Measurement on 3GPP Rel-6 TS 34.121 UE's Transmitter Characteristics and Performance Tests with R&S®CMU200

Application Note

Products:

| R&S®CMU200

Most of the tests specified in standard TS 34.121 [1] for 3GPP Rel-6 can be performed with R&S®CMU200. This document provides a step by step guide on how to perform Rel-6 measurements on transmitter characteristics and performance tests according to TS 34.121 V9.1.0 clauses 5 and 10 with stand-alone R&S®CMU200. Test cases that require additional instruments, e.g. fading generator (R&S®SMU200A or R&S®AMU200A) will be discussed in brief in this application note with recommended reference. A set of *.sav files based on R&S®CMU200 firmware v5.22A for UE supporting operating band I and power class 3 in RMC 12.2 kbps + HSPA is attached to this application note.

Note: This application note substitutes for application note RCS0712-0053.

Application Note

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1 Introduction

Most of the tests specified in standard TS 34.121 [1] for 3GPP Rel-6 can be performed with R&S®CMU200. This document provides a step by step guide on how to perform Rel-6 measurements on transmitter characteristics and performance tests according to TS 34.121 V8.7.0 clauses 5 and 10 with standalone R&S®CMU200 for UE supporting operating band I and power class 3. Test cases that require additional instruments, e.g. fading generator (R&S®SMU200A or R&S®AMU200A) will be discussed in brief in this application note with recommended reference. A set of *.sav files based on R&S®CMU200 firmware V5.22A for UE supporting operating band I and power class 3 in RMC 12.2 kbps + HSPA is attached to this application note. Information on these *.sav files within this application note is marked with the symbol 

1.1 Covered Tests in Accordance with TS 34.121

Table 1 shows the Rel-6 transmitter characteristics and performance tests that can be performed with R&S®CMU200.

Transmitter characteristics and performance tests of 3GPP Rel-6 supported by R&S®CMU200		
Test	**Clause**	**Test Parameter**
Transmitter characteristics	5.2B	Maximum output power with HS-DPCCH and E-DCH
	5.2D	UE relative code domain power accuracy for HS-DPCCH and E-DCH
	5.9B	Spectrum emission mask with E-DCH
	5.10B	Adjacent channel leakage power ratio (ACLR) with E-DCH
	5.13.2B	Relative code domain error with HS-DPCCH and E-DCH
Performance requirements	10.2.1.1	Detection of E-DCH HARQ ACK Indicator Channel (E-HICH): Single Link Performance (10 ms TTI)*
	10.2.1.1A	Detection of E-DCH HARQ ACK Indicator Channel (E-HICH): Single Link Performance (10 ms TTI and Type 1)*
	10.2.1.2	Detection of E-DCH HARQ ACK Indicator Channel (E-HICH): Single Link Performance (2 ms TTI)*
	10.2.1.2A	Detection of E-DCH HARQ ACK Indicator Channel (E-HICH): Single Link Performance (2 ms TTI and Type 1)*
	10.3.1.1	Detection of E-DCH Relative Grant Channel (E-RGCH): Single Link Performance (10 ms TTI)*
	10.3.1.1A	Detection of E-DCH Relative Grant Channel (E-RGCH): Single Link Performance (10 ms TTI and Type 1)*
	10.3.1.2	Detection of E-DCH Relative Grant Channel (E-RGCH): Single Link Performance (2 ms TTI)*
	10.3.1.2A	Detection of E-DCH Relative Grant Channel (E-RGCH): Single Link Performance (2 ms TTI and Type 1)*
	10.4.1	Demodulation of E-DCH Absolute Grant Channel (E-AGCH): Single Link Performance*
	10.4.1A	Demodulation of E-DCH Absolute Grant Channel (E-AGCH): Single Link Performance (Type 1)*

* Requires additional instruments besides R&S®CMU200

Table 1: 3GPP Rel-6 measurement supported by R&S®CMU200

2 Rel-6 Transmitter Characteristics

2.1 Generic Call Setup for Transmitter Characteristics

For sub-test 1 to 4, enter the UE into loopback test mode 1 looping back both the 12.2kbps RMC and HSDPA to E-DCH according to procedure 7.3.9.3.1 in TS 34.108 [3] and start the loopback test.

For sub-test 5, enter the UE into loopback test mode 1 looping back HSDPA to E-DCH according to procedure 7.3.9.3.2 in TS 34.108 [3] and start the loopback test.

Table 2 shows the UL RLC SDU size for E-DCH transmitter characteristics supported by R&S®CMU200.

UL RLC SDU size for E-DCH tests supported by R&S®CMU200					
TC Clause	**TS 34.121-1 E-DCH Test Cases**	**Inter-TTI**	**DL SDU size [bits]**	**Number of DL SDUs per DL transmission**	**UL RLC SDU Size [bits]**
5.2B	Maximum Output Power with HS-DPCCH and E-DCH subtests 1..4	3 (H-Set 1)	2936	1	2936 bits (1*DL RLC SDU)
5.2D	UE Relative Code Domain Power Accuracy for HS-DPCCH and E-DCH	3 (H-Set 1)	2936	1	2936 bits (1*DL RLC SDU)
5.9B	Spectrum Emission Mask with E-DCH	3 (H-Set 1)	2936	1	2936 bits (1*DL RLC SDU)
5.10B	ACLR with E-DCH	3 (H-Set 1)	2936	1	2936 bits (1*DL RLC SDU)
5.13.2B	Relative Code Domain Error with HS-DPCCH and E-DCH	3 (H-Set 1)	2936	1	2936 bits (1*DL RLC SDU)
10.2.1.1	Detection of E-HICH -Single Link Performance (10ms)	3 (H-Set 1)	2936	1	2936 bits (1*DL RLC SDU)
10.2.1.2	Detection of E-HICH -Single Link Performance (2ms)	3 (H-Set 1)	2936	1	5872 bits (2*DL RLC SDU)
10.3.1.1	Detection of E-RGCH - Single Link Performance (10ms)	3 (H-Set 1)	2936	1	2936 bits (1*DL RLC SDU)
10.3.1.2	Detection of E-RGCH - Single Link Performance (2ms)	3 (H-Set 1)	2936	1	5872 bits (2*DL RLC SDU)
10.4.1	Demodulation of E-AGCH (Single Link Performance)	3 (H-Set 1)	2936	1	8808 bits (3*DL RLC SDU)

Table 2: UL RLC SDU size for E-DCH tests supported by R&S®CMU200 (Subset of Table C.11.3.1 of TS 34.121 [1])

Configuration in R&S®CMU200 for **subtest 1..4**
(settings for Subtest 5 follows in next chapter)

Network → Packet Switched Domain → On

BS Signal → Circuit Switched → DCH (Dedicated Chn.) Type → RMC

BS Signal → Circuit Switched → RMC Settings → Reference Channel Type → 12.2 kbps + HSPA 34.108

*BS Signal → Circuit Switched → RMC Settings → Test Mode → Loop Mode 1 **

BS Signal → Circuit Switched → RMC Settings → HSPA → HSUPA UL RLC SDU Size → 2936 Bit

BS Signal → Circuit Switched → RMC Settings → HSPA → HSPA Test Loop → Loop Mode 1

BS Signal → Packet Switched → DCH (Dedicated Chn.) Type → HSUPA Test Mode

BS Signal → Packet Switched → HSUPA Test Mode → Radiobearer Setup → RMC 12.2 kbps + HSPA

*BS Signal → Packet Switched → HSUPA Test Mode → HSUPA UL RLC SDU Size → 2936 Bit ***

** Loop Mode 1 is automatically selected when Reference Channel Type is set to 12.2 kbps + HSPA 34.108*
*** HSUPA UL RLC SDU Size in Circuit Switched and Packet Switched is set to the same value automatically*

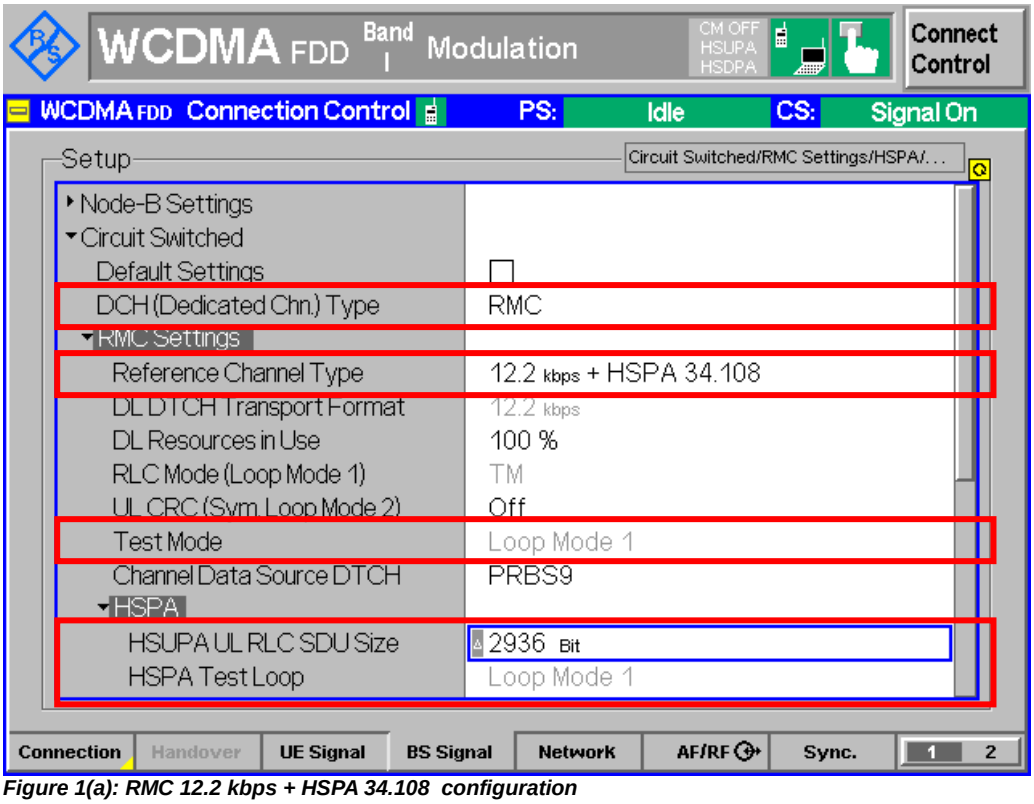


Figure 1(a): RMC 12.2 kbps + HSPA 34.108 configuration

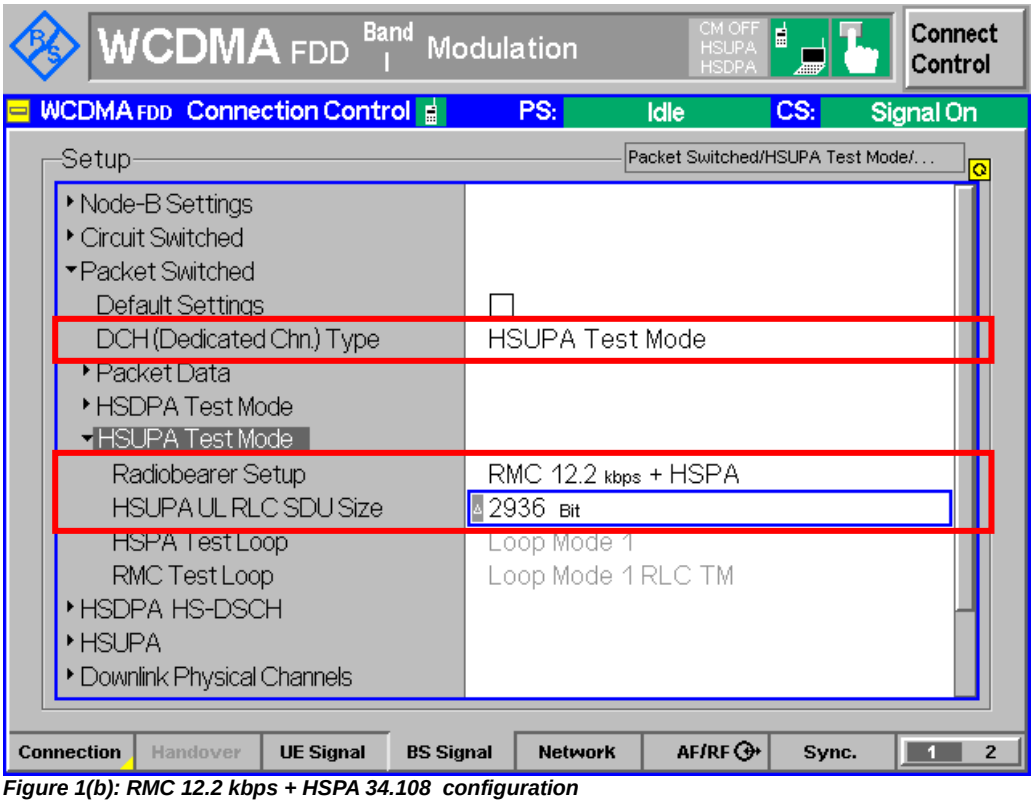


Figure 1(b): RMC 12.2 kbps + HSPA 34.108 configuration

RADIO BEARER SETUP message in 9.2.1 of TS 34.108 [3] as shown in Table 3 is used to configure E-DCH call with the following exceptions in Table 4(a), 4(b), 4(c) and 4(d).

Configuration in R&S®CMU200 for **subtest 5**

Based on the settings for subtest 1..4, the following settings / configuration changes in R&S®CMU200 are necessary to support subtest 5

BS Signal → Packet Switched → DCH (Dedicated Chn.) Type → HSUPA Test Mode

BS Signal → Packet Switched → HSUPA Test Mode → Radiobearer Setup → SRB 2.5 kbps + HSPA (ßd = 0)

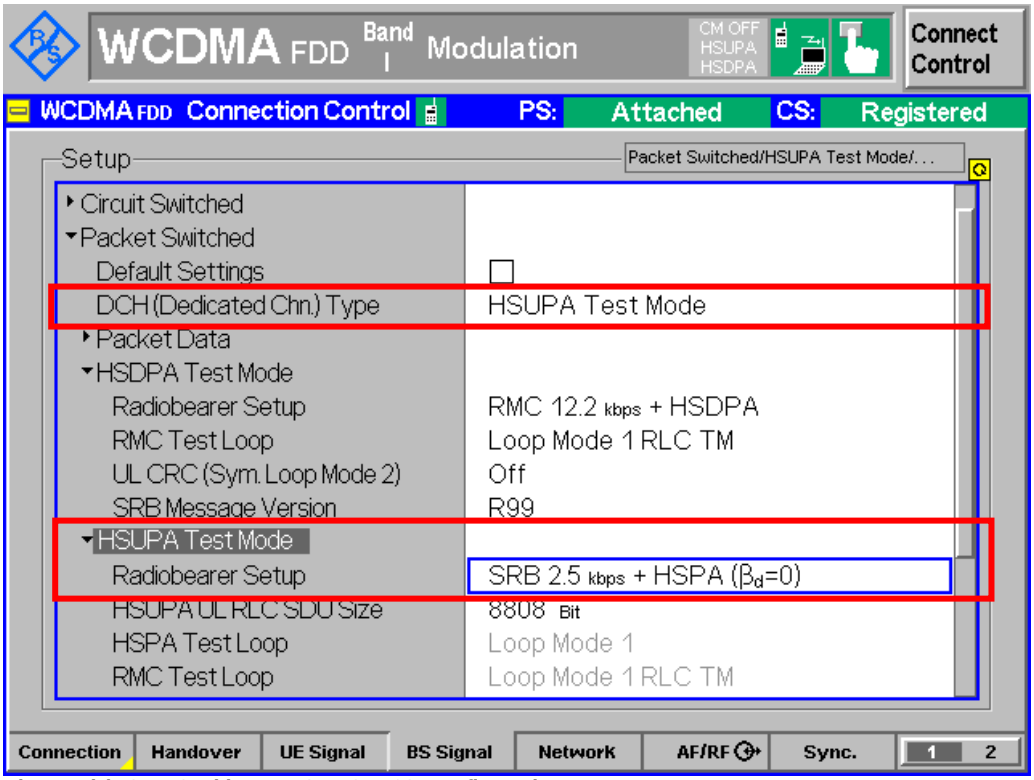


Figure 1(c): SRB 2.5 kbps + HSPA 34.108 configuration

Info: this new redio berear setup supports the new changes for 3GPP TS 34.121 /5.2B sub test 5 on wich ßd = 0 is necessary.

Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA)			
Information Element	**Condition**	**Value/remark**	**Version**
Added or Reconfigured TrCH information list	A1	1 TrCH added	
- E-DCH Transmission Time		10 ms	
- HARQ RV Configuration		Rv0	
- Added or reconfigured E-DCH MAC-d flow			
- E-DCH MAC-d flow power offset		0	
- E-DCH MAC-d flow maximum number of retransmissions		7	
Added or Reconfigured UL TrCH information list	A1	1 TrCH added	
- E-DCH Transmission Time Interval		2 ms	
- HARQ RV Configuration		Rv0	
- Added or reconfigured E-DCH MAC-d flow		(for DCCH)	
- E-DCH MAC-d flow power offset		0	
- E-DCH MAC-d flow maximum number of retransmissions		7	
E-DCH info	A1, A2		Rel-6
- MAC-es/e reset indicator		TRUE	
- E-DPCCH info			
- E-DPCCH/DPCCH power offset		0	
- Happy bit delay condition		100 ms	
- E-TFCI boost info		Not present	Rel-7
- E-TFCI BetaED SwitchE-DPDCH power interpolation		Not present	Rel-7
- E-DPDCH info	A1		
- E-TFCI table index		0	
- E-DCH minimum set E-TFCI		9	
- Maximum channelisation codes		2sf4	
- PLnon-max		0.84	
- Power Offset for Scheduling Info		0	
- E-DPDCH info	A2		
- E-TFCI table index		0	
- E-DCH minimum set E-TFCI		9	
- Maximum channelisation codes		2sf2 and 2sf4	
- PLnon-max		0.84	
- Power Offset for Scheduling Info		0	
- Scheduled Transmission configuration	A1, A2		
- 2 ms scheduled transmission grant HARQ process allocation		Not present	
- Serving Grant		Not present	

Notes:
Condition A1: not using E-DCH 4 codes
Condition A2: using E-DCH 4 codes

Table 3: Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA) (Subset of 9.2.1 of TS 34.108 [3])

Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA)	
Information Element	**Value/Remark**
UL Transport channel information for all transport channels	
- 2 bit CTFC	3
- Power offset Information	
- CHOICE Gain Factors	Signalled Gain Factors
- CHOICE mode	FDD
- Gain factor ßc	Value used in test: see Table 5
- Gain factor ßd	Value used in test: see Table 5
CHOICE channel requirement	Uplink DPCH info
- Power Control Algorithm	Algorithm2
Note: All other 2 bit CTFC values use computed gain factors as in the default message	

Table 4(a): Contents of RADIO BEARER SETUP message: AM or UM (Test Loop Mode 1) (Table5.2B.1A of TS 34.121 [1])

Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA) for Sub-tests 1, 2, 4	
Information Element	**Value/Remark**
E-DCH info	Uplink DPCH info
- E-DPDCH info	
- Reference E-TFCIs	5 E-TFCIs
- Reference E-TFCI	11
- Reference E-TFCI PO	4
- Reference E-TFCI	67
- Reference E-TFCI PO	18
- Reference E-TFCI	71
- Reference E-TFCI PO	23
- Reference E-TFCI	75
- Reference E-TFCI PO	26
- Reference E-TFCI	81
- Reference E-TFCI PO	27

Table 4(b): Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA) for Sub-tests 1, 2, 4, 5 (Table5.2B.2, Table 5.2D.3 and Table 5.13.2B.4 of TS 34.121 [1])

Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA) for Sub-test 3	
Information Element	**Value/Remark**
E-DCH info	Uplink DPCH info
- E-DPDCH info	
- Reference E-TFCIs	2 E-TFCIs
- Reference E-TFCI	11
- Reference E-TFCI PO	4
- Reference E-TFCI	92

- Reference E-TFCI PO	18

Table 4(c): Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA) for Sub-tests 3 (Table5.2B.3, Table 5.2D.4 and Table 5.13.2B.5 of TS 34.121 [1])

Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA) for Sub-test 5	
Information Element	**Value/Remark**
E-DCH info	Uplink DPCH info
- E-DPDCH info	
- E-DCH minimum set of E-TFCI	67
- Reference E-TFCIs	1 E-TFCIs
- Reference E-TFCI	67
- Reference E-TFCI PO	18
- Maximum channelization codes	Sf4

Table 4(c): Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA) for Sub-tests 5 (Table5.2B.3A, Table 5.2D.4 and Table 5.13.2B.5 of TS 34.121 [1])

Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA)	
Information Element	**Value/Remark**
CHOICE channel requirement	Uplink DPCH info
- Power Control Algorithm	For sub-test 1 to 4: Algorithm2 For sub-test 5: Algorithm 1
- ΔACK	Value used in test: see Table C.11.1.3
- ΔNACK	Value used in test: see Table C.11.1.3
- Ack-Nack repetition factor	3 (required for continuous HS-DPCCH signal)
E-DCH info	
- E-DPCCH/DPCCH power offset	Value used in test: see Table 5
Downlink HS-PDSCH Information	
- Measurement Feedback Info	
- CQI Feedback cycle, k	4 ms
- CQI repetition factor	2 (required for continuous HS-DPCCH signal)
- ΔCQI	Value used in test: see Table 5

Table 4(d): Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA) Table5.2B.4, Table 5.2D.5 and Table 5.13.2B.6 of TS 34.121 [1])

Summary of CMU200 settings acc. tables 4(a,b,c,d)			
sub-test	**CMU200 radio bearer setup**	**necessary E-DCH channelization**	**Mandatory TTI mode**
1…4	12.2kbps + HSPA 34.108 (CS connection)	UE categorie 1..6: 2xSF2 (condition A1, A2 acc. 34.108)	10ms only (acc. conditions in table 5.2B.2 and table 5.2B.3)
5 (for all UE-categories)	SRB 2.5kbps + HSPA (ßd=0) (PS connection)	1xSF4 (acc. conditions in 5.13.2B.5)	10ms only (acc. conditions in 5.2B.3A)

Table 4(e): Summary of connection setup configuration in CMU200 to be used for the diferent sub-test 1…5

Configuration in R&S®CMU200 for **subtests 1…5**

BS Signal → HSDPA HS-DSCH → CQI Feedback Cycle → 4 ms

BS Signal → HSDPA HS-DSCH → CQI Repetition Factor → 2

BS Signal → HSDPA HS-DSCH → ACK/NACK Repetition Factor → 3

BS Signal → HSDPA HS-DSCH → Channel Configuration Type → Fixed Reference Channel

BS Signal → HSDPA HS-DSCH → Fixed Reference Channel → H-Set Selection → H-Set 1 QPSK

BS Signal → HSUPA → TTI Mode → 10 ms

UE Signal → HSUPA → E-TFCI Table Index → 0
UE Signal → HSUPA → Minimum Set E-TFCI → 9

UE Signal → HSUPA → Happy Bit Delay Condition → 100 ms

UE Signal → HSUPA → Puncturing Limit PLnon-max → 0.84

UE Signal → HSUPA → Maximum Channelization Code
→ for sub-test 1..4: 2xSF2 (for all UE categories)
→ for sub-test 5: 1xSF4 (for all UE categories)

UE Signal → HSUPA → Initial Serving Grant → Value → Off

UE Signal → HSUPA → RAB H-ARQ Profile → H-ARQ Power Offset → 0 dB

UE Signal → HSUPA → RAB H-ARQ Profile → Maximum Number of Retransmissions → 7

UE Signal → HSUPA → HSUPA Gain Factors → Number of Reference E-TFCIs → 5 (sub-tests 1, 2 and 4) or 2 (sub-test 3) or 1 (sub-test 5)

UE Signal → HSUPA → Reference E-TFCI 1…4
→ 11 67 71 75 (for sub-tests 1, 2, 4) or 11 92 (for sub-test 3) or 67 (for sub-test 5)

UE Signal → HSUPA → Reference E-TFCI 5…8 → 81 (for sub-tests 1, 2, 4)

UE Signal → HSUPA → Reference E-TFCI Power Offset
→ 4 18 23 26 27 (for sub-tests 1, 2, 4) or 4 18 (for sub-test 3) or 18 (for sub-test 5)

BS Signal → TPC Settings → TPC Algorithm
→ Algorithm 2 (for sub-tests 1, 2, 3, 4) or Algorithm 1 (for sub-tests 5)

