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] 3GPP Rel-6 can be performed with for 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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Covered Tests in Accordance with TS 34.121

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 cl R&S [®] CMU200		tics and performance tests of 3GPP Rel-6 supported by
Test	Clause	Test Parameter
	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
Transmitter characteristics	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)*
	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)*
Performance requirements 10.3.1.	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 14	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 \rightarrow Packet Switched Domain \rightarrow On

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

BS Signal \rightarrow Circuit Switched \rightarrow RMC Settings \rightarrow Reference Channel Type \rightarrow 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 \rightarrow Circuit Switched \rightarrow RMC Settings \rightarrow HSPA \rightarrow HSPA Test Loop \rightarrow Loop Mode 1

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

BS Signal \rightarrow Packet Switched \rightarrow HSUPA Test Mode \rightarrow Radiobearer Setup \rightarrow 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

WCDMA FDD I MC	PS: Idle CS: Signal On
-Setup	Circuit Switched/RMC Settings/HSPA/
▶ Node-B Settings	
Default Settings	
DCH (Dedicated Chn.) Type	RMC
RMC Settings	
Reference Channel Type	12.2 kbps + HSPA 34.108
DLDTCH Transport Format	12.2 kbps
DL Resources in Use	100 %
RLC Mode (Loop Mode 1)	TM 4
UL CRC (Sym. Loop Mode 2)	Off
Test Mode	Loop Mode 1
Channel Data Source DTCH	PRBS9
HSPA	
HSUPA UL RLC SDU Size	▲ 2936 Bit
HSPA Test Loop	Loop Mode 1

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

VCDMA FDD Connection Control	PS:	Idle	CS:	Signal Or
Setup		Packet Switch	ned/HSUPA Te:	st Mode/
▶ Node-B Settings				
Circuit Switched				
▼Packet Switched				
Default Settings				
DCH (Dedicated Chn.) Type	HSUPA Te	est Mode		
▶ Packet Data				
►HSDPA Test Mode				
✓ HSUPA Test Mode				
Radiobearer Setup		kbps + HSPA	١	
HSUPA UL RLC SDU Size	⊿ 2936 Bit			
HSPA Test Loop	Loop Mode			
RMC Test Loop	Loop Mode	e 1 RLC TM		
HSDPA HS-DSCH				
▶ HSUPA				

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 $^{\mbox{\tiny R}}CMU200$ are necessary to support subtest 5

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

BS Signal \rightarrow Packet Switched \rightarrow HSUPA Test Mode \rightarrow Radiobearer Setup \rightarrow SRB 2.5 kbps + HSPA (Bd = 0)

JCDMA FDD Connection Control 🛔	PS: Attached CS: Registere
-Setup	Packet Switched/HSUPA Test Mode/
Circuit Switched	
▼Packet Switched	
Default Settings	
DCH (Dedicated Chn.) Type	HSUPA Test Mode
▶ Packet Data	
★HSDPA Test Mode	
Radiobearer Setup	RMC 12.2 kbps + HSDPA
RMC Test Loop	Loop Mode 1 RLC TM
UL CRC (Sym. Loop Mode 2)	Off
SRB Message Version	R99
✓HSUPA Test Mode	
Radiobearer Setup	SRB 2.5 kbps + HSPA (βd=0)
HSUPA UL RLC SDU SIZE	8808 Bit
HSPA Test Loop	Loop Mode 1
RMC Test Loop	Loop Mode 1 RLC TM

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 &d = 0 is necessary.

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 - 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])

- Reference E-TFCI

- Reference E-TFCI PO

Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and USDBA) for Sich to to 1, 2, 4		
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	

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

81 27

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 Subtests 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 Subtests 5 (Table5.2B.3A, Table 5.2D.4 and Table 5.13.2B.5 of TS 34.121 [1])

HSDPA)	
Information Element	Value/Remark
CHOICE channel requirement	Uplink DPCH info
Dower Control Algorithm	For sub-test 1 to 4: Algorithm2
- Power Control Algorithm	For sub-test 5: Algorithm 1
- ACK	Value used in test: see Table C.11.1.3
- ANACK	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)
- ACQI	Value used in test: see Table 5

Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and

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 CN	Summary of CMU200 settings acc. tables 4(a,b,c,d)										
sub-test	CMU200 radio bearer setup	necessary E-DCH channelization	Mandatory TTI mode								
14	12.2kbps + HSPA 34.108 (CS connection)	UE categorie 16: 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 subtest 1...5

Configuration in R&S[®]CMU200 for subtests 1...5 BS Signal \rightarrow HSDPA HS-DSCH \rightarrow CQI Feedback Cycle \rightarrow 4 ms

BS Signal \rightarrow HSDPA HS-DSCH \rightarrow CQI Repetition Factor \rightarrow 2

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

BS Signal \rightarrow HSDPA HS-DSCH \rightarrow Channel Configuration Type \rightarrow Fixed Reference Channel

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

BS Signal → HSUPA → TTI Mode → 10 ms

 $\begin{array}{l} \textit{UE Signal} \rightarrow \textit{HSUPA} \rightarrow \textit{E-TFCI Table Index} \rightarrow 0 \\ \textit{UE Signal} \rightarrow \textit{HSUPA} \rightarrow \textit{Minimum Set E-TFCI} \rightarrow 9 \end{array}$

UE Signal \rightarrow HSUPA \rightarrow Happy Bit Delay Condition \rightarrow 100 ms

UE Signal \rightarrow HSUPA \rightarrow Puncturing Limit PLnon-max \rightarrow 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 \rightarrow HSUPA \rightarrow Initial Serving Grant \rightarrow Value \rightarrow Off

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

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

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

UE Signal \rightarrow HSUPA \rightarrow Reference E-TFCI 1...4 \rightarrow 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 \rightarrow HSUPA \rightarrow Reference E-TFCI 5...8 \rightarrow 81 (for sub-tests 1, 2, 4)

UE Signal \rightarrow HSUPA \rightarrow Reference E-TFCI Power Offset \rightarrow 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)

8	> WCDM/	A FDD Ba	nd Mo	dulation		M OFF SUPA SDPA	Connect Control
🗖 W	CDMA FDD Conne	ction Contr	ol 🛔	PS:	Idle	CS:	Signal On
Ē	Setup				HSDPA HS	-DSCH/	Q
	✓HSDPA HS-DSC Default Settings Data Pattern Force NACK			D PRBS9 Off			
	CQI Feedback C CQI Repetition F ACK/NACK Rep	actor	or	4 ms 2 3			
	UE Category Se UE Category T1 Release Tim Receiver Window	ər		UE Capa 12 50 ms 2047	oility Repo	rt	
	Channel Configur				erence Ch	annel	
	■ Fixed Reference H-Set Selectio			H-Set 10	QPSK		
	RV Coding Sec	luence		{0,2,5,6}			
Conn	ection Handover	UE Signal	BS Sig	nal Netwo	rk AF/F	₹G+ Sy	nc. <u>1</u> 2

Figure 2(a): RADIO BEARER SETUP message configuration

		dulation	CM OFF HSUPA HSDPA	1	Connect Control
<mark>- </mark> W	ICDMA FDD Connection Control 🛔	PS:	Idle	CS: Si	gnal On
Г	Setup		HSUPA/RAB H-AI	RQ Profile/	<mark>0</mark>
	▼HSUPA				
	Default Settings				
	E-DCH Physical Layer Category				
	E-TECI Table Index	0			
	H-ARQ Redundancy Versions	Always RV	0		
	Minimum Set E-TFCI	9			
	Happy Bit Delay Condition	100 ms			
	Puncturing Limit PLnon-max	0.84			
	Maximum Channelisation Code	2xSF4			
	Initial Serving Grant				
	Value	Off			
	Туре	Primary			-
	▼RAB H-ARQ Profile				
	H-ARQ Power Offset	0 dB			
	Max. Number of Retransmissions	7			
Con	nection Handover UE Signal BS Sig	nal Network	AF/RF ⊕+	Sync.	1 2

Figure 2(b): RADIO BEARER SETUP message configuration

VCDMA FDD Connection Control 📓	PS:	Idle	CS: S	Signal Or
-Setup		- HSUPA/HSUP/	A Gain Factors/	
E-DCH Physical Layer Category E-TFCI Table Index H-ARQ Redundancy Versions Minimum Set E-TFCI Happy Bit Delay Condition Puncturing Limit PLnon-max Maximum Channelisation Code Initial Serving Grant RAB H-ARQ Profile HSUPA Gain Factors	5 0 Always RV 9 100 ms 0.84 2xSF2	0		
∆ E-DPCCH Number of Reference E-TFCls Reference E-TFCl 14 Reference E-TFCl 58 Reference E-TFCl Power Offset	81	•••••••	1 75 00 12 [°] 7 28 29	

Figure 2(c): RADIO BEARER SETUP message configuration

WCDMA FDD I Por	wer	CM OFF HSUPA HSDPA		Connect Control
WCDMA FDD Connection Control 🛔	PS:	Idle	CS: Si	gnal On
-Setup	T	PC Settings/TPC	Algorithm	
E-RGCH/E-HICH E-RGCH Active E-RGCH/E-HICH Chan. Code Data Gen. During Signalling Change ▼TPC Settings	-20.0 dB Off 6 Off			
Default Settings TPC Algorithm	Algorithm 2			
IPC Step Size Activate Pattern TPC Pattern Setup Test Step Preconditions	1 dB Execute Set 1 Auto			
Test Step E,F,G,H • Set 1 • Set 2 • Set 3	Segmentatio	n Off		
connection Handover UE Signal BS Sign	nal Network	AF/RF ↔	Sync.	

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 β c, β d, Δ ACK, Δ NACK, Δ CQI and Δ E-DPCCH in R&S®CMU200 and summary of gain factor setting in R&S®CMU200 respectively.

