HSUPA RF Measurements with the R&S[®]CMW500 in line with 3GPP TS 34.121

Application Note

Products:

| R&S[®]CMW500

Most of the tests specified in the 3GPP standard TS 34.121 [1] Release 6 (Rel-6) can be performed with the R&S[®]CMW500. This document provides a stepby-step guide on how to use a stand-alone R&S®CMW500 to take Rel-6 measurements on transmitter characteristics and execute performance tests according to TS 34.121 V9.7.0, clauses 5 and 10. Test cases that require fading simulation can also be carried out with the aid of a standalone R&S[®]CMW500 that has been configured with a built-in fading simulator option. That greatly reduces setup Furthermore, test complexity. the R&S[®]CMW500's wizard enables easy configuration of the test setup for various HSUPA subtests as specified by TS 34.121 [1]. The procedure detailing how the wizard is used is also explained for each test case. The test cases mentioned in this application note are carried out using Rel-6 user equipment (UE) that supports Operating Band I and Power Class 3.

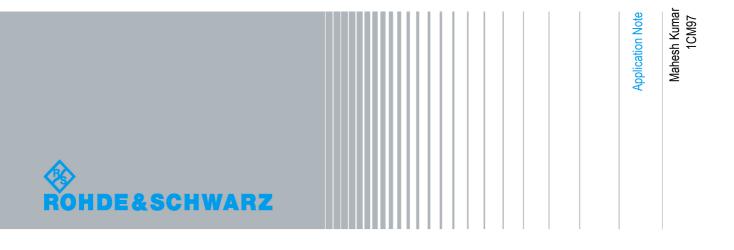


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Covered Tests in Line with TS 34.121

1 Introduction

Most of the tests specified in the 3GPP standard TS 34.121 [1] Release-6 (Rel-6) can be performed with the R&S[®]CMW500. This document provides a step-by-step guide on how to take Rel-6 measurements on transmitter characteristics and execute performance tests according to TS 34.121 V9.7.0, clauses 5 and 10, using a standalone R&S[®]CMW500 and user equipment (UE) supporting Operating Band I and Power Class 3. Performance test cases meant to be tested in the presence of fading can be carried out with the aid of a standalone R&S[®]CMW500equipped with a built-in fading simulator option. That greatly reduces the test setup complexity. These test cases will be discussed in brief in this application note. Optionally, external fading simulators like the R&S[®]AMU200A or the R&S[®]SMU200A can be used for those test cases as well. The R&S[®]CMW500's wizard provides easy recall of preconfigured settings as required such as Subtests 1 through 5). The procedure for carrying out each test case and is marked with this symbol:



1.1 Covered Tests in Line with TS 34.121

Table 1 shows the Rel-6 transmitter characteristics and performance tests that can be performed with the $R\&S^{\otimes}CMW500$.

Transmitter-characteristic and performance tests for 3GPP Rel-6 supported by the R&S $^{\odot}$ CMW500			
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)*	
Performance requirements	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)*	

* Requires built-in fading simulation on the R&S[®]CMW500.

Table 1: 3GPP Rel-6 measurements supported by the R&S[®]CMW500.

Information on Using the R&S®CMW500's Wizard

1.2 Information on Using the R&S[®]CMW500's Wizard

In order to use the wizard to recall the preconfigured settings for the Subtests 1 through 5), activate the WCDMA-UE signaling application before using the wizard.

Press the "WIZARD" hardkey located on the front panel of the R&S[®]CMW500.

Application Wizards \rightarrow HSUPA Maximum Output Power Settings \rightarrow Subtest Selection \rightarrow Subtest 1 \rightarrow Finish

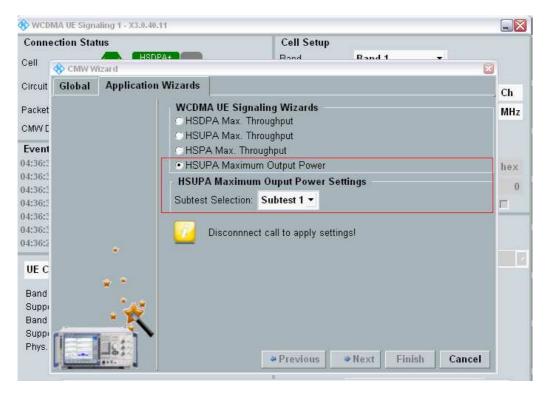


Figure 1: Activating the WCDMA-UE signaling application.

2 Rel-6 Transmitter Characteristics

2.1 Generic Call Setup for Transmitter Characteristics

Most of the test cases used to determine the transmitter characteristics for Rel-6 UE need to be tested for Subtests 1 through 5.