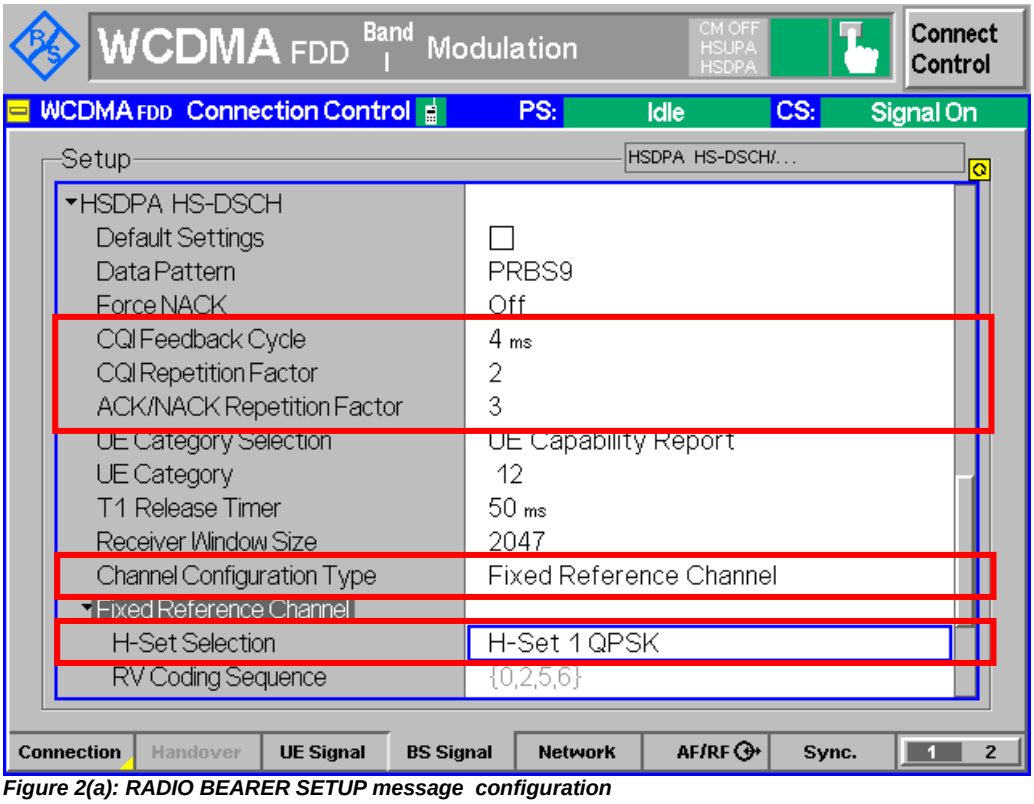


Figure 2(a): RADIO BEARER SETUP message configuration

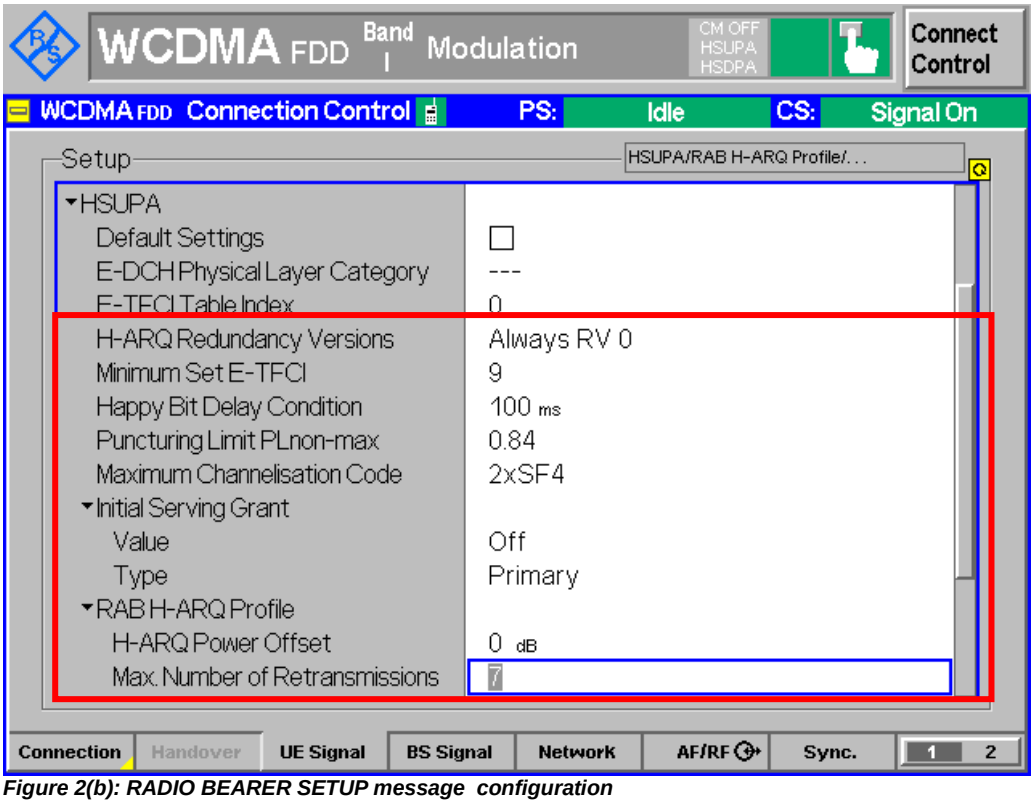


Figure 2(b): RADIO BEARER SETUP message configuration

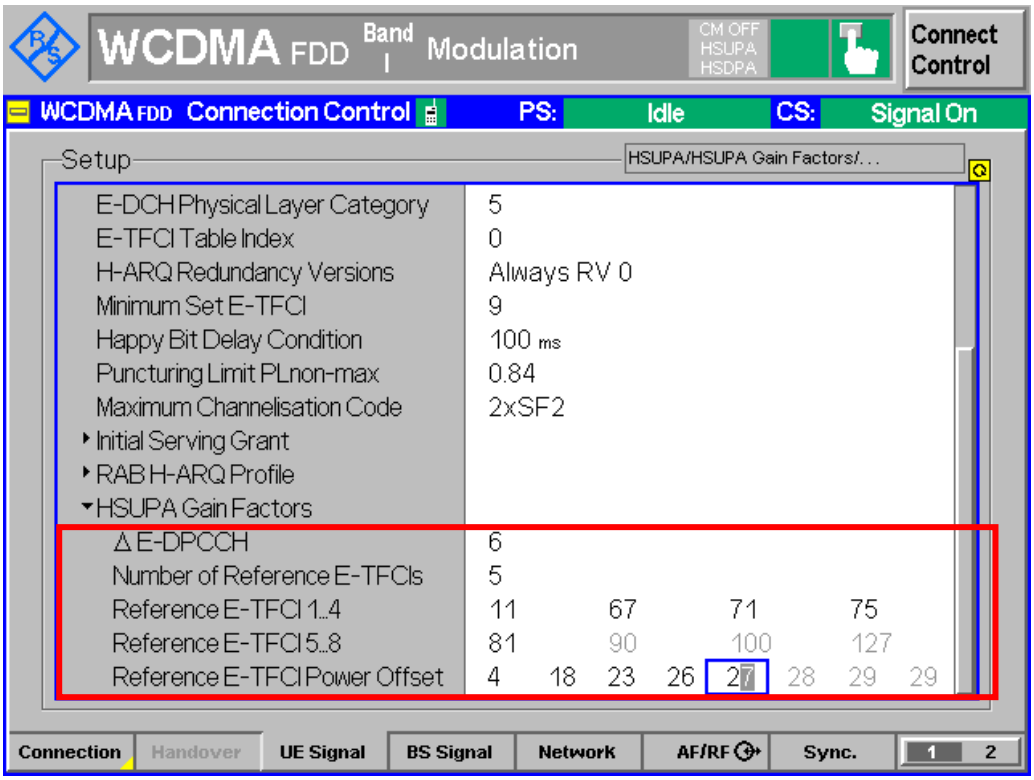


Figure 2(c): RADIO BEARER SETUP message configuration

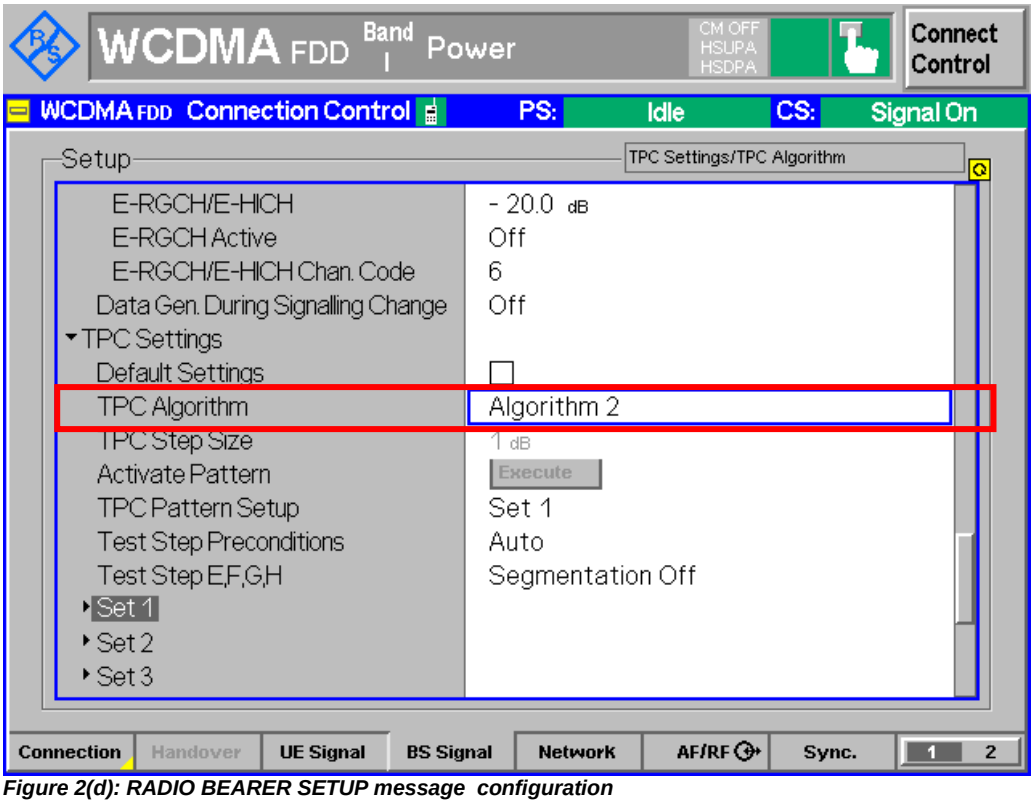


Figure 2(d): RADIO BEARER SETUP message configuration

Table 5, 6(a), 6(b) and 7 show the β values for transmitter characteristics with HS-DPCCH and E-DCH, signalled value for gain factors βc, βd, ΔACK, ΔNACK, ΔCQI and ΔE-DPCCH in R&S®CMU200 and summary of gain factor setting in R&S®CMU200 respectively.

β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d *(SF)*	β_c/β_d	β_{HS} *(Note 1)*	β_{ec}	β_{ed} *(Note 5, Note 6)*	β_{ed} *(SF)*	β_{ed} *(Codes)*	CM *(dB)* *(Note 2)*	MPR *(dB)* *(Note 2)*	*AG Index* *(Note 6)*	*E-TFCI*
1	11/15 *(Note 3)*	15/15 *(Note 3)*	64	11/15 *(Note 3)*	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed}1$: 47/15 $\beta_{ed}2$: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71

5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Notes:

Note 1: For sub-test 1 to 4, ΔACK, ΔNACK and ΔCQI = 30/15 with β_{hs} = 30/15 * β_c . For sub-test 5, ΔACK, ΔNACK and ΔCQI = 5/15 with β_{hs} = 5/15 * β_c .

Note 2: CM = 1 for βc/βd =12/15, βhs/βc=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the βc/βd ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to βc = 10/15 and βd = 15/15.

Note 4: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 5: βed can not be set directly, it is set by Absolute Grant Value.

Note 6: For subtests 2 ,3 and 4, UE may perform E-DPDCH power scaling at max power which could results in slightly smaller MPR values.

Table 5: β values for transmitter characteristics tests with HS-DPCCH and E-DCH (Table C.11.1.3 of TS 34.121 [1])

Signalled value for gain factors βc and βd	
Signalled value for βc and βd	**Quantized amplitude ratio for βc and βd**
15	15/15
14	14/15
13	13/15
12	12/15
11	11/15
10	10/15
9	9/15
8	8/15
7	7/15
6	6/15
5	5/15
4	4/15
3	3/15
2	2/15
1	1/15

Table 6(a): Signalled value for gain factors βc and βd in R&S®CMU200 acc. 3GPP TS-25213

Signalled value for gain factors ΔACK, ΔNACK and ΔCQI	
Signalled value for ΔACK, ΔNACK and ΔCQI	**Quantized amplitude ratio (β_{HS} / βc)**

8	30/15
7	24/15
6	19/ 5
5	15/15
4	12/15
3	9/15
2	8/15
1	6/15
0	5/15

Table 6(b): Signalled value for gain factors ΔACK, ΔNACK and ΔCQI in R&S®CMU200

Signalled value for gain factors ΔE-DPCCH	
Signalled value for ΔE-DPCCH	**Quantized amplitude ratio (β_{ec} / βc)**
8	30/15
7	24/15
6	19/ 5
5	15/15
4	12/15
3	9/15
2	8/15
1	6/15
0	5/15

Table 6(c): Signalled value for gain factors ΔE-DPCCH in R&S®CMU200

Configuration in R&S®CMU200:
Following parameters bellow have to be configured according the summary in Table 7

UE Signal → UE Gain Factors → RMC → Uplink 12.2 → βc

UE Signal → UE Gain Factors → RMC → Uplink 12.2 → βd

UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → βc

UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → βd

UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → ΔACK

UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → ΔNACK

UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → ΔCQI

UE Signal → HSUPA → HSUPA Gain Factors → ΔE-DPCCH

BS Signal → HSUPA → E-AGCH → AG Pattern → AG Index

Summary of gain factor setting in R&S®CMU200								
Sub-test	***βc***	***βd***	***ΔACK***	***ΔNACK***	***ΔCQI***	***ΔE-DPCCH***	***AG Index***	***E-TFCI***
1	10	15	8	8	8	6	20	75

2	6	15	8	8	8	8	12	67
3	15	9	8	8	8	8	15	92
4	2	15	8	8	8	5	17	71
5	15	0	0	0	0	0	12	67

Table 7: Summary of gain factor setting in R&S® CMU200

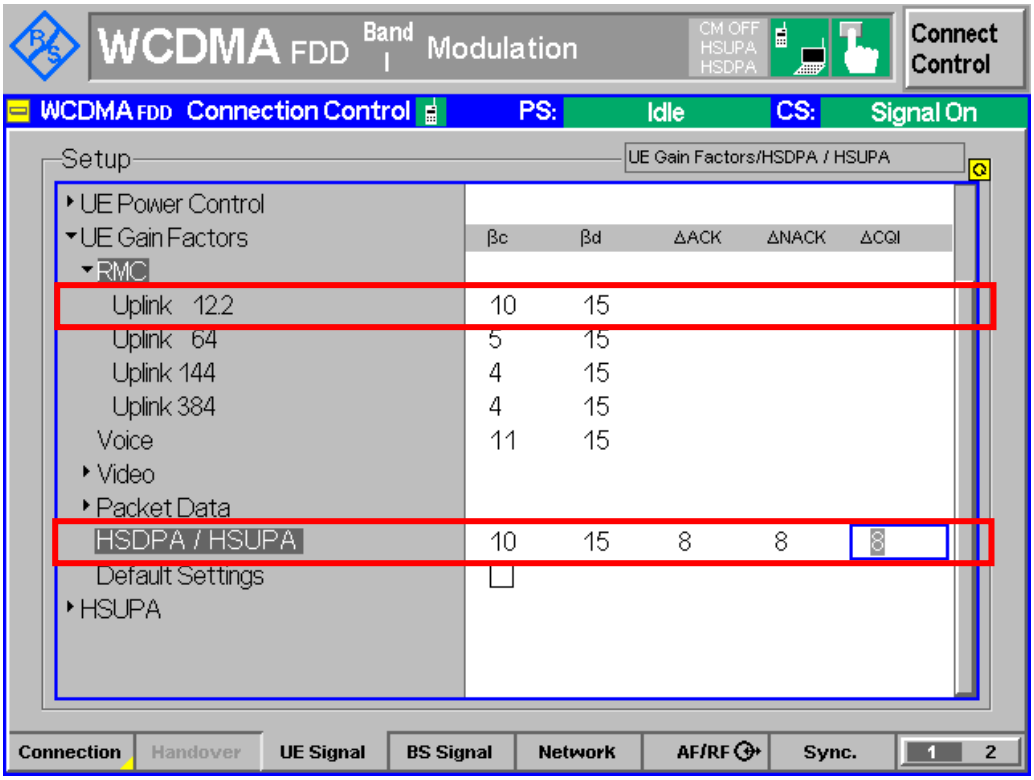


Figure 3(a): β values for transmitter characteristics tests with HS-DPCCH and E-DCH configuration

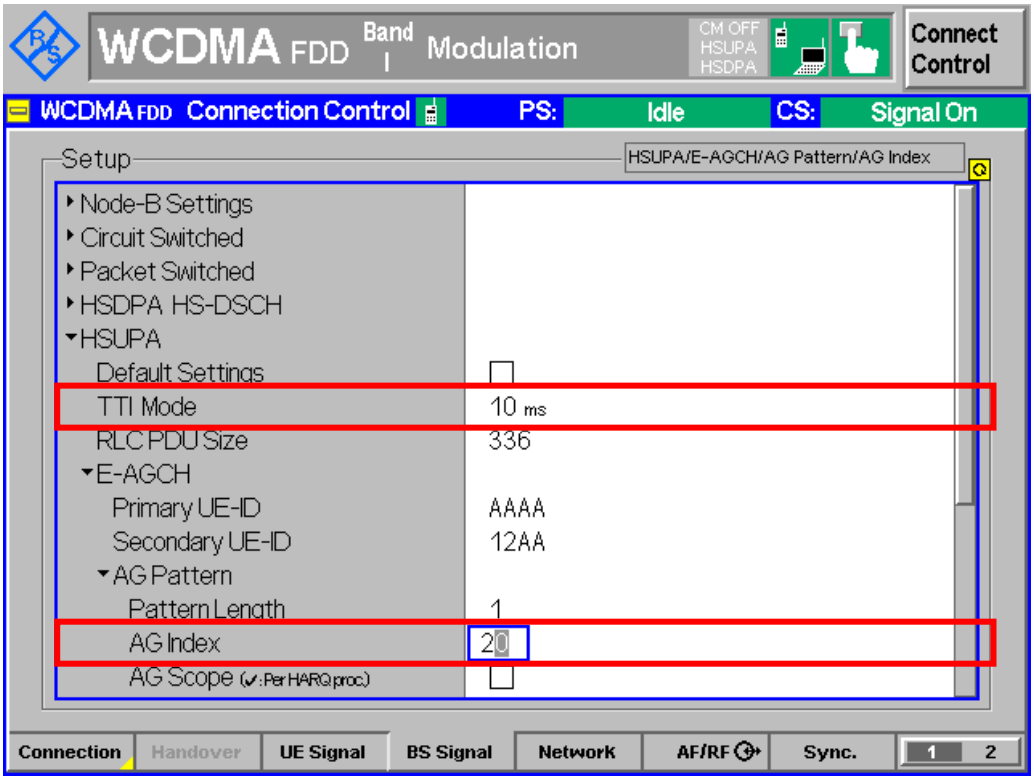


Figure 3(b): β values for transmitter characteristics tests with HS-DPCCH and E-DCH configuration

Table 8 shows the settings for serving cell during measurement with HS-DPCCH and E-DCH.

Settings for the serving cell during measurement with HS-DPCCH and E-DCH		
Parameter	**Unit**	**Cell 1**
Cell type		Serving cell
UTRA RF Channel Number		Test dependent value
Qqualmin	dB	-24
Qrxlevmin	dBm	-115
UE_TXPWR_MAX_RACH	dBm	+21
Ior	dBm/3.84 MHz	-86

Table 8: Settings for the serving cell during measurement with HS-DPCCH and E-DCH (Table 5.2B.4A, Table 5.2D.6, Table 5.9B.2, Table 5.10B.1A and Table 5.13.2B.7 of TS 34.121 [1])

Configuration in R&S®CMU200:
Network → Cell Reselection Information → Qqualmin → - 24 dB
*Network → Cell Reselection Information → Qrxlevmin → - 58 dBm * 2 + 1*
UE Signal → UE Power Control → Open Loop → Max Allowed UE Power → 21.0 dBm
BS Signal → Node-B Settings → Output Channel Power (Ior) → -86 dBm

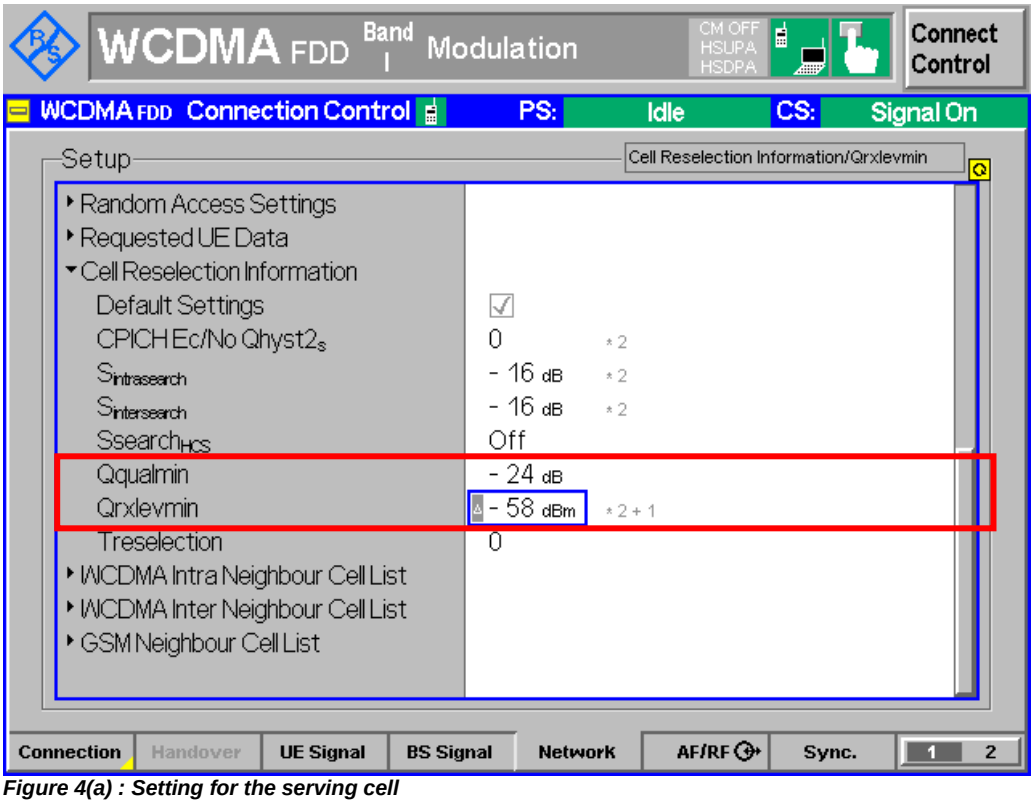


Figure 4(a) : Setting for the serving cell

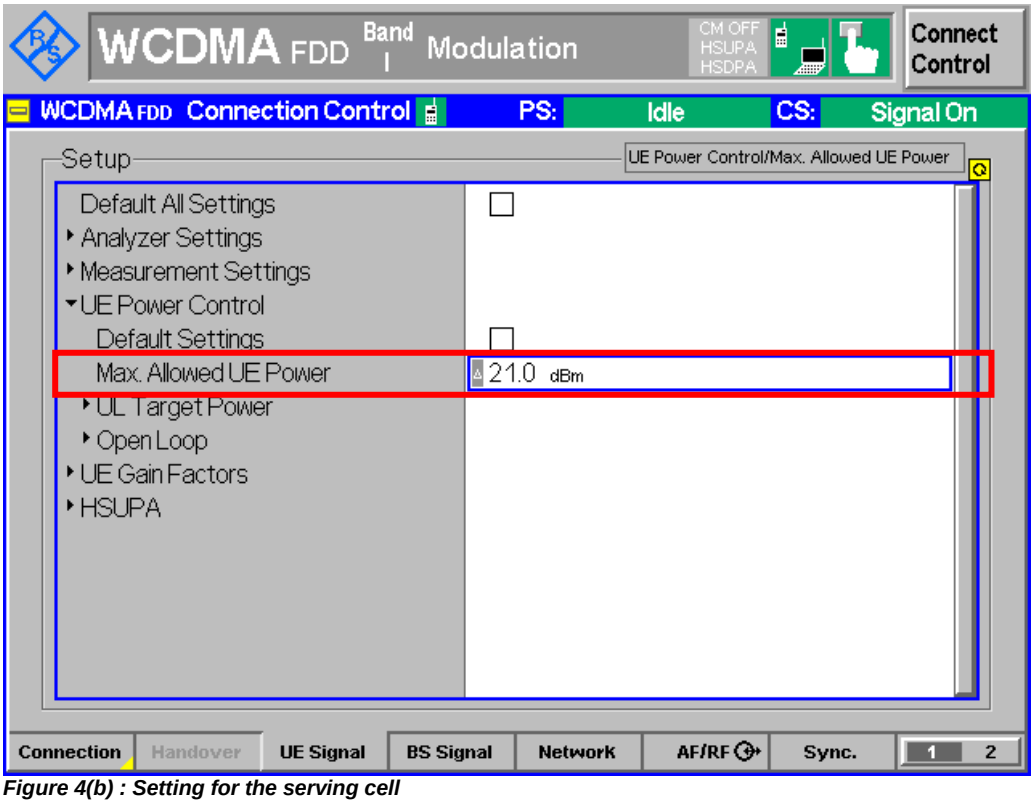


Figure 4(b) : Setting for the serving cell

Table 9 shows the downlink physical channels for HSUPA measurement for subclauses 5.2B, 5.2D, 5.9B, 5.10B and 5.13.2B as specified in Table E.5A.1 of TS 34.121 [1].

Downlink physical channel parameters for E-DCH transmitter characteristics tests		
Parameter during measurement	**Unit**	**Value**
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH_Ec/Ior	dB	-15
HS-PDSCH	dB	-3 (Note 1)
HS-SCCH_1	dB	-8 (Note 2)
DPCH_Ec/Ior	dB	-10
E-AGCH	dB	-20
E-HICH	dB	-20
E-RGCH	dB	DTX'd
OCNS_Ec/Ior	dB	Necessary power so that total transmit power spectral density of Node B (Ior) adds to one

Notes:
1. During TTIs, in which the HS-PDSCH is not allocated to the UE via HS-SCCH signalling, the HS-PDSCH shall be transmitted continuously with constant power
2. During TTIs, in which the HS-SCCH is not allocated to the UE the HS-SCCH shall be transmitted continuously with constant power.

Table 9: Downlink physical channels for E-DCH transmitter characteristics tests (Table E.5A.1 of TS 34.121 [1])

Configuration in R&S®CMU200:

BS Signal → Node-B Settings → Level Reference → Output Channel Power (Ior)
BS Signal → Downlink Physical Channels → P-CPICH → -10.0 dB
BS Signal → Downlink Physical Channels → P-SCH → -15.0 dB
BS Signal → Downlink Physical Channels → S-SCH → -15.0 dB
BS Signal → Downlink Physical Channels → P-CCPCH → -12.0 dB
BS Signal → Downlink Physical Channels → PICH → -15.0 dB
BS Signal → Downlink Physical Channels → DPDCH Level Config → -10.0 dB
BS Signal → Downlink Physical Channels → HSDPA Channels → On
BS Signal → Downlink Physical Channels → HS-SCCH → HS-SCCH#1 → Level → -8.0 dB
BS Signal → Downlink Physical Channels → HS-SCCH → HS-SCCH#2 → Level → Off
BS Signal → Downlink Physical Channels → HS-SCCH → HS-SCCH#3 → Level → Off
BS Signal → Downlink Physical Channels → HS-SCCH → HS-SCCH#4 → Level → Off
BS Signal → Downlink Physical Channels → HS-SCCH → HS-SCCH Selection → 1
BS Signal → Downlink Physical Channels → HS-SCCH → Number of HS-SCCH → 4
BS Signal → Downlink Physical Channels → HS-SCCH → Unscheduled Subframes → Transmit Dummy UEID
BS Signal → Downlink Physical Channels → HS-PDSCH → Level (All Active Codes) → -3.0 dB
BS Signal → Downlink Physical Channels → HSUPA Channels → On
BS Signal → Downlink Physical Channels → E-AGCH → E-AGCH → -20.0 dB
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -20.0 dB
BS Signal → Downlink Physical Channels → E-RGCH Active → Off