β val	values for transmitter characteristics tests with HS-DPCCH and E-DCH													
Sub- test	βc	βa	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	1309/2 25	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
		No	tes:								_		
	Note 1: For sub-test 1 to 4, \triangle ACK, \triangle NACK and \triangle CQI = 30/15 with β_{hs} = 30/15 * β_c . For										For sub-		
	test 5, \triangle ACK, \triangle NACK and \triangle CQI = 5/15 with β_{hs} = 5/15 * β_c .												
	Note 2: CM = 1 for $\beta c/\beta d$ =12/15, $\beta hs/\beta c$ =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.												
		No	te 3:	(TF1, TI	⁻ 0) is acl	nieved by		he sigr	the TFC du nalled gain				
		No	te 4:	In case	of testing	ງ by UE ເ	•	PDCH	Physical L	ayer cat	egory 1,	Sub-test	3 is
		No	te 5:			•			•	int Value			
 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. 										wer			
		Ta	hia E. O	values fo	r transmi	ttor obor	otoriction	tooto		CCU and		able C 11	12 of

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 β	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 β c and β d in R&S[®]CMU200 acc. 3GPP TS-25213

Signalled value for gain factors ∆ACK, ∆NACK and ∆CQI							
Signalled value for $\triangle ACK$, $\triangle NACK$ and $\triangle CQI$	Quantized amplitude ratio (β_{HS} / β c)						

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 ΔΑCK, ΔΝΑCK and ΔCQI in R&S[®]CMU200

Signalled value for gain factors ∆E-DPCCH								
Signalled value for ∆E-DPCCH	Quantized amplitude ratio (β_{ec} / β c)							
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 ∆E-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 \rightarrow UE Gain Factors \rightarrow RMC \rightarrow Uplink 12.2 $\rightarrow \beta c$

UE Signal \rightarrow UE Gain Factors \rightarrow RMC \rightarrow Uplink 12.2 $\rightarrow \beta d$

UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \beta c$

 $UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA \rightarrow \beta d$

UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \triangle ACK$

UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \Delta$ NACK

UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \triangle CQI$

UE Signal \rightarrow HSUPA \rightarrow HSUPA Gain Factors $\rightarrow \Delta E$ -DPCCH

BS Signal \rightarrow HSUPA \rightarrow E-AGCH \rightarrow AG Pattern \rightarrow AG Index

Summary	Summary of gain factor setting in R&S [®] CMU200											
Sub-test	Sub-test βc βd ΔACK $\Delta NACK$ 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

ICDMA FDD Connection Control	P\$.	Idle	CS:	Signal	
Setup			UE Gain Facto	rs/HSDPA / H	ISUPA	
▶ UE Power Control						
■UE Gain Factors	βc	βd	ΔACK	ANACK	∆CQI	
▼ RMC						
Uplink 12.2	10	15				
Uplink 64	5	15				
Uplink 144	4	15				
Uplink 384	4	15				
Voice	11	15				
▶ Video						
 Packet Data 						
HSDPA / HSUPA	10	15	8	8	8	
Default Settings						
▶ HSUPA						

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

		H/AG Pattern/AG	Index
			_
10 ms			
336			
AAAA			
12AA			
1			
20			
	336 AAAA 12AA 1	336 AAAA 12AA 1	336 AAAA 12AA 1

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					
lor	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 \rightarrow Cell Reselection Information \rightarrow Qqualmin \rightarrow - 24 dB Network \rightarrow Cell Reselection Information \rightarrow Qrxlevmin \rightarrow - 58 dBm * 2 + 1 UE Signal \rightarrow UE Power Control \rightarrow Open Loop \rightarrow Max Allowed UE Power \rightarrow 21.0 dBm BS Signal \rightarrow Node-B Settings \rightarrow Output Channel Power (Ior) \rightarrow -86 dBm

VCDMA FDD Connection Control	PS:	Idle	CS:	Signal On
Setup		Cell Reselec	ction Information/	'Qrxlevmin
 Random Access Settings Requested UE Data Cell Reselection Information Default Settings CPICH Ec/No Qhyst2s Sintresearch Sintersearch Ssearch_{HCS} 	Г О - 16 ав - 16 ав Off	_		
Qqualmin Qrxlevmin	-24 dB ⊿-58 dBm	*2+1		
Treselection	0			

Figure 4(a) : Setting for the serving cell

WCDMAFDD Connection Control PS: Idle CS: Signal On Setup UE Power Control/Max. Allowed UE Power Image: Control/Max. Allowed UE Power Image: Control/Max. Allowed UE Power Image: Control/Max. Allowed UE Power Analyzer Settings Image: Control Image: Contro Image: Control <t< th=""><th>Ø</th><th>WCDM/</th><th>FDD Bar</th><th>^{ıd} Modul</th><th>ation</th><th>CM OFF HSUPA HSDPA</th><th>L</th><th>Connect Control</th></t<>	Ø	WCDM/	FDD Bar	^{ıd} Modul	ation	CM OFF HSUPA HSDPA	L	Connect Control
Default All Settings	<mark>-</mark> WC	DMA FDD Conne	ction Contro	ol 💼	PS:	ldle	CS: S	ignal On
 Analyzer Settings Measurement Settings UE Power Control Default Settings Max. Allowed UE Power 21.0 dBm UL Target Power Open Loop UE Gain Factors 	S	Setup				UE Power Control/I	Max. Allowed U	E Power
Max. Allowed UE Power △ 21.0 dBm ► UL Target Power ► Open Loop ► UE Gain Factors	•	Analyzer Settings Measurement Set UE Power Control	tings]			
 UL Target Power Open Loop UE Gain Factors 				21	 Û dBm			
		 UL Target Powe Open Loop UE Gain Factors 						
Connection Handover UE Signal BS Signal Network AF/RF (Sync. 1 2	Conne	ection Handover	UE Signal	BS Signal	Network	AF/RF ↔	Sync.	1 2

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 channe tests							
Parameter during measurement	Unit	Value					
P-CPICH_Ec/lor	dB	-10					
P-CCPCH and SCH_Ec/lor	dB	-12					
PICH_Ec/lor	dB	-15					
HS-PDSCH	dB	-3 (Note 1)					
HS-SCCH_1	dB	-8 (Note 2)					
DPCH_Ec/lor	dB	-10					
E-AGCH	dB	-20					
E-HICH	dB	-20					
E-RGCH	dB	DTX'd					
OCNS_Ec/lor	dB	Necessary power so that total transmit power spectral density of Node B (lor) 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 \rightarrow Node-B Settings \rightarrow Level Reference \rightarrow Output Channel Power (Ior) BS Signal \rightarrow Downlink Physical Channels \rightarrow P-CPICH \rightarrow -10.0 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow P-SCH \rightarrow -15.0 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow S-SCH \rightarrow -15.0 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow P-CCPCH \rightarrow -12.0 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow PICH \rightarrow -15.0 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow DPDCH Level Config \rightarrow -10.0 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow HSDPA Channels \rightarrow On BS Signal \rightarrow Downlink Physical Channels \rightarrow HS-SCCH \rightarrow HS-SCCH#1 \rightarrow Level \rightarrow -8.0 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow HS-SCCH \rightarrow HS-SCCH#2 \rightarrow Level \rightarrow Off BS Signal \rightarrow Downlink Physical Channels \rightarrow HS-SCCH \rightarrow HS-SCCH#3 \rightarrow Level \rightarrow Off BS Signal \rightarrow Downlink Physical Channels \rightarrow HS-SCCH \rightarrow HS-SCCH#4 \rightarrow Level \rightarrow Off BS Signal \rightarrow Downlink Physical Channels \rightarrow HS-SCCH \rightarrow HS-SCCH Selection \rightarrow 1 BS Signal \rightarrow Downlink Physical Channels \rightarrow HS-SCCH \rightarrow Number of HS-SCCH \rightarrow 4 BS Signal → Downlink Physical Channels → HS-SCCH → Unscheduled Subframes → Transmit Dummy UEID BS Signal \rightarrow Downlink Physical Channels \rightarrow HS-PDSCH \rightarrow Level (All Active Codes) → -3.0 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow HSUPA Channels \rightarrow On BS Signal \rightarrow Downlink Physical Channels \rightarrow E-AGCH \rightarrow E-AGCH \rightarrow -20.0 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow E-RGCH/E-HICH \rightarrow E-RGCH/E-HICH \rightarrow -20.0 dB

BS Signal \rightarrow Downlink Physical Channels \rightarrow E-RGCH Active \rightarrow Off

VCDMA FDD Connection Control 🛔	PS:	Idle	CS: Si	gnal Or
Setup		Node-B Settings	sl	
▼Node-B Settings	Channel	Frequency	Uplink	
RF Channel Downlink Band [1]	10562	2112.4 мн г	1922.4 мн	z
Frequency Offset	+ 0.000	kHz		
RX/TX Separation	190.000) MHz		
Primary Scrambling Code	9			
Level Reference	Output	Channel Power	(lor)	
Output Channel Power (lor)	⊿-86.0 d	IBm		
OCNS (R99)	- 16.8 d	B		
AWGN Noise Pwr. (@3.84 MHz, loc)	Off			
Geometry Factor (lor/loc)				
Total Output Power (lor+loc)	- 86.0 d	IBm		
Circuit Switched				
 Packet Switched 				
▶HSDPA HS-DSCH				
►HSUPA				

VCDMA FDD Connection Control 🔮	PS:	Idle	CS: S	Signal Or
-Setup		— Downlink Phys	ical Channels/PICH	1
 Downlink Physical Channels Default Settings 				
P-CPICH	- 10.0 dB			
S-CPICH S-CPICH Channel Code S-CPICH Sec. Scrambling Code S-CPICH Phase	Off 7 0 0 °			
P-SCH S-SCH P-CCPCH	- 15.0 ав - 15.0 ав - 12.0 ав			
S-CCPCH S-CCPCH Channel Code	-5.3 dB 2			
PICH	⊿-15.0 dB			
PICH Channel Code Paging Indicators per Frame	3 18			

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

	odulation	CM OFF HSUPA HSDPA	Connect Control
😑 WCDMA FDD Connection Control 📄	PS:	ldle	CS: Signal On
-Setup		- Downlink Physical (Channels/
PICH PICH Channel Code Paging Indicators per Frame AICH AICH Channel Code	-5.0 ав 3 18 -5.0 ав 6		
DPDCH Level Config	Level ⊿ - 10.0 dB	Minimum - 18.0	Maximum dB 7.0 dB
DPCH Channel Code Power Offset (DPCCH/DPDCH) DL DPCH Timing Offset Secondary Scrambl. Code Secondary Scrambl. Code (HSDPA)	96 0.0 dB 0 * 256 c 0 0	hip	
HSDPA Channels • HS-SCCH • HS-PDSCH	On		
Connection Handover UE Signal BS Sig	jnal Network	AF/RF ↔	Sync. 2