For Subtests 1 through 4, enter the UE into Loopback Test Mode 1, looping back both the 12.2 kbps 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 Subtest 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 the E-DCH transmitter characteristics that the R&S[®]CMW500 supports.

UL RLC SDU size for E-DCH tests supported by the R&S [®] CMW500					
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	3 (H-Set 1)	2936	1	For Subtests 1 to 4: 2936 For Subtest 5: 11744
5.2D	UE Relative Code Domain Power Accuracy for HS-DPCCH and E- DCH	3 (H-Set 1)	2936	1	2936 bits
5.9B	Spectrum Emission Mask with E-DCH	3 (H-Set 1)	2936	1	For Subtests 1 to 4: 2936 For Subtest 5: 11744
5.10B	ACLR with E-DCH	3 (H-Set 1)	2936	1	For Subtests 1 to 4: 2936 For Subtest 5: 11744
5.13.2B	Relative Code Domain Error with HS-DPCCH and E-DCH	3 (H-Set 1)	2936	1	2936 bits
10.2.1.1	Detection of E-HICH -Single Link Performance (10ms)	3 (H-Set 1)	2936	1	2936 bits
10.2.1.2	Detection of E-HICH -Single Link Performance (2ms)	3 (H-Set 1)	2936	1	5872 bits

Table 2: UL RLC SDU size for E-DCH tests supported by the R&S[®]CMW500 (subset of Table C.11.3.1 from TS 34.121 [1]),

Subtest 1 to 4 verifies the maximum UE power for different RMC plus HSPA signals. For Subtests 1 through 4, configure the R&S[®]CMW500 as follows: *WCDMA-UE Signaling* \Rightarrow *PS Domain* \Rightarrow *On* [check mark] *WCDMA-UE Signaling* \Rightarrow *UE Term. Connect* \Rightarrow *Test Mode WCDMA-UE Signaling* \Rightarrow *RMC Data Rate* \Rightarrow *DL RMC* 12.2 *UL* 12.2 *WCDMA-UE Signaling* \Rightarrow *Test Mode* \Rightarrow *Loop Mode* 1 *RLC WCDMA-UE Signaling* \Rightarrow *Procedure* \Rightarrow *RMC on CS Domain* + *HSPA* 34.108 *WCDMA-UE Signaling* \Rightarrow *Direction* \Rightarrow *HSPA Config* \Rightarrow *Connection Configuration* \Rightarrow *HSPA* \Rightarrow *HSUPA UL RLC SDU Size* \Rightarrow 2936

Subtest 5 verifies the maximum UE power for an SRB plus HSPA signal (no RMC). It requires algorithm 1 and an "All 1" TPC pattern. For Subtest 5, configure the R&S[®]CMW500 as follows: *WCDMA-UE Signaling* \rightarrow *UE Term. Connect* \rightarrow *Test Mode WCDMA-UE Signaling* \rightarrow *Test Mode* \rightarrow *HSPA WCDMA-UE Signaling* \rightarrow *Direction* \rightarrow *HSPA Config* \rightarrow *Connection Configuration* \rightarrow *HSPA* \rightarrow *HSUPA UL RLC SDU Size* \rightarrow 11744

😵 WCDMA UE Signaling 1 - V3.0.30				WCDMA
Connection Status Cell HSDPA CPG	Cell Setup Band	Band 1 🔹	Uplink	WCDMA 1 TX Meas
Circuit Switched OFF Packet Switched OFF CMW Demod. Info	Channel Frequency Output Power	10563 Ch 2112.6 MHz	9613 Ch 1922.6 MHz	WCDMA 1 RX Meas
Event Log	Total Output Scrambling Code		0 hex	Go to
	P-CPICH PS Domain Connection Se	−10.0 dB I Reduced Signali	Code 0	Routing
	UE term. Connec	100	•	
UE Measurement Report	RMC Data Rate DL Test Mode Loo	12.2 kbps ▼ UL 12. p Mode 1 RLC ▼		
Log10(TCH BLER) Transmitted UE Power [dBm] UE RX-TX Time Difference [Chip] Pathloss [dB]		RMC on CS + HSPA 3 ISPA	4.108 -	Signaling Parameter
	Data Pattern F Error Insertion	PRBS9	-	WCDMA-UE Signaling OFF
				Config

Figure 2: RMC 12.2kbps + HSDPA 34.108 configuration.