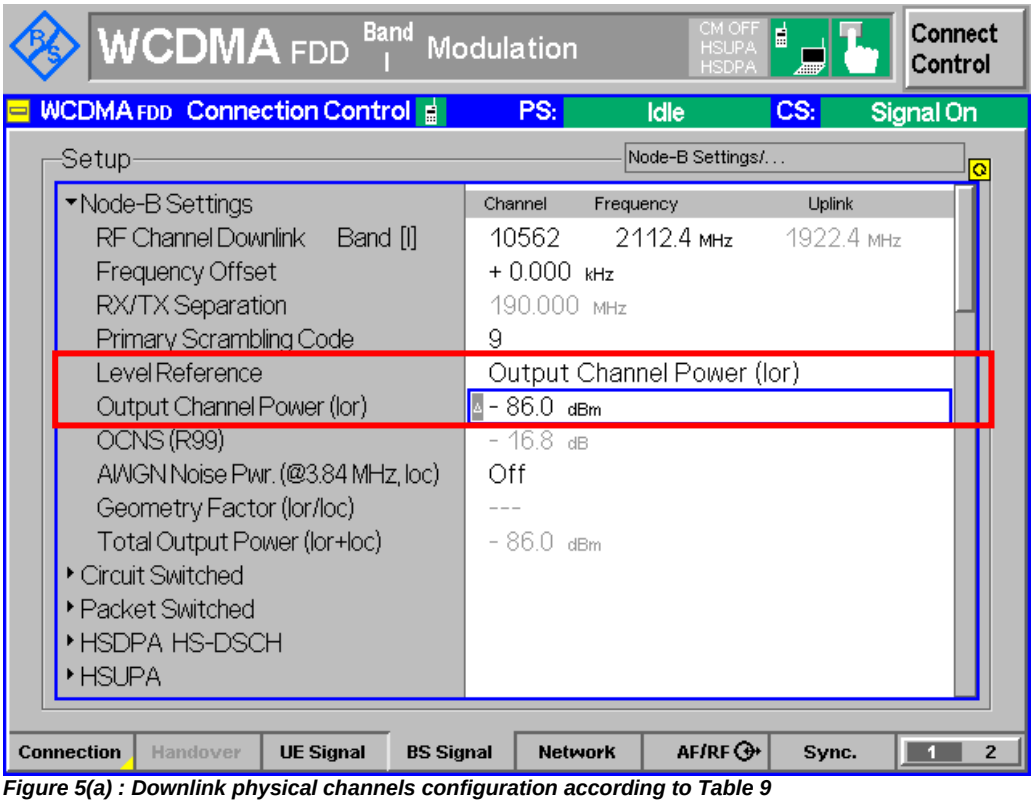


Figure 5(a) : Downlink physical channels configuration according to Table 9

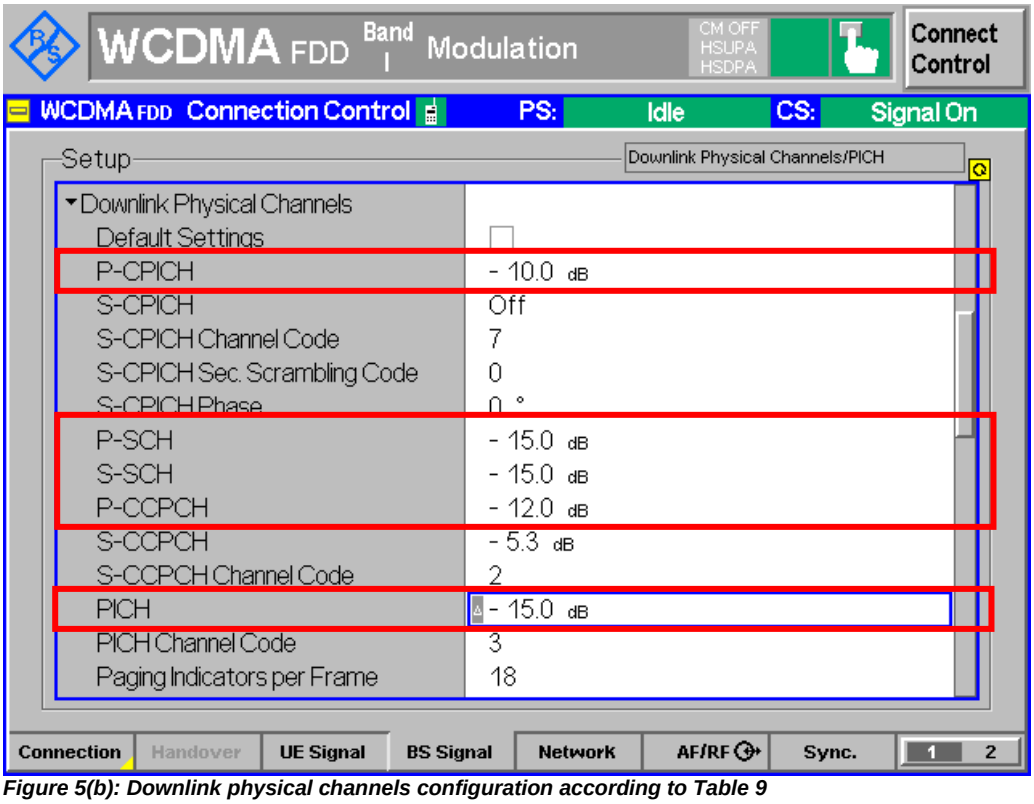


Figure 5(b): Downlink physical channels configuration according to Table 9

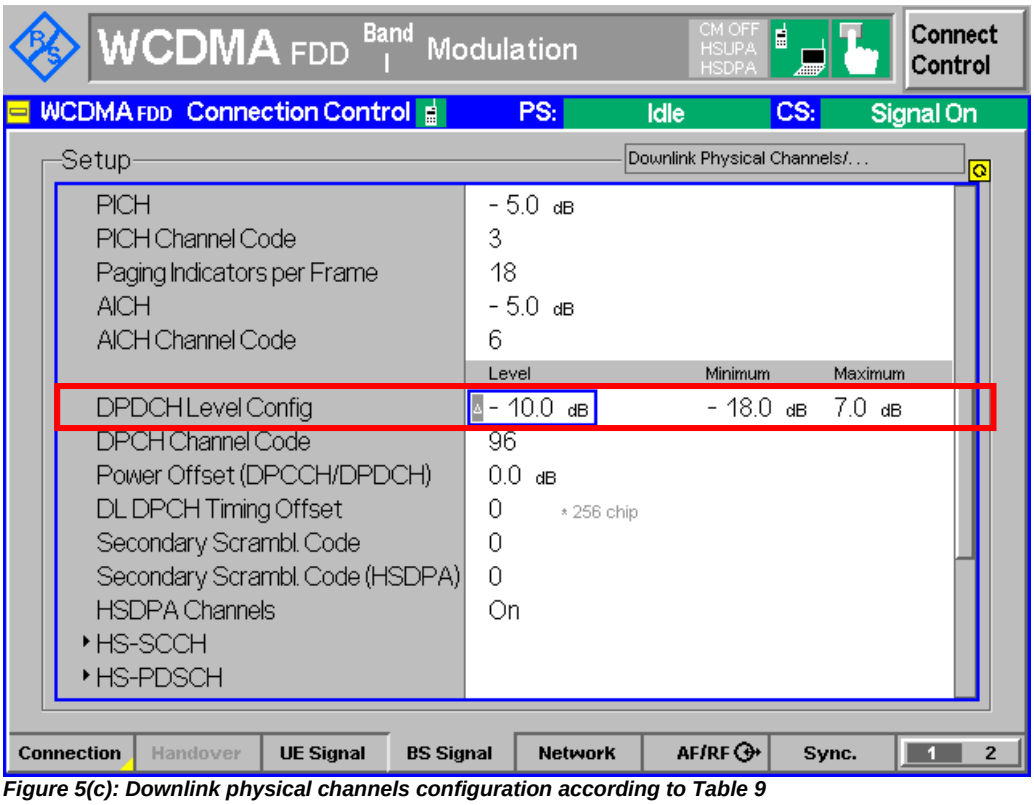


Figure 5(c): Downlink physical channels configuration according to Table 9

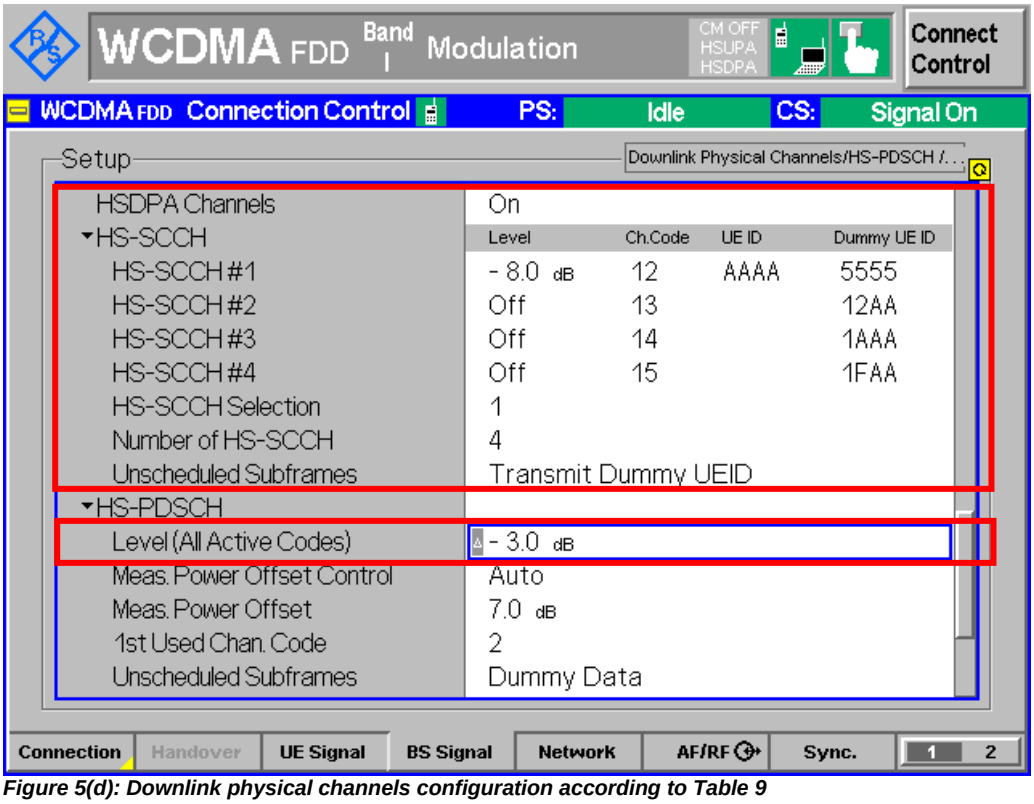


Figure 5(d): Downlink physical channels configuration according to Table 9

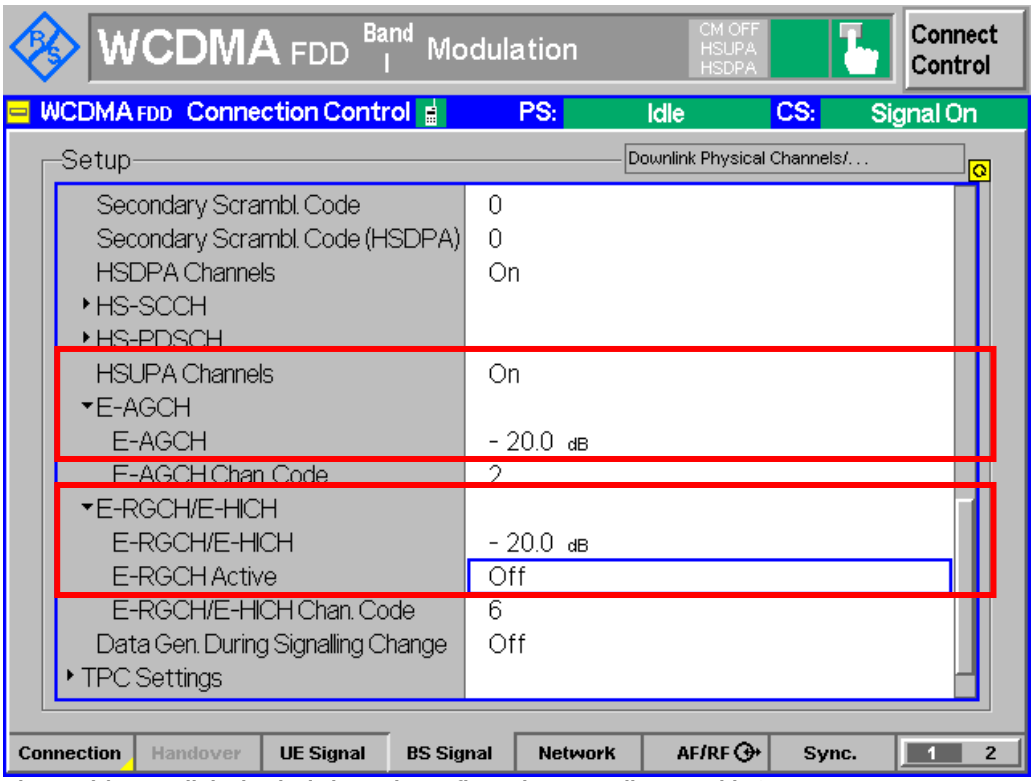
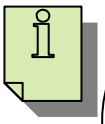


Figure 5(e): Downlink physical channels configuration according to Table 9

A HSUPA call is setup according to TS 34.108 [3] subclause 7.3.9. To establish a HSUPA connection, press ‘Connect UE (CS)’ (for sub-tests 1 to 4) or ‘Connect UE (PS)’ (for sub-test 5) on R&S®CMU200 once UE has registered/attached with R&S®CMU200.



For sub-test 1, recall HSUPATx1.sav and establish **CS call**.

For sub-test 2, recall HSUPATx2.sav and establish **CS call**.

For sub-test 3, recall HSUPATx3.sav and establish **CS call**.

For sub-test 4, recall HSUPATx4.sav and establish **CS call.**

For sub-test 5, recall HSUPATx5.sav, modify the following configuration and establish **PS call**.
UE Signal → HSUPA → Maximum Channelization Code → 1xSF4

Note: With 12.2 kbps + HSPA 34.108 reference measurement, used for sub-test 1..4 channel, packet switched connection is setup automatically after the circuit switched connection so that the R&S®CMU200 reaches the signaling state PS: Established, CS: Connected.

For sub-test 5 a special radio bearer setup is necessary, “SRB 2.5 kbps + HSPA (ßd=0) here a packet switched connection is necessary (Connect UE PS)

2.2 Maximum Output Power with HS-DPCCH and E-DCH (5.2B)

The maximum output power with HS-DPCCH and E-DCH measures the maximum power the UE can transmit when HS-DPCCH and E-DCH is fully or partially transmitted during a DPCCH timeslot. The measurement period shall be at least one timeslot. An excess maximum output power may interfere other channels or other systems. A small maximum output power decreases the coverage area. Table 10 shows the test requirements for maximum output power with HS-DPCCH and E-DCH. This test applies to all FDD UE of Release 6 and later releases that support HSDPA and E-DCH.

Maximum output power with HS-DPCCH and E-DCH				
Sub-test in Table 5	Power Class 3		Power Class 4	
	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)
1	+24	+1.7/-6.7	+21	+2.7/-5.7
2	+22	+3.7/-5.2	+19	+4.7/-4.2
3	+23	+2.7/-5.2	+20	+3.7/-4.2
4	+22	+3.7/-5.2	+19	+4.7/-4.2
5	+24	+1.7/-3.7	+21	+2.7/-2.7

Notes:
The test procedure will result in a power slightly below the maximum, and therefore the lower limits in Table 10 are made lower by 1.5 dB.
The test procedure allows UE to decrease its maximum transmit power for E-TFC selection in sub-test 1 and 5, and therefore the lower limits of sub-test 1 and 5 in Table 10 are made lower by 1.5 dB.
Table 10: Maximum output power with HS-DPCCH and E-DCH (Table5.2B.5 of TS 34.121 [1])

Fixed Reference Channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message, sub-test 1, downlink physical channels, and serving cell are configured in R&S®CMU200 as specified in section 2.1. The test requires power control bits to be set such that the UE power to be at least 7.5 dB lower than the maximum output power, to give one TPC_cmd = +1 command and to give one TPC_cmd = -1 command to the UE for sub-test 1…4. For sub-test 5 it is necessary to set the TPC patterns to “all1”.
Achieving this power condition the total UE UL power should be measured with the UL OFF power measurements e.g.

Configuration in R&S®CMU200 for **subtest 1…4**
BS Signal → TPC Settings → TPC Algorithm → Algorithm 2
BS Signal → TPC Settings → TPC Pattern Setup → Set 1
BS Signal → TPC Settings → Set 1 → Pattern Type → Closed Loop
BS Signal → TPC Settings → Set 1 → UL Target Power → 15.0 dBm
BS Signal → TPC Settings → Set 2 → Pattern Type → Single Pattern + Alternating
BS Signal → TPC Settings → Set 1 → Pattern → 11111 (for TPC_cmd = +1 command)
BS Signal → TPC Settings → Set 2 → Pattern Type → Single Pattern + Alternating
BS Signal → TPC Settings → Set 1 → Pattern → 00000 (for TPC_cmd = -1 command)

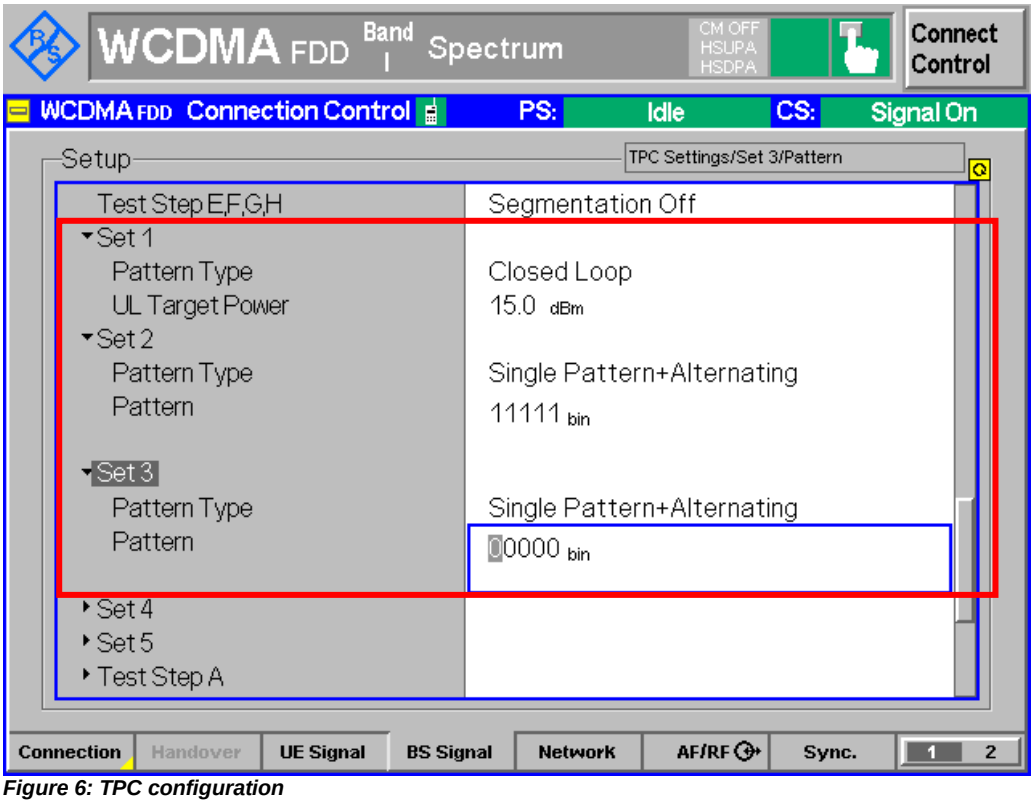


Figure 6: TPC configuration

A HSUPA call is established. The UE power is set to be at least 7.5 dB lower than the maximum output power and wait for 150 ms.

Configuration in R&S®CMU200:
BS Signal Settings → TPC Pattern Setup → Set 1

Power control bits of one TPC_cmd = +1 command is sent to the UE. The received E-TFCI in UE is checked for 150 ms. If UE does not send decreased E-TFCI (DTX on E-DPDCH is also considered decreased E-TFCI) within 150 ms, TPC_cmd = +1 command is sent to the UE, wait for 150 ms and decreased E-TFCI is checked. This process is repeated until UE sends decreased E-TFCI.

Configuration in R&S®CMU200:
BS Signal Settings → TPC Pattern Setup → Set 2
BS Signal Settings → Activate Pattern

Measurement result for E-TFCI is available in HSUPA E-AGCH in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Receiver Quality → Applic. 2 → HSUPA E-AGCH

Figure 7(a) and 7(b) show the target E-TFCI (for sub-test 1) and decreased E-TFCI respectively. In Figure 7(b) value for decreased E-TFCI is E-TFCI 71. The value for decreased E-TFCI may vary depending on the UE output power.

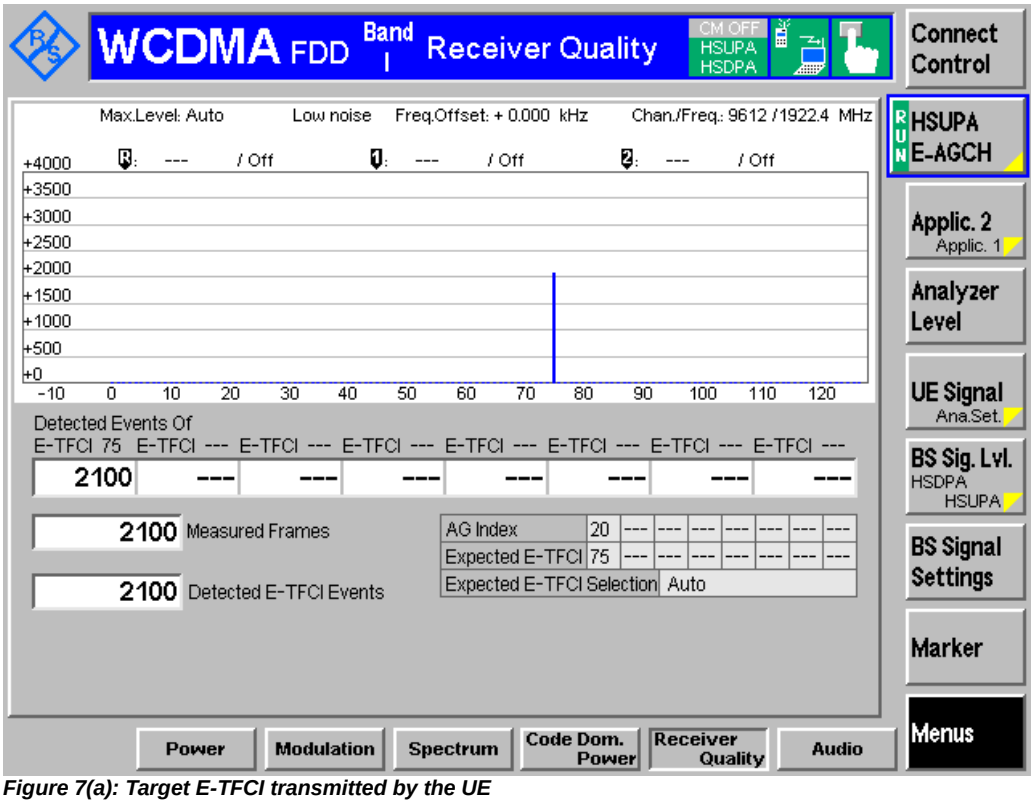


Figure 7(a): Target E-TFCI transmitted by the UE

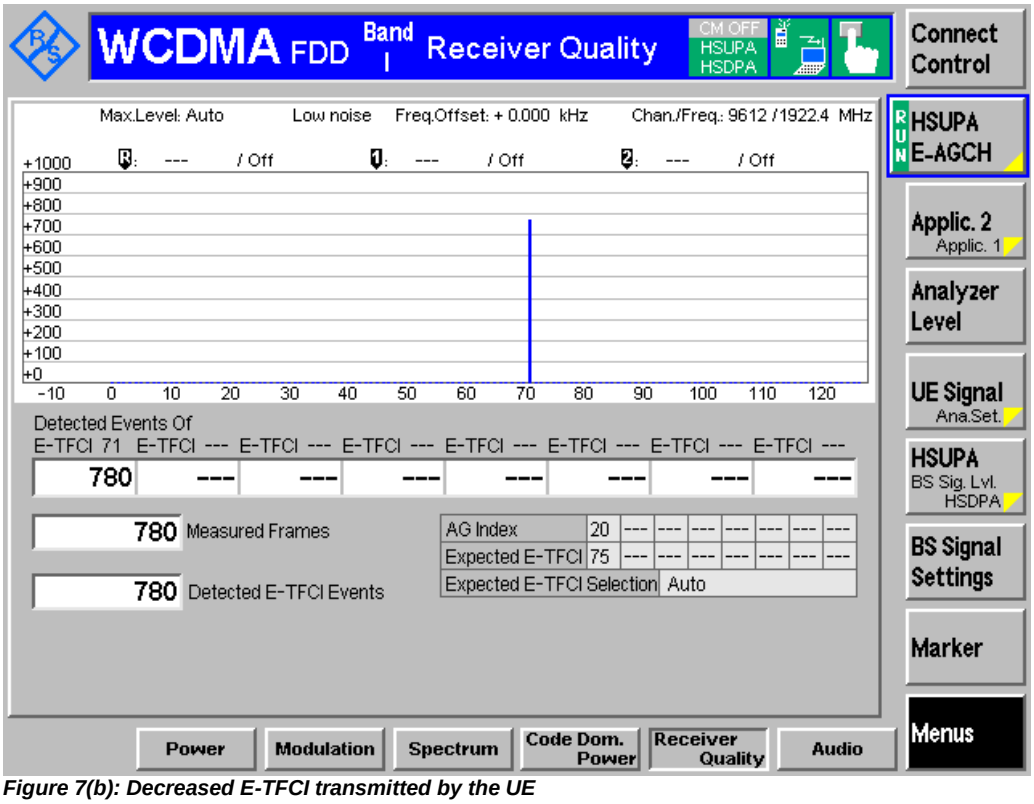


Figure 7(b): Decreased E-TFCI transmitted by the UE

Power control bits of one TPC_cmd = -1 command is sent to the UE and wait for 150 ms. The received E-TFCI is checked for 150ms. If UE sends any decreased E-TFCI (DTX on E-DPDCH is also considered decreased E-TFCI) within 150 ms, TPC_cmd = -1 command is sent to the UE and wait for 150 ms.

Configuration in R&S®CMU200:
BS Signal Settings → TPC Pattern Setup → Set 3
BS Signal Settings → Activate Pattern

E-TFCI transmitted by the UE is verified and confirmed to be equal to the target E-TFCI in Table 5. UE is failed if the E-TFCI transmitted by the UE is not equal to the traget E-TFCI. Mean power of the UE is measured.

The Maximum output power with HS-DPCCH and E-DCH is repeated with different combinations of β values as specified in Table 5.

Measurement result for maximum output power with HS-DPCCH and E-DCH is available in OFF Power in R&S®CMU200.

Configuration in R&S®CMU200:
Menu → Power → OFF Power

Figure 8 shows the maximum output power measurement result.

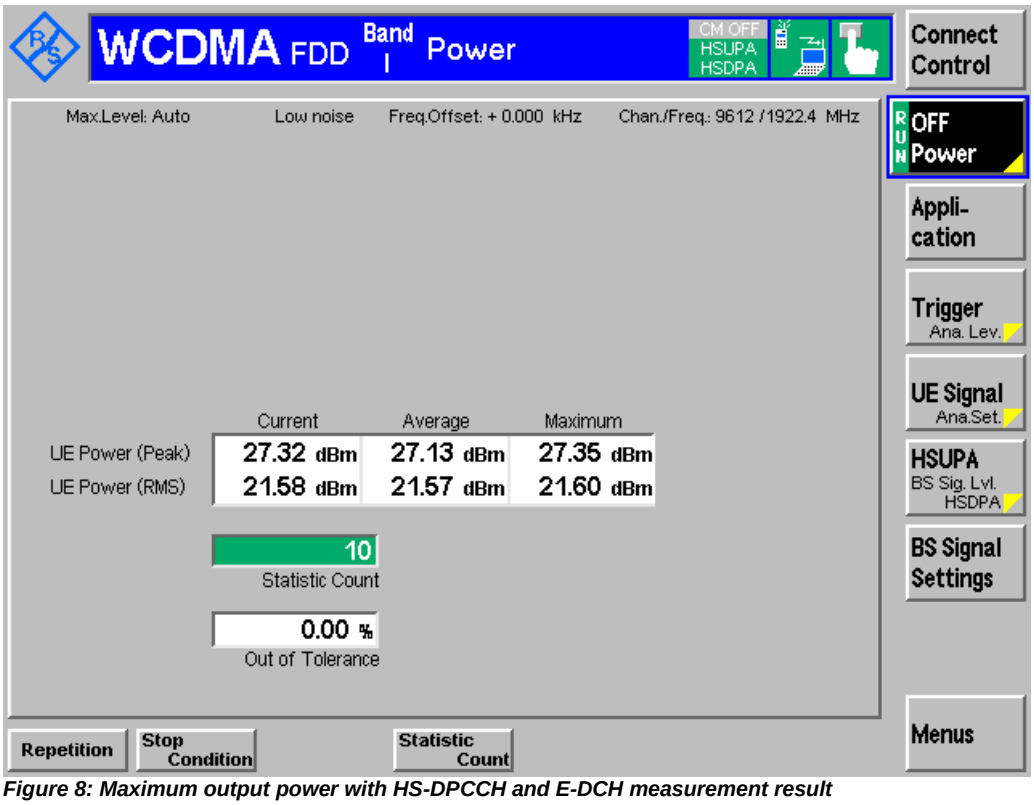
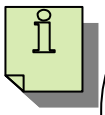


Figure 8: Maximum output power with HS-DPCCH and E-DCH measurement result

Note: The limits for OFF Power can be set in R&S®CMU200 according to Table 10.

Configuration in R&S®CMU200 for **subtest 1…4**



E-DCH category 1 to 6

For sub-test 1, recall HSUPATx1.sav and establish **CS call**.

For sub-test 2, recall HSUPATx2.sav and establish **CS call**.

For sub-test 3, recall HSUPATx3.sav and establish **CS call**.

For sub-test 4, recall HSUPATx4.sav and establish **CS call**.

The TPC setting is available at:
BS Signal Settings → TPC Pattern Setup → Set 1 (closed loop), Set 2 (TPC_cmd = +1 command) or Set 3 (TPC_cmd = -1 command)
BS Signal Settings → Activate Pattern (for Set 2 and Set 3)

The measurement result is available at:
Menus → Receiver Quality → Applic.2 → HSUPA E-AGCH
Menus → Power → Application → OFF Power

A HSUPA call is established. The UE power is set to be at least 7.5 dB lower than the maximum output power and wait for 150 ms.

Configuration in R&S®CMU200 for **subtest 5**
BS Signal → TPC Settings → TPC Algorithm → Algorithm 1
BS Signal → TPC Settings → TPC Pattern Setup → Set 5
BS Signal → TPC Settings → Set 5 → Pattern Type → "all 1

E-DCH category 1 to 6

For sub-test 5, recall HSUPATx5.sav and establish **PS call**.

The TPC setting is available at:
BS Signal Settings → TPC Pattern Setup
→ Set 1 (closed loop), Set 5 (TPC pattern "all 1")

BS Signal Settings → Activate Pattern (for Set 1 and Set 5)

The measurement result is available at:
Menus → Receiver Quality → Applic.2 → HSUPA E-AGCH
Menus → Power → Application → OFF Power

Configuration of limits in R&S®CMU200 for **sub-tests 1…5:**
OFF Power → Limits → OFF Power → Current&Max. → UE Power (RMS)
OFF Power → Limits → OFF Power → Average → UE Power (RMS)

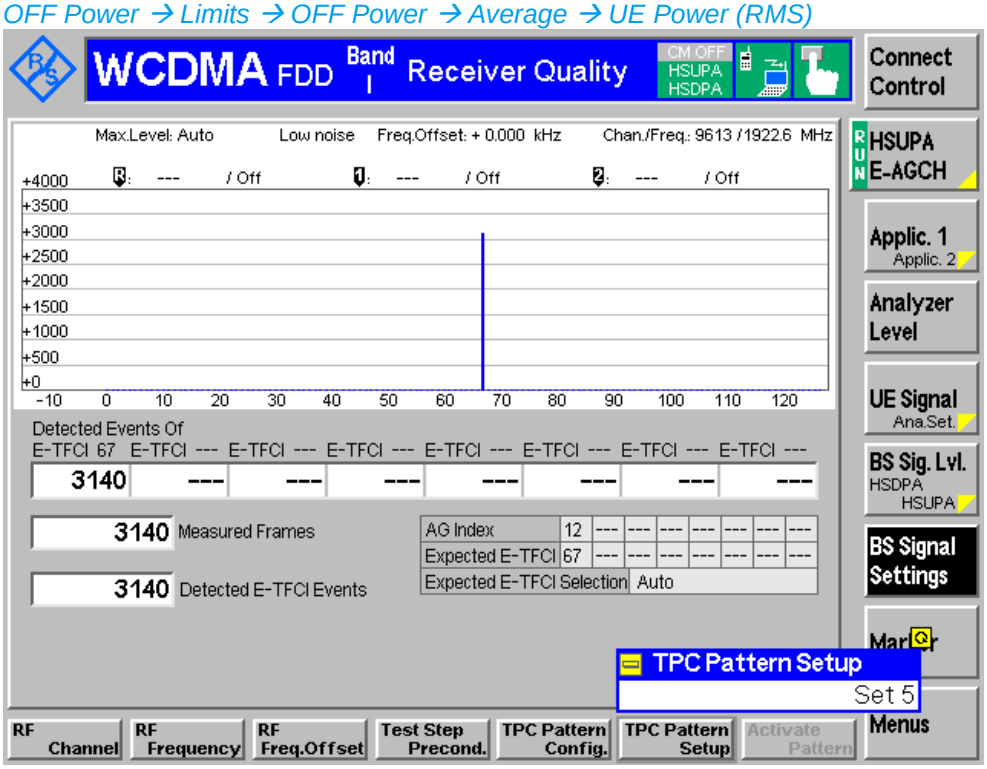


Figure 8(a): Target E-TFCI transmitted by the UE for Subtest 5

2.3 UE Relative Code Domain Power Accuracy for HS-DPCCH and E-DCH (5.2D)

UE relative code domain power accuracy measures the ability of the UE to correctly set the level of individual code power relative to the total power of all active codes. The measure of accuracy is the difference between two dB ratios:

UE Relative CDP accuracy = (Measured CDP ratio) – (Nominal CDP ratio)
where

$$\text{Measured CDP ratio} = 10 * \log\left(\frac{\text{Measured code power}}{\text{Measured total power of all active codes}}\right)$$

$$\text{Nominal CDP ratio} = 10 * \log\left(\frac{\text{Nominal CDP}}{\text{Sum of all Nominal CDPs}}\right)$$

The nominal CDP of a code is relative to the total of all codes and is derived from beta factors. The sum of all nominal CDPs will equal 1 by definition. The UE relative CDP accuracy shall be maintained over the period during which the total of all active code powers remains unchanged or one timeslot, whichever is the longer. This test applies to all FDD UE of Release 6 and later releases that support HSDPA and E-DCH. This test is in addition to the test for HSDPA only in 5.2C of TS 34.121 [1].

Figure 9 shows the transmit power profile for UE relative code domain power accuracy. A repeating pattern with alternating value of Absolute Grants as shown in Table 5 and Absolute Grant Index of Zero_Grant is generated. This will generate a repeating pattern on the E-DPDCH(s) with a level corresponding to the sending of Scheduling Information every other 10ms E-DCH TTI as shown in Figure 9.