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

NCDMA FDD Connection Control 🛔	PS:	ldle	CS	Signal O
-Setup		— Downlink I	Physical Chan	nels/HS-PDSCH /
HSDPA Channels	On			
▼HS-SCCH	Level	Ch.Code	UE ID	Dummy UE ID
HS-SCCH#1	-8.0 dB	12	AAAA	5555
HS-SCCH#2	Off	13		12AA
HS-SCCH#3	Off	14		1444
HS-SCCH #4	Off	15		1FAA
HS-SCCH Selection	1			
Number of HS-SCCH	4			
Unscheduled Subframes	Transmit	Dummy L	JEID	
▼HS-PDSCH				
Level (All Active Codes)	⊿-3.0 dB			
Meas. Power Offset Control	Auto			
Meas. Power Offset	7.0 ав			
1st Used Chan. Code	2			
Unscheduled Subframes	Dummy D	ata		

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

WCDMA FDD Band No	dulation	CM OFF HSUPA HSDPA		Connect Control
WCDMA FDD Connection Control 🛔	PS:	Idle	CS: Sig	nal On
-Setup		- Downlink Physical	Channels/	
Secondary Scrambl Code Secondary Scrambl Code (HSDPA) HSDPA Channels > HS-SCCH > HS-PDSCH	0 0 On			
HSUPA Channels ▼E-AGCH E-AGCH	Оn -20.0 dB			
E-AGCH Chan Code ▼E-RGCH/E-HICH E-RGCH/E-HICH E-RGCH Active	2 -20.0 ав Off			
E-RGCH/E-HICH Chan. Code Data Gen. During Signalling Change ▶ TPC Settings	6 Off			
Connection Handover UE Signal BS Sig	nal Network	AF/RF ⊕+	Sync.	1 2

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 \rightarrow HSUPA \rightarrow Maximum Channelization Code \rightarrow 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)

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 C	lass 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 2 → Pattern Type → Single Pattern + Alternating BS Signal → TPC Settings → Set 1 → Pattern → 00000 (for TPC_cmd = -1 command)

WCDMA FDD Band Sp.	ectrum HSUPA CM OFF Connect HSUPA Control
😑 WCDMA FDD Connection Control 🛓	PS: Idle CS: Signal On
-Setup	TPC Settings/Set 3/Pattern
Test Step E,F,G,H	Segmentation Off
 ▼Set 1 Pattern Type UL Target Power ▼Set 2 Pattern Type Pattern 	Closed Loop 15.0 dBm Single Pattern+Alternating 11111 bin
<mark>▼Set 3</mark> Pattern Type Pattern	Single Pattern+Alternating
Set 4 Set 5 Test Step A Connection Handover UE Signal BS Sign	nal Network AF/RF ()+ Sync. 1 2

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 \rightarrow TPC Pattern Setup \rightarrow 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 \rightarrow TPC Pattern Setup \rightarrow Set 2 BS Signal Settings \rightarrow Activate Pattern

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

Configuration in R&S®CMU200: Menus \rightarrow Receiver Quality \rightarrow Applic. 2 \rightarrow 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.

WCDMA FDD Band Receiver Quality	Connect Control
	RHSUPA E-AGCH
+3500 +3000 +2500	Applic. 2 Applic. 1
+2000 +1500 +1000 +500	Analyzer Level
+0 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 Detected Events Of	UE Signal Ana.Set.
E-TFCI 75 E-TFCI E-TFCI E-TFCI E-TFCI E-TFCI E-TFCI E-TFCI E-TFCI E-TFCI	BS Sig. Lvi. HSDPA HSUPA
2100 Measured Frames AG Index 20	BS Signal Settings
	Marker
Power Modulation Spectrum Code Dom. Power Receiver Quality Audio	Menus

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

🤣 🚺			nd Receiv	ver Quali	ty HSUPA HSUPA HSDPA	26	Connect Control
<u>+1000 </u>	.Level: Auto : / C	_	Freq.Offset: + 0		Chan./Freq.:9612 / : / Off		R HSUPA N E-AGCH
+900 +800 +700 +600 +500							Applic. 2 Applic. 1
+400 +300 +200 +100 +0							Analyzer Level
-10 0 Detected Ev	10 20 ents Of	30 40	50 60	70 80	90 100 110	120	UE Signal Ana.Set.
E-TFCI 71		-TFCI E-TFC	E-TFCI	E-TFCI	- E-TFCI E-	TFCI	HSUPA BS Sig. Lvi. HSDPA
<u> </u>	780 Measure	d Frames d E-TFCI Events			 tion Auto	 	BS Signal Settings
,							Marker
Eiguro 7/h h	Power	Modulation	Spectrum	Code Dom. Powe	Receiver Quality	Audio	Menus

7(b) Эy g

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 \rightarrow TPC Pattern Setup \rightarrow Set 3 BS Signal Settings \rightarrow 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.

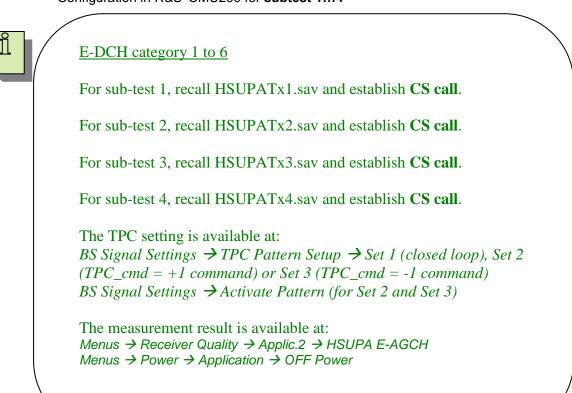
Configuration in R&S[®]CMU200: Menu \rightarrow Power \rightarrow OFF Power

Figure 8 shows the maximum output power measurement result.

		and Power			Connect Control
Max.Level: Auto	Low noise	Freq.Offset: + 0.0	100 kHz Chan./F	req.: 9612 / 1922.4 MHz	R OFF Power
					Appli- cation
					Trigger Ana. Lev
	Current	Average	Maximum		UE Signa Ana.Set
UE Power (Peak) UE Power (RMS)	27.32 dBm 21.58 dBm	27.13 dBm 21.57 dBm	27.35 dBm 21.60 dBm		HSUPA BS Sig. Lvl. HSDPA
l	10 Statistic Coun				BS Signa Settings
	0.00 % Out of Tolerance				
epetition Stop Cond	ition	Statistic Count			Menus