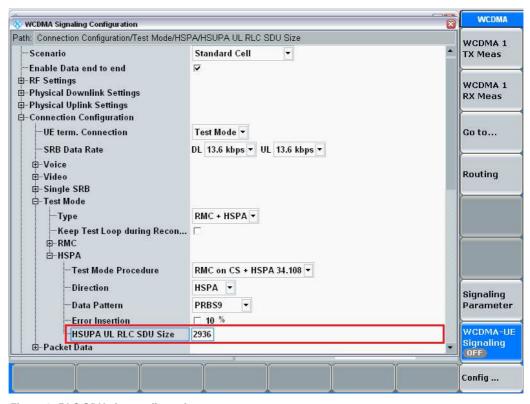


Figure 3: RLC SDU size configuration.

Use the RADIO BEARER SETUP message in 9.2.1 of TS 34.108 [3], as shown in Table 3, to configure an E-DCH call with the exceptions shown as in Tables 4 through 8.

Added or reconfigured TrCH information list A1 1 TrCH a - E-DCH transmission time 10 ms - Added or reconfigured E-DCH MAC-d flow Rv0 - E-DCH MAC-d flow power offset 0 - 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 a - E-DCH transmission time interval 2 ms - HARQ RV configuration Rv0 - Added or reconfigured E-DCH MAC-d flow (for DCC - E-DCH MAC-d flow power offset 0 - E-DCH MAC-d flow power offset 0 - E-DCH MAC-d flow power offset 0 - E-DCH info A1, A2 - MAC-es/e reset indicator TRUE - E-DPCCH/DPCCH power offset 0 - Happy bit delay condition 100 ms - E-TFCI boost info 100 ms - E-TFCI boost info 100 ms - E-DPCCH info 41 - E-DPCH info A1 - E-DPCH info A1 - E-DPCH info A1 - E-DPCH info A1 - E-DCH minimum	emark Vers	sion
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- Maximum channelization codes2sf4- PLnon-max0.84- Power offset for scheduling info0- E-DPDCH infoA2- E-TFCI table index0- E-DCH minimum set E-TFCI9- Maximum channelization codes2sf2 and- PLnon-max0.84		
- PLnon-max0.84- Power offset for scheduling info0- E-DPDCH infoA2- E-TFCI table index0- E-DCH minimum set E-TFCI9- Maximum channelization codes2sf2 and- PLnon-max0.84		
- Power offset for scheduling info0- E-DPDCH infoA2- E-TFCI table index0- E-DCH minimum set E-TFCI9- Maximum channelization codes2sf2 and- PLnon-max0.84		
- E-DPDCH info A2 - E-TFCI table index 0 - E-DCH minimum set E-TFCI 9 - Maximum channelization codes 2sf2 and - PLnon-max 0.84		
- E-TFCI table index0- E-DCH minimum set E-TFCI9- Maximum channelization codes2sf2 and- PLnon-max0.84		
- E-DCH minimum set E-TFCI9- Maximum channelization codes2sf2 and- PLnon-max0.84		
 Maximum channelization codes PLnon-max 2sf2 and 0.84 		
– PLnon-max 0.84		
	2sf4	
 Power offset for scheduling info 0 		
- Scheduled transmission configuration A1, A2		
- 2 ms scheduled transmission grant HARQ process Not press	ent	

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

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

Contents of the 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 	Signaled gain factors		
– CHOICE mode	FDD		
– Gain factor ßc	Value used in test: see Table 10		
– Gain factor ßd	Value used in test: see Table 10		
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: Contents of the RADIO BEARER SETUP message: AM or UM (Test Loop Mode 1), Table 5.2B.1A of TS 34.121 [1].

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

Table 5: Contents of the RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA) for Subtests 1, 2, 4, 5 (Tables 5.2B.2, 10.2D.3 and 10.13.2B.4 of TS 34.121 [1]).

Contents of the RADIO BEARER SETUP messa HSDPA) for Subtest 3	age: AM or UM (E-DCH and	
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 6: Contents of the RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA) for Subtest 3 (Tables 5.2B.3, 10.2D.4 and 10.13.2B.5 of TS 34.121 [1]).

Contents of the RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA) for Subtest 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 7 : Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA) for Subtest 5 (Tables 5.2B.3A, 10.2D.4 and 10.13.2B.5 of TS 34.121 [1])

Contents of the RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA)			
Information element	Value/Remark		
CHOICE channel requirement	Uplink DPCH info		
- Power control algorithm	For Subtests 1 to 4: Algorithm2		
	For Subtest 5: Algorithm 1		
– ΔΑϹΚ	Value used in test: see Table 10		
– ΔΝΑϹΚ	Value used in test: see Table 10		
 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 10		
Downlink HS-PDSCH Information			

 Measurement feedback info 	
– CQI feedback cycle, k	4 ms
- CQI repetition factor	2 (required for continuous HS-DPCCH signal)
– ΔCQI	Value used in test: see Table 10

Table 8: Contents of the RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA) Tables 5.2B.4, 10.2D.5 and 10.13.2B.6 of TS 34.121 [1]).