The relative code domain power of each active code is measured at the measurement points as specified in Figure 9. Each measurement is over a half slot period. Measurement point 1 is the last timeslot before TTI1. Measurement point 2 is the first timeslot of TTI1 and measurement point 3 is the first timeslot of TTI2. The 25 µs transient periods at the ends of each measured timeslot shall not be included.

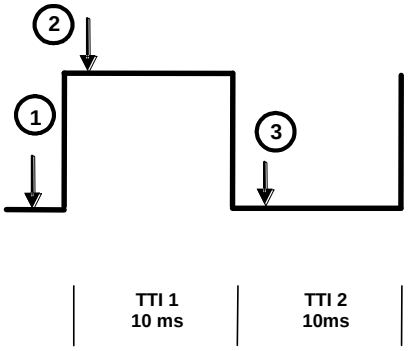


Figure 9: Transmit power profile showing measurement points (Figure 5.2D.1 of TS 34.121 [1])

Table 11 shows the nominal UE relative code domain power for each active code at each point. Table 12 shows the test requirements for the required accuracy, i.e. the difference between the expected and measured code domain power.

UE relative code domain power nominal ratios							
Subtest in Table 5	Measurement point	Expected relative code domain power in dB					
		DPCCH	DPDCH	HS-DPCCH	E-DPCCH	E-DPDCH1	E-DPDCH2
1	1	-9.3	-6.6	-3.3	-7.3	-18.9	OFF
	2	-18.5	-15.8	-12.5	-16.5	-0.5	OFF
	3	-9.3	-6.6	-3.3	-7.3	-18.9	OFF
2	1	-11.9	-3.9	-5.8	-5.8	-21.4	OFF
	2	-14.0	-6.0	-8.0	-8.0	-4.1	OFF
	3	-11.9	-3.9	-5.8	-5.8	-21.4	OFF
3	1	-9.8	-14.2	-3.7	-3.7	-19.3	OFF
	2	-14.6	-19.1	-8.6	-8.6	-4.7	-4.7
	3	-9.8	-14.2	-3.7	-3.7	-19.3	OFF
4	1	-17.9	-0.4	-11.9	-17.9	-27.5	OFF
	2	-19.7	-2.2	-13.7	-19.7	-4.7	OFF
	3	-17.9	-0.4	-11.9	-17.9	-27.5	OFF

Table 11: UE relative code domain power nominal ratios (Table 5.2D.7 of TS 34.121 [1])

UE relative code domain power accuracy test requirements	
Nominal CDP ratio	Accuracy (dB)
≥ -10 dB	±1.7
-10 dB to ≥ -15 dB	±2.3
-15 dB to ≥ -20 dB	±2.9

Table 12: UE relative code domain power accuracy test requirements (Table 5.2D.8 of TS 34.121 [1])

Fixed Reference Channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message, sub-test 1, downlink physical channels, and serving cell are configured in R&S®CMU200 as specified in section 2.1 with exception of RADIO BEARER SETUP message in Table 13.

Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA)	
Information Element	Value/Remark
UL Transport channel information for all transport channels	
- 2 bit CTFC	3
- Power offset Information	
- CHOICE Gain Factors	Signalled Gain Factors
- CHOICE mode	FDD
- Gain factor ßc	Value used in test: see Table 5
- Gain factor ßd	Value used in test: see Table 5
Note: All other 2 bit CTFC values use computed gain factors as in the default message	

Table13: Contents of RADIO BEARER SETUP message: AM or UM (Test Loop Mode 1) (Table5.2D.2 and Table 5.13.2B.3 of TS 34.121 [1])

In 3GPP TS 34.121 V8.7.0, UE relative code domain power accuracy for HS-DPCCH and E-DCH is measured at UE power level of 15 dBm ± 2 dB. In 3GPP TS 34.121 V8.6.0 and previous releases, UE relative code domain power accuracy for HS-DPCCH and E-DCH is measured at maximum output power as specified in section 2.2. Configuration and *.sav file for this test case are based on TS 34.121 V8.7.0 [1].

A HSUPA call is established. The UE power is set to be 15 dBm ± 2 dB by referring to Figure 10.

Configuration in R&S®CMU200:
BS Signal Settings → TPC Pattern Config → TPC Pattern Set → Set 1
BS Signal Settings → TPC Pattern Config. → Set 1 → Pattern Type → Closed Loop
BS Signal Settings → TPC Pattern Config. → Set 1 → UL Target Power → 15.0 dBm

E-TFCI transmitted by the UE is verified and confirmed to be equal to the target E-TFCI in Table 5. UE is failed if the E-TFCI transmitted by the UE is not equal to the traget E-TFCI.

Measurement result for E-TFCI is available in *HSUPA E-AGCH* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Receiver Quality → Applic. 2 → HSUPA E-AGCH

Figure 7(a) shows the E-TFCI transmitted by the UE.

Alternating “0” and “1” TPC commands are sent in the downlink so as to satisfy the condition of obtaining TPC_cmd = 0.

Configuration in R&S®CMU200:
BS Signal Settings → TPC Pattern Config → TPC Pattern Set → Set 1
BS Signal Settings → TPC Pattern Config. → Set 1 → Pattern Type → Alternating 0, 1

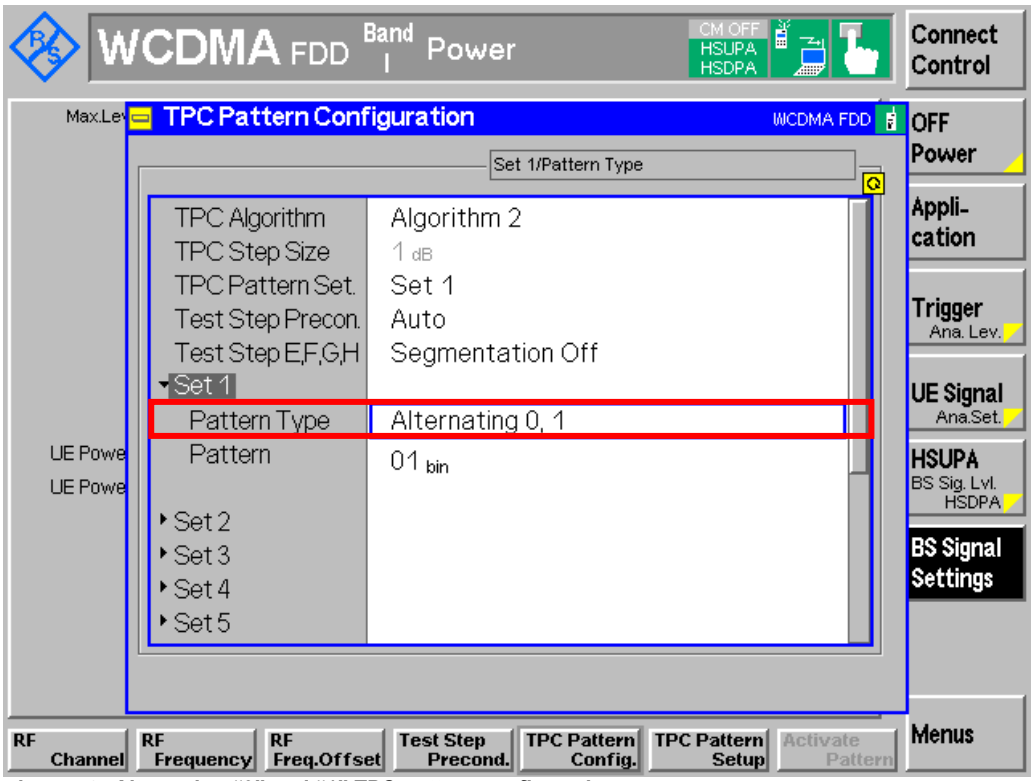


Figure 10: Alternating “0” and “1” TPC pattern configuration

A repeating pattern with alternating value of Absolute Grants of sub-test 1 and Absolute Grant Index of Zero_Grant is generated.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-AGCH → AG Pattern → Pattern Length → 2
BS Signal → HSUPA → E-AGCH → AG Pattern → AG Index → 0 20

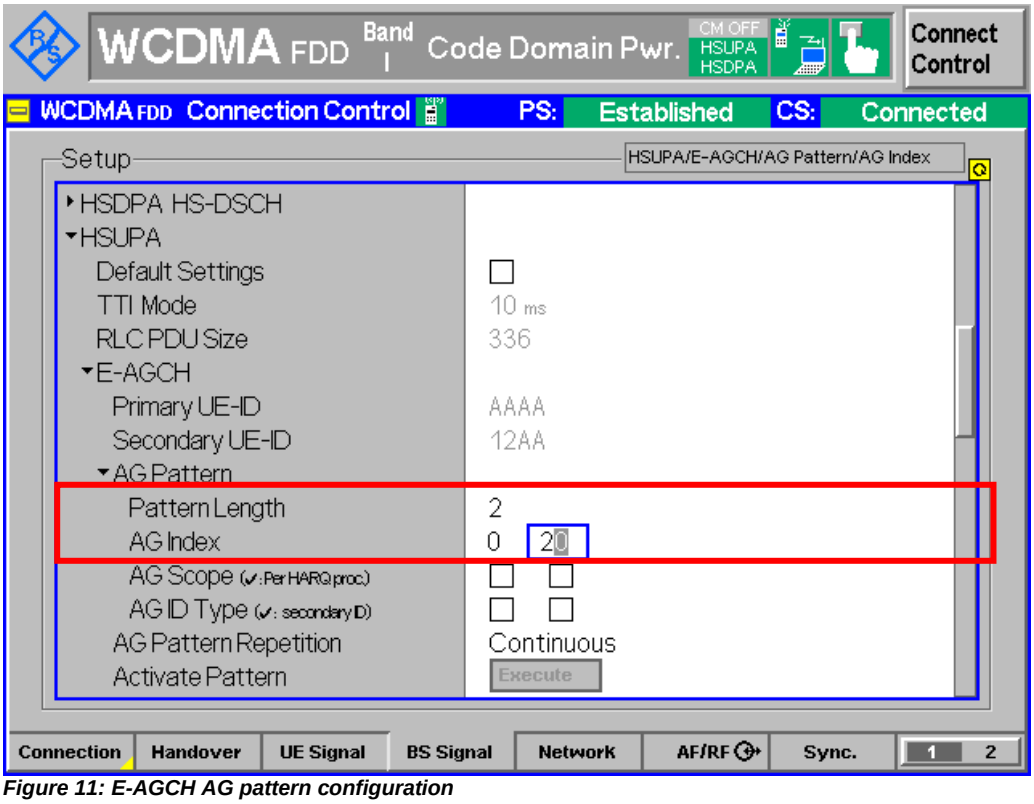


Figure 11: E-AGCH AG pattern configuration

The UE relative code domain power accuracy for HS-DPCCH and E-DCH is repeated with different combinations of β values for sub-test 2, 3 and 4 as specified in Table 5.

Measurement result for UE relative code domain power accuracy with HS-DPCCH and E-DCH is available in *CDP/Relative* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Code Dom. Power → Applic. 1 → CDP/Relative

Figure 12(a) shows the UE relative code domain power accuracy for HS-DPCCH and E-DCH measurement result.

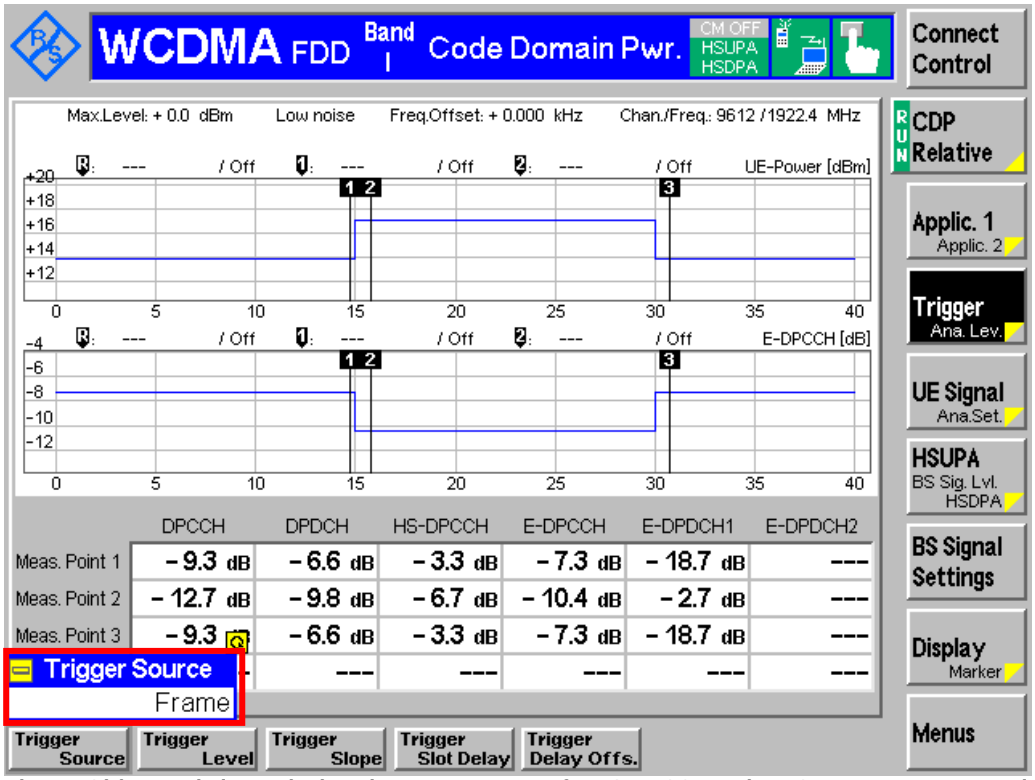


Figure 12(a): UE relative code domain power accuracy for HS-DPCCH and E-DCH measurement result

It is recommended to use frame trigger for UE relative code domain power accuracy with HS-DPCCH and E-DCH.

Configuration in R&S®CMU200:
Trigger → Trigger Source → Frame

The number of symbols displayed in the graph can be configured by changing the *Measure Length* in R&S®CMU200 as shown in Figure 12(b).

Configuration in R&S®CMU200:
Menus → Code Dom. Power → Applic. 1 → CDP/Relative
CDP Relative → 40.0

Position of the measurement points can be configured by changing the *Measure Points* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Code Dom. Power → Applic. 1 → CDP/Relative
CDP/Relative → Measure Points → Measure Point 1 → 14.5
CDP/Relative → Measure Points → Measure Point 2 → 15.5
CDP/Relative → Measure Points → Measure Point 3 → 30.5

The upper diagram of the measurement result shows the UE-Power, which matches transmit power profile in Figure 8. The lower diagram can display either DPCCH, DPDCH1, HS-DPCCH, E-DPCCH, E-DPDCH1 or E-DPDCH2 by changing *Diagram Type*.

Configuration in R&S®CMU200:
Menus → Code Dom. Power → Applic. 1 → CDP/Relative
Diagram Type → DPCCH, DPDCH1, HS-DPCCH, E-DPCCH, E-DPDCH1 or E-DPDCH2

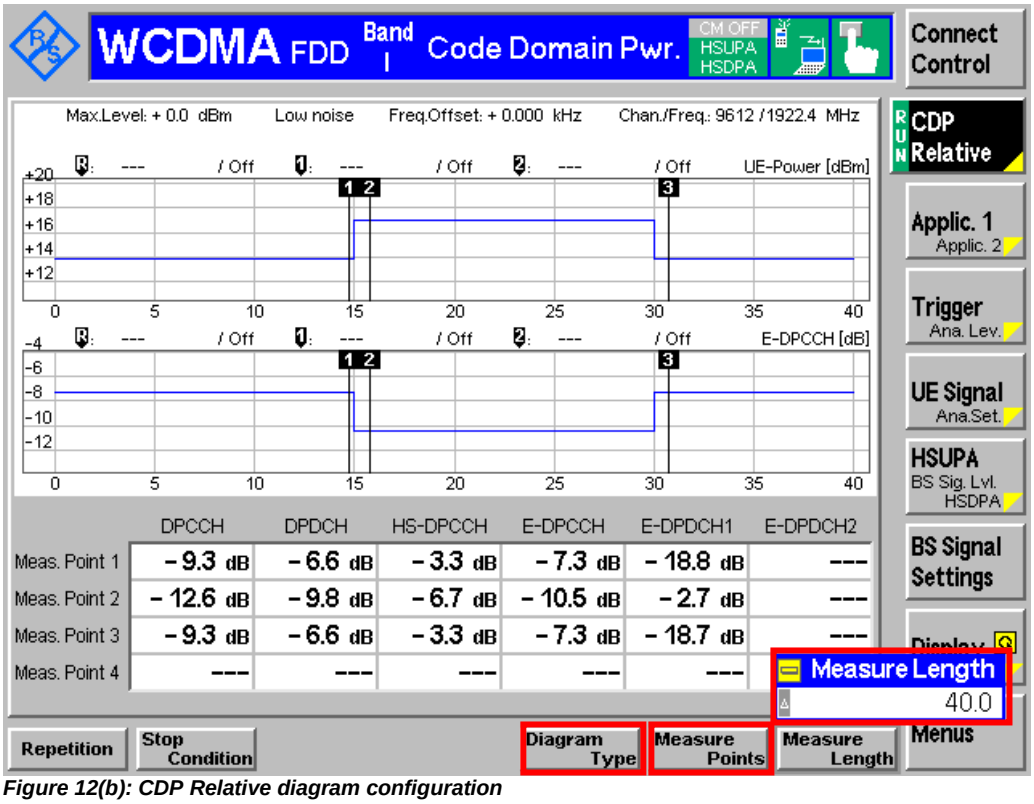


Figure 12(b): CDP Relative diagram configuration

The span of X and Y scale of both diagrams can be configured by changing the *Scale X* and *Scale Y* in R&S®CMU200 as shown in Figure 14(b).

Configuration in R&S®CMU200:
Display → UE-Power Scale Y → 10 dBm
Display → E-DPCCH Scale Y → 10 dB
Display → UE-Power Scale X → Start → 0
Display → UE-Power Scale X → Span → 40
Display → E-DPCCH Scale X → Start → 0
Display → E-DPCCH Scale X → Span → 40

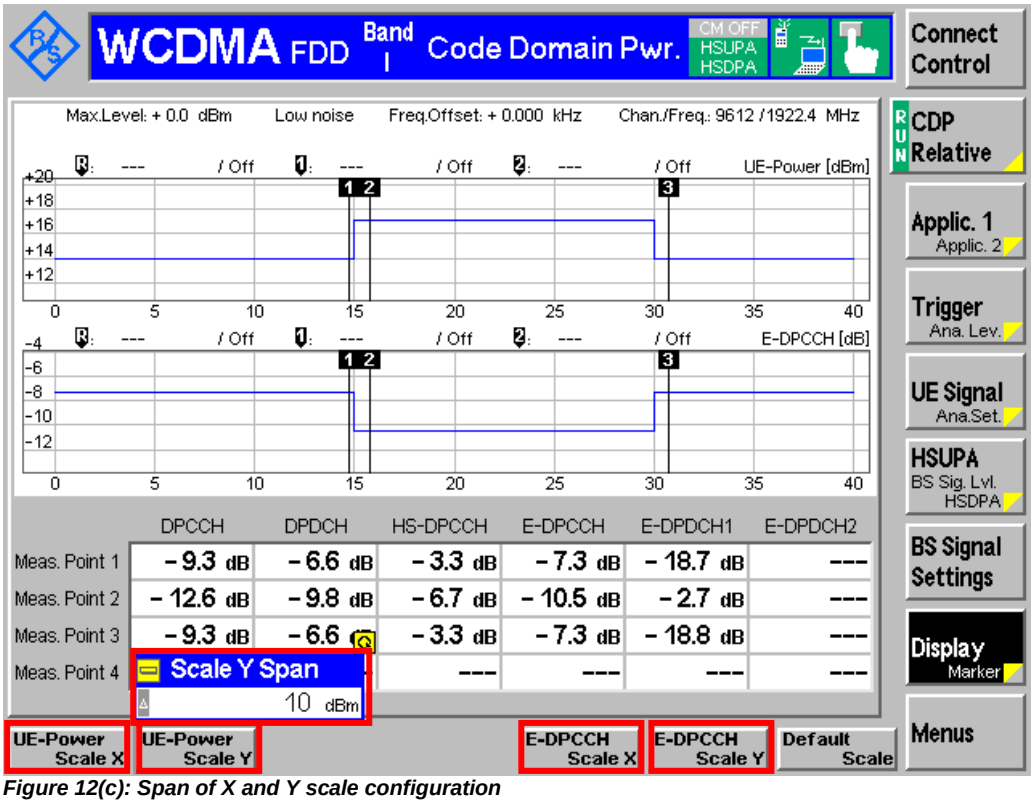


Figure 12(c): Span of X and Y scale configuration

E-DCH category 1 to 6

For sub-test 1, recall HSUPATx1.sav and establish CS call.

For sub-test 2, recall HSUPATx2.sav and establish CS call.

For sub-test 3, recall HSUPATx3.sav and establish CS call.

For sub-test 4, recall HSUPATx4.sav and establish CS call.

For sub-test 5, recall HSUPATx5.sav and establish PS call.
UE Signal → HSUPA → Maximum Channelization Code → 1xSF4

Modify the following configurations for all the above *sav files:
BS Signal → HSUPA → E-AGCH → AG Pattern → Pattern Length → 2
BS Signal → HSUPA → E-AGCH → AG Pattern → AG Index → 0 20 (sub-test 1), 0 12 (sub-test 2), 0 15 (sub-test 3), 0 17 (sub-test 4)
Trigger → Trigger Source → Frame

The TPC setting is available at:
BS Signal Settings → TPC Pattern Setup → Set 1 (closed loop), Set 4 (Alternating 0, 1)

The measurement result is available at:
Menus → Receiver Quality → Applic.2 → HSUPA E-AGCH
Menus → Code Dom. Power → CDP/Relative

2.4 Spectrum Emission Mask with E-DCH (5.9B)

Spectrum emission mask of the UE applies to frequencies between 2.5 MHz and 12.5 MHz away from the UE centre carrier frequency. The out of channel emission is specified relative to the RRC filtered mean power of the UE carrier. This test applies to all FDD UE of Release 6 and later releases that support HSDPA and E-DCH.

This test verifies that the power of UE emission does not exceed the limit in Table 14 even in the presence of the E-DCH for all values of βc, βd, β_{HS}, β_{ec} and β_{ed} as specified in Table 5. The maximum output power with HS-DPCCH and/or E-DCH is specified in section 2.2. Excess emission increases the interference to other channels or to other systems.

Table 14, 14(a), 14(b) and 14(c) show the spectrum emission mask requirement and additional spectrum emission limits. Δf is the separation between the carrier frequency and the centre of the measurement bandwidth. The minimum requirement is calculated from the relative requirement or the absolute requirement, whichever is the higher power.

Spectrum Emission Mask Requirement			
Δf in MHz	**Minimum requirement**		**Measurement bandwidth**
	Relative requirement	**Absolute requirement**	
2.5 - 3.5	$\left\{-33.5-15.\left(\frac{\Delta f}{MHz}-2.5\right)\right\}$ dBc	-69.6 dBm	30 kHz
3.5 - 7.5	$\left\{-33.5-1.\left(\frac{\Delta f}{MHz}-3.5\right)\right\}$ dBc	-54.3 dBm	1 MHz
7.5 - 8.5	$\left\{-37.5-10.\left(\frac{\Delta f}{MHz}-7.5\right)\right\}$ dBc	-54.3 dBm	1 MHz
8.5 - 12.5	-47.5 dBc	-54.3 dBm	1 MHz

Table 14: Spectrum emission mask requirement (Table 5.9B.3 of TS 34.121 [1])

Additional spectrum emission limits for Bands II, IV, X			
Δf in MHz	**Frequency offset of measurement filter centre frequency, f_offset**	**Additional requirements Band II, IV, X**	**Measurement bandwidth**
2.5 MHz ≤ Δf < 3.5 MHz	2.515 MHz ≤ f_offset < 3.485 MHz	-15 dBm	30 kHz
3.5 MHz ≤ Δf ≤ 12.5 MHz	4.0 MHz ≤ f_offset < 12.0 MHz	-13 dBm	1 MHz

Table 14(a): Additional spectrum emission limits for Bands II, IV, X (Table 5.9B.3A of TS 34.121 [1])

Additional spectrum emission limits for Band V			
Δf in MHz	**Frequency offset of measurement filter centre frequency, f_offset**	**Additional requirements Band V**	**Measurement bandwidth**
2.5 MHz ≤ Δf < 3.5 MHz	2.515 MHz ≤ f_offset < 3.485 MHz	-15 dBm	30 kHz
3.5 MHz ≤ Δf ≤ 12.5 MHz	3.55 MHz ≤ f_offset < 12.45 MHz	-13 dBm	100 kHz

Table 14(b): Additional spectrum emission limits for Bands V (Table 5.9B.3B of TS 34.121 [1])

Additional spectrum emission limits for Bands XII, XIII, XIV			
Δf in MHz	**Frequency offset of measurement filter centre frequency, f_offset**	**Additional requirements Band XII, XIII, XIV**	**Measurement bandwidth**
2.5 MHz ≤ Δf < 2.6 MHz	2.515 MHz ≤ f_offset < 2.585 MHz	-13 dBm	30 kHz
2.6 MHz ≤ Δf ≤ 12.45 MHz	2.65 MHz ≤ f_offset < 12.45 MHz	-13 dBm	100 kHz

Table 14(c): Additional spectrum emission limits for Bands XII, XIII, XIV (Table 5.9B.3C of TS 34.121 [1])

Fixed Reference Channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message, sub-test 1, downlink physical channels, and serving cell are configured in R&S®CMU200 as specified in section 2.1. A HSUPA call is established. Maximum output power in UE is set as specified in section 2.2.

The spectrum emission mask with E-DCH is repeated with different combination of β values as specified in Table 5.

Measurement result for spectrum emission mask with E-DCH is available in *Emission Mask* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Spectrum → Application → Emission Mask

Figure 13 shows the spectrum emission mask with E-DCH measurement result.

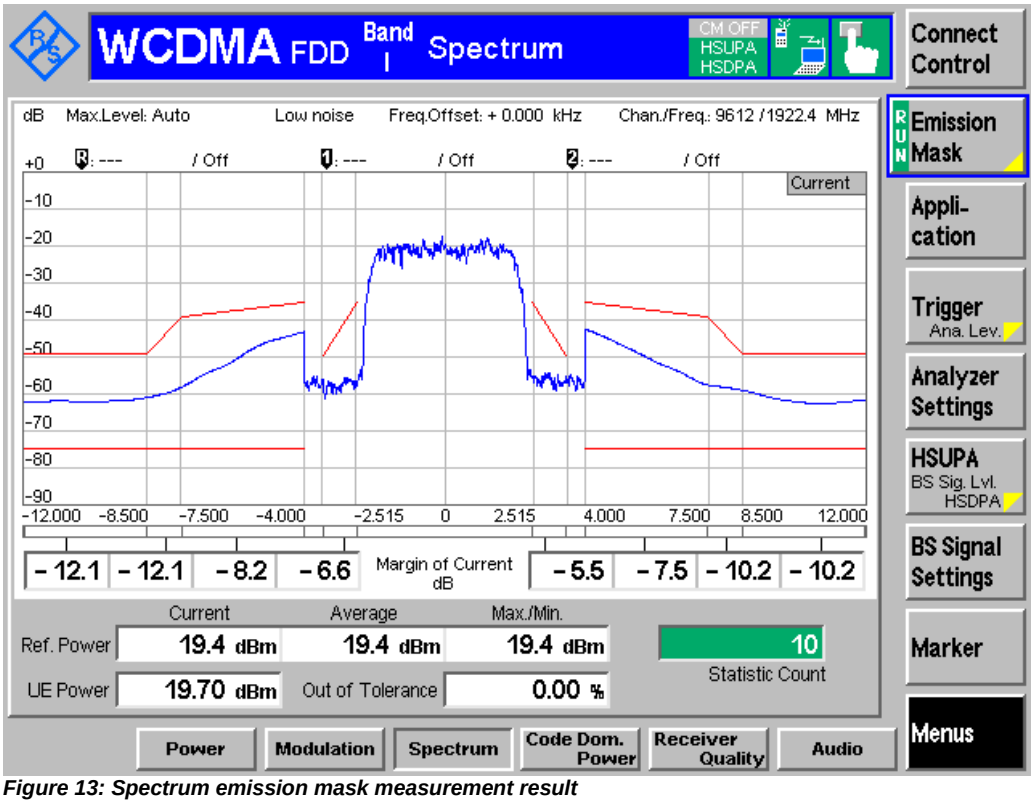
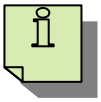


Figure 13: Spectrum emission mask measurement result



E-DCH category 1 to 6

For sub-test 1, recall HSUPATx1.sav and establish CS call.

For sub-test 2, recall HSUPATx2.sav and establish CS call.

For sub-test 3, recall HSUPATx3.sav and establish CS call.

For sub-test 4, recall HSUPATx4.sav and establish CS call.

For sub-test 5, recall HSUPATx5.sav and establish PS call.
UE Signal → HSUPA → Maximum Channelization Code → 1xSF4

The TPC setting is available at:
BS Signal Settings → TPC Pattern Setup → Set 1 (closed loop), Set 2 (TPC_cmd = +1 command) or Set 3 (TPC_cmd = -1 command)
BS Signal Settings → Activate Pattern (for Set 2 and Set 3)

The measurement result is available at:
Menus → Receiver Quality → Applic.2 → HSUPA E-AGCH
Menus → Spectrum → Emission Mask

2.5 Adjacent Channel Leakage Power Ratio (ACLR) with E-DCH (5.10B)

ACLR is defined as the ratio of the RRC filtered mean power centred on the assigned channel frequency to the RRC filtered mean power centred on an adjacent channel frequency. Excess ACLR increases the interference to other channels or to other systems. This test applies to all FDD UE of Release 6 and later releases that support HSDPA and E-DCH.