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

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<sup>®</sup>CMU200 for subtest 5
BS Signal \rightarrow TPC Settings \rightarrow TPC Algorithm \rightarrow Algorithm 1
BS Signal \rightarrow TPC Settings \rightarrow TPC Pattern Setup \rightarrow Set 5
BS Signal \rightarrow TPC Settings \rightarrow Set 5 \rightarrow Pattern Type \rightarrow "all 1
```



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

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

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

The measurement result is available at: Menus \rightarrow Receiver Quality \rightarrow Applic.2 \rightarrow HSUPA E-AGCH Menus \rightarrow Power \rightarrow Application \rightarrow 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)

\$	W	CD	MA	FDD	Band I	Recei	ver	Qua	lity	CM C HSUP HSDP		<u>i</u> L		Connect Control
+4000	Max.Lo	evel: Aut	0 / Off	Low noise	-	q.Offset:+ /C			Chan 2: -		613 / 19 / Off	22.6 MHz	R U N	HSUPA E-AGCH
+3500 +3000 +2500	•••				•				•					Applic. 1 Applic. 2
+2000 +1500 +1000														Analyzer Level
+500 +0 -10 Detect	0 ed Ever	10 nts Of	20	30 40	50	60	70	80	90	100	110	120		UE Signal Ana.Set.
	140			CI E-1	FCI			-	E-' 	TFCI	• E-TF •	<u></u>		BS Sig. LVI. HSDPA HSUPA
		40 Mea		rames -TFCI Even	ts	AG Inde Expecte Expecte	ed E-T	_	 ection /	 Auto	- -			BS Signal Settings
										TPC	Patt	ern Setu	lb.	Marl <mark>Q</mark> r
RF Cha	nnel	RF Freque	ency F	F req.Offse		st Step Precond		C Patte Conf		PC Patte Sel		ctivate Patter	1	et 5 Menus

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

 $\begin{aligned} & \text{MeasuredCDP ratio} = 10 * \log \Biggl(\frac{\text{Measuredcodepower}}{\text{Measuredtotalpower of allactive codes}} \Biggr) \\ & \text{NominalCDP ratio} = 10 * \log \Biggl(\frac{\text{NominalCDP}}{\text{Sumof allnominalCDPs}} \Biggr) \end{aligned}$

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 μ s transient periods at the ends of each measured timeslot shall not be included.

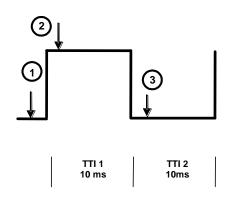


Figure 9: Transmit power profile showing measurement points (Figure 5.2D.1 of TS 34.121 [1])

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 Accuracy for HS-DPCCH and E-DCH (5.2	D)
--------------------------------------------------------------------	----

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

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

A HSUPA call is established. The UE power is set to be 15 dBm \pm 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 \rightarrow Receiver Quality \rightarrow Applic. 2 \rightarrow 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 \rightarrow TPC Pattern Config \rightarrow TPC Pattern Set \rightarrow Set 1

BS Signal Settings \rightarrow TPC Pattern Config. \rightarrow Set 1 \rightarrow Pattern Type \rightarrow Alternating 0, 1

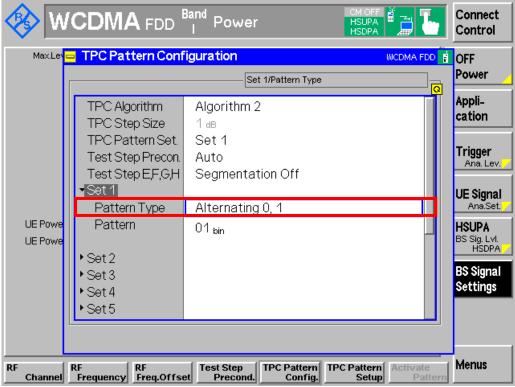


Figure 10: Alternating "0" and "1" TPC pattern configuration

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

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 \rightarrow HSUPA \rightarrow E-AGCH \rightarrow AG Pattern \rightarrow Pattern Length \rightarrow 2 BS Signal \rightarrow HSUPA \rightarrow E-AGCH \rightarrow AG Pattern \rightarrow AG Index \rightarrow 0 20

Ŷ	WCDM	A FDD ^{Ba}	I nd Cod	le Doma	ain Pwr.	CM OFF HSUPA HSDPA	¹]	Connect Control
🖃 W	ICDMA FDD Conn	ection Cont	rol 📳	PS:	Establi	shed	CS: C	Connected
Г	Setup				HSUPA	VE-AGCH/A	G Pattern/A	G Index
	▶ HSDPA HS-DS	юн						
	▼HSUPA							
	Default Settin	gs						
	TTI Mode			10 ms				
	RLC PDU Size	•		336				
	▼E-AGCH							
	Primary UE-I			AAAA				
	Secondary U	E-ID		12AA				
	▼AG Pattern							_
	Pattern Lei	ngth		2				
	AG Index			0 20				
	• •) (✔: secondary D)						
	AGPatternF	•		Continu	ous			
	Activate Pat	tern		Execute				
			r					
Con	nection Handover	UE Signal	BS Signa	al Netw	ork i	AF/RF ⊕+	Sync.	1 2

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 \rightarrow Code Dom. Power \rightarrow Applic. 1 \rightarrow CDP/Relative

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

%	W		FDD B	and Code	Domain I	Wr. HSUP. HSDP.		Connect Control
	_	+0.0 dBm	Low noise	Freq.Offset: + (Chan./Freq.: 961:		CDP Relative
+20):	/ Off	1:	/ Off	Q:	/ Off 3	UE-Power [dBm]	Itolutio
+18 +16 +14 +12								Applic. 1 Applic. 2
-4		5 10 / Off	15 10: 1 2	20 / Off	25 Q:	30 : / Off 3	35 40 E-DPCCH [dB]	Trigger Ana. Lev.
-8 -10 -12								UE Signal Ana.Set.
0		5 10	15	20	25	30 3	35 40	HSUPA BS Sig. Lvl.
0		DPCCH	DPDCH	HS-DPCCH	E-DPCCH	E-DPDCH1	E-DPDCH2	HSDPA
leas. Po	int 1	– 9.3 dB	– 6.6 dB	– 3.3 dB	– 7.3 dB	– 18.7 dB		BS Signal
leas. Po	int 2	– 12.7 dB	- 9 .8 dB	– 6.7 dB	– 10.4 dB	- 2.7 dB		Settings
leas. Po	int 3	- 9.3 👩	– 6.6 dB	- 3.3 dB	-7.3 dB	– 18.7 dB		Diaplass
Trig	iger S	ource						Display Marker
		Frame						
rigger Sol	urce	frigger Level	Trigger Slope	Trigger Slot Delay	Trigger Delay Offs	s.		Menus

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 \rightarrow Trigger Source \rightarrow 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 \rightarrow Code Dom. Power \rightarrow Applic. 1 \rightarrow CDP/Relative CDP Relative \rightarrow 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 \rightarrow Code Dom. Power \rightarrow Applic. 1 \rightarrow CDP/Relative CDP/Relative \rightarrow Measure Points \rightarrow Measure Point 1 \rightarrow 14.5 CDP/Relative \rightarrow Measure Points \rightarrow Measure Point 2 \rightarrow 15.5 CDP/Relative \rightarrow Measure Points \rightarrow Measure Point 3 \rightarrow 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 \rightarrow Code Dom. Power \rightarrow Applic. 1 \rightarrow CDP/Relative Diagram Type \rightarrow DPCCH, DPDCH1, HS-DPCCH, E-DPDCH1 or E-DPDCH2

	Max.Leve	:+0.0 dBm	Low noise	Freq.Offset: +	0.000 kHz C	han./Freq.: 9612	2/1922.4 MHz	CDP
+20	₿:	· / Off	f Q:	/ Off	Q :		JE-Power [dBm]	Relative
+18 +16 +14 +12						3		Applic. 1 Applic. 2
0	₿:	5 1 · / Off	10 15 f Q:	20 / Off	25 Ø:	30 3 / Off 3	35 40 E-DPCCH [dB]	Trigger Ana. Lev
-6 -8 -10 -12								UE Signa Ana.Set
0		5 1	10 15	20	25	30 3	35 40	HSUPA BS Sig. LvI
		DPCCH	DPDCH	HS-DPCCH	E-DPCCH	E-DPDCH1	E-DPDCH2	HSDP/
eas. P	Point 1	– 9.3 dB	- 6.6 di	3 – 3.3 dB	– 7.3 dB	– 18.8 dB		BS Signa Settings
	Point 2	- 12.6 dB	- 9.8 di	3 - 6.7 dB	– 10.5 dB	-2.7 dB		Securiya
eas. P		- 9.3 dB	- 6.6 di	3 – 3.3 dB	- 7.3 dB	– 18.7 dB		Display
leas. P leas. P	Point 3	- «B						

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:

 $\begin{array}{l} \text{Display} \rightarrow \text{UE-Power Scale Y} \rightarrow 10 \ dBm\\ \text{Display} \rightarrow \text{E-DPCCH Scale Y} \rightarrow 10 \ dB\\ \text{Display} \rightarrow \text{UE-Power Scale X} \rightarrow \text{Start} \rightarrow 0\\ \text{Display} \rightarrow \text{UE-Power Scale X} \rightarrow \text{Span} \rightarrow 40\\ \text{Display} \rightarrow \text{E-DPCCH Scale X} \rightarrow \text{Start} \rightarrow 0\\ \text{Display} \rightarrow \text{E-DPCCH Scale X} \rightarrow \text{Span} \rightarrow 40\\ \end{array}$

8	WC	DMA	FDD B	and Code	Domain F	Wr. HSUP		Connect Control
Ma:	x.Level: + 0	.0 dBm	Low noise	Freq.Offset: + (0.000 kHz C	han./Freq.: 9612	2/1922.4 MHz	CDP
+20.	:	/ Off	Q:	/ Off	Q :		JE-Power [dBm]	Relative
+20			1 2			3		
+16 +14								Applic. 1 Applic. 2
+14								1 101010. 2
0	5	10	15	20	25	30 3	35 40	Trigger
4	:	/ Off	Q:	/ Off	Q :	/ Off	E-DPCCH [dB]	Ana. Lev
-6			1 2			3		UE Signal
-10								Ana.Set.
-12								HSUPA
0	5	10	15	20	25	30 3	35 40	BS Sig. Lvl. HSDPA
		РССН	DPDCH	HS-DPCCH	E-DPCCH			10077
	D	FUUH		HS-DPUUH	E-DECCH	E-DPDCH1	E-DPDCH2	BA A!
eas. Poi		•9.3 dB	- 6.6 dB	- 3.3 dB	- 7.3 dB	E-DPDCH1		
	nt 1 🗕						E-DPDCH2	BS Signal Settings
eas. Poi	nt 1 -	9.3 dB	- 6.6 dB	– 3.3 dB	– 7.3 dB	– 18.7 dB	E-DPDCH2	Settings
eas. Poir eas. Poir	nt 1 - nt 2 - 4 nt 3 -	· 9.3 dB 12.6 dB	– 6.6 dB – 9.8 dB – 6.6 (G	– 3.3 dB – 6.7 dB	– 7.3 dB – 10.5 dB	– 18.7 dB – 2.7 dB	E-DPDCH2	Settings Display
leas. Poil leas. Poil leas. Poil leas. Poil	nt 1 - nt 2 - 4 nt 3 -	•9.3 dB 12.6 dB •9.3 dB	– 6.6 dB – 9.8 dB – 6.6 (G	– 3.3 dB – 6.7 dB	– 7.3 dB – 10.5 dB	– 18.7 dB – 2.7 dB		

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 \rightarrow HSUPA \rightarrow Maximum Channelization Code \rightarrow 1xSF4

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

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

The measurement result is available at: Menus \rightarrow Receiver Quality \rightarrow Applic.2 \rightarrow HSUPA E-AGCH Menus \rightarrow Code Dom. Power \rightarrow 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 requirem	Minimum requirement			
	Relative requirement	Absolute requirement	Measurement bandwidth		
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	Δf in MHz Frequency offset of measurement filter centre frequency, f offset Additional requirements Band II, IV, X Measurement bandwidth				
2.5 MHz ≤ ∆f < 3.5 MHz	$2.515 \text{ MHz} \le \text{f_offset} < 3.485 \text{ MHz}$	-15 dBm	30 kHz		