Summary of the I	Summary of the R&S [®] CMW500 settings in line with Table 4 (a,b,c,d)										
Subtest	R&S®CMW500 radio bearer setup	Necessary E-DCH channelization	Mandatory TTI mode								
1 to 4	12.2 kbps + HSPA 34.108 (CS connection)	UE categories 1 to 6: 2xSF2 (condition A1, A2 from 34.108)	10 ms only (in line with conditions in Table 10.2B.2 and Table 10.2B.3)								
5 (for all UE-categories)	SRB 2.5 kbps + HSPA (ßd=0) (PS connection)	1xSF4 (in line with conditions in 5.13.2B.5)	10 ms only (in line with. conditions in 5.2B.3A)								

Table 9: Summary of the connection setup configuration on the R&S®CMW500 to be used for the different subtests (Subtests 1 through 5).

Configure the R&S[®]CMW500 for **Subtests 1 through 5** as follows:

Config \rightarrow HSDPA \rightarrow CQI Feedback Cycle \rightarrow 4 ms Config \rightarrow HSDPA \rightarrow CQI Repetition Factor \rightarrow 2 Config \rightarrow HSDPA \rightarrow ACK/NACK Repetition Factor \rightarrow 3 Config \rightarrow HSDPA \rightarrow Channel Configuration \rightarrow Configuration Type \rightarrow Fixed Reference Channel Config \rightarrow HSDPA \rightarrow Fixed Reference Channel \rightarrow H-Set \rightarrow H-Set 1 QPSK Config \rightarrow HSUPA \rightarrow TTI Mode \rightarrow 10 ms Config \rightarrow HSUPA \rightarrow E-TFCI Table Index \rightarrow 0 Config \rightarrow HSUPA \rightarrow Minimum Set E-TFCI \rightarrow 9 (checkmark ON) Config \rightarrow HSUPA \rightarrow Happy Bit Delay Condition \rightarrow 100 ms Config \rightarrow HSUPA \rightarrow Puncturing Limit PLnon-max \rightarrow 0.84 Config \rightarrow HSUPA \rightarrow Maximum Channelization Code \rightarrow for Subtests 1 to 4: 2xSF2 (for all UE categories) \rightarrow for Subtest 5: 1xSF4 (for all UE categories) Config \rightarrow HSUPA \rightarrow Initial Serving Grant \rightarrow Value \rightarrow Off Config \rightarrow HSUPA \rightarrow RAB H-ARQ Profile \rightarrow H-ARQ Power Offset \rightarrow 0 dB Config \rightarrow HSUPA \rightarrow RAB H-ARQ Profile \rightarrow Maximum No. of Retransmissions \rightarrow 7 Config \rightarrow Physical Uplink Settings \rightarrow Gain Factors \rightarrow HSUPA \rightarrow Number of Reference E-TFCIs \rightarrow 5 (Subtests 1, 2 and 4) or 2 (Subtest 3) or 1 (Subtest 5)

Config \rightarrow Physical Uplink Settings \rightarrow Gain Factors \rightarrow HSUPA \rightarrow Reference E-TFCI 1...4 \rightarrow 11 67 71 75 (for Subtests 1, 2, 4) or 11 92 (for Subtest 3) or 67 (for Subtest 5)

Config \rightarrow Physical Uplink Settings \rightarrow Gain Factors \rightarrow HSUPA \rightarrow Reference E-TFCI 5 \rightarrow 81 (for Subtests 1, 2, 4)

Config \rightarrow Physical Uplink Settings \rightarrow Gain Factors \rightarrow HSUPA \rightarrow Reference E-TFCI \rightarrow Power Offset \rightarrow 4 18 23 26 27 (for Subtests 1, 2, 4) or 4 18 (for Subtest 3) or 18 (for Subtest 5)

Config \rightarrow Physical Uplink Settings \rightarrow TX Power Control (TPC) \rightarrow Alg. Step Size \rightarrow Alg. 2 /1dB (for Subtests 1, 2, 3, 4) or Alg. 1 /1 dB (for Subtest 5)

S WCDMA Signaling Configuration	Example 1
Path: HSUPA/RLC PDU Size	
⊖-HSDPA -CQI Feedback Cycle -CQI Repetition Factor -ACK/NACK Repetition Factor	₩ 4 ms 2 3
	Manual: 12 Use Reported (if available): 🔽 14
Channel Configuration └── Configuration Type □─Fixed Reference └──H-Set	Fixed Reference Channel - H-Set 1 OPSK
⊕ Con ⊞-User Defined	
HSUPA -TTI Mode RLC PDU Size E-AGCH E-E-AGCH E-E-RGCH/E-HICH -UE Category -E-TFCI Table Index -H-ARQ Redundancy Versions Minimum Set E-TFCI Happy Bit Delay Condition -Puncturing Limit PLnon-max -Maximum Channelisation Code	10 ms ▼ 336 Manual: 6 Use Reported (if available): ▼ 6 0 Always RV 0 ▼ ▼ 9 100 ms 0.84 2xSF2 ▼
Unregister Connect Test Mode	Send SMS Config

Figure 4: RADIO BEARER SETUP message configuration.