This test verifies that the power of UE emission does not exceed the limit in Table 15 for all values of βc, βd and β_{HS}, β_{ec} and β_{ed} as specified in Table 5. The maximum output power with E-DCH is specified in section 2.2.

UE ACLR		
Power Class	**UE channel**	**ACLR limit**
3	+5 MHz or –5 MHz	32.2 dB
3	+10 MHz or –10 MHz	42.2 dB
4	+5 MHz or –5 MHz	32.2 dB
4	+10 MHz or –10 MHz	42.2 dB

Table 15: UE ACLR (Table 5.10B.2 of TS 34.121 [1])

Fixed Reference Channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message, sub-test 1, downlink physical channels, and serving cell are configured in R&S®CMU200 as specified in section 2.1. A HSUPA call is established. Maximum output power in UE is set as specified in section 2.2.

The ACLR with HS-DPCCH is repeated with different combination of β values as specified in Table 5.

Measurement result for ACLR with E-DCH is available in *ACLR Filter* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Spectrum → Application → ACLR Filter

Figure 14 shows the ACLR with E-DCH measurement result.

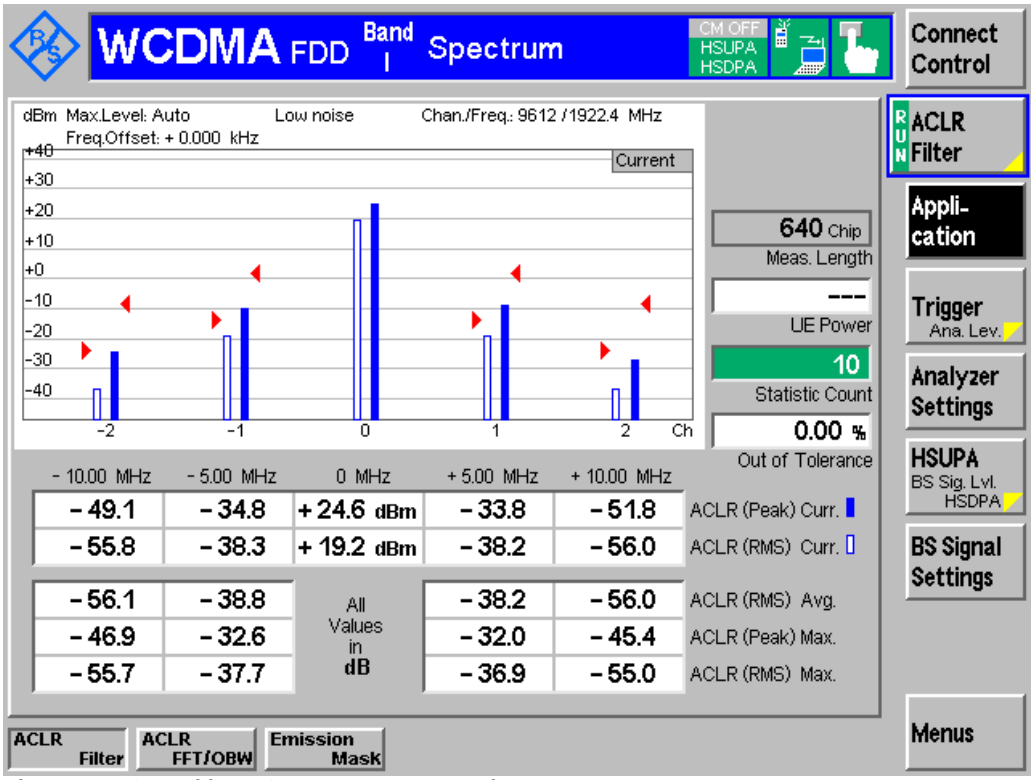
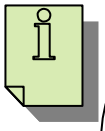


Figure 14: ACLR with E-DCH measurement result



E-DCH category 1 to 6

For sub-test 1, recall HSUPATx1.sav and establish CS call.

For sub-test 2, recall HSUPATx2.sav and establish CS call.

For sub-test 3, recall HSUPATx3.sav and establish CS call.

For sub-test 4, recall HSUPATx4.sav and establish CS call.

For sub-test 5, recall HSUPATx5.sav and establish PS call.
UE Signal → HSUPA → Maximum Channelization Code → 1xSF4

The TPC setting is available at:
BS Signal Settings → TPC Pattern Setup → Set 1 (closed loop), Set 2 (TPC_cmd = +1 command) or Set 3 (TPC_cmd = -1 command)
BS Signal Settings → Activate Pattern (for Set 2 and Set 3)

The measurement result is available at:
Menus → Receiver Quality → Applic.2 → HSUPA E-AGCH
Menus → Spectrum → ACLR Filter

2.6 Relative Code Domain Error with HS-DPCCH and E-DCH (5.13.2B)

Relative code domain error for every non-zero beta code in the domain measures the ratio of the mean power of the projection onto the non-zero beta code to the mean power of the non-zero beta code in the composite reference waveform. The measurement interval is one timeslot except when the mean power between slots is expected to change, whereupon the measurement interval is reduced by 25 µs at each end of the slot.

Relative code domain error is affected by both the spreading factor and beta values of the various code channels in the domain. Effective Code Domain Power (ECDP) for each used code k is defined using Nominal CDP ratio as specified in TS 25.101 [4].

$$ECDP_k = (\text{Nominal CDP ratio})_k + 10 * \log 10 (SF_k / 256)$$

Relative Code Domain Error is not applicable when either or both the following channel conditions occur:

i) ECDP of any code channel is < -30 dB
ii) Nominal code domain power of any code channel is < -20 dB

Relative code domain error considers only code channels with non-zero beta in the composite reference waveform and does not apply to PRACH preamble and message parts. This test applies to all FDD UE of Release 6 and later releases that support HSDPA and E-DCH.

Table 16, 17 and Table 18 show the parameters for relative code domain error with HS-DPCCH and E-DCH, nominal ECDP ratios and relative code domain error test requirement respectively. Relative code domain error shall meet the test requirements in Table 18 for parameters specified in Table 16.

Parameters for relative code domain error with HS-DPCCH and E-DCH			
Parameter		**Unit**	**Level**
UE output power		dBm	≥ −20
Operating conditions			Normal conditions
Power control step size		dB	1
Measurement period[1]	PRACH	Chips	3904
	Any DPCH		From 1280 to 2560[2]

Notes:
1. Less any 25 µs transient periods
2. The longest period over which the nominal power remains constant

Table 16: Parameters for relative code domain error with HS-DPCCH and E-DCH (Table 5.13.2B.2 of TS 34.121 [1])

Nominal ECDP ratios				
Sub-test in Table 5	**Code**	**Nominal Code Domain Power**	**Spreading factor**	**Nominal ECDP**
1	DPCCH	-18.5	256	-18.5
	DPDCH	-15.8	64	-21.8
	HS-DPCCH	-12.5	256	-12.5
	E-DPCCH	-16.5	256	-16.5
	E-DPDCH	-0.5	4	-18.6
2	DPCCH	-14.0	256	-14.0
	DPDCH	-6.0	64	-12.0
	HS-DPCCH	-8.0	256	-8.0
	E-DPCCH	-8.0	256	-8.0
	E-DPDCH	-4.1	4	-22.2
3	DPCCH	-14.6	256	-14.6
	DPDCH	-19.1	64	-25.1
	HS-DPCCH	-8.6	256	-8.6
	E-DPCCH	-8.6	256	-8.6
	E-DPDCH1	-4.7	4	-22.8
	E-DPDCH2	-4.7	4	-22.8
4	DPCCH	-19.7	256	-19.7
	DPDCH	-2.2	64	-8.2
	HS-DPCCH	-13.7	256	-13.7
	E-DPCCH	-19.7	256	-19.7
	E-DPDCH	-4.7	4	-22.8

Table 17: Nominal ECDP ratios (Table 5.13.2B.8 of TS 34.121 [1])

Relative code domain error test requirement	
ECDP (dB)	**Relative code domain error (dB)**
-21 < ECDP	≤ -15.5
-30 ≤ ECDP ≤ -21	≤ -36.5 - ECDP
ECDP < -30	No requirement

Table 18: Relative code domain error test requirement (Table 5.13.2B.9 of TS 34.121 [1])

Fixed Reference Channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message, sub-test 1, downlink physical channels, and serving cell are configured in R&S®CMU200 as specified in section 2.1 with exception of RADIO BEARER SETUP message in Table 13.

In 3GPP TS 34.121 V8.7.0, relative code domain error with HS-DPCCH and E-DCH is measured at UE power level of 15 dBm ± 2 dB and -18 dBm ± 2 dB. In 3GPP TS 34.121 V8.6.0 and previous releases, relative code domain error with HS-DPCCH and E-DCH is measured at maximum output power as specified in section 2.2 and -18 dBm ± 2 dB. Configuration and *.sav file for this test case are based on TS 34.121 V8.7.0 [1].

A HSUPA call is established. The UE power is set to be 15 dBm ± 2 dB by referring to Figure 10.

Configuration in R&S®CMU200:
BS Signal Settings → TPC Pattern Config → TPC Pattern Set → Set 1
BS Signal Settings → TPC Pattern Config. → Set 1 → Pattern Type → Closed Loop
BS Signal Settings → TPC Pattern Config. → Set 1 → UL Target Power → 15.0 dBm

E-TFCI transmitted by the UE is verified and confirmed to be equal to the target E-TFCI in Table 5. UE is failed if the E-TFCI transmitted by the UE is not equal to the traget E-TFCI.

Measurement result for E-TFCI is available in *HSUPA E-AGCH* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Receiver Quality → Applic. 2 → HSUPA E-AGCH

Figure 7(a) shows the E-TFCI transmitted by the UE.

The relative code domain error measurement is repeated with UE power level of -18 dBm with ±2 dB tolerance. These settings can be configured in R&S®CMU200 by referring to Figure 10.

Configuration in R&S®CMU200:
BS Signal Settings → Set 1 → Pattern Type → Closed Loop
BS Signal Settings → Set 1 → UL Target Power → -18.0 dBm

The relative code domain error measurement is repeated with different combinations of β values for sub-test 2, 3 and 4 as specified in Table 5 at UE power level of 15 dBm ±2 dB and -18 dBm with ±2 dB tolerance.

Measurement result for relative code domain error with HS-DPCCH and E-DCH is available in *CDE Relative* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Code Dom. Power → Applic. 2 → CDE/Relative

Figure 15 shows the relative code domain error with HS-DPCCH and E-DCH measurement result.

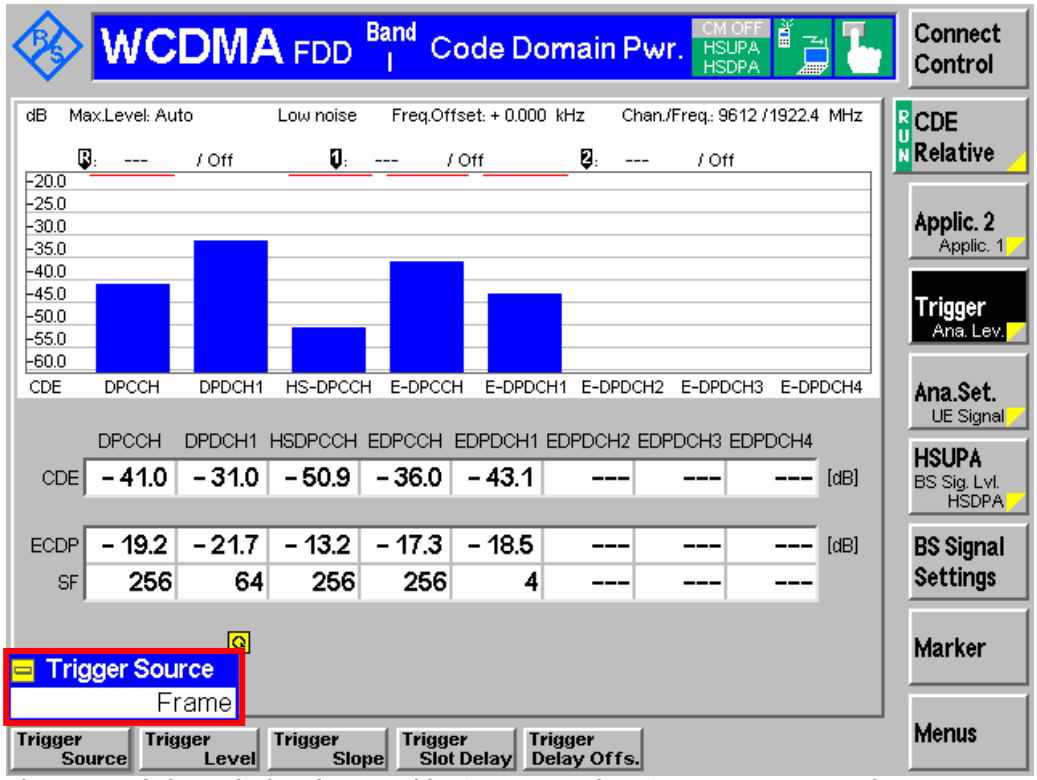


Figure 15: Relative code domain error with HS-DPCCH and E-DCH measurement result

It is recommended to use frame trigger for UE relative code domain power accuracy with HS-DPCCH and E-DCH.

Configuration in R&S®CMU200:
Trigger → Trigger Source → Frame

Depending on the values of gain factors, measurement threshold may require adjustment.

Configuration in R&S®CMU200:
UE Signal → Measurement Settings → Threshold → -10 dB

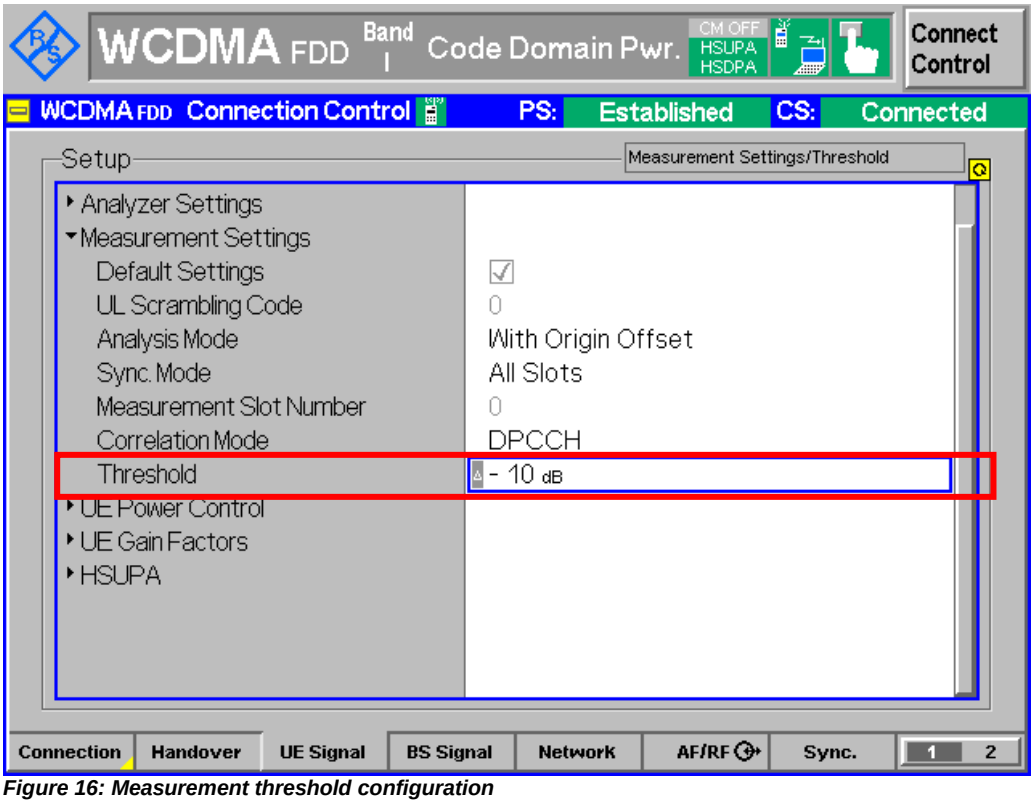
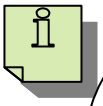


Figure 16: Measurement threshold configuration



E-DCH category 1 to 6

For sub-test 1, recall HSUPATx1.sav and establish CS call.

For sub-test 2, recall HSUPATx2.sav and establish CS call.

For sub-test 3, recall HSUPATx3.sav and establish CS call.

For sub-test 4, recall HSUPATx4.sav and establish CS call.

For sub-test 5, recall HSUPATx5.sav and establish PS call.
UE Signal → HSUPA → Maximum Channelization Code → 1xSF4

Modify the following configuration for all the above *sav files:
Trigger → Trigger Source → Frame

The TPC setting is available at:
BS Signal Settings → TPC Pattern Setup → Set 1
BS Signal Settings → Set 1 → UL Target Power → 15.0 dBm or -18.0 dBm

The measurement result is available at:
Menus → Receiver Quality → Applic.2 → HSUPA E-AGCH
Menus → Code Dom. Power → Applic. 2 → CDE/Relative

3 Rel-6 Performance Requirements

3.1 Generic Call Setup for Performance Requirements

All parameters of performance requirements are defined using the UL reference measurement channel (RMC) 12.2 kbps and Fixed Reference Channels (FRC H-Set 1, QPSK) as specified in TS 34.121 Annex C.11 unless stated otherwise. Loopback test mode 1 as specified in 5.3.2.3 and 5.3.2.6 of TS 34.109 [2] is used for looping back both the 12.2 kbps RMC and HSDPA to E-DCH. E-DCH call is setup according to 7.3.9 of TS 34.108 [3]. Table 2 shows the UL RLC SDU size for E-DCH performance requirements supported by R&S®CMU200. A HSUPA call is configured in R&S®CMU200 as shown in Figure 1(a) and 1(b).

UE output power for all performance requirements shall be greater than -10 dBm unless stated otherwise.

Configuration in R&S®CMU200:
BS Signal → TPC Settings → TPC Algorithm → Algorithm 1
BS Signal → TPC Settings → TPC Step Size → 1 dB
BS Signal → TPC Settings → TPC Pattern Setup → Set 1
BS Signal → TPC Settings → Set 1 → Pattern Type → Closed Loop
BS Signal → TPC Settings → Set 1 → UL Target Power → 0.0 dBm

UL RLC SDU size is configured in R&S®CMU200 according to Table 2.

Configuration in R&S®CMU200:
BS Signal → Circuit Switched → RMC Settings → HSPA → HSUPA UL RLC SDU Size → 2936 Bit (for section 3.2, 3.3, 3.6 and 3.7) or 5872 Bit (for section 3.4, 3.5, 3.8 and 3.9) or 8808 Bit (for section 3.10 and 3.11)

RADIO BEARER SETUP message in 9.2.1 of TS 34.108 [3] as shown in Table 19 and Table 20 are used to configure E-DCH call.

Contents of RADIO BEARER SETUP message: AM or UM (Test Loop Mode 1)			
Information Element	**Condition**	**Value/remark**	**Version**
- Power offset information			
- CHOICE Gain Factors		Signalled Gain Factors	
- CHOICE mode		FDD	
- Gain factor βc		8	
- Gain factor βd		15	

Table 19: Contents of RADIO BEARER SETUP message: AM or UM (Test Loop Mode 1) (Subset of 9.2.1 of TS 34.108 [3])

Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA)			
Information Element	**Condition**	**Value/remark**	**Version**
- RLC PDU size		336 bits	
CHOICE channel requirement - Power Control Algorithm - TPC step size - Δ_{ACK} - Δ_{NACK} - Ack-Nack repetition factor		Uplink DPCH info Algorithm1 0 (1 dB) 3 3 1	Rel-5 and earlier Rel-6
E-DCH info - E-DPCCH info - Happy bit delay condition	A1, A2	 100 ms	
- E-DPDCH info - E-TFCI table index - E-DCH minimum set E-TFCI - Reference E-TFCIs - Reference E-TFCI - Reference E-TFCI PO - Maximum channelisation codes - PLnon-max	A1	 0 9 1 E-TFCI 11 4 2sf4 0.84	
- E-DPDCH info - E-TFCI table index - E-DCH minimum set E-TFCI - Reference E-TFCIs - Reference E-TFCI - Reference E-TFCI PO - Reference E-TFCI - Reference E-TFCI PO - Maximum channelisation codes - PLnon-max	A2	 0 9 2 E-TFCI 11 4 83 16 2sf2 and 2sf4 0.84	
Downlink HS-PDSCH Information - Measurement Feedback Info - CHOICE mode - CQI Feedback cycle, k - CQI repetition factor - Δ_{CQI}		 FDD 2 ms 1 5 (corresponds to 0 dB in relative power offset)	
- Scheduled Transmission configuration - 2 ms scheduled transmission grant HARQ process allocation - Serving Grant	A1, A2	 Not present Not present	

Notes:
Condition A1: not using E-DCH 4 codes
Condition A2: using E-DCH 4 codes

Table 20: Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA) (Subset of 9.2.1 of TS 34.108 [3])

Configuration in R&S®CMU200:
BS Signal → HSUPA → RLC PDU Size → 336
BS Signal → HSDPA HS-DSCH → CQI Feedback Cycle → 2 ms
BS Signal → HSDPA HS-DSCH → CQI Repetition Factor → 1
BS Signal → HSDPA HS-DSCH → ACK/NACK Repetition Factor → 1
BS Signal → HSDPA HS-DSCH → Channel Configuration Type → Fixed Reference Channel
BS Signal → HSDPA HS-DSCH → Fixed Reference Channel → H-Set Selection → H-Set 1 QPSK
UE Signal → HSUPA → E-TFCI Table Index → 0
UE Signal → HSUPA → Minimum Set E-TFCI → 9
UE Signal → HSUPA → Happy Bit Delay Condition → 100 ms
UE Signal → HSUPA → Puncturing Limit PLnon-max → 0.84
UE Signal → HSUPA → Maximum Channelisation Code → 2xSF4 (for E-DCH category 1 to 5) or 2xSF2 and 2xSF4 (for E-DCH category 6)
UE Signal → HSUPA → Initial Serving Grant → Value → Off
UE Signal → HSUPA → HSUPA Gain Factors → Number of Reference E-TFCIs → 1 (for E-DCH category 1 to 5) or 2 (for E-DCH category 6)
UE Signal → HSUPA → Reference E-TFCI 1…4 → 11 (for E-DCH category 1 to 5) or 11 83 (for E-DCH category 6)
UE Signal → HSUPA → Reference E-TFCI Power Offset → 4 (for E-DCH category 1 to 5) or 4 16 (for E-DCH category 6)
UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → βc → 8
UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → βd → 15
UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → ΔACK → 3
UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → ΔNACK → 3
UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → ΔCQI → 5

These settings can be configured in R&S®CMU200 by referring to Figure 2(a), 2(b), 2(c) and 3(a).

Table 21 shows the downlink physical channels for E-DCH single link performance tests for subclauses 10.2.1, 10.3.1, 10.4.1 and 10.4.1A as specified in Table E.5A.2 of TS 34.121 [1].

Downlink physical channel parameters for E-DCH single link performance tests

Parameter during measurement	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH_Ec/Ior	dB	-15
HS-PDSCH	dB	-3 (Note 1)
HS-SCCH_1	dB	-7.5 (Note 2)
DPCH_Ec/Ior	dB	-10
E-AGCH	dB	Test specific (Note 3)
E-HICH	dB	Test specific (Note 4)
E-RGCH	dB	Test specific (Note 4)
OCNS_Ec/Ior	dB	Necessary power so that total transmit power spectral density of Node B (Ior) adds to one

Notes:
1. During TTIs, in which the HS-PDSCH is not allocated to the UE via HS-SCCH signalling, the HS-PDSCH shall be transmitted continuously with constant power
2. During TTIs, in which the HS-SCCH is not allocated to the UE the HS-SCCH shall be transmitted continuously with constant power.
3. Test specific value or -20 dB is used
4. Test specific value or DTX'd is used.

Table 21: Downlink physical channel parameters for E-DCH single link performance tests (Table E.5A.2 of TS 34.121 [1])

Configuration in R&S®CMU200:
BS Signal → Node-B Settings → Level Reference → Output Channel Power (Ior)
BS Signal → Downlink Physical Channels → P-CPICH → -10.0 dB
BS Signal → Downlink Physical Channels → P-SCH → -15.0 dB
BS Signal → Downlink Physical Channels → S-SCH → -15.0 dB
BS Signal → Downlink Physical Channels → P-CCPCH → -12.0 dB
BS Signal → Downlink Physical Channels → PICH → -15.0 dB
BS Signal → Downlink Physical Channels → DPDCH Level Config → -10.0 dB
BS Signal → Downlink Physical Channels → HSDPA Channels → On
BS Signal → Downlink Physical Channels → HS-SCCH → HS-SCCH#1 → Level → -7.5 dB
BS Signal → Downlink Physical Channels → HS-SCCH → HS-SCCH#2 → Level → Off
BS Signal → Downlink Physical Channels → HS-SCCH → HS-SCCH#3 → Level → Off
BS Signal → Downlink Physical Channels → HS-SCCH → HS-SCCH#4 → Level → Off
BS Signal → Downlink Physical Channels → HS-SCCH → HS-SCCH Selection → 1
BS Signal → Downlink Physical Channels → HS-SCCH → Number of HS-SCCH → 4
BS Signal → Downlink Physical Channels → HS-SCCH → Unscheduled Subframes → Transmit Dummy UEID
BS Signal → Downlink Physical Channels → HS-PDSCH → Level (All Active Codes) → -3.0 dB
BS Signal → Downlink Physical Channels → HSUPA Channels → On
BS Signal → Downlink Physical Channels → E-AGCH → E-AGCH → -20.0 dB
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → Test specific value
BS Signal → Downlink Physical Channels → E-RGCH Active → OFF or On (for E-RGCH test specific value)

These settings can be configured in R&S®CMU200 by referring to Figure 2(a), 2(b), 2(c) and 3(a).
The value of absolute grant scope shall be set to 0 (“All HARQ Processes”).

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-AGCH → AG Pattern → AG Scope(√:Per HARQ proc.) → (unchecked)

This setting can be configured in R&S®CMU200 as shown in Figure 3(b).

All parameters of performance requirements in this application note require an external multi-path fading simulator, e.g. R&S®SMU200A, to generate VA30 multi-path fading signal. These tests are recommended to be performed remotely. Detail setup information on R&S®SMU200A and remote control via CMUgo are available in application note [6].

A HSUPA call is setup according to TS 34.108 [3] subclause 7.3.9. To establish a HSUPA connection, press ‘Connect UE (CS)’ (E-DCH category 1 to 5) or ‘Connect UE (PS)’ (E-DCH category 6) on R&S®CMU200 once UE has registered/attached with R&S®CMU200.

3.2 Detection of E-DCH HARQ ACK Indicator Channel (E-HICH): Single Link Performance (10 ms TTI) (10.2.1.1)

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) in different multi-path fading environments are determined by the Missed ACK and False ACK values. The test will verify the average probability for Missed ACK and False ACK, when E-HICH is transmitted using 12 consecutive slots, do not exceed the specified values. The test applies to all FDD UE of Release 6 and later releases that support HSDPA and E-DCH.

Upon the UE transmission on E-DPCCH and E-DPDCH, the SS (System Simulator, i.e. Node-B simulator) reacts with E-HICH = ACK or DTX. The UE transmits new data or retransmissions on the corresponding E-DPCCH and E-DPDCH. New data is a sign for

ACK, received by the UE, while retransmission is a sign for NACK or DTX, received by the UE . The later is interpreted as NACK by higher layer and causes retransmission.

Fixed Reference Channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message as specified in section 3.1 is configured in R&S®CMU200 with exception of RADIO BEARER SETUP message in Table 22. External multi-path fading simulator is configured with VA30 fading signal.

RADIO BEARER SETUP: Specific Message Contents	
Information Element	**Value/remark**
RLC PDU size - E-DCH Transmission Time	112 10 ms
E-DCH MAC-d flow maximum number of retransmissions	15 (max)
E-DCH info - Happy bit delay condition	 10 ms (indication of exhausted resources on frame basis)

Table 22: RADIO BEARER SETUP: Specific Message Contents (Section 10.2.1.1.4.2 and section 10.2.1.1A.4.2 of TS 34.121 [1])

Configuration in R&S®CMU200:
BS Signal → HSUPA → TTI Mode → 10 ms
BS Signal → HSUPA → RLC PDU Size → 112
UE Signal → HSUPA → Happy Bit Delay Condition → 10 ms
UE Signal → HSUPA → RAB H-ARQ Profile → Max. Number of Retransmission → 15

These settings can be configured in R&S®CMU200 by referring to Figure 2(b) and 3(b).

Table 23, 24 and 25 show the test parameters for E-HICH – serving E-DCH cell, test requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – serving E-DCH cell and test requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – single link respectively.

Test parameters for E-HICH – Serving E-DCH cell			
Parameter	**Unit**	**Missed ACK**	**False ACK**
Ioc	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
E-HICH Ec/Ior	dB	-35 (test 1)	-∞ (test 2)
E-HICH signalling pattern	-	100% ACK	100% DTX

Table 23: Test parameters for E-HICH – Serving E-DCH cell (Table 10.2.1.1.5.1 of TS 34.121 [1])

Test requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – Serving E-DCH cell				
Test Number	**Propagation Conditions**	**Reference Value**		
		E-HICH Ec/Ior (dB)	**Ior/Ioc (dB)**	**Missed ACK probability**
1	VA30	-35.0	0.6	0.01

Table 24: Test requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – Serving E-DCH cell (Table 10.2.1.1.5.2 of TS 34.121 [1])

Test requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – Single link			
Test Number	**Propagation Conditions**	**Reference Value**	
		Ior/Ioc (dB)	**False ACK probability**
2	VA30	0.6	0.5

Table 25: Test requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – Single link (Table 10.2.1.1.5.3 of TS 34.121 [1])

Downlink physical channels in section 3.1, Table 23, Table 24 and Table 25 are configured in R&S®CMU200. The Absolute Grant is set to 5. The Relative Grant is not configured. The expected UL data rate is 71.6 kbps corresponding to E-TFC Index 45.