$3.5 \text{ MHz} \le \Delta f \le 12.5 \text{ MHz}$	4.0 MHz \leq f_offset < 12.0 MHz	-13 dBm	1 MHz		
Table 1	A(a): Additional spectrum emission lin	nits for Bands II IV Y (Table	5 0B 2A of TS 2A 121 [1]		

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 $\leq \Delta f$ < 3.5 MHz	2.515 MHz \leq f_offset < 3.485 MHz	-15 dBm	30 kHz		
$3.5 \text{ MHz} \leq \Delta f \leq 12.5 \text{ MHz}$	3.55 MHz \leq 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])

Spectrum Emission Mask with E-DCH (5.9B)

Additional spectrum emission limits for Bands XII, XIII, XIV					
Δf in MHz	Frequency offset of measurement Additional requirements Measurement ba filter centre frequency, f_offset Band XII, XII, XIV		Measurement bandwidth		
2.5 MHz ≤ ∆f < 2.6 MHz	2.515 MHz ≤ f_offset < 2.585 MHz	-13 dBm	30 kHz		
$2.6 \text{ MHz} \leq \Delta f \leq 12.45 \text{ MHz}$	2.65 MHz \leq 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 \rightarrow Spectrum \rightarrow Application \rightarrow Emission Mask

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

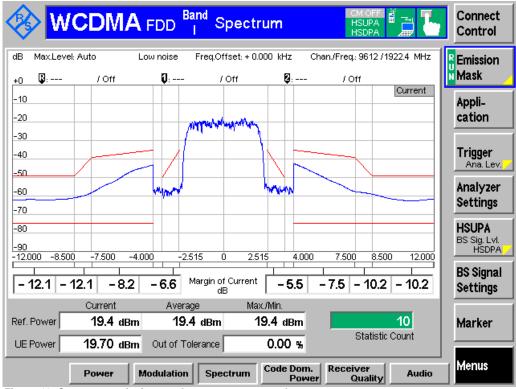
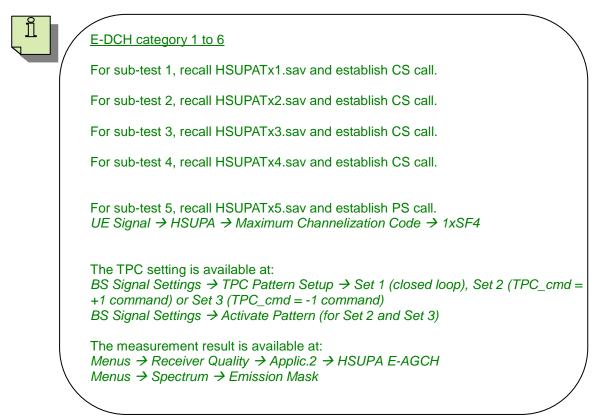


Figure 13: Spectrum emission mask measurement result

Spectrum Emission Mask with E-DCH (5.9B)



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

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

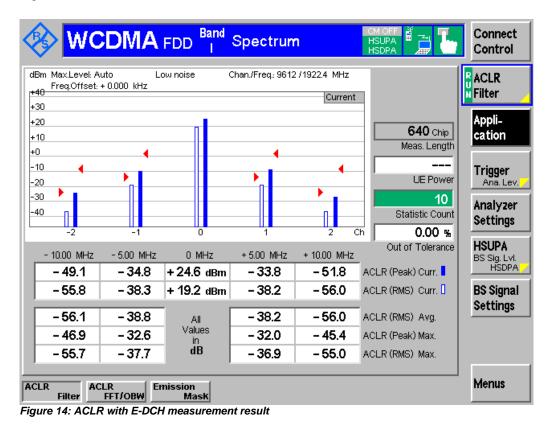
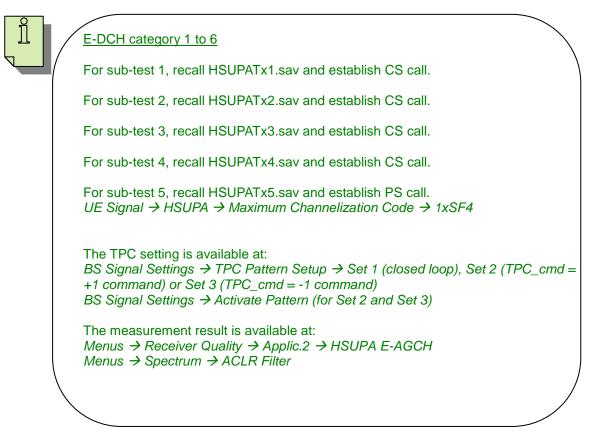


Figure 14 shows the ACLR with E-DCH measurement result.

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



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].

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

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					
Parame	ter	Unit	Level		
UE output power		dBm	≥-20		
Operating conditions			Normal conditions		
Power control step size		dB	1		
Measurement period ¹	PRACH	China	3904		
measurement period	Any DPCH	Chips	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])

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

Nominal ECDP ra	atios			
Sub-test in Table 5	Code	Nominal Code Domain Power	Spreading factor	Nominal ECDP
	DPCCH	-18.5	256	-18.5
	DPDCH	-15.8	64	-21.8
1	HS-DPCCH	-12.5	256	-12.5
	E-DPCCH	-16.5	256	-16.5
	E-DPDCH	-0.5	4	-18.6
	DPCCH	-14.0	256	-14.0
	DPDCH	-6.0	64	-12.0
2	HS-DPCCH	-8.0	256	-8.0
	E-DPCCH	-8.0	256	-8.0
	E-DPDCH	-4.1	4	-22.2
	DPCCH	-14.6	256	-14.6
	DPDCH	-19.1	64	-25.1
2	HS-DPCCH	-8.6	256	-8.6
3	E-DPCCH	-8.6	256	-8.6
	E-DPDCH1	-4.7	4	-22.8
	E-DPDCH2	-4.7	4	-22.8
	DPCCH	-19.7	256	-19.7
	DPDCH	-2.2	64	-8.2
4	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 \pm 2 dB and -18 dBm \pm 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 \pm 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 \pm 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 \rightarrow Receiver Quality \rightarrow Applic. 2 \rightarrow 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 \rightarrow Set 1 \rightarrow Pattern Type \rightarrow Closed Loop BS Signal Settings \rightarrow Set 1 \rightarrow UL Target Power \rightarrow -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 \rightarrow Code Dom. Power \rightarrow Applic. 2 \rightarrow CDE/Relative

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

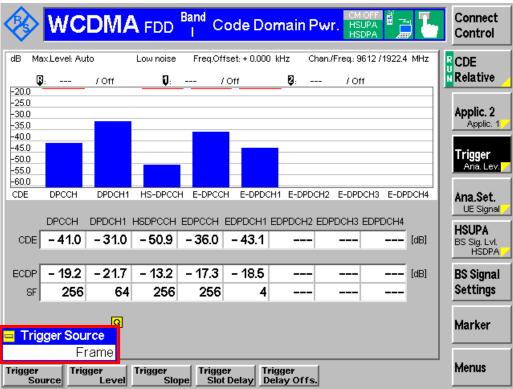


Figure 15: Relative code domain error with HS-DPCCH and E-DCH measurement result

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

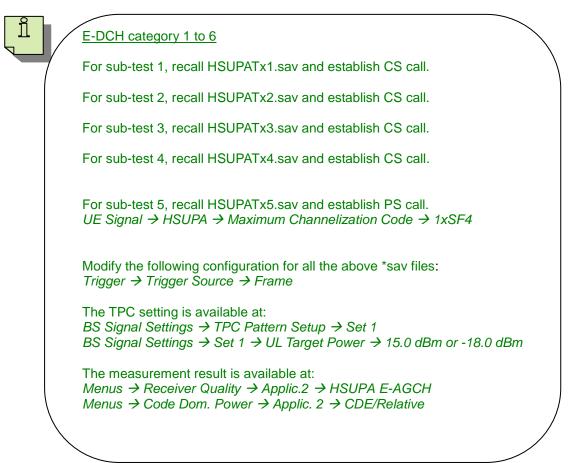
Configuration in R&S[®]CMU200: Trigger \rightarrow Trigger Source \rightarrow Frame

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

Configuration in R&S[®]CMU200: UE Signal \rightarrow Measurement Settings \rightarrow Threshold \rightarrow -10 dB

WCDMA FDD	^d Code [Domain P	Wr. HSUPA HSDPA	Č - C	Connect Control
WCDMA FDD Connection Control		PS: Est	ablished	CS: Co	onnected
-Setup		M	easurement Set	ttings/Threshold	
 Analyzer Settings Measurement Settings Default Settings UL Scrambling Code Analysis Mode Sync. Mode Measurement Slot Number Correlation Mode 	All 0 DF	th Origin Of Slots PCCH	fset		
Threshold • UE Power Control • UE Gain Factors • HSUPA	<u>⊿</u> - 1	0 ав			
Connection Handover UE Signal	BS Signal	Network	AF/RF ⊕	Sync.	1 2

Figure 16: Measurement threshold configuration



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 \rightarrow TPC Settings \rightarrow TPC Algorithm \rightarrow Algorithm 1 BS Signal \rightarrow TPC Settings \rightarrow TPC Step Size \rightarrow 1 dB BS Signal \rightarrow TPC Settings \rightarrow TPC Pattern Setup \rightarrow Set 1 BS Signal \rightarrow TPC Settings \rightarrow Set 1 \rightarrow Pattern Type \rightarrow Closed Loop BS Signal \rightarrow TPC Settings \rightarrow Set 1 \rightarrow UL Target Power \rightarrow 0.0 dBm

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

Configuration in R&S[®]CMU200:

BS Signal \rightarrow Circuit Switched \rightarrow RMC Settings \rightarrow HSPA \rightarrow HSUPA UL RLC SDU Size \rightarrow 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 SE	TUP messa	ge: AM or <mark>UM (E-DC</mark> I	and HSDPA)
Information Element	Condition	Value/remark	Version
- RLC PDU size		336 bits	
CHOICE channel requirement		Uplink DPCH info	Rel-5 and earlier Rel-6
- Power Control Algorithm		Algorithm1	
- TPC step size		0 (1 dB)	
- Aack		3	
- Anack		3	
- Ack-Nack repetition factor		1	
E-DCH info	A1, A2		
- E-DPCCH info			
- Happy bit delay condition		100 ms	
- E-DPDCH info	A1		
- E-TFCI table index		0	
- E-DCH minimum set E-TFCI		9	
- Reference E-TFCIs		1 E-TFCI	
- Reference E-TFCI		11	
- Reference E-TFCI PO		4	
- Maximum channelisation codes		2sf4	
- PLnon-max		0.84	
- E-DPDCH info	A2		
- E-TFCI table index		0	
- E-DCH minimum set E-TFCI		9	
- Reference E-TFCIs		2 E-TFCI	
- Reference E-TFCI		11	
- Reference E-TFCI PO		4	
- Reference E-TFCI		83	
- Reference E-TFCI PO		16	
- Maximum channelisation codes		2sf2 and 2sf4	
- PLnon-max		0.84	
Downlink HS-PDSCH Information			
- Measurement Feedback Info			
- CHOICE mode		FDD	
- CQI Feedback cycle, k		2 ms	
- CQI repetition factor		1	
^{- Δ} CQI		5 (corresponds to 0 dB in relative power offset)	
- Scheduled Transmission configuration	A1, A2		
- 2 ms scheduled transmission grant HARQ process allocation		Not present	
- Serving Grant		Not present	

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 \rightarrow HSDPA HS-DSCH \rightarrow CQI Feedback Cycle \rightarrow 2 ms BS Signal \rightarrow HSDPA HS-DSCH \rightarrow CQI Repetition Factor \rightarrow 1 BS Signal \rightarrow HSDPA HS-DSCH \rightarrow ACK/NACK Repetition Factor \rightarrow 1 BS Signal \rightarrow HSDPA HS-DSCH \rightarrow Channel Configuration Type \rightarrow Fixed Reference Channel BS Signal \rightarrow HSDPA HS-DSCH \rightarrow Fixed Reference Channel \rightarrow H-Set Selection \rightarrow H-Set 1 QPSK UE Signal \rightarrow HSUPA \rightarrow E-TFCI Table Index \rightarrow 0 UE Signal \rightarrow HSUPA \rightarrow Minimum Set E-TFCI \rightarrow 9 UE Signal \rightarrow HSUPA \rightarrow Happy Bit Delay Condition \rightarrow 100 ms UE Signal \rightarrow HSUPA \rightarrow Puncturing Limit PLnon-max \rightarrow 0.84 UE Signal \rightarrow HSUPA \rightarrow Maximum Channelisation Code \rightarrow 2xSF4 (for E-DCH category 1 to 5) or 2xSF2 and 2xSF4 (for E-DCH category 6) UE Signal \rightarrow HSUPA \rightarrow Initial Serving Grant \rightarrow Value \rightarrow Off UE Signal \rightarrow HSUPA \rightarrow HSUPA Gain Factors \rightarrow Number of Reference E-TFCIs \rightarrow 1 (for E-DCH category 1 to 5) or 2 (for E-DCH category 6) UE Signal \rightarrow HSUPA \rightarrow Reference E-TFCI 1...4 \rightarrow 11 (for E-DCH category 1 to 5) or 11 83 (for E-DCH category 6) UE Signal \rightarrow HSUPA \rightarrow Reference E-TFCI Power Offset \rightarrow 4 (for E-DCH category 1 to 5) or 4 16 (for E-DCH category 6) UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \beta c \rightarrow 8$ UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \beta d \rightarrow 15$ UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \triangle ACK \rightarrow 3$ UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \Delta$ NACK \rightarrow 3 UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \triangle CQI \rightarrow 5$

These settings can be configured in $R\&S^{\otimes}CMU200$ 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/lor	dB	-10		
P-CCPCH and SCH_Ec/lor	dB	-12		
PICH_Ec/lor	dB	-15		
HS-PDSCH	dB	-3 (Note 1)		
HS-SCCH_1	dB	-7.5 (Note 2)		