HSUPA	
TTI Mode	10 ms 🔻
	336
⊞-E-AGCH	
⊞ E-RGCH/E-HICH	
UE Category	Manual: 6 Use Reported (if available): 💌 6
-E-TFCI 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	2xSF2
-Initial Serving Grant	🗆 13 Type: Primary 💌
⊡RAB H-ARQ Profile	
-H-ARQ Power Offset	0 dB
Max Nr Of Retransmissions	7

Figure 5: RADIO BEARER SETUP message configuration.

ģ⊷HSUPA																	
TTI Mode	10	ms	•														
	33	6															
⊨-E-AGCH																	
Primary UE-ID	AA	AA															
Secondary UE-ID	12/	AΑ															
⊨ ⊸AG Pattern																	
-Pattern Length	1																
AG Index	•	20	\checkmark	10													
AG Scope (per HARQ proc																	
ID Type (secondary ID)	\Box																I
AG Pattern Repetition	Continuous 💌									I							
—AG Pattern Execution	Execute						I										
Unscheduled TTI	DT	Х					•										

Figure 6: RADIO BEARER SETUP message configuration.

Physical Uplink Settings/TX Power	Control (TPC)/TP	C Se	tun						1		
TX Power Control (TPC) Active TPC Setup		All 1									
TPC State TPC Condition	Pro Idle	econ	d. Exe	cute					WCDMA 1 RX Meas		
-Alg. / Step Size	Alg	. 2 /	1dB 🔻								
— Target Power — User Defined Pattern ⊕ TPC Setup		operation 1993	0.0 dl 0001111		l)			Î	Go to		
🗄 Gain Factors	βC	βD	ΔΑCΚ		ANACK	ΔCC)I				
	10	15							Routing		
	5	15									
	4	15									
RMC 384	4	15									
	4	15									
Voice	11	15							ſ		
Video 64	9	15									
HSDPA	10	15	8		8	8					
⊡-HSUPA ΔE-DPCCH No of Reference E-TFCI	6 s 5								Signaling Paramete		
Reference E-TFCI	1		2	3	4	5	6	7	WCDMA-U		
-E-TFCI	11		67	71	75	81	90	100	Signaling		
Power Offset	4		18	23	26	27	28	29	ON		
egister Connect Test Mode					Sen		Ĩ		Config		

Figure 7: β values for transmitter characteristics tests with HS-DPCCH and E-DCH configuration.

l

Tables 10, 11, 12 and 13 show the β values for transmitter characteristics with HS-DPCCH and E-DCH, the signaled value for gain factors β c, β d, Δ ACK, Δ NACK, Δ CQI and Δ E-DPCCH in the R&S®CMW500, and a summary of gain factor settings in the R&S®CMW500.

β val	β values for transmitter characteristic 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 (<i>dB</i>) (<i>Note 2</i>)	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

Notes:

Note 1: For Subtests 1 to 4, $\triangle ACK$, $\triangle NACK$ and $\triangle CQI = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$. For Subtest 5, $\triangle ACK$,

$$\Delta NACK$$
 and $\Delta CQI = 5/15$ with $P_{hs} = 5/15 * P_c$.

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.

- Note 3: For Subtest 1 the $\beta c/\beta d$ ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to $\beta c = 10/15$ and $\beta d = 15/15$.
- Note 4: In case of testing by UE using E-DPDCH Physical Layer category 1, Subtest 3 is omitted according to TS25.306 Table 10.1g.
- Note 5: βed cannot be set directly; it is set using the absolute grant value.

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

Table 10: β values for transmitter characteristics tests with HS-DPCCH and E-DCH configuration (Table C.11.1.3 of TS 34.121 [1]).

Signaled value for gain factors βc and βd							
Signaled 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 11: Signaled value for gain factors βc and βd on the R&S®CMW500 in line with 3GPP TS-25213.

Signaled value for gain factors \triangle ACK, \triangle NACK and \triangle CQI							
Signaled 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 12: Signaled value for gain factors $\triangle ACK$, $\triangle NACK$ and $\triangle CQI$ on the R&S®CMW500.