Configuration in R&S®CMU200:
BS Signal → Node-B Settings → Output Channel Power (Ior) → -59.4 dBm
BS Signal → Node-B Settings → AWGN Noise Pwr. (@3.84 MHz, Ioc) → Off
BS Signal → HSUPA → E-AGCH → AG Pattern → AG Index → 5
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -35.0 dB
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH Active → Off

These settings can be configured in R&S®CMU200 by referring to Figure 3(b), 5(a) and 5(e).

A HSUPA call is established. Fading simulator is switched on.

Missed ACK test:
For Missed ACK, the SS responds with 100% ACK. If UE indicates on the E-DPCCH a retransmission, the ACK from the SS was received as NACK or DTX by the UE and is counted as missed ACK. If the UE indicates on the E-DPCCH new data, the ACK from the SS was received as ACK by the UE and is counted as correct ACK. If the number of retransmission reaches the maximum number of retransmission due to several false or missed ACK detections in series, the first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK and this case is not counted as sample.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All ACK

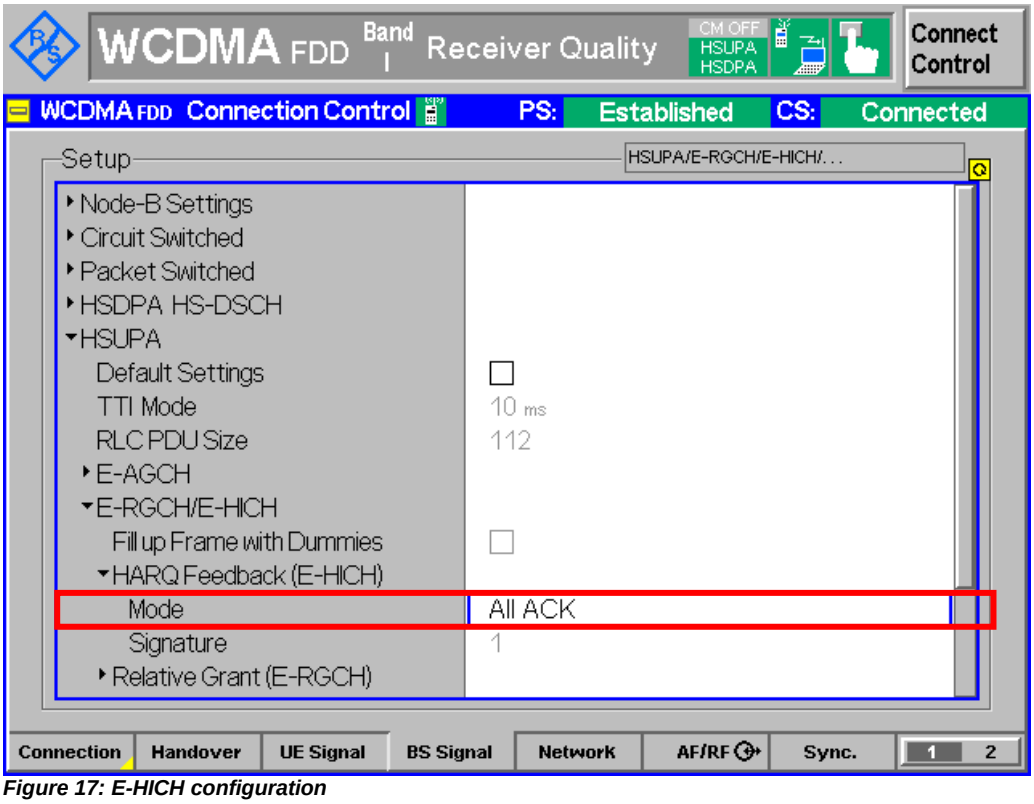


Figure 17: E-HICH configuration

The test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

False ACK test:

For False ACK, the SS responds with 100% DTX. If UE indicates on the E-DPCCH new data, the DTX from the SS was received as ACK by the UE and is counted as false ACK. If the UE indicats on the E-DPCCH retransmission, the DTX from the SS was received as DTX or NACK by the UE and is counted as correct reception. The number of retranmission will reach the maximum number of retransmission due to several retransmissions in series. The first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK received by the UE and this case is not counted as sample.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All DTX

This setting can be configured in R&S®CMU200 by referring to Figure 17.

The test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

Measurement result for detection of E-DCH HARQ Indicator Channel (E-HICH) is available in *HSUPA E-HICH* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Receiver Quality → Applic. 2 → HSUPA E-HICH

Figure 18 shows the detection of E-DCH HARQ Indicator Channel (E-HICH) measurement result.

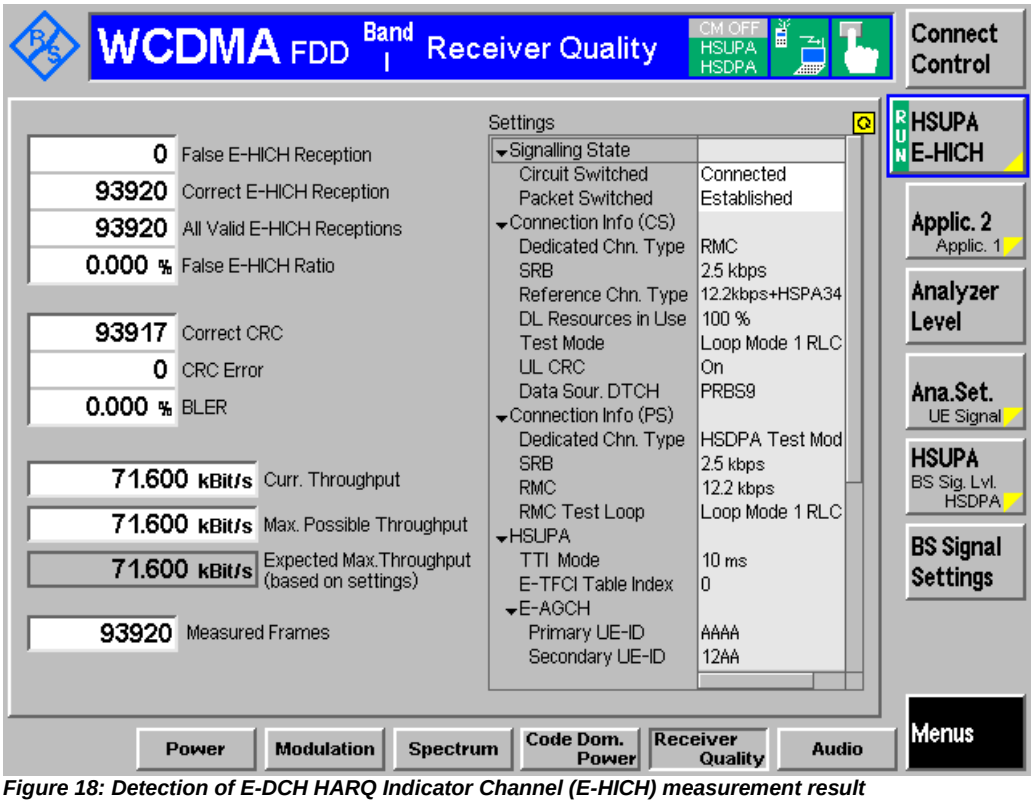


Figure 18: Detection of E-DCH HARQ Indicator Channel (E-HICH) measurement result

E-DCH category 1 to 5

For Missed ACK, recall EHICH10.sav and establish CS call.

For False ACK, recall EHICH10.sav, modify the following configuration and establish CS call:
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All DTX

E-DCH category 6

For Missed ACK, recall EHICH10.sav, modify the following configuration and establish PS call.
UE Signal → HSUPA → Maximum Channelisation Code → 2xSF2 and 2xSF4

For False ACK, recall EHICH10.sav, modify the following configurations and establish PS call.
UE Signal → HSUPA → Maximum Channelisation Code → 2xSF2 and 2xSF4
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All DTX

The measurement result is available at:
Menus → Receiver Quality → Applic. 2 → HSUPA E-HICH

3.3 Detection of E-DCH HARQ ACK Indicator Channel (E-HICH): Single Link Performance (10 ms TTI, Type 1) (10.2.1.1A)

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) in different multi-path fading environments are determined by the Missed ACK values. The test will verify the average probability for Missed ACK, when E-HICH is transmitted using 12 consecutive slots, do not exceed the specified values. The test applies to all FDD UE of Release 7 and later releases that support HSDPA and E-DCH and the optional Type 1 enhanced performance requirements.

Upon the UE transmission on E-DPCCH and E-DPDCH, the SS (System Simulator, i.e. Node-B simulator) reacts with E-HICH = ACK. The UE transmits new data or retransmissions on the corresponding E-DPCCH and E-DPDCH. New data is a sign for ACK, received by the UE while retransmission is a sign for NACK or DTX, received by the UE . The later is interpreted as NACK by higher layer and causes retransmission.

Fixed Reference Channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message as specified in section 3.1 is configured in R&S®CMU200 with exception of RADIO BEARER SETUP message in Table 22. External multi-path fading simulator is configured with VA30 fading signal.

Configuration in R&S®CMU200:
BS Signal → HSUPA → TTI Mode → 10 ms
BS Signal → HSUPA → RLC PDU Size → 112
UE Signal → HSUPA → Happy Bit Delay Condition → 10 ms
UE Signal → HSUPA → RAB H-ARQ Profile → Max. Number of Retransmission → 15

These settings can be configured in R&S®CMU200 by referring to Figure 2(b) and 3(b).

Table 26 and 27 show the test parameters for E-HICH – serving E-DCH cell and test requirement type 1 for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – serving E-DCH cell respectively.

Test parameters for E-HICH – Serving E-DCH cell		
Parameter	**Unit**	**Missed ACK**
Ioc	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
E-HICH Ec/Ior	dB	-38.2 (test 1)
E-HICH signalling pattern	-	100% ACK

Table 26: Test parameters for E-HICH – Serving E-DCH cell (Table 10.2.1.1A.5.1 of TS 34.121 [1])

Test requirement Type 1 for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – Serving E-DCH cell				
Test Number	Propagation Conditions	Reference Value		
		E-HICH Ec/Ior (dB)	Ior/Ioc (dB)	Missed ACK probability
1	VA30	-38.2	0.6	0.01

Table 27: Test requirement Type 1 for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – Serving E-DCH cell (Table 10.2.1.1A.5.2 of TS 34.121 [1])

Downlink physical channels in section 3.1, Table 26 and Table 27 are configured in R&S®CMU200. The Absolute Grant is set to 5. The Relative Grant is not configured. The expected UL data rate is 71.6 kbps corresponding to E-TFC Index 45.

Configuration in R&S®CMU200:
BS Signal → Node-B Settings → Output Channel Power (Ior) → -59.4 dBm
BS Signal → Node-B Settings → AWGN Noise Pwr. (@3.84 MHz, Ioc) → Off
BS Signal → HSUPA → E-AGCH → AG Pattern → AG Index → 5
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -38.2 dB
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH Active → Off

These settings can be configured in R&S®CMU200 by referring to Figure 3(b), 5(a) and 5(e).

A HSUPA call is established. Fading simulator is switched on.

For Missed ACK, the SS responds with 100% ACK. If UE indicates on the E-DPCCH a retransmission, the ACK from the SS was received as NACK or DTX by the UE and is counted as missed ACK. If the UE indicates on the E-DPCCH new data, the ACK from the SS was received as ACK by the UE and is counted as correct ACK. If the number of retransmission reaches the maximum number of retransmission due to several false or missed ACK detections in series, the first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK and this case is not counted as sample.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All ACK

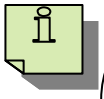
This setting can be configured in R&S®CMU200 by referring to Figure 17.

The test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

Measurement result for detection of E-DCH HARQ Indicator Channel (E-HICH) is available in *HSUPA E-HICH* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Receiver Quality → Applic. 2 → HSUPA E-HICH

Figure 18 shows the detection of E-DCH HARQ Indicator Channel (E-HICH) measurement result.



E-DCH category 1 to 5

Recall EHICH10.sav, modify the following configuration and establish CS call.
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -38.2 dB

E-DCH category 6

For Missed ACK, recall EHICH10.sav, modify the following configuration and establish PS call.
UE Signal → HSUPA → Maximum Channelisation Code → 2xSF2 and 2xSF4
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -38.2 dB

The measurement result is available at:
Menus → Receiver Quality → Applic. 2 → HSUPA E-HICH

3.4 Detection of E-DCH HARQ ACK Indicator Channel (E-HICH): Single Link Performance (2 ms TTI) (10.2.1.2)

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) in different multi-path fading environments are determined by the Missed ACK and False ACK values. The test will verify the average probability for Missed ACK and False ACK, when E-HICH is transmitted using 3 consecutive slots, do not exceed the specified values. The test applies to all FDD UE of Release 6 and later releases that support HSDPA and E-DCH with 2 ms TTI.

Upon the UE transmission on E-DPCCH and E-DPDCH, the SS (System Simulator, i.e. Node-B simulator) reacts with E-HICH = ACK or DTX. The UE transmits new data or retransmissions on the corresponding E-DPCCH and E-DPDCH. New data is a sign for ACK, received by the UE while retransmission is a sign for NACK or DTX, received by the UE . The later is interpreted as NACK by higher layer and causes retransmission.

Fixed Reference Channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message as specified in section 3.1 is configured in R&S®CMU200 with exception of RADIO BEARER SETUP message in Table 28. External multi-path fading simulator is configured with VA30 fading signal.

RADIO BEARER SETUP: Specific Message Contents	
Information Element	**Value/remark**
RLC PDU size - E-DCH Transmission Time	112 2 ms
E-DCH MAC-d flow maximum number of retransmissions	15 (max)
E-DCH info - Happy bit delay condition	 2 ms (indication of exhausted resources on frame basis)

Table 28: RADIO BEARER SETUP: Specific Message Contents (Section 10.2.1.2.4.2 and section 10.2.1.2A.4.2 of TS 34.121 [1])

Configuration in R&S®CMU200:
BS Signal → Packet Switched → HSUPA Test Mode → HSUPA UL RLC SDU Size → 5872 Bit
BS Signal → HSUPA → TTI Mode → 2 ms
BS Signal → HSUPA → RLC PDU Size → 112
UE Signal → HSUPA → Happy Bit Delay Condition → 2 ms
UE Signal → HSUPA → RAB H-ARQ Profile → Max. Number of Retransmission → 15

These settings can be configured in R&S®CMU200 by referring to Figure 1(b), 2(b) and 3(b).

Table 29, 30 and 31 show the test parameters for E-HICH – serving E-DCH cell, test requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – serving E-DCH cell and test requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – serving E-DCH cell respectively.

Test parameters for E-HICH – Serving E-DCH cell			
Parameter	**Unit**	**Missed ACK**	**False ACK**
Ioc	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
E-HICH Ec/Ior	dB	-28.2 (test 1)	-∞ (test 2)
E-HICH signalling pattern	-	100% ACK	100% DTX

Table 29: Test parameters for E-HICH – Serving E-DCH cell (Table 10.2.1.2.5.1 of TS 34.121 [1])

Test requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – Serving E-DCH cell				
Test Number	**Propagation Conditions**	**Reference Value**		
		E-HICH Ec/Ior (dB)	**Ior/Ioc (dB)**	**Missed ACK probability**
1	VA30	-28.2	0.6	0.01

Table 30: Test requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – Serving E-DCH cell (Table 10.2.1.2.5.2 of TS 34.121 [1])

Test requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – Serving E-DCH cell			
Test Number	**Propagation Conditions**	**Reference Value**	
		Ior/Ioc (dB)	**False ACK probability**
2	VA30	0.6	0.5

Table 31: Test requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – Serving E-DCH cell (Table 10.2.1.2.5.3 of TS 34.121 [1])

Downlink physical channels in section 3.1, Table 29, Table 30 and Table 31 are configured in R&S®CMU200. The Absolute Grant is set to 4. The Relative Grant is not configured. The expected UL data rate is 237 kbps corresponding to E-TFC Index 39.

Configuration in R&S®CMU200:
BS Signal → Node-B Settings → Output Channel Power (Ior) → -59.4 dBm
BS Signal → Node-B Settings → AWGN Noise Pwr. (@3.84 MHz, Ioc) → Off
BS Signal → HSUPA → E-AGCH → AG Pattern → AG Index → 4
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -28.2 dB
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH Active → Off

These settings can be configured in R&S®CMU200 by referring to Figure 3(b), 5(a) and 5(e).

A HSUPA call is established. Fading simulator is switched on.

Missed ACK test:
For Missed ACK, the SS responds with 100% ACK. If UE indicates on the E-DPCCH a retransmission, the ACK from the SS was received as NACK or DTX by the UE and is counted as missed ACK. If the UE indicates on the E-DPCCH new data, the ACK from the SS was received as ACK by the UE and is counted as correct ACK. If the number of retransmission reaches the maximum number of retransmission due to several false or missed ACK detections in series, the first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK and this case is not counted as sample.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All ACK

This setting can be configured in R&S®CMU200 by referring to Figure 17.

The test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

False ACK test:
For False ACK, the SS responds with 100% DTX. If UE indicats on the E-DPCCH new data, the DTX from the SS was received as ACK by the UE and is counted as false ACK. If the UE indicats on the E-DPCCH retransmission, the DTX from the SS was received as DTX or NACK by the UE and is counted as correct reception. The number of retranmission will reach the maximum number of retransmission due to several retransmissions in series. The first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK received by the UE and this case is not counted as sample.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All DTX

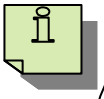
This setting can be configured in R&S®CMU200 by referring to Figure 17.

The test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

Measurement result for detection of E-DCH HARQ Indicator Channel (E-HICH) is available in *HSUPA E-HICH* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Receiver Quality → Applic. 2 → HSUPA E-HICH

Figure 18 shows the detection of E-DCH HARQ Indicator Channel (E-HICH) measurement result.



E-DCH category 2 and 4

For Missed ACK, recall EHICH2.sav and establish CS call.

For False ACK, recall EHICH2.sav, modify the following configuration and establish CS call.
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All DTX

E-DCH category 6

For Missed ACK, recall EHICH2.sav, modify the following configuration and establish PS call.
UE Signal → HSUPA → Maximum Channelisation Code → 2xSF2 and 2xSF4

For False ACK, recall EHICH2.sav, modify the following configurations and establish PS call.
UE Signal → HSUPA → Maximum Channelisation Code → 2xSF2 and 2xSF4
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All DTX

The measurement result is available at:
Menus → Receiver Quality → Applic. 2 → HSUPA E-HICH

3.5 Detection of E-DCH HARQ ACK Indicator Channel (E-HICH): Single Link Performance (2 ms TTI, Type 1) (10.2.1.2A)

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) in different multi-path fading environments are determined by the Missed values. The test will verify the average probability for Missed ACK, when E-HICH is transmitted using 3 consecutive slots, do not exceed the specified values. The test applies to all FDD UE of Release 7 and later releases that support HSDPA, E-DCH with 2 ms TTI and optional Type 1 enhanced performance requirements.

Upon the UE transmission on E-DPCCH and E-DPDCH, the SS (System Simulator, i.e. Node-B simulator) reacts with E-HICH = ACK. The UE transmits new data or retransmissions on the corresponding E-DPCCH and E-DPDCH. New data is a sign for ACK, received by the UE while retransmission is a sign for NACK or DTX, received by the UE . The later is interpreted as NACK by higher layer and causes retransmission.

Fixed Reference Channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message as specified in section 3.1 is configured in R&S®CMU200 with exception of RADIO BEARER SETUP message in Table 28. External multi-path fading simulator is configured with VA30 fading signal.

Configuration in R&S®CMU200:
BS Signal → Packet Switched → HSUPA Test Mode → HSUPA UL RLC SDU Size → 5872 Bit
BS Signal → HSUPA → TTI Mode → 2 ms
BS Signal → HSUPA → RLC PDU Size → 112
UE Signal → HSUPA → Happy Bit Delay Condition → 2 ms
UE Signal → HSUPA → RAB H-ARQ Profile → Max. Number of Retransmission → 15

These settings can be configured in R&S®CMU200 by referring to Figure 1(b), 2(b) and 3(b).

Table 32 and 33 show the test parameters for E-HICH – serving E-DCH cell, test requirement Type 1 for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – serving E-DCH respectively.

Test parameters for E-HICH – Serving E-DCH cell		
Parameter	**Unit**	**Missed ACK**
Ioc	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
E-HICH Ec/Ior	dB	-31.6 (test 1)
E-HICH signalling pattern	-	100% ACK

Table 32: Test parameters for E-HICH – Serving E-DCH cell (Table 10.2.1.2A.5.1 of TS 34.121 [1])

Test requirement Type 1 for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – Serving E-DCH cell				
Test Number	Propagation Conditions	Reference Value		
		E-HICH Ec/Ior (dB)	Ior/Ioc (dB)	Missed ACK probability
1	VA30	-31.6	0.6	0.01

Table 33: Test requirement Type 1 for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – Serving E-DCH cell (Table 10.2.1.2A.5.2 of TS 34.121 [1])

Downlink physical channels in section 3.1, Table 32 and Table 33 are configured in R&S®CMU200. The Absolute Grant is set to 4. The Relative Grant is not configured. The expected UL data rate is 237 kbps corresponding to E-TFC Index 39.

Configuration in R&S®CMU200:
BS Signal → Node-B Settings → Output Channel Power (Ior) → -59.4 dBm
BS Signal → Node-B Settings → AWGN Noise Pwr. (@3.84 MHz, Ioc) → Off
BS Signal → HSUPA → E-AGCH → AG Pattern → AG Index → 4
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All ACK
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -31.6 dB
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH Active → Off

These settings can be configured in R&S®CMU200 by referring to Figure 3(b), 5(a) and 5(e).

A HSUPA call is established. Fading simulator is switched on.

For Missed ACK, the SS responds with 100% ACK. If UE indicates on the E-DPCCH a retransmission, the ACK from the SS was received as NACK or DTX by the UE and is counted as missed ACK. If the UE indicates on the E-DPCCH new data, the ACK from the SS was received as ACK by the UE and is counted as correct ACK. If the number of retransmission reaches the maximum number of retransmission due to several false or missed ACK detections in series, the first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK and this case is not counted as sample.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All ACK

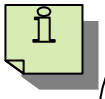
This setting can be configured in R&S®CMU200 by referring to Figure 17.

The test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

Measurement result for detection of E-DCH HARQ Indicator Channel (E-HICH) is available in *HSUPA E-HICH* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Receiver Quality → Applic. 2 → HSUPA E-HICH

Figure 18 shows the detection of E-DCH HARQ Indicator Channel (E-HICH) measurement result.



E-DCH category 2 and 4

For Missed ACK, recall EHICH2.sav, modify the following configuration and establish CS call.
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -31.6 dB

E-DCH category 6

For Missed ACK, recall EHICH2.sav, modify the following configuration and establish PS call.
UE Signal → HSUPA → Maximum Channelisation Code → 2xSF2 and 2xSF4
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -31.6 dB

The measurement result is available at:
Menus → Receiver Quality → Applic. 2 → HSUPA E-HICH

3.6 Detection of E-DCH Relative Grant Channel (E-RGCH): Single Link Performance (10 ms TTI) (10.3.1.1)

The receive characteristics of the E-DCH Relative Grant Channel (E-RGCH) in multi-path fading environments are determined by the Missed UP/DOWN and Missed HOLD values. The test will verify the average probability for Missed UP/DOWN and Missed HOLD, when E-RGCH is transmitted using 12 consecutive slots, do not exceed the specified values. The test applies to all FDD UE of Release 6 and later releases that support HSDPA and E-DCH.

The UE transmits E-DPCCH and E-DPDCH. The SS (System Simulator, i.e. Node-B simulator) transmits E-RGCH UP, DOWN or HOLD (DTX). The UE changes or holds the transport format of the corresponding E-DPCCH and E-DPDCH accordingly. This is visible for the SS by reading the E-TFCI, signalled on the corresponding E-DPCCH. The fail cases for UP are DOWN (erroneous detection) and HOLD (missed detection). The fail cases for DOWN are UP and HOLD.

Fixed Reference Channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message as specified in section 3.1 is configured in R&S®CMU200 with exception of RADIO BEARER SETUP message in Table 34. External multi-path fading simulator is configured with VA30 fading signal.

Test parameters for E-HICH – Serving E-DCH cell		
Information Element	**Value/remark**	**Version**
RLC PDU size	112	Rel-6
- E-DCH Transmission Time	10 ms	
E-DCH MAC-d flow maximum number of retransmissions	0	
E-DCH info - Happy bit delay condition - E-DCH minimum set E-TFCI	 10 ms (indication of exhausted resources on frame basis) Not Present in RGCH performance tests, all E-TFCs should be in the selection process)	Rel-6
Downlink information for each radio link list - Downlink information for each radio link - CHOICE E-RGCH Information - E-RGCH Information - Signature Sequence - RG combination index	 0 0	 Rel-6

Table 34: RADIO BEARER SETUP: Specific Message Contents (Section 10.3.1.1.4.2 and section 10.3.1.1A.4.2 of TS 34.121 [1])

Configuration in R&S®CMU200:
BS Signal → HSUPA → TTI Mode → 10 ms
BS Signal → HSUPA → RLC PDU Size → 112
BS Signal → HSUPA → E-RGCH/E-HICH → Relative Grant (E-RGCH) → Signature → 0
UE Signal → HSUPA → Happy Bit Delay Condition → 10 ms
UE Signal → HSUPA → Minimum set E-TFCI → OFF
UE Signal → HSUPA → RAB H-ARQ Profile → Max. Number of Retransmission → 0

These settings can be configured in R&S®CMU200 by referring to Figure 2(b), 3(b) and as shown in Figure 19.

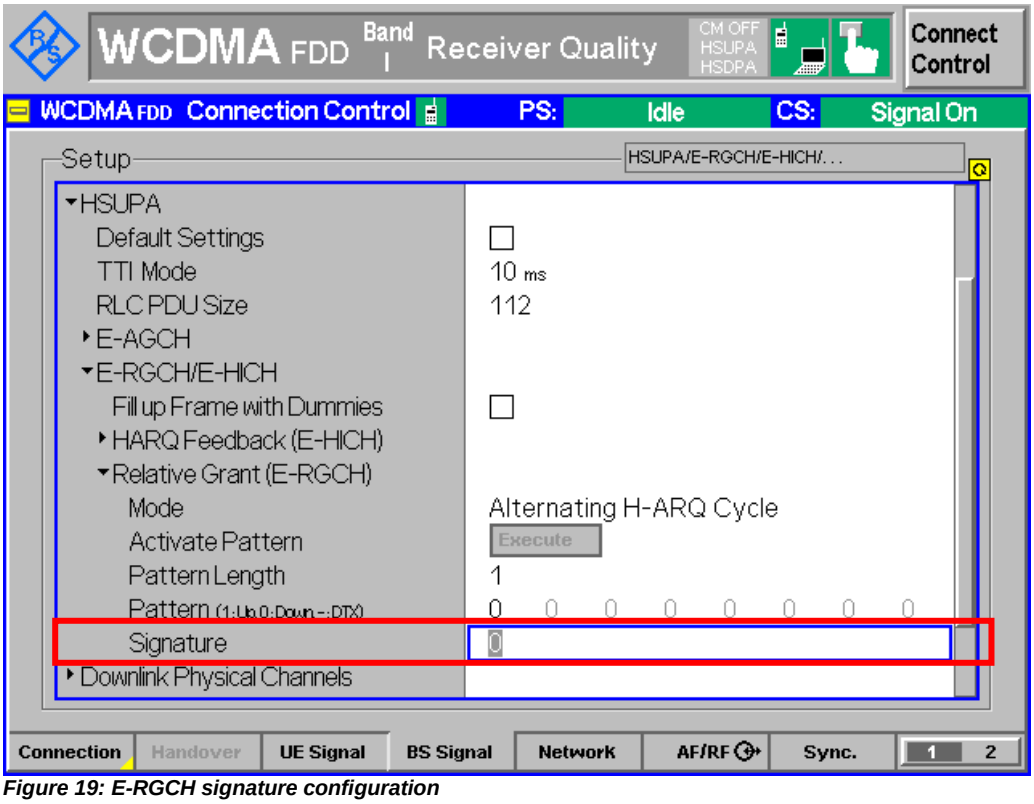


Figure 19: E-RGCH signature configuration

Table 35, 36 and 37 show the test parameters for E-RGCH – serving E-DCH cell, test requirement for Missed UP/DOWN when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH cell and test requirement for Missed HOLD when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH cell respectively.

Test parameters for E-RGCH – Serving E-DCH cell			
Parameter	**Unit**	**Missed UP/DOWN**	**Missed HOLD**
Ioc	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
E-RGCH Ec/Ior	dB	-30.9 (test 1)	-∞ (test 2)
E-RGCH signalling pattern	-	50% UP 50% DOWN	100% HOLD

Table 35: Test parameters for E-RGCH – Serving E-DCH cell (Table 10.3.1.1.5.1 of TS 34.121 [1])

Test requirement for Missed UP/DOWN when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH cell				
Test Number	Propagation Conditions	Reference Value		
		E-RGCH Ec/Ior (dB)	Ior/Ioc (dB)	Missed UP/DOWN probability
1	VA30	-30.9	0.6	0.05/0.05

Table 36: Test requirement for Missed UP/DOWN when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH cell (Table 10.3.1.1.5.2 of TS 34.121 [1])

Test requirement for Missed HOLD when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH cell			
Test Number	Propagation Conditions	Reference Value	
		Ior/Ioc (dB)	Missed HOLD probability
2	VA30	0.6	0.1

Table 37: Test requirement for Missed HOLD when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH cell (Table 10.3.1.1.5.3 of TS 34.121 [1])

Downlink physical channels in section 3.1, Table 35, Table 36 and Table 37 are configured in R&S®CMU200. The Absolute Grant is set to 5. The expected UL data rate is 71.6 kbps corresponding to E-TFC Index 45.