DPCH_Ec/lor	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/lor	dB	Necessary power so that total transmit power spectral density of Node B (lor) 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 \rightarrow Node-B Settings \rightarrow Level Reference \rightarrow Output Channel Power (Ior) BS Signal \rightarrow Downlink Physical Channels \rightarrow P-CPICH \rightarrow -10.0 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow P-SCH \rightarrow -15.0 dB BS Signal → Downlink Physical Channels → S-SCH → -15.0 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow P-CCPCH \rightarrow -12.0 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow PICH \rightarrow -15.0 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow DPDCH Level Config \rightarrow -10.0 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow HSDPA Channels \rightarrow On BS Signal \rightarrow Downlink Physical Channels \rightarrow HS-SCCH \rightarrow HS-SCCH#1 \rightarrow Level \rightarrow -7.5 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow HS-SCCH \rightarrow HS-SCCH#2 \rightarrow Level \rightarrow Off BS Signal \rightarrow Downlink Physical Channels \rightarrow HS-SCCH \rightarrow HS-SCCH#3 \rightarrow Level \rightarrow Off BS Signal \rightarrow Downlink Physical Channels \rightarrow HS-SCCH \rightarrow HS-SCCH#4 \rightarrow Level \rightarrow Off BS Signal \rightarrow Downlink Physical Channels \rightarrow HS-SCCH \rightarrow HS-SCCH Selection \rightarrow 1 BS Signal \rightarrow Downlink Physical Channels \rightarrow HS-SCCH \rightarrow Number of HS-SCCH \rightarrow 4 BS Signal \rightarrow Downlink Physical Channels \rightarrow HS-SCCH \rightarrow Unscheduled Subframes \rightarrow Transmit Dummy UEID BS Signal \rightarrow Downlink Physical Channels \rightarrow HS-PDSCH \rightarrow Level (All Active Codes) → -3.0 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow HSUPA Channels \rightarrow On BS Signal \rightarrow Downlink Physical Channels \rightarrow E-AGCH \rightarrow E-AGCH \rightarrow -20.0 dB BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → Test specific value BS Signal \rightarrow Downlink Physical Channels \rightarrow E-RGCH Active \rightarrow OFF or On (for E-RGCH test specific value)

These settings can be configured in $R\&S^{\otimes}CMU200$ 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 \rightarrow HSUPA \rightarrow E-AGCH \rightarrow AG Pattern \rightarrow AG Scope($\sqrt{:}$ Per HARQ proc.) \rightarrow (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	112		
- E-DCH Transmission Time	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 – serving E-DCH cell and test requirement for False 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	
loc	dBm/3.84 MHz	-6	60	
Phase reference	-	P-CF	PICH	
E-HICH Ec/lor	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	Reference Value		
rest number	Conditions	E-HICH Ec/lor (dB)	lor/loc (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])

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Test requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – Single link			
Propagation	Reference Value		
Conditions	lor/loc (dB)	False ACK probability	
VA30	0.6	0.5	
	ve slots – Single lin Propagation Conditions	ve slots – Single link Propagation Conditions lor/loc (dB)	

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 $R\&S^{\ensuremath{\mathbb{R}}}CMU200$ 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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow All ACK

WCDMA FDD I Re	ceiver Qualit	y CM OFF HSUPA HSDPA	12	Connect Control
🗏 WCDMA FDD Connection Control 🚆	PS: Est	ablished	CS: Co	nnected
-Setup	——————————————————————————————————————	SUPA/E-RGCH/E	-HICH/	
▶ Node-B Settings				
Circuit Switched				
▶ Packet Switched				
▶ HSDPA HS-DSCH				
►HSUPA				
Default Settings				
TTI Mode	10 ms			
RLC PDU Size	112			
▶ E-AGCH				
▼E-RGCH/E-HICH				
Fill up Frame with Dummies				
▼HARQ Feedback (E-HICH)				
Mode	All ACK			
Signature	1			
 Relative Grant (E-RGCH) 				
Connection Handover UE Signal BS Sig	nal Network	AF/RF ⊕•	Sync.	1 2

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 retransmission 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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow 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 \rightarrow Receiver Quality \rightarrow Applic. 2 \rightarrow HSUPA E-HICH

WCDMA FDD Band Rece	eiver Quality		Connect Control
0 False E-HICH Reception 93920 Correct E-HICH Reception 93920 All Valid E-HICH Receptions 0.000 % False E-HICH Ratio 93917 Correct CRC 0 CRC Error 0.000 % BLER 71.600 kBit/s Curr. Throughput 71.600 kBit/s Max. Possible Throughput 71.600 kBit/s Expected Max. Throughput 93920 Measured Frames	Settings ✓ Signalling State Circuit Switched Packet Switched ✓ Connection Info (CS) Dedicated Chn. Type SRB Reference Chn. Type DL Resources in Use Test Mode UL CRC Data Sour. DTCH ✓ Connection Info (PS) Dedicated Chn. Type SRB RMC RMC Test Loop ✓ HSUPA TTI Mode E-TFCI Table Index ✓ E-AGCH Primary UE-ID Secondary UE-ID	Connected Established RMC 2.5 kbps 12.2kbps+HSPA34 100 % Loop Mode 1 RLC On PRBS9 HSDPA Test Mod 2.5 kbps 12.2 kbps Loop Mode 1 RLC 10 ms 0 AAAA 12AA	R HSUPA E-HICH Applic. 2 Applic. 1 Analyzer Level Ana.Set. UE Signal BS Sig. Lvi. HSDPA BS Signal Settings
Power Modulation Spectrum	n Code Dom. Rece Power	eiver Quality Audio	Menus

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 \rightarrow HSUPA \rightarrow Maximum Channelisation Code \rightarrow 2xSF2 and 2xSF4
For False ACK, recall EHICH10.sav, modify the following configurations and establish PS call.
UE Signal \rightarrow HSUPA \rightarrow Maximum Channelisation Code \rightarrow 2xSF2 and 2xSF4 BS Signal \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow All DTX
The measurement result is available at: Menus \rightarrow Receiver Quality \rightarrow Applic. 2 \rightarrow 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		
loc	dBm/3.84 MHz	-60		
Phase reference	-	P-CPICH		
E-HICH Ec/lor	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/lor (dB)	lor/loc (dB)	Missed ACK probability
1	VA30	-38.2	0.6	0.01
Table 27: Tast requirement Type 1 for Missed ACK when hybrid APO asknowledgement indicator is				

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 $R\&S^{\ensuremath{\mathbb{R}}}CMU200$ 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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow All ACK

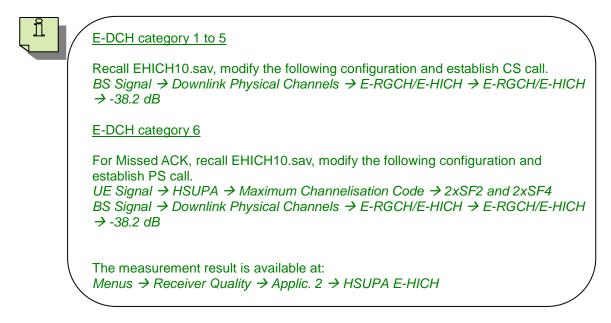
This setting can be configured in R&S[®]CMU200 by referring to Figure 17.

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 \rightarrow Receiver Quality \rightarrow Applic. 2 \rightarrow HSUPA E-HICH

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



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 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	112		
- E-DCH Transmission Time	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		
loc	dBm/3.84 MHz	-60		
Phase reference	-	P-CPICH		
E-HICH Ec/lor	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		
Test Number		E-HICH Ec/lor (dB)	lor/loc (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	Reference Value		
	Conditions	lor/loc (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 $R\&S^{\mbox{\tiny \ensuremath{\mathbb{R}}}}CMU200$ 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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow 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 retransmission 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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow All DTX

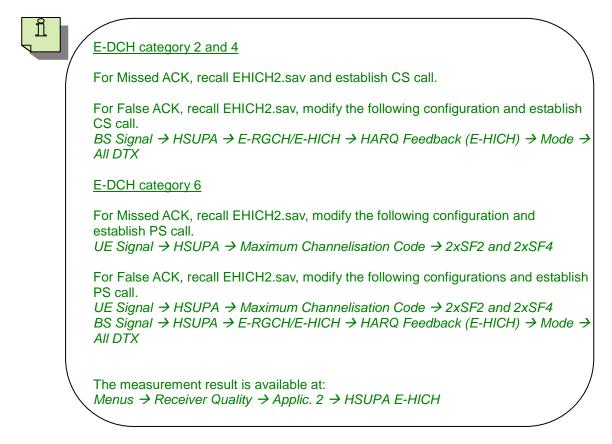
This setting can be configured in R&S[®]CMU200 by referring to Figure 17.

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 \rightarrow Receiver Quality \rightarrow Applic. 2 \rightarrow HSUPA E-HICH

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



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 $R\&S^{\ensuremath{\mathbb{R}}}CMU200$ 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	
loc	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
E-HICH Ec/lor	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/lor (dB)	lor/loc (dB)	Missed ACK probability
1	VA30	-31.6	0.6	0.01
Table 33: Test requirement Type 1 for Missed ACK when hybrid ARO acknowledgement indicator is				

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 $R\&S^{\ensuremath{\mathbb{R}}}CMU200$ 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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow All ACK

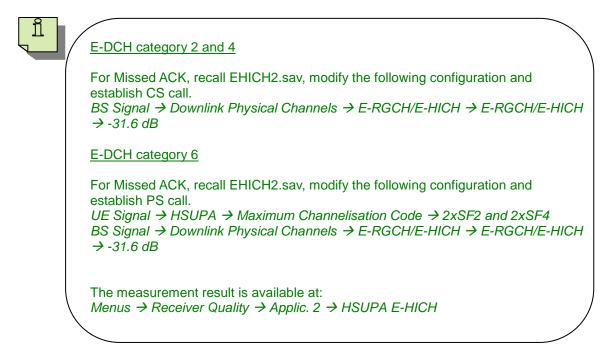
This setting can be configured in R&S[®]CMU200 by referring to Figure 17.

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 \rightarrow Receiver Quality \rightarrow Applic. 2 \rightarrow HSUPA E-HICH

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



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

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 multipath 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		Rel-6		
- Happy bit delay condition	10 ms (indication of exhausted resources on frame basis)			
- E-DCH minimum set E-TFCI	Not Present in RGCH performance tests, all E-TFCs should be in the selection process)			
Downlink information for each radio link list				
- Downlink information for each radio link				