Signaled value for gain factors ∆E-DPCCH							
Signaled 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 13: Signaled value for gain factors ⊿E-DPCCH on the R&S®CMW500.

Summary	Summary of gain factor settings on the R&S [®] CMW500										
Subtest	βc	βd	⊿АСК	∆NACK	∆CQI	⊿E-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	1	0	0	0	0	12	67			

Table 14: Summary of gain factors to be set on the R&S®CMW500.

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Configure the R&S[®]CMW500 as follows:

The following parameters have to be configured according to the summary provided in Table 14. Refer to Figure 7.

```
Config \Rightarrow Physical Uplink Settings \Rightarrow Gain Factors \Rightarrow RMC 12.2 \Rightarrow \beta c
Config \Rightarrow Physical Uplink Settings \Rightarrow Gain Factors \Rightarrow RMC 12.2 \Rightarrow \beta d
Config \Rightarrow Physical Uplink Settings \Rightarrow Gain Factors \Rightarrow HSDPA \Rightarrow \beta c
Config \Rightarrow Physical Uplink Settings \Rightarrow Gain Factors \Rightarrow HSDPA \Rightarrow \beta d
Config \Rightarrow Physical Uplink Settings \Rightarrow Gain Factors \Rightarrow HSDPA \Rightarrow \Delta ACK
Config \Rightarrow Physical Uplink Settings \Rightarrow Gain Factors \Rightarrow HSDPA \Rightarrow \Delta ACK
Config \Rightarrow Physical Uplink Settings \Rightarrow Gain Factors \Rightarrow HSDPA \Rightarrow \Delta ACK
Config \Rightarrow Physical Uplink Settings \Rightarrow Gain Factors \Rightarrow HSDPA \Rightarrow \Delta ACK
Config \Rightarrow Physical Uplink Settings \Rightarrow Gain Factors \Rightarrow HSDPA \Rightarrow \Delta CQI
Config \Rightarrow Physical Uplink Settings \Rightarrow Gain Factors \Rightarrow HSUPA \Rightarrow \Delta E-DPCCH
Config \Rightarrow HSUPA \Rightarrow E-AGCH \Rightarrow AG Pattern \Rightarrow AG Index
```

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

Configure the R&S[®]CMW500 as follows:

Config → Network → Cell Reselection → Qqualmin → -24 dBConfig → Network → Cell Reselection → Qrxlevmin → -115Config → Physical Uplink Settings → Maximum UE Power → 21.0 dBmConfig → RF Settings → RF Power Downlink → Output Power (Ior) → -86 dBm

Table 16 shows the downlink physical channels for HSUPA measurements for subclauses 5.2B, 5.2D, 5.9B, 5.10B and 5.13.2B as specified in Table E.5A.1 of TS 34.121 [1].

Downlink physical channel parameters for E-DCH transmitter characteristic 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)						

 Table 16: Downlink physical channels for E-DCH transmitter characteristic tests (Table E.5A.1 of TS 34.121 [1]).

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 signaling, 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.

Configure the R&S[®]CMW500 as follows:

Config \rightarrow RF Settings \rightarrow RF Power Downlink \rightarrow Output Power (Ior) Config \rightarrow Physical Downlink Settings \rightarrow P-CPICH \rightarrow -10.0 dB Config \rightarrow Physical Downlink Settings \rightarrow P-SCH \rightarrow –15.0 dB Config \rightarrow Physical Downlink Settings \rightarrow S-SCH \rightarrow –15.0 dB Config \rightarrow Physical Downlink Settings \rightarrow P-CCPCH \rightarrow -12.0 dB Config \rightarrow Physical Downlink Settings \rightarrow PICH \rightarrow –15.0 dB Config \rightarrow Physical Downlink Settings \rightarrow DPDCH \rightarrow –10.0 dB Config \rightarrow Physical Downlink Settings \rightarrow HS-SCCH \rightarrow HS-SCCH#1 \rightarrow Level \rightarrow – 8.0 dB Config \rightarrow Physical Downlink Settings \rightarrow HS-SCCH \rightarrow HS-SCCH#2 \rightarrow Level \rightarrow Off Config \rightarrow Physical Downlink Settings \rightarrow HS-SCCH#3 \rightarrow Level \rightarrow Off Config \rightarrow Physical Downlink Settings \rightarrow HS-SCCH \rightarrow HS-SCCH#4 \rightarrow Level \rightarrow Off Config \rightarrow Physical Downlink Settings \rightarrow HS-SCCH \rightarrow HS-SCCH Enhanced \rightarrow Selection \rightarrow No.1 Config \rightarrow Physical Downlink Settings \rightarrow HS-SCCH \rightarrow HS-SCCH Enhanced \rightarrow Number of HS-SCCH \rightarrow 4 Config \rightarrow Physical Downlink Settings \rightarrow HS-SCCH \rightarrow HS-SCCH Enhanced \rightarrow Unscheduled Subframes → Transmit Dummy UEID Config \rightarrow Physical Downlink Settings \rightarrow HS-PDSCH \rightarrow -3.0 dB Config \rightarrow Physical Downlink Settings \rightarrow E-AGCH \rightarrow E-AGCH \rightarrow –20.0 dB Config \rightarrow Physical Downlink Settings \rightarrow E-HICH \rightarrow –20.0 dB Config \rightarrow Physical Downlink Settings \rightarrow E-RGCH \rightarrow Off [uncheck]