Configuration in R&S®CMU200:
BS Signal → Node-B Settings → Output Channel Power (Ior) → -59.4 dBm
BS Signal → Node-B Settings → AWGN Noise Pwr. (@3.84 MHz, Ioc) → Off
BS Signal → HSUPA → E-AGCH → AG Pattern → AG Index → 5
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -30.9 dB
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH Active → On

These settings can be configured in R&S®CMU200 by referring to Figure 3(b), 5(a) and 5(e).

A HSUPA call is established. Fading simulator is switched on.

Upon reception of every E-DPCCH and E-DPDCH, “DTX” is always signalled by the SS on the E-HICH during the entire test. This is to ensure no E-HICH power but UE will transmit new data, since “E-DCH MAC-d flow maximum number of retransmissions” is set to 0.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All DTX

This setting can be configured in R&S®CMU200 by referring to Figure 17.

Missed UP/DOWN test:
4 consecutive “DOWN” is signalled by the SS on the E-RGCH. E-TFCI for 4 consecutive HARQ processes, signalled on the E-DPCCH and corresponding to these “DOWN”, is read by SS. It is counted as Missed DOWN if the UE increases or holds the transport format at each HARQ process upon a “DOWN” command. The UE may transmit less data than granted if Happy Bit = 1 is signalled by the UE. The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

4 consecutive “UP” is signalled by the SS on the E-RGCH. E-TFCI for 4 consecutive HARQ processes, signalled on the E-DPCCH and corresponding to these “UP”, is read by SS. It is counted as Missed UP if the UE decreases or holds the transport format at each HARQ process upon a “UP” command. The UE may transmit less data than granted if Happy Bit = 1 is signalled by the UE. The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → Relative Grant (E-RGCH) → Mode → Alternating H-ARQ Cylce

This setting can be configured in R&S®CMU200 by referring to Figure 19.

The “DOWN-UP” cycle above is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved for DOWN and UP separately. If one counter reaches the pass criterion, this counter is stopped and the remaining counter is continued. If the last counter reaches pass, the Missed UP DOWN test is pass. If the first counter reaches fail, the Missed UP DOWN test is fail.

Due to Missed UP or Missed DOWN the operating range will shift down or up. If the operating range shifts outside the range shown in Table 38, the operating range must be re-adjusted. R&S®CMU200 will re-adjust the operating point when the operating is shifted outside of the operating range.

E-TFCI operating point/range (10 ms)						
Missed UP DOWN	**Missed HOLD**	**AG Value**	**βed/βc**	**E-TFCI**	**TB Size = N*112 + Header + Padding**	**UL rate (kbps)**
		6	24/15	59	1264 = 11*112 + 18 + 14	126.4
			21/15	52	951 = 8* 112 + 18 + 37	95.1
Initial operaing range	**Initial operating point**	**5**	**19/15**	**45**	**716 = 6*112 + 18 + 26**	**71.6**
			17/15	**40**	**584 = 5*112 + 18 + 6**	**58.4**
		4	15/15	35	477 = 4*112 + 18 + 11	47.7
			13/15	28	359 = 3*112 + 18 + 4	35.9
			12/15	19	249 = 2*112 + 18 + 7	24.9

Table 38: E-TFCI operating point/range (10 ms) (Table 10.3.1.1.4.2.1 of TS 34.121 [1])

Configuration in R&S®CMU200:
HSUPA E-RGCH → Control → HSUPA E-RGCH → Nr. Of Expected E-TFCI’s → 7
HSUPA E-RGCH → Control → HSUPA E-RGCH → Initial E-TFCI Index → 5
HSUPA E-RGCH → Control → HSUPA E-RGCH → E-TFCI Value Selection → Auto

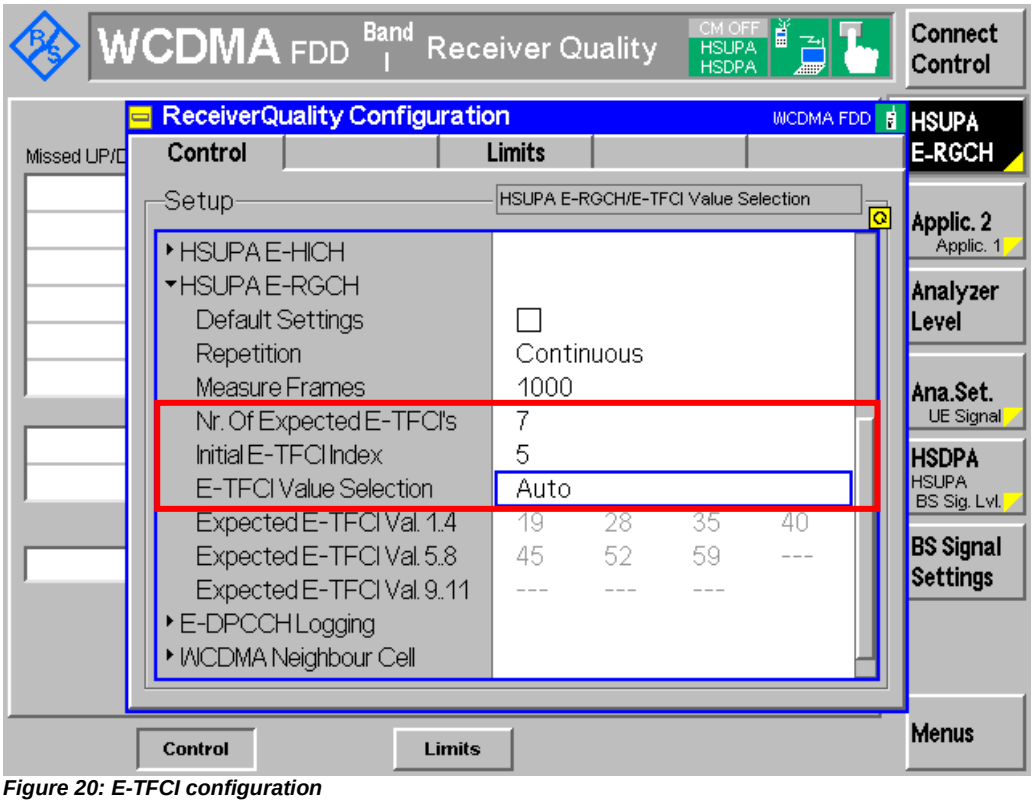


Figure 20: E-TFCI configuration

The test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

Missed HOLD test:

"DTX" is signalled by the SS on the E-RGCH. E-TFCI, signalled on the E-DPCCH and corresponding to the "DTX", is read by SS. It is counted as Missed HOLD if the UE increases or decreases the transport format upon a "DTX" command. The UE may transmit less data than granted if Happy Bit = 1 is signalled by the UE. The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → Relative Grant (E-RGCH) → Mode → All DTX

This setting can be configured in R&S®CMU200 by referring to Figure 19.

Missed HOLD test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

Due to Missed HOLD the operating range will shift down or up. If the operating range shifts outside the range shown in Table 38, the operating range must be re-adjusted.

The test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

Measurement result for detection of E-DCH Relative Grant Channel (E-RGCH) is available in *HSUPA E-RGCH* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Receiver Quality → Applic. 2 → HSUPA E-RGCH

Figure 21(a) and 21(b) show the detection of E-DCH HARQ Indicator Channel (E-HICH) Missed UP/DOWN and Missed HOLD measurement result respectively.

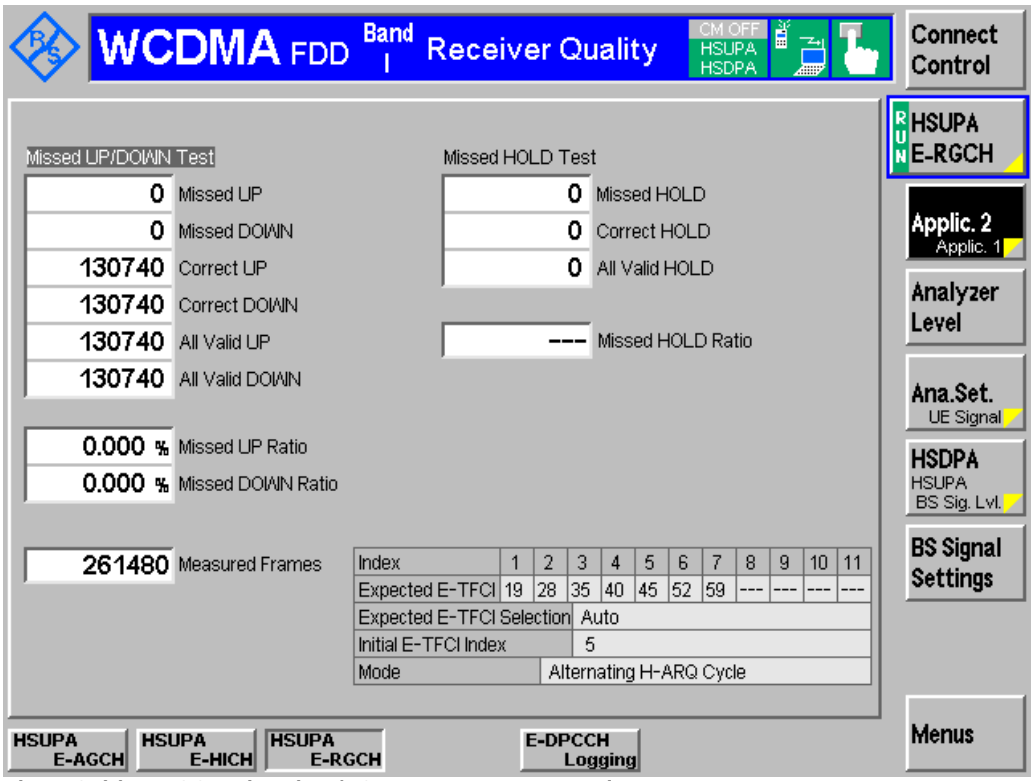


Figure 21(a): E-RGCH Missed UP/DOWN measurement result

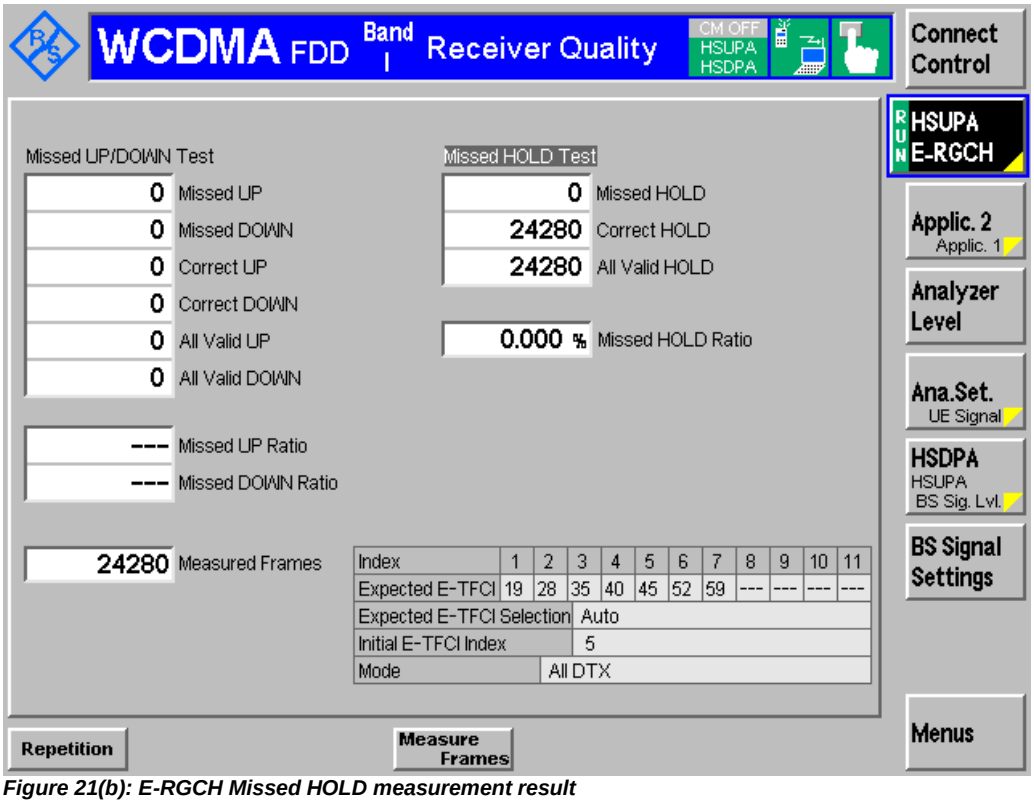


Figure 21(b): E-RGCH Missed HOLD measurement result

E-DCH category 1 to 5

For Missed UP/DOWN, recall ERGCH10.sav and establish CS call.

For Missed HOLD, recall ERGCH10.sav, modify the following configuration and establish CS call.
BS Signal → HSUPA → E-RGCH/E-HICH → Relative Grant (E-RGCH) → Mode → All DTX

E-DCH category 6

For Missed UP/DOWN, recall ERGCH10.sav, modify the following configuration and establish PS call.
UE Signal → HSUPA → Maximum Channelisation Code → 2xSF2 and 2xSF4

For Missed HOLD, recall ERGCH10.sav, modify the following configurations and establish PS call.
UE Signal → HSUPA → Maximum Channelisation Code → 2xSF2 and 2xSF4
BS Signal → HSUPA → E-RGCH/E-HICH → Relative Grant (E-RGCH) → Mode → All DTX

The measurement result is available at:
Menus → Receiver Quality → Applic. 2 → HSUPA E-RGCH

3.7 Detection of E-DCH Relative Grant Channel (E-RGCH): Single Link Performance (10 ms TTI, Type 1) (10.3.1.1A)

The receive characteristics of the E-DCH Relative Grant Channel (E-RGCH) in multi-path fading environments are determined by the Missed UP/DOWN. The test will verify the average probability for Missed UP/DOWN, when E-RGCH is transmitted using 12 consecutive slots, do not exceed the specified values. The test applies to all FDD UE of Release 7 and later releases that support HSDPA, E-DCH and the optional Type 1 enhanced performance.

The UE transmits E-DPCCH and E-DPDCH. The SS (System Simulator, i.e. Node-B simulator) transmits E-RGCH UP or DOWN. The UE changes or holds the transport format of the corresponding E-DPCCH and E-DPDCH accordingly. This is visible for the SS by reading the E-TFCI, signalled on the corresponding E-DPCCH. The fail cases for UP are DOWN (erroneous detection) and HOLD (missed detection). The fail cases for DOWN are UP and HOLD.

Fixed Reference Channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message as specified in section 3.1 is configured in R&S®CMU200 with exception of RADIO BEARER SETUP message in Table 34. External multi-path fading simulator is configured with VA30 fading signal.

Configuration in R&S®CMU200:
BS Signal → HSUPA → TTI Mode → 10 ms
BS Signal → HSUPA → RLC PDU Size → 112
BS Signal → HSUPA → E-RGCH/E-HICH → Relative Grant (E-RGCH) → Signature → 0
UE Signal → HSUPA → Happy Bit Delay Condition → 10 ms
UE Signal → HSUPA → Minimum set E-TFCI → OFF
UE Signal → HSUPA → RAB H-ARQ Profile → Max. Number of Retransmission → 0

These settings can be configured in R&S®CMU200 by referring to Figure 2(b), 3(b) and as shown in Figure 19.

Table 39 and 40 show the test parameters for E-RGCH – serving E-DCH cell and test requirement Type 1 for Missed UP/DOWN when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH respectively.

Test parameters for E-RGCH – Serving E-DCH cell		
Parameter	**Unit**	**Missed UP/DOWN**
Ioc	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
E-RGCH Ec/Ior	dB	-34.9 (test 1)
E-RGCH signalling pattern	-	50% UP 50% DOWN

Table 39: Test parameters for E-RGCH – Serving E-DCH cell (Table 10.3.1.1A.5.1 of TS 34.121 [1])

Test requirement Type 1 for Missed UP/DOWN when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH cell				
Test Number	Propagation Conditions	Reference Value		
		E-RGCH Ec/Ior (dB)	Ior/Ioc (dB)	Missed UP/DOWN probability
1	VA30	-34.9	0.6	0.05/0.05

Table 40: Test requirementType 1 for Missed UP/DOWN when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH cell (Table 10.3.1.1A.5.2 of TS 34.121 [1])

Downlink physical channels in section 3.1, Table 39 and Table 40 are configured in R&S®CMU200. The Absolute Grant is set to 5. The expected UL data rate is 71.6 kbps corresponding to E-TFC Index 45.

Configuration in R&S®CMU200:
BS Signal → Node-B Settings → Output Channel Power (Ior) → -59.4 dBm
BS Signal → Node-B Settings → AWGN Noise Pwr. (@3.84 MHz, Ioc) → Off
BS Signal → HSUPA → E-AGCH → AG Pattern → AG Index → 5
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -34.9 dB
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH Active → On

These settings can be configured in R&S®CMU200 by referring to Figure 3(b), 5(a) and 5(e).

A HSUPA call is established. Fading simulator is switched on.

Upon reception of every E-DPCCH and E-DPDCH, “DTX” is always signalled by the SS on the E-HICH during the entire test. This is to ensure no E-HICH power but UE will transmit new data, since “E-DCH MAC-d flow maximum number of retransmissions” is set to 0.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All DTX

This setting can be configured in R&S®CMU200 by referring to Figure 17.

4 consecutive “DOWN” is signalled by the SS on the E-RGCH. E-TFCI for 4 consecutive HARQ processes, signalled on the E-DPCCH and corresponding to these “DOWN”, is read by SS. It is counted as Missed DOWN if the UE increases or holds the transport format at each HARQ process upon a “DOWN” command. The UE may transmit less data than granted if Happy Bit = 1 is signalled by the UE. The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

4 consecutive “UP” is signalled by the SS on the E-RGCH. E-TFCI for 4 consecutive HARQ processes, signalled on the E-DPCCH and corresponding to these “UP”, is read by SS. It is counted as Missed UP if the UE decreases or holds the transport format at each HARQ process upon a “UP” command. The UE may transmit less data than granted if Happy Bit = 1 is signalled by the UE. The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → Relative Grant (E-RGCH) → Mode → Alternating H-ARQ Cylce

This setting can be configured in R&S®CMU200 by referring to Figure 19.

The “DOWN-UP” cycle above is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved for DOWN and UP separately. If one counter reaches the pass criterion, this counter is stopped and the remaining counter is continued. If the last counter reaches pass, the Missed UP DOWN test is pass. If the first counter reaches fail, the Missed UP DOWN test is fail.

Due to Missed UP or Missed DOWN the operating range will shift down or up. If the operating range shifts outside the range shown in Table 41, the operating range must be re-adjusted. R&S®CMU200 will re-adjust the operating point when the operating is shifted outside of the operating range.

E-TFCI operating point/range (10 ms)					
Missed UP DOWN	**AG Value**	**βed/βc**	**E-TFCI**	**TB Size = N*112 + Header + Padding**	**UL rate (kbps)**
	6	24/15	59	1264 = 11*112 + 18 + 14	126.4
		21/15	52	951 = 8* 112 + 18 + 37	95.1
Initial operaing range	**5**	**19/15**	**45**	**716 = 6*112 + 18 + 26**	**71.6**
		17/15	**40**	**584 = 5*112 + 18 + 6**	**58.4**
	4	15/15	35	477 = 4*112 + 18 + 11	47.7
		13/15	28	359 = 3*112 + 18 + 4	35.9
		12/15	19	249 = 2*112 + 18 + 7	24.9

Table 41: E-TFCI operating point/range (10 ms) (Table 10.3.1.1A.4.2.1 of TS 34.121 [1])

Configuration in R&S®CMU200:
HSUPA E-RGCH → Control → HSUPA E-RGCH → Nr. Of Expected E-TFCI’s → 7
HSUPA E-RGCH → Control → HSUPA E-RGCH → Initial E-TFCI Index → 5
HSUPA E-RGCH → Control → HSUPA E-RGCH → E-TFCI Value Selection → Auto

These settings can be configured in R&S®CMU200 as shown in Figure 20.

The test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

Measurement result for detection of E-DCH Relative Grant Channel (E-RGCH) is available in *HSUPA E-RGCH* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Receiver Quality → Applic. 2 → HSUPA E-RGCH

Figure 21(a) shows the detection of E-DCH HARQ Indicator Channel (E-HICH) Missed UP/DOWN measurement result.

E-DCH category 1 to 5

For Missed UP/DOWN, recall ERGCH10.sav, modify the following configuration and establish CS call.
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -34.9 dB

E-DCH category 6

For Missed UP/DOWN, recall ERGCH10.sav, modify the following configurations and establish PS call.
UE Signal → HSUPA → Maximum Channelisation Code → 2xSF2 and 2xSF4
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -34.9 dB

The measurement result is available at:
Menus → Receiver Quality → Applic. 2 → HSUPA E-RGCH

3.8 Detection of E-DCH Relative Grant Channel (E-RGCH): Single Link Performance (2 ms TTI) (10.3.1.2)

The receive characteristics of the E-DCH Relative Grant Channel (E-RGCH) in multi-path fading environments are determined by the Missed UP/DOWN and Missed HOLD values. The test will verify the average probability for Missed UP/DOWN and Missed HOLD, when E-RGCH is transmitted using 3 consecutive slots, do not exceed the specified values. The test applies to all FDD UE of Release 6 and later releases that support HSDPA and E-DCH with 2 ms TTI.

The UE transmits E-DPCCH and E-DPDCH. The SS (System Simulator, i.e. Node-B simulator) transmits E-RGCH UP, DOWN or HOLD (DTX). The UE changes or holds the transport format of the corresponding E-DPCCH and E-DPDCH accordingly. This is visible for the SS by reading the E-TFCI, signalled on the corresponding E-DPCCH. The fail cases for UP are DOWN (erroneous detection) and HOLD (missed detection). The fail cases for DOWN are UP and HOLD.

Fixed Reference Channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message as specified in section 3.1 is configured in R&S®CMU200 with exception of RADIO BEARER SETUP message in Table 42. External multi-path fading simulator is configured with VA30 fading signal.

Test parameters for E-HICH – Serving E-DCH cell		
Information Element	**Value/remark**	**Version**
RLC PDU size	112	Rel-6
- E-DCH Transmission Time	10 ms (Test 2 and 4), 2 ms (Test 1 and 3)	
E-DCH MAC-d flow maximum number of retransmissions	0	
E-DCH info - Happy bit delay condition - E-DCH minimum set E-TFCI	 10 ms (Test 2 and 4), 2 ms (Test 1 and 3) (indication of exhausted resources on frame basis) Not Present in RGCH performance tests, all E-TFCs should be in the selection process)	Rel-6
Downlink information for each radio link list - Downlink information for each radio link - CHOICE E-RGCH Information - E-RGCH Information - Signature Sequence - RG combination index	 0 0	 Rel-6

Table 42: RADIO BEARER SETUP: Specific Message Contents (Section 10.3.1.2.4.2 and section 10.3.1.2A.4.2 of TS 34.121 [1])

Configuration in R&S®CMU200:
BS Signal → Packet Switched → HSUPA Test Mode → HSUPA UL RLC SDU Size → 5872 Bit
BS Signal → HSUPA → TTI Mode → 2 ms
BS Signal → HSUPA → RLC PDU Size → 112
BS Signal → HSUPA → E-RGCH/E-HICH → Relative Grant (E-RGCH) → Signature → 0
UE Signal → HSUPA → Happy Bit Delay Condition → 2 ms
UE Signal → HSUPA → Minimum set E-TFCI → OFF
UE Signal → HSUPA → RAB H-ARQ Profile → Max. Number of Retransmission → 0

These settings can be configured in R&S®CMU200 by referring to Figure 2(b), 3(b) and as shown in Figure 19.

Table 43, 44 and 45 show the test parameters for E-RGCH – serving E-DCH cell, test requirement for Missed UP/DOWN when relative scheduling grant is transmitted using 3 consecutive slots – Serving E-DCH cell and test requirement for Missed HOLD when relative scheduling grant is transmitted using 3 consecutive slots – Serving E-DCH cell respectively.

Test parameters for E-RGCH – Serving E-DCH cell			
Parameter	**Unit**	**Missed UP/DOWN**	**Missed HOLD**
Ioc	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
E-RGCH Ec/Ior	dB	-24.3 (test 1)	-∞ (test 2)
E-RGCH signalling pattern	-	50% UP 50% DOWN	100% HOLD

Table 43: Test parameters for E-RGCH – Serving E-DCH cell (Table 10.3.1.2.5.1 of TS 34.121 [1])

Test requirement for Missed UP/DOWN when relative scheduling grant is transmitted using 3 consecutive slots – Serving E-DCH cell				
Test Number	**Propagation Conditions**	**Reference Value**		
		E-RGCH Ec/Ior (dB)	**Ior/Ioc (dB)**	**Missed UP/DOWN probability**
1	VA30	-24.3	0.6	0.05/0.05

Table 44: Test requirement for Missed UP/DOWN when relative scheduling grant is transmitted using 3 consecutive slots – Serving E-DCH cell (Table 10.3.1.2.5.2 of TS 34.121 [1])

Test requirement for Missed HOLD when relative scheduling grant is transmitted using 3 consecutive slots – Serving E-DCH cell			
Test Number	**Propagation Conditions**	**Reference Value**	
		Ior/Ioc (dB)	**Missed HOLD probability**
2	VA30	0.6	0.1

Table 45: Test requirement for Missed HOLD when relative scheduling grant is transmitted using 3 consecutive slots – Serving E-DCH cell (Table 10.3.1.2.5.3 of TS 34.121 [1])

Downlink physical channels in section 3.1, Table 43, Table 44 and Table 45 are configured in R&S®CMU200. The Absolute Grant is set to 4. The expected UL data rate is 237 kbps corresponding to E-TFC Index 39.

Configuration in R&S®CMU200:
BS Signal → Node-B Settings → Output Channel Power (Ior) → -59.4 dBm
BS Signal → Node-B Settings → AWGN Noise Pwr. (@3.84 MHz, Ioc) → Off
BS Signal → HSUPA → E-AGCH → AG Pattern → AG Index → 4
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -24.3 dB
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH Active → On

These settings can be configured in R&S®CMU200 by referring to Figure 3(b), 5(a) and 5(e).

A HSUPA call is established. Fading simulator is switched on.

Upon reception of every E-DPCCH and E-DPDCH, “DTX” is always signalled by the SS on the E-HICH during the entire test. This is to ensure no E-HICH power but UE will transmit new data, since “E-DCH MAC-d flow maximum number of retransmissions” is set to 0.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All DTX

This setting can be configured in R&S®CMU200 by referring to Figure 17.

Missed UP/DOWN test:
8 consecutive “UP” is signalled by the SS on the E-RGCH. E-TFCI for 8 consecutive HARQ processes, signalled on the E-DPCCH and corresponding to these “UP”, is read by SS. It is counted as Missed UP if the UE decreases or holds the transport format at each HARQ process upon a “UP” command. The UE may transmit less data than granted if Happy Bit = 1 is signalled by the UE. The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

8 consecutive “DOWN” is signalled by the SS on the E-RGCH. E-TFCI for 8 consecutive HARQ processes, signalled on the E-DPCCH and corresponding to these “DOWN”, is read by SS. It is counted as Missed DOWN if the UE increases or holds the transport format at each HARQ process upon a “DOWN” command. The UE may transmit less data than granted if Happy Bit = 1 is signalled by the UE. The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → Relative Grant (E-RGCH) → Mode → Alternating H-ARQ Cylce

This setting can be configured in R&S®CMU200 by referring to Figure 19.

The “UP-DOWN” cycle above is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved for UP and DOWN separately. If one counter reaches the pass criterion, this counter is stopped and the remaining counter is continued. If the last counter reaches pass, the Missed UP DOWN test is pass. If the first counter reaches fail, the Missed UP DOWN test is fail.

Due to Missed UP or Missed DOWN the operating range will shift down or up. If the operating point shifts into the range “risk of buffer underflow” or “ambiguous E-TFCI” in

Table 46, the operating point must be re-adjusted. R&S®CMU200 will re-adjust the operating point when the operating is shifted outside of the operating range.

E-TFCI operating point/range (2 ms)						
Missed UP DOWN	**Missed HOLD**	**AG Value**	**βed/βc**	**E-TFCI**	**TB Size = N*112 + Header + min Padding**	**UL rate (kbps)**
Risk of buffer underflow						
			21/15	54	817 = 7*112 + 18 + 15	408
		5	19/15	50	707 = 6*112 + 18 + 17	353.5
Initial operaing range			17/15	45	590 = 5*112 + 18 + 12	295.5
	Initial operating point	4	15/15	39	474 = 4*112 + 18 + 8	273
			13/15	31	355 = 3*112 + 18 + 1	177.5
Ambiguous E-TFCI			12/15	21	247 = 2*112 + 18 + 5	123.5
		3	11/15	21	247 = 2*112 + 18 + 5	123.5

Table 46: E-TFCI operating point/range (2 ms) (Table 10.3.1.2.4.2.1 of TS 34.121 [1])

Configuration in R&S®CMU200:
HSUPA E-RGCH → Control → HSUPA E-RGCH → Nr. Of Expected E-TFCI's → 6
HSUPA E-RGCH → Control → HSUPA E-RGCH → Initial E-TFCI Index → 3
HSUPA E-RGCH → Control → HSUPA E-RGCH → E-TFCI Value Selection → Auto

These settings can be configured in R&S®CMU200 by referring to Figure 20.