- CHOICE E-RGCH Information		Rel-6		
- E-RGCH Information				
- Signature Sequence	0			
- RG combination index	0			

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 $R\&S^{\mbox{\tiny \ensuremath{\mathbb{R}}}}CMU200$ by referring to Figure 2(b), 3(b) and as shown in Figure 19.

NCDMA FDD Connection Control 🛔	PS: Idle <mark>CS:</mark> Signal O
-Setup	HSUPA/E-RGCH/E-HICH/
▼HSUPA	
Default Settings	
TTI Mode	10 ms
RLC PDU Size	112
► E-AGCH	
▼E-RGCH/E-HICH	
Fill up Frame with Dummies	
HARQ Feedback (E-HICH)	
▼Relative Grant (E-RGCH)	
Mode	Alternating H-ARQ Cycle
Activate Pattern	Execute
Pattern Length	1
Pattern (1:Up0:Down-:DTX)	0 0 0 0 0 0 0 0
Signature	0
Downlink Physical Channels	

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						
loc	dBm/3.84 MHz	-60							
Phase reference	-	P-CPICH							
E-RGCH Ec/lor	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	Propagation Reference Value					
rest Number	Conditions	E-RGCH Ec/lor (dB)	lor/loc (dB)	Missed UP/DOWN probability			
1	VA30	-30.9	0.6	0.05/0.05			
Ta	blo 26. Tost roquiromont	for Missod UP/DOW/N w	hon rolativo scho	duling grant is transmitted using			

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	ce Value						
Test Number	Conditions	lor/loc (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 $R\&S^{\ensuremath{\mathbb{R}}}CMU200$ 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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow 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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow Relative Grant (E-RGCH) \rightarrow Mode \rightarrow 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 ope	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	Initial operating point	5	19/15	45	716 = 6*112 + 18 + 26	71.6				
range			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

<u>-</u>	ReceiverQ	uality Configurat	tion			WCDMA F	DD 🛔	HSUPA
ssed UP/E	Control		Limits					E-RGCH
	-Setup		HSUPA E-	-RGCH/E-TI	FCI Value S	election		Applic. 2
	HSUPAE	-HICH						Applic. 2
	- HSUPAE	-RGCH						Analyze
	Default	Settings						Level
	Repetitio	on	Cont	inuous				
	Measure	Frames	1000					Ana.Set
	Nr. Of Ex	(pected E-TFCl's	7				F	UE Sign:
	Initial E-1	FCIIndex	5					HSDPA
	E-TFCI	Value Selection	Auto					HSUPA BS Sig. Lv
	· ·	d E-TFCI Val. 1.4	19	28	35	40		
		d E-TFCI Val. 5.8	45	52	59			BS Signa Settings
	· ·	d E-TFCI Val. 911						Securiya
	►E-DPCCł							
	NCDMA N	leighbour Cell						

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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow Relative Grant (E-RGCH) \rightarrow Mode \rightarrow 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 \rightarrow Receiver Quality \rightarrow Applic. 2 \rightarrow HSUPA E-RGCH

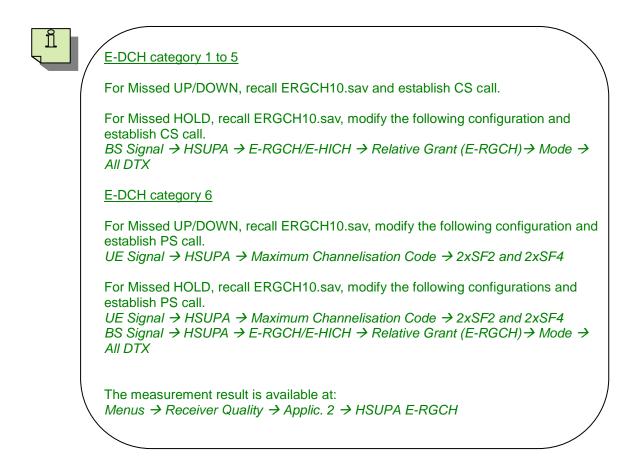
Figure 21(a) and 21(b) show the detection of E-DCH HARQ Indicator Channel (E-HICH) Missed UP/DOWN and Missed HOLD measurement result respectively.

	FDD Band F	Receiver	Quality	CM OFF HSUPA	j L	Connect Control
Missed UP/DOWN Test		Missed HOLD) Test			HSUPA E-RGCH
0 Missed UP			0 Missed H	OLD		
0 Missed DO	MN		O Correct H	HOLD		Applic. 2 Applic. 1
130740 Correct UF)		0 All Valid F	HOLD		
130740 Correct DC	MN	·				Analyzer
130740 All Valid UF	,		Missed H	IOLD Ratio		Level
130740 All Valid DO	ИМС					Ana.Set. UE Signal
0.000 % Missed UP	Ratio					HSDPA
0.000 % Missed DO	WN Ratio					HSUPA BS Sig. Lvl.
						BS Signal
261480 Measured F		1 2 E-TFCI 19 28		6 7 8 9 52 59	10 11	Settings
		E-TFCI Selecti		52 59		
	Initial E-T		5			
	Mode		Alternating H-A	ARQ Cycle		
HSUPA E-AGCH E-HICH	HSUPA E-RGCH	E-I	DPCCH Logging			Menus

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

🛞 WC	DMA FDD	Band I	Recei	ver	Qu	alit	v 🗌	CM OI HSUP HSDP	д 📟	Ž	τ.		Connect Control
Missed UP/DOWN	Test		Missed	HOLD	Test							R U N	HSUPA E-RGCH
0	Missed UP				0	Misseo	HOLE	D					
0	Missed DOWN			2428	30	Correc	t HOL	D					Applic. 2 Applic. 1
0	Correct UP			2428	30	All Val	id HOL	.D					
0	Correct DOWN												Analyzer
0	All Valid UP			0.000	9%	Misse	d HOLI	D Rati	0				Level
0	All Valid DOMN		,										Ana.Set. UE Signal
	Missed UP Ratio												HSDPA
	Missed DOWN Ratio												HSUPA BS Sig. Lvl.
24280	Measured Frames	Expected	I E-TFCI I E-TFCI I FCI Index	Selectio (<u> </u>	40 4 uto	5 6 15 52		89	10	11		BS Signal Settings
Repetition		Me	asure Frame:	1	_								Menus

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



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 multipath 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						
loc	dBm/3.84 MHz	-60						
Phase reference	-	P-CPICH						
E-RGCH Ec/lor	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	Reference Value						
rest Number	Conditions	E-RGCH Ec/lor (dB)	lor/loc (dB)	Missed UP/DOWN probability				
1	VA30	-34.9	0.6	0.05/0.05				
T-	blo 10: Toot requirement	Tune 1 fer Missed UD/DO	A/AL	a a a h a duilin a arrant ia				

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 $R\&S^{\ensuremath{\mathbb{R}}}CMU200$ 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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow 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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow Relative Grant (E-RGCH) \rightarrow Mode \rightarrow 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				
Initial operaing range		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

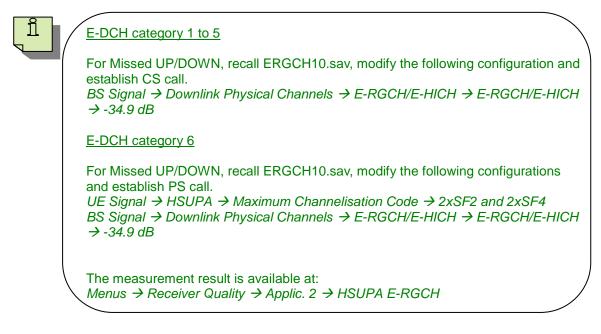
These settings can be configured in R&S[®]CMU200 as shown in Figure 20.

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 \rightarrow Receiver Quality \rightarrow Applic. 2 \rightarrow HSUPA E-RGCH

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



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 multipath 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		Rel-6					
- Happy bit delay condition	10 ms (Test 2 and 4), 2 ms (Test 1 and 3) (indication of exhausted resources on frame basis)						
- E-DCH minimum set E-TFCI	Not Present in RGCH performance tests, all E-TFCs should be in the selection process)						
Downlink information for each radio link list							
- Downlink information for each radio link							
- CHOICE E-RGCH Information		Rel-6					
- E-RGCH Information							
- Signature Sequence	0						
- RG combination index	0						

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 \rightarrow Packet Switched \rightarrow HSUPA Test Mode \rightarrow HSUPA UL RLC SDU Size \rightarrow 5872 Bit BS Signal \rightarrow HSUPA \rightarrow TTI Mode \rightarrow 2 ms BS Signal \rightarrow HSUPA \rightarrow RLC PDU Size \rightarrow 112 BS Signal \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow Relative Grant (E-RGCH) \rightarrow Signature \rightarrow 0 UE Signal \rightarrow HSUPA \rightarrow Happy Bit Delay Condition \rightarrow 2 ms UE Signal \rightarrow HSUPA \rightarrow Minimum set E-TFCI \rightarrow OFF UE Signal \rightarrow HSUPA \rightarrow RAB H-ARQ Profile \rightarrow Max. Number of Retransmission \rightarrow 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		
loc	dBm/3.84 MHz	-6	60		
Phase reference	-	P-CPICH			
E-RGCH Ec/lor	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					
Propagation	Reference Value				
Conditions	E-RGCH Ec/lor (dB)	lor/loc (dB)	Missed UP/DOWN probability		
VA30	-24.3	0.6	0.05/0.05		
	- Serving E-DCH cel Propagation Conditions	- Serving E-DCH cell Propagation Conditions E-RGCH Ec/lor (dB)	- Serving E-DCH cell Propagation Conditions E-RGCH Ec/lor (dB) Ior/loc (dB)		

 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	Reference Value		
	Conditions	lor/loc (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 $R\&S^{\ensuremath{\mathbb{R}}}CMU200$ 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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow 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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow Relative Grant (E-RGCH) \rightarrow Mode \rightarrow 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)
			Ri	sk of buffer u	Inderflow	
			21/15	54	817 = 7*112 + 18 + 15	408
		5	19/15	50	707 = 6*112 + 18 + 17	353.5
Initial			17/15	45	590 = 5*112 + 18 + 12	295.5
operaing range	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
Ambiguous E-		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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow Relative Grant (E-RGCH) \rightarrow Mode \rightarrow 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 \rightarrow Receiver Quality \rightarrow Applic. 2 \rightarrow 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

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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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow Relative Grant (E-RGCH) \rightarrow Mode \rightarrow All DTX

E-DCH category 6