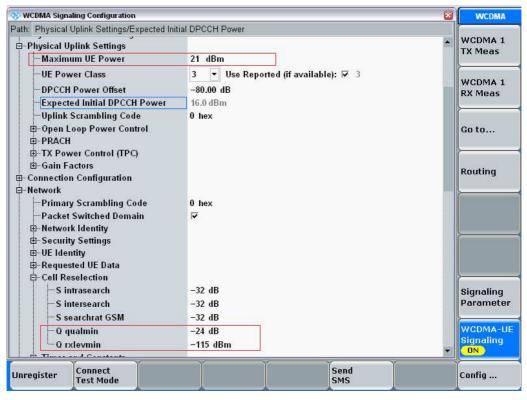


Figure 8: Serving cell parameters.

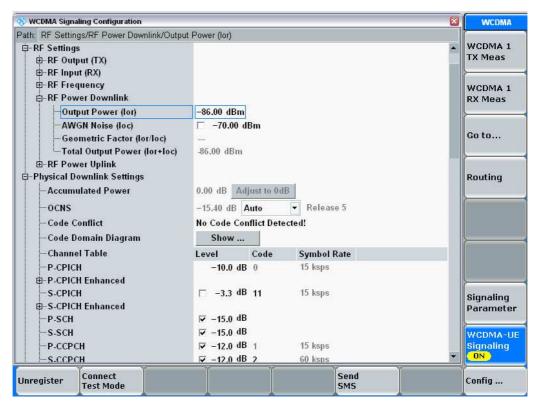


Figure 9: Downlink physical channel configuration in line with Table 16.

Physical Downlink Settings/E-RGCH							-
- S-CCPCH	⊽ -12.0 dB	2	60 ksps				WCDMA 1
РІСН	🔽 −15.0 dB	2	15 ksps				TX Meas
AICH	🔽 −16.0 dB	3	15 ksps				<u>}</u>
AICH Enhanced							WCDMA 1
DPCH	🔽 −10.0 dB	3	30 ksps				RX Meas
-F-DPCH	🔽 −10.0 dB	6	15 ksps				<u>}</u>
DPCH Enhanced							
	Level	Channel Code	Symbol Rate	UE ID	UE ID Dummy		Go to
-HS-SCCH #1	🔽 −8.0 dB	2	30 ksps	AAAA hex	5555 hex		
-HS-SCCH #2	□ -8.0 dB	7	30 ksps	AAAA hex	12AA hex		Routing
-HS-SCCH #3	∏ –8.0 dB	8	30 ksps	AAAA hex	1AAA hex		Cores -
-HS-SCCH #4	□ -8.0 dB	9	30 ksps	AAAA hex	1FAA hex		
HS-SCCH Enhanced							
Selection	No. 1	-					
Number of HSSCCH	4						-
Unscheduled Subframes	Transmit Du	mmy UEID	•				
Channel Table	Level	Channel Code	Symbol Rate				Signaling
HS-PDSCH B-HS-PDSCH Enhanced	I⊽ -3.0 dB	1	240 ksps				Paramete
-E-AGCH	🔽 −20.0 dB	3	15 ksps				WCDMA-L
-E-HICH	🔽 −20.0 dB	6	30 ksps				Signaling
- E-RGCH	□ -20.0 dB	6	30 ksps			-	ON
egister Connect			Ĩ,	Send			Config

Figure 10: Downlink physical channel configuration in line with Table 16.

Set up an HSUPA call in line with TS 34.108 [3], subclause 7.3.9. To establish an HSUPA connection, press "Connect Test Mode" (for Subtests 1 through 4) or "Connect HSPA TM" (for Subtest 5) on the R&S[®]CMW500 once the UE has registered with/attached to the R&S[®]CMW500.