The test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

Missed HOLD test:
"DTX" is signalled by the SS on the E-RGCH. E-TFCI, signalled on the E-DPCCH and corresponding to the "DTX", is read by SS. It is counted as Missed HOLD if the UE increases or decreases the transport format upon a "DTX" command. The UE may transmit less data than granted if Happy Bit = 1 is signalled by the UE. The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → Relative Grant (E-RGCH) → Mode → All DTX

This setting can be configured in R&S®CMU200 by referring to Figure 19.

Missed HOLD test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

Due to Missed HOLD the operating range will shift down or up. If the operating point shifts into the range "risk of buffer underflow" or "ambiguous E-TFCI" in Table 46, the operating point must be re-adjusted. R&S®CMU200 will re-adjust the operating point when the operating is shifted outside of the operating range.

The test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

Measurement result for detection of E-DCH Relative Grant Channel (E-RGCH) is available in *HSUPA E-RGCH* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Receiver Quality → Applic. 2 → HSUPA E-RGCH

Figure 21(a) and 21(b) show the detection of E-DCH HARQ Indicator Channel (E-HICH) Missed UP/DOWN and Missed HOLD measurement result respectively.

E-DCH category 2 and 4

For Missed UP/DOWN, recall ERGCH2.sav and establish CS call.

For Missed HOLD, recall ERGCH2.sav, modify the following configuration and establish CS call.
BS Signal → HSUPA → E-RGCH/E-HICH → Relative Grant (E-RGCH) → Mode → All DTX

E-DCH category 6

For Missed UP/DOWN, recall ERGCH2.sav, modify the following configuration and establish PS call.
UE Signal → HSUPA → Maximum Channelisation Code → 2xSF2 and 2xSF4

For Missed HOLD, recall ERGCH2.sav, modify the following configurations and establish PS call.
UE Signal → HSUPA → Maximum Channelisation Code → 2xSF2 and 2xSF4
BS Signal → HSUPA → E-RGCH/E-HICH → Relative Grant (E-RGCH) → Mode → All DTX

The measurement result is available at:
Menus → Receiver Quality → Applic. 2 → HSUPA E-RGCH

3.9 Detection of E-DCH Relative Grant Channel (E-RGCH): Single Link Performance (2 ms TTI, Type 1) (10.3.1.2A)

The receive characteristics of the E-DCH Relative Grant Channel (E-RGCH) in multi-path fading environments are determined by the Missed UP/DOWN values. The test will verify the average probability for Missed UP/DOWN, when E-RGCH is transmitted using 3 consecutive slots, do not exceed the specified values. The test applies to all FDD UE of Release 7 and later releases that support HSDPA , E-DCH with 2 ms TTI and the optional Type 1 enhanced performance requirements.

The UE transmits E-DPCCH and E-DPDCH. The SS (System Simulator, i.e. Node-B simulator) transmits E-RGCH UP or DOWN. The UE changes or holds the transport format of the corresponding E-DPCCH and E-DPDCH accordingly. This is visible for the SS by reading the E-TFCI, signalled on the corresponding E-DPCCH. The fail cases for UP are DOWN (erroneous detection) and HOLD (missed detection). The fail cases for DOWN are UP and HOLD.

Fixed Reference Channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message as specified in section 3.1 is configured in R&S®CMU200 with exception of RADIO BEARER SETUP message in Table 42. External multi-path fading simulator is configured with VA30 fading signal.

Configuration in R&S®CMU200:
BS Signal → Packet Switched → HSUPA Test Mode → HSUPA UL RLC SDU Size → 5872 Bit
BS Signal → HSUPA → TTI Mode → 2 ms
BS Signal → HSUPA → RLC PDU Size → 112
BS Signal → HSUPA → E-RGCH/E-HICH → Relative Grant (E-RGCH) → Signature → 0
UE Signal → HSUPA → Happy Bit Delay Condition → 2 ms
UE Signal → HSUPA → Minimum set E-TFCI → OFF
UE Signal → HSUPA → RAB H-ARQ Profile → Max. Number of Retransmission → 0

These settings can be configured in R&S®CMU200 by referring to Figure 2(b), 3(b) and as shown in Figure 19.

Table 47 and 48 show the test parameters for E-RGCH – serving E-DCH cell and test requirement Type 1 for Missed UP/DOWN when relative scheduling grant is transmitted using 3 consecutive slots – Serving E-DCH cell respectively.

Test parameters for E-RGCH – Serving E-DCH cell		
Parameter	**Unit**	**Missed UP/DOWN**
Ioc	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
E-RGCH Ec/Ior	dB	-28.4 (test 1)
E-RGCH signalling pattern	-	50% UP 50% DOWN

Table 47: Test parameters for E-RGCH – Serving E-DCH cell (Table 10.3.1.2A.5.1 of TS 34.121 [1])

Test requirement Type 1 for Missed UP/DOWN when relative scheduling grant is transmitted using 3 consecutive slots – Serving E-DCH cell				
Test Number	Propagation Conditions	Reference Value		
		E-RGCH Ec/Ior (dB)	Ior/Ioc (dB)	Missed UP/DOWN probability
1	VA30	-28.4	0.6	0.05/0.05

Table 48: Test requirement Type 1 for Missed UP/DOWN when relative scheduling grant is transmitted using 3 consecutive slots – Serving E-DCH cell (Table 10.3.1.2A.5.2 of TS 34.121 [1])

Downlink physical channels in section 3.1, Table 47 and Table 48 are configured in R&S®CMU200. The Absolute Grant is set to 4. The expected UL data rate is 237 kbps corresponding to E-TFC Index 39.

Configuration in R&S®CMU200:
BS Signal → Node-B Settings → Output Channel Power (Ior) → -59.4 dBm
BS Signal → Node-B Settings → AWGN Noise Pwr. (@3.84 MHz, Ioc) → Off
BS Signal → HSUPA → E-AGCH → AG Pattern → AG Index → 4
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -28.4 dB
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH Active → On

These settings can be configured in R&S®CMU200 by referring to Figure 3(b), 5(a) and 5(e).

A HSUPA call is established. Fading simulator is switched on.

Upon reception of every E-DPCCH and E-DPDCH, “DTX” is always signalled by the SS on the E-HICH during the entire test. This is to ensure no E-HICH power but UE will transmit new data, since “E-DCH MAC-d flow maximum number of retransmissions” is set to 0.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All DTX

This setting can be configured in R&S®CMU200 by referring to Figure 17.

8 consecutive “UP” is signalled by the SS on the E-RGCH. E-TFCI for 8 consecutive HARQ processes, signalled on the E-DPCCH and corresponding to these “UP”, is read by SS. It is counted as Missed UP if the UE decreases or holds the transport format at each HARQ process upon a “UP” command. The UE may transmit less data than granted if Happy Bit = 1 is signalled by the UE. The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

8 consecutive “DOWN” is signalled by the SS on the E-RGCH. E-TFCI for 8 consecutive HARQ processes, signalled on the E-DPCCH and corresponding to these “DOWN”, is read by SS. It is counted as Missed DOWN if the UE increases or holds the transport format at each HARQ process upon a “DOWN” command. The UE may transmit less data than granted if Happy Bit = 1 is signalled by the UE. The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → Relative Grant (E-RGCH) → Mode → Alternating H-ARQ Cylce

This setting can be configured in R&S®CMU200 by referring to Figure 19.

The “UP-DOWN” cycle above is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved for UP and DOWN separately. If one counter reaches the pass criterion, this counter is stopped and the remaining counter is continued. If the last counter reaches pass, the Missed UP DOWN test is pass. If the first counter reaches fail, the Missed UP DOWN test is fail.

Due to Missed UP or Missed DOWN the operating range will shift down or up. If the operating point shifts into the range “risk of buffer underflow” or “ambiguous E-TFCI” in Table 49 the operating point must be re-adjusted. R&S®CMU200 will re-adjust the operating point when the operating is shifted outside of the operating range.

E-TFCI operating point/range (2 ms)					
Missed UP DOWN	**AG Value**	**βed/βc**	**E-TFCI**	**TB Size = N*112 + Header + min Padding**	**UL rate (kbps)**
Risk of buffer underflow					
		21/15	54	817 = 7*112 + 18 + 15	408
	5	19/15	50	707 = 6*112 + 18 + 17	353.5
Initial operating range		17/15	45	590 = 5*112 + 18 + 12	295.5
	4	15/15	39	474 = 4*112 + 18 + 8	273
		13/15	31	355 = 3*112 + 18 + 1	177.5
Ambiguous E-TFCI		12/15	21	247 = 2*112 + 18 + 5	123.5
	3	11/15	21	247 = 2*112 + 18 + 5	123.5

Table 49: E-TFCI operating point/range (2 ms) (Table 10.3.1.2A.4.2.1 of TS 34.121 [1])

Configuration in R&S®CMU200:
HSUPA E-RGCH → Control → HSUPA E-RGCH → Nr. Of Expected E-TFCI’s → 6
HSUPA E-RGCH → Control → HSUPA E-RGCH → Initial E-TFCI Index → 3
HSUPA E-RGCH → Control → HSUPA E-RGCH → E-TFCI Value Selection → Auto

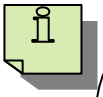
These settings can be configured in R&S®CMU200 by referring to Figure 20.

The test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

Measurement result for detection of E-DCH Relative Grant Channel (E-RGCH) is available in *HSUPA E-RGCH* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Receiver Quality → Applic. 2 → HSUPA E-RGCH

Figure 21(a) shows the detection of E-DCH HARQ Indicator Channel (E-HICH) Missed UP/DOWN measurement result.



E-DCH category 2 and 4

For Missed UP/DOWN, recall ERGCH2.sav, modify the following configuration and establish CS call.
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -28.4 dB

E-DCH category 6

For Missed UP/DOWN, recall ERGCH2.sav, modify the following configuration and establish PS call.
UE Signal → HSUPA → Maximum Channelisation Code → 2xSF2 and 2xSF4
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -28.4 dB

The measurement result is available at:
Menus → Receiver Quality → Applic. 2 → HSUPA E-RGCH

3.10 Demodulation of E-DCH Absolute Grant Channel (E-AGCH): Single Link Performance (10.4.1)

The receive characteristics of the E-DCH Absolute Grant Channel (E-AGCH) in multi-path fading environments are determined by the missed detection probability. The test will verify that the missed detection probability of the E-AGCH channel does not exceed 0.01. The test applies to all FDD UE of Release 6 and later releases that support HSDPA and E-DCH.

Fixed Reference Channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message as specified in section 3.1 is configured in R&S®CMU200 with exception of RADIO BEARER SETUP message in Table 50. External multi-path fading simulator is configured with VA30 fading signal.

RADIO BEARER SETUP: Specific Message Contents	
Information Element	**Value/remark**
E-DCH MAC-d flow maximum number of retransmissions	0

Table 50: RADIO BEARER SETUP: Specific Message Contents (Section 10.4.1.4.2 and section 10.4.1A.4.2 of TS 34.121 [1])

Configuration in R&S®CMU200:
BS Signal → Packet Switched → HSUPA Test Mode → HSUPA UL RLC SDU Size → 8808 Bit
BS Signal → HSUPA → TTI Mode → 10 ms
UE Signal → HSUPA → RAB H-ARQ Profile → Max. Number of Retransmission → 0

These settings can be configured in R&S®CMU200 by referring to Figure 1(b), 2(b) and 3(b).

Table 51, 52 and 53 show the test parameters for E-AGCH detection – single link, test requirement for E-AGCH detection – single link and mapping of the E-AGCH test sequence and the expected E-TFCI respectively.

Test parameters for E-AGCH detection – single link		
Parameter	**Unit**	
Ioc	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
P-CPICH Ec_Ior	dB	-10
E-AGCH information		The E-AGCH information sequence "AG_4 AG_8 AG_{10} AG_4 AG_8 AG_{10} AG_4 AG_8 $AG_{10,...}$" shall be transmitted continuously, where AG_4, AG_8 and AG_{10} denote absolute grant index of 4, 8, 10 respectively
E-AGCH TTI length	ms	10
E-HICH Ec_Ior	dB	-20
βc		15/15
βd		5/15
β_{HS}		15/15

Table 51: Test parameters for E-AGCH detection – single link (Table 10.4.1.3 and Table 10.4.1A.3 of TS 34.121 [1])

Test requirement for E-AGCH detection – single link				
Test Number	Propagation Conditions	Reference Value		
		E-AGCH Ec/Ior (dB)	Ior/Ioc (dB)	Missed detection probability
1	VA30	-23.1	0.6	0.01

Table 52: Test requirement for E-AGCH detection – single link (Table 10.4.1.3a of TS 34.121 [1])

Downlink physical channels in section 3.1, Table 51 and Table 52 are configured in R&S®CMU200. The Relative Grant is not configured.

Configuration in R&S®CMU200:
BS Signal → Node-B Settings → Output Channel Power (Ior) → -59.4 dBm
BS Signal → Node-B Settings → AWGN Noise Pwr. (@3.84 MHz, Ioc) → Off
BS Signal → HSUPA → E-AGCH → AG Pattern → Pattern Length → 3
BS Signal → HSUPA → E-AGCH → AG Pattern → AG Index → 4 8 10
BS Signal → Downlink Physical Channels → P-CPICH → -10.0 dB
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -20.0 dB
UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → βc → 15
UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → βd → 5
UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → ΔACK → 5
UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → ΔNACK → 5
UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → ΔCQI → 5
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -23.1 dB
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH Active → Off

These settings can be configured in R&S®CMU200 by referring to Figure 3(a), 5(b), 5(e) and 11.

A HSUPA call is established. Fading simulator is switched on.

100% ACK is signalled by the SS on the E-HICH for all processes. Absolute Grants according to the E-AGCH information sequence as defined in Table 51 is signalled by the SS. The E-TFCI transmitted on the E-DPCCH for each E-DCH TTI is analyzed by the SS to determine if a missed detection event has occurred by correlating the detected E-TFCIs with the expected E-TFCIs corresponding to the abosolute grant sequence sent on E-AGCH. A missed detection event is recorded if the expected E-TFC is not detected by the SS.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All ACK

This setting can be configured in R&S®CMU200 by referring to Figure 17.

The exact mapping of the E-AGCH absolute grant indices and the expected E-TFCIs are shown in Table 53. The mapping shall be used by the SS to compute the missed detection probability.

Mapping of the E-AGCH test sequence and the expected E-TFCI	
Absolute Grant Index	**Expected E-TFCI Index**
AG_4	$E\text{-}TFCI_{28}$
AG_8	$E\text{-}TFCI_{67}$
AG_{10}	$E\text{-}TFCI_{81}$

Note:
$E\text{-}TFCI_{28}$, $E\text{-}TFCI_{67}$ and $E\text{-}TFCI_{81}$ denote the E-TFC index of 28, 67 and 81 from 10ms TTI Table 0 in TS 25.321 [5]. This mapping is based on the assumption that 1, 5 or 9 RLC PDUs of size 336 bits are used respectively.

Table 53: Mapping of the E-AGCH test sequence and the expected E-TFCI (Table 10.4.1.4 and Table 10.4.1A.4 of TS 34.121 [1])

The test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

Measurement result for demodulation of E-DCH Absolute Grant Channel (E-AGCH) is available in *HSUPA E-AGCH* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Receiver Quality → Applic. 2 → HSUPA E-AGCH
HSUPA E-AGCH → Measure Type → Missed Detection

Figure 22 shows the E-AGCH missed detection measurement result.

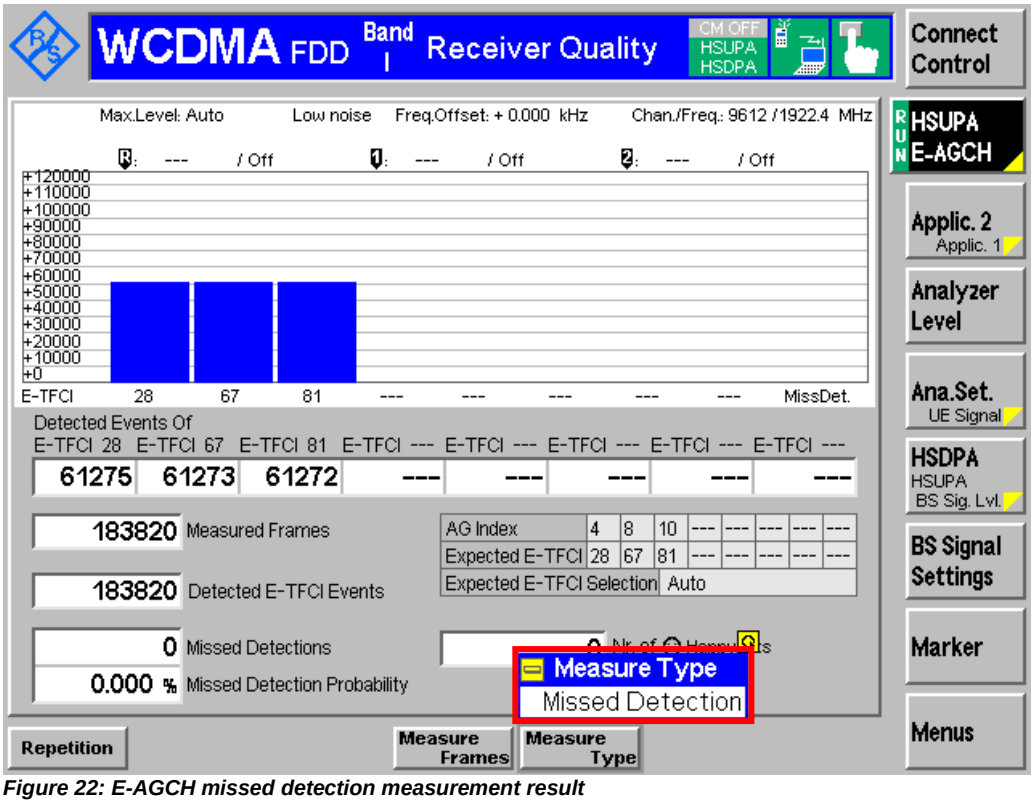
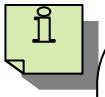


Figure 22: E-AGCH missed detection measurement result



E-DCH category 1 to 5

Recall EAGCH.sav and establish CS call.

E-DCH category 6

Recall EAGCH.sav, modify the following configuration and establish PS call.
UE Signal → HSUPA → Maximum Channelisation Code → 2xSF2 and 2xSF4

The measurement result is available at:
Menus → Receiver Quality → Applic. 2 → HSUPA E-AGCH
HSUPA E-AGCH → Measure Type → Missed Detection

3.11 Demodulation of E-DCH Absolute Grant Channel (E-AGCH): Single Link Performance (Type 1) (10.4.1A)

The receive characteristics of the E-DCH Absolute Grant Channel (E-AGCH) in multi-path fading environments are determined by the missed detection probability. The test will verify that the missed detection probability of the E-AGCH channel does not exceed 0.01. The test applies to all FDD UE of Release 7 and later releases that support HSDPA, E-DCH and the optional Type 1 enhanced performance requirements.

Fixed Reference Channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message as specified in section 3.1 is configured in R&S®CMU200 with exception of RADIO BEARER SETUP message in Table 50. External multi-path fading simulator is configured with VA30 fading signal.

Configuration in R&S®CMU200:
BS Signal → Packet Switched → HSUPA Test Mode → HSUPA UL RLC SDU Size → 8808 Bit
BS Signal → HSUPA → TTI Mode → 10 ms
UE Signal → HSUPA → RAB H-ARQ Profile → Max. Number of Retransmission → 0

These settings can be configured in R&S®CMU200 by referring to Figure 1(b), 2(b) and 3(b).

Table 51 and 54 show the test parameters for E-AGCH detection – single link and test requirement for E-AGCH detection – single link respectively.

Test requirement for E-AGCH detection – single link				
Test Number	Propagation Conditions	Reference Value		
		E-AGCH Ec/Ior (dB)	Ior/Ioc (dB)	Missed detection probability
1	VA30	-26.7	0.6	0.01

Table 54: Test requirement for E-AGCH detection – single link (Table 10.4.1A.5 of TS 34.121 [1])

Downlink physical channels in section 3.1, Table 51 and Table 54 are configured in R&S®CMU200. The Relative Grant is not configured.

Configuration in R&S®CMU200:
BS Signal → Node-B Settings → Output Channel Power (Ior) → -59.4 dBm
BS Signal → Node-B Settings → AWGN Noise Pwr. (@3.84 MHz, Ioc) → Off
BS Signal → HSUPA → E-AGCH → AG Pattern → Pattern Length → 3
BS Signal → HSUPA → E-AGCH → AG Pattern → AG Index → 4 8 10
BS Signal → Downlink Physical Channels → P-CPICH → -10.0 dB
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -20.0 dB
UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → βc → 15
UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → βd → 5
UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → ΔACK → 5
UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → ΔNACK → 5
UE Signal → UE Gain Factors → Packet Data → HSDPA / HSUPA → ΔCQI → 5

BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -26.7 dB
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH Active → Off

These settings can be configured in R&S®CMU200 by referring to Figure 3(a), 5(b), 5(e) and 11.

A HSUPA call is established. Fading simulator is switched on.

100% ACK is signalled by the SS on the E-HICH for all processes. Absolute Grants according to the E-AGCH information sequence as defined in Table 51 is signalled by the SS. The E-TFCI transmitted on the E-DPCCH for each E-DCH TTI is analyzed by the SS to determine if a missed detection event has occurred by correlating the detected E-TFCIs with the expected E-TFCIs corresponding to the abosolute grant sequence sent on E-AGCH. A missed detection event is recorded if the expected E-TFC is not detected by the SS.

Configuration in R&S®CMU200:
BS Signal → HSUPA → E-RGCH/E-HICH → HARQ Feedback (E-HICH) → Mode → All ACK

This setting can be configured in R&S®CMU200 by referring to Figure 17.

The exact mapping of the E-AGCH absolute grant indices and the expected E-TFCIs are shown in Table 53. The mapping shall be used by the SS to compute the missed detection probability.

The test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

Measurement result for demodulation of E-DCH Absolute Grant Channel (E-AGCH) is available in *HSUPA E-AGCH* in R&S®CMU200.

Configuration in R&S®CMU200:
Menus → Receiver Quality → Applic. 2 → HSUPA E-AGCH
HSUPA E-AGCH → Measure Type → Missed Detection

Figure 22 shows the E-AGCH missed detection measurement result.

E-DCH category 1 to 5

Recall EAGCH.sav, modify the following configuration and establish CS call.
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -26.7 dB

E-DCH category 6

Recall EAGCH.sav, modify the following configurations and establish PS call.
UE Signal → HSUPA → Maximum Channelisation Code → 2xSF2 and 2xSF4
BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -26.7 dB

The measurement result is available at:
Menus → Receiver Quality → Applic. 2 → HSUPA E-AGCH
HSUPA E-AGCH → Measure Type → Missed Detection

4 Summary of R&S®CMU200 *.SAV Files

Table below summarizes the available *.sav files based on R&S®CMU200 firmware V5.22A for UE supporting operating band I and power class 3 in RMC 12.2 kbps + HSPA.

Summary of *.SAV files (Firmware V5.22A, UE operating band I, power class 3 and E-DCH category 5)

Clause	Test parameter	*.SAV filename
5.2B	Maximum output power with HS-DPCCH and E-DCH	HSUPATx1.sav HSUPATx2.sav HSUPATx3.sav HSUPATx4.sav HSUPATx5.sav
5.2D	UE relative code domain power accuracy for HS-DPCCH and E-DCH	
5.9B	Spectrum emission mask with E-DCH	
5.10B	Adjacent channel leakage power ratio (ACLR) with E-DCH	
5.13.2B	Relative code domain error with HS-DPCCH and E-DCH	
10.2.1.1	Detection of E-DCH HARQ ACK Indicator Channel (E-HICH): Single Link Performance (10 ms TTI)	EHICH10.sav
10.2.1.1A	Detection of E-DCH HARQ ACK Indicator Channel (E-HICH): Single Link Performance (10 ms TTI and Type 1)	EHICH10.sav
10.2.1.2	Detection of E-DCH HARQ ACK Indicator Channel (E-HICH): Single Link Performance (2 ms TTI)	EHICH2.sav
10.2.1.2A	Detection of E-DCH HARQ ACK Indicator Channel (E-HICH): Single Link Performance (2 ms TTI and Type 1)	EHICH2.sav
10.3.1.1	Detection of E-DCH Relative Grant Channel (E-RGCH): Single Link Performance (10 ms TTI)	ERGCH10.sav
10.3.1.1A	Detection of E-DCH Relative Grant Channel (E-RGCH): Single Link Performance (10 ms TTI and Type 1)	ERGCH10.sav
10.3.1.2	Detection of E-DCH Relative Grant Channel (E-RGCH): Single Link Performance (2 ms TTI)	ERGCH2.sav
10.3.1.2A	Detection of E-DCH Relative Grant Channel (E-RGCH): Single Link Performance (2 ms TTI and Type 1)	ERGCH2.sav
10.4.1	Demodulation of E-DCH Absolute Grant Channel (E-AGCH): Single Link Performance	EAGCH.sav
10.4.1A	Demodulation of E-DCH Absolute Grant Channel (E-AGCH): Single Link Performance (Type 1)	EAGCH.sav

5 Reference

[1] Technical Specification Group Radio Access Network; User Equipment (UE) Conformance Specification; 3GPP TS 34.121-1 V8.7.0, June 2009

[2] Technical Specification Group Radio Access Network; Terminal logical test interface; 3GPP TS 34.109 V8.0.0, December 2008

[3] Technical Specification Group Radio Access Network; Common test environments for User Equipment (UE); 3GPP TS 34.108 V8.7.0, June 2009

[4] Technical Specification Group Radio Access Network; User Equipment (UE) radio transmission and reception (FDD); 3GPP TS 25.101 V8.6.0, March 2009

[5] Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification; 3GPP TS 25.321 V8.6.0, June 2009

[6] Rohde & Schwarz; Application Note: Measurements on 3GPP UE's according to TS34.121 with CMUgo: Tests with combined Instruments, 1MA130, October 2008

[7] Rohde & Schwarz; Reiner Stuhlfauth; High Speed Uplink Packet Access, HSUPA – RF measurements with CMU200 radio communication tester

[8] Rohde & Schwarz; Application Note: Operation Guide for HSUPA Test Set-up According to 3GPP TS 34.121, RCS0712-0053, March 2008

6 Ordering Information

Ordering information		
Type	**Description**	**Order no.**
R&S®CMU200	Base unit with following accessories: power cord, operating and service manual for instrument	1100.0008.02
R&S®CMU-B21	Unversal signaling unit; provides multistandard signaling hardware; required for WCDMA 3GPP FDD	1100.5200.14
R&S®CMU-B56	WCDMA (3GPP FDD) signaling module for CMU-B21 model 14	1150.1850.14
R&S®CMU-B68	Versatile baseband board for WCDMA (3GPP FDD) layer 1, DL and UL, non-signaling	1149.9809.02
R&S®CMU-K16	WCDMA (3GPP FDD) band 10, UE test signaling software (R&S®CMU200-B68, R&S®CMU200-B21 model 14 or 54, R&S®CMU200-B56 necessary)	1200.9158.02
R&S®CMU-K17	WCDMA (3GPP FDD) band 11, UE test signaling software (R&S®CMU200-B68, R&S®CMU200-B21 model 14 or 54, R&S®CMU200-B56 necessary)	1200.9258.02
R&S®CMU-K56	HSUPA 5.7 Mbit/s extension, 3GPP/FDD/UE, Rel.6 (R&S®CMU-B68, R&S®CMU-B21 model 14 or 54, R&S®CMU-B56 necessary)	1200.7803.02
R&S®CMU-K57	WCDMA signaling 3GPP/FDD/UE, band 7 (R&S®CMU200-B68, R&S®CMU200-B21 model 14 or 54, R&S®CMU200-B56 necessary)	1200.7903.02
R&S®CMU-K58	WCDMA signaling 3GPP/FDD/UE, band 8 (R&S®CMU200-B68, R&S®CMU200-B21 model 14 or 54, R&S®CMU200-B56 necessary)	1200.8000.02
R&S®CMU-K59	WCDMA signaling 3GPP/FDD/UE, band 9 (R&S®CMU200-B68, R&S®CMU200-B21 model 14 or 54, R&S®CMU200-B56 necessary)	1200.8100.02
R&S®CMU-K60	HSDPA 14 Mbit/s extension 3GPP/FDD/UE, Rel. 5 (¸CMU-K64 necessary)	1200.8200.02
R&S®CMU-K61	WCDMA (3GPP FDD) band 4, UE test signaling software	1157.3670.02
R&S®CMU-K62	WCDMA (3GPP FDD) band 5, UE test signaling software	1157.3770.02
R&S®CMU-K63	WCDMA (3GPP FDD) band 6, UE test signaling software	1157.3870.02
R&S®CMU-K64	3.6 Mbit/s HSDPA	1157.3970.02
R&S®CMU-K65	WCDMA (3GPP FDD) UL user equipment TX test, non-signaling test software	1115.4891.02
R&S®CMU-K66	WCDMA (3GPP FDD) DL generator, non-signaling test software	1115.5100.02
R&S®CMU-K67	WCDMA (3GPP FDD) band 3, UE test signaling software	1150.3000.02
R&S®CMU-K68	WCDMA (3GPP FDD) band 1, UE test signaling software	1115.5300.02
R&S®CMU-K69	WCDMA (3GPP FDD) band 2, UE test signaling software	1115.5400.02

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