For Missed UP/DOWN, recall ERGCH2.sav, modify the following configuration and establish PS call. UE Signal \rightarrow HSUPA \rightarrow Maximum Channelisation Code \rightarrow 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 \rightarrow Receiver Quality \rightarrow Applic. 2 \rightarrow 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 multipath 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 \rightarrow Packet Switched \rightarrow HSUPA Test Mode \rightarrow HSUPA UL RLC SDU Size \rightarrow 5872 Bit BS Signal \rightarrow HSUPA \rightarrow TTI Mode \rightarrow 2 ms BS Signal \rightarrow HSUPA \rightarrow RLC PDU Size \rightarrow 112 BS Signal \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow Relative Grant (E-RGCH) \rightarrow Signature \rightarrow 0 UE Signal \rightarrow HSUPA \rightarrow Happy Bit Delay Condition \rightarrow 2 ms UE Signal \rightarrow HSUPA \rightarrow Minimum set E-TFCI \rightarrow OFF UE Signal \rightarrow HSUPA \rightarrow RAB H-ARQ Profile \rightarrow Max. Number of Retransmission \rightarrow 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		
loc	dBm/3.84 MHz	-60		
Phase reference	-	P-CPICH		
E-RGCH Ec/lor	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	Reference Value				
rest number	Conditions	E-RGCH Ec/lor (dB)	lor/loc (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						

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 $R\&S^{\ensuremath{\mathbb{R}}}CMU200$ 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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow 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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow Relative Grant (E-RGCH) \rightarrow Mode \rightarrow 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 (kb		
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	
initial operating range	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

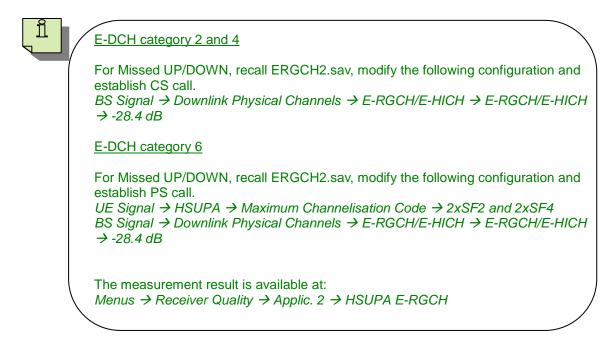
These settings can be configured in R&S[®]CMU200 by referring to Figure 20.

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 \rightarrow Receiver Quality \rightarrow Applic. 2 \rightarrow HSUPA E-RGCH

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



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 multipath 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 \rightarrow HSUPA \rightarrow RAB H-ARQ Profile \rightarrow Max. Number of Retransmission \rightarrow 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			
loc	dBm/3.84 MHz	-60		
Phase reference	-	P-CPICH		
P-CPICH Ec_lor	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_lor	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	Reference Value				
Condi	Conditions	E-AGCH Ec/lor (dB)	lor/loc (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 \rightarrow Node-B Settings \rightarrow Output Channel Power (lor) \rightarrow -59.4 dBm BS Signal → Node-B Settings → AWGN Noise Pwr. (@3.84 MHz, loc) → Off BS Signal \rightarrow HSUPA \rightarrow E-AGCH \rightarrow AG Pattern \rightarrow Pattern Length \rightarrow 3 BS Signal \rightarrow HSUPA \rightarrow E-AGCH \rightarrow AG Pattern \rightarrow AG Index \rightarrow 4 8 10 BS Signal \rightarrow Downlink Physical Channels \rightarrow P-CPICH \rightarrow -10.0 dB BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -20.0 dB UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \beta c \rightarrow 15$ UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \beta d \rightarrow 5$ UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \triangle ACK \rightarrow 5$ UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \Delta$ NACK \rightarrow 5 UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \triangle CQI \rightarrow 5$ BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -23.1 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow E-RGCH/E-HICH \rightarrow E-RGCH Active \rightarrow 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.

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Configuration in R&S<sup>®</sup>CMU200:
BS Signal \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow All ACK
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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-TFCI ₂₈		
AG ₈	E-TFCI ₆₇		
AG ₁₀	E-TFCI ₈₁		

Note:

E-TFCl₂₈, E-TFCl₆₇ and E-TFCl₈₁ 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 \rightarrow Receiver Quality \rightarrow Applic. 2 \rightarrow HSUPA E-AGCH HSUPA E-AGCH \rightarrow Measure Type \rightarrow Missed Detection

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

WCDMA FDD Band Receiver Quality	Connect Control
Max.Level: Auto Low noise Freq.Offset: + 0.000 kHz Chan./Freq: 9612 / 1922.4 MHz ☐: / Off ☐: / Off ☐: / Off ☐: / Off	N HSUPA
+ 120000 +100000 +90000 +90000 +80000 +70000	Applic. 2 Applic. 1
+60000 +50000 +40000 +30000 +20000 +20000	Analyzer Level
+0 E-TFCI 28 67 81 MissDet. Detected Events Of	Ana.Set. UE Signal
E-TFCI 28 E-TFCI 67 E-TFCI 81 E-TFCI E	HSDPA HSUPA BS Sig. Lvi. <mark>-</mark>
183820 Measured Frames AG Index 4 8 10 Expected E-TFCI 28 67 81 183820 Detected E-TFCI Events Expected E-TFCI Selection Auto	BS Signal Settings
0 Missed Detections 0 Nr. of O Hanny®ts 0.000 % Missed Detection Probability ■ Measure Type	Marker
Missed Detection Repetition Measure Frames Measure Type	Menus

Figure 22: E-AGCH missed detection measurement result

[1	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 \rightarrow HSUPA \rightarrow Maximum Channelisation Code \rightarrow 2xSF2 and 2xSF4	
	The measurement result is available at: Menus \rightarrow Receiver Quality \rightarrow Applic. 2 \rightarrow HSUPA E-AGCH HSUPA E-AGCH \rightarrow Measure Type \rightarrow 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 multipath 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 $R\&S^{\ensuremath{\mathbb{R}}}CMU200$ 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						
Tost Number	Number Propagation Conditions	Reference Value				
rest Number		E-AGCH Ec/lor (dB)	lor/loc (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 \rightarrow Node-B Settings \rightarrow Output Channel Power (Ior) \rightarrow -59.4 dBm BS Signal \rightarrow Node-B Settings \rightarrow AWGN Noise Pwr. (@3.84 MHz, loc) \rightarrow Off BS Signal \rightarrow HSUPA \rightarrow E-AGCH \rightarrow AG Pattern \rightarrow Pattern Length \rightarrow 3 BS Signal \rightarrow HSUPA \rightarrow E-AGCH \rightarrow AG Pattern \rightarrow AG Index \rightarrow 4 8 10 BS Signal \rightarrow Downlink Physical Channels \rightarrow P-CPICH \rightarrow -10.0 dB BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -20.0 dB UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \beta c \rightarrow 15$ UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \beta d \rightarrow 5$ $\textit{UE Signal} \rightarrow \textit{UE Gain Factors} \rightarrow \textit{Packet Data} \rightarrow \textit{HSDPA} / \textit{HSUPA} \rightarrow \varDelta \textit{ACK} \rightarrow 5$ UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \Delta$ NACK \rightarrow 5 UE Signal \rightarrow UE Gain Factors \rightarrow Packet Data \rightarrow HSDPA / HSUPA $\rightarrow \Delta CQI \rightarrow 5$ BS Signal → Downlink Physical Channels → E-RGCH/E-HICH → E-RGCH/E-HICH → -26.7 dB BS Signal \rightarrow Downlink Physical Channels \rightarrow E-RGCH/E-HICH \rightarrow E-RGCH Active \rightarrow 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 \rightarrow HSUPA \rightarrow E-RGCH/E-HICH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow 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.

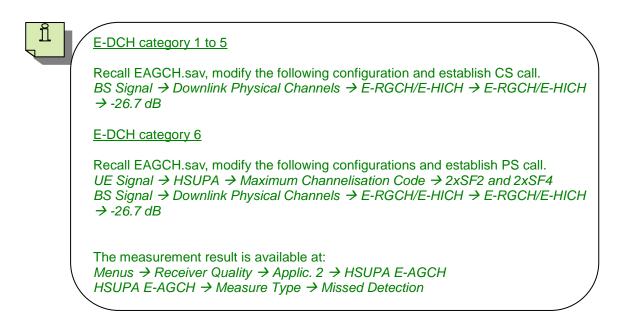
The test is continued until statistical significance as specified in Table F.6.4 of TS 34.121 [1] is achieved.

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 \rightarrow Receiver Quality \rightarrow Applic. 2 \rightarrow HSUPA E-AGCH HSUPA E-AGCH \rightarrow Measure Type \rightarrow Missed Detection

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



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				
5.2D	UE relative code domain power accuracy for HS-DPCCH and E-DCH	HSUPATx1.sav HSUPATx2.sav HSUPATx3.sav			
5.9B	Spectrum emission mask with E-DCH				
5.10B	Adjacent channel leakage power ratio (ACLR) with E-DCH	HSUPATx4.sav HSUPATx5.sav			
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 inform			
Туре	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	&S [®] CMU-B68 Versatile baseband board for WCDMA (3GPP FDD) layer 1, DL and UL, non-signaling		
R&S [®] CMU-K16	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)		
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	&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)		
R&S [®] CMU-K60	&S [®] CMU-K60 HSDPA 14 Mbit/s extension 3GPP/FDD/UE, Rel. 5 (,CMU-K64 necessary)		
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	&S [®] CMU-K65 WCDMA (3GPP FDD) UL user equipment TX test, non-signaling test software		
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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