WCDMA UE Signaling 1 - X3.0.40.11							WCDMA
Connection Status		Cell Setup					1
Cell HSDPA CPC		Band Band 1 Downlink		nd 1 👻			WCDMA 1 TX Meas
				mlink	Uplink		TAmeus
Circuit Switched Registered		Channel		10563 Ch	9613	Ch	WCDMA 1
Packet Switched 📩 Attached		Frequency		2112.6 MHz	1922.6	MHz	RX Meas
CMVV Demod. Info 🧮		Output Power	1	-86.00 dBm			<u> </u>
Event Log	Total Output		-86.00 dBm			Go to	
0:21:04 🕦 RRC Connection Released	•	Scrambling Code	a	0 hex	0	hex	00 10
0:21:03 🕜 Call Released 0:21:03 🕜 CS and PS Radiobearer Released		Р-СРІСН 🔻		-10.0 dB	Code	0	
0:21:02 🕤 PS Radiobearer Released		PS Domain	•	Reduced Signal	ing		Routing
0:21:01 🕦 Test Loop Openend		Connection Se	0.000				
0:21:01 🕜 Release Call 0:20:34 🕜 Call Established	UE term. Connect Test Mode			*			
	iner.	Туре		RMC + HSPA			
UE Info 💌		RMC					<u>}</u>
Connection Type Established		Data Rate DL	12.2	kbps - UL 12	.2 kbps 🔻		
Circuit Switched		Test Mode Loo					
E-Packet Switched Registration Identity Type IMSI		HSPA	<u>}</u>				
Registration Identity 001010123456063		Procedure I	RMC	on CS + HSPA		Signaling	
IMEI 357272040768214 UE Called Number UE Calling Number CTM Text Telephony (TTY)		Direction	HSPA 🔻				Parameter
		Data Pattern	PRBS	-0			WCDMA-UE
			- KD 3	2008	-		Signaling
nelexit ni	1003	Error Insertion		L 10 1	/6		ON

Figure 11: RMC 12.2 kbps + HSPA 34.108 call setup procedure for Subtests 1 through 4.

🔊 WCDMA UE Signaling 1 - X3.0.40.11						WCDMA
Connection Status Cell HSDPA+ CPC	Cell Setup Band	Band 1 Downlink	•	Uplink		WCDMA 1 TX Meas
Circuit Switched 1988 Call Established Packet Switched 29 Connection Established CMW Demod, Info	Channel Frequency Output Power	10563 2112.6 -86.00	MHz	9613 1922.6		WCDMA 1 RX Meas
Event Log 0:26:47 ① Call Established 0:26:47 ① Test Loop Closed	Total Output Scrambling Code	86.00 0	dBm hex		hex	Go to
10:26:47 ① CS and PS Radiobearer Established 10:26:46 ① CS Radiobearer Established 10:26:43 ① RRC Connection Established	P-CPICH PS Domain Connection Set	-10.0 IV Reduced	1.1	Code ng	0	Routing
10:26:42 🕇 RRC Connection Request 10:26:40 🔂 Establish RMC+HSPA Test Mode Call 💌	UE term. Connec Type RMC	Test M RMC +				
Connection Type Established -Circuit Switched UE terminated RMC Call -Packet Switched HSPA+ TM	Data Rate DL	and the second second second		2 kbps 🕗		
Registration Identity Type IMSI Registration Identity 001010123456063 IMEI 357272040768214 UE Called Number	Procedure F					
CE Called Number	Data Pattern F	RBS9	10 %	•		WCDMA-UI Signaling ON
Disconnect RMC		Send SMS		Handow	'er	Config

Figure 12: RMC 12.2 kbps + HSPA 34.108 call setup procedure for Subtests 1 through 4.

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

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

The maximum output power with HS-DPCCH and E-DCH measures the maximum power that the UE can transmit when HS-DPCCH and E-DCH are fully or partially transmitted during a DPCCH timeslot. The measurement period shall be at least one timeslot. An excess maximum output power may interfere with other channels or other systems. A low 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 for Release 6 and later releases that support HSDPA and E-DCH.

Maximum output power with HS-DPCCH and E-DCH								
Subtest in Table 10	Power C	lass 3	Power Class 4					
Sublest in Table To	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; therefore, the lower limits in Table 17 are made lower by 1.5 dB.

The test procedure allows a UE to decrease its maximum transmit power for E-TFC selection in Subtests 1 and 5; therefore, the lower limits of Subtests 1 and 5 in Table 17 are made lower by 1.5 dB.

Table 17: Maximum output power with HS-DPCCH and E-DCH	(Table 5.2B.5 of TS 34.121 [1]).
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Maximum output power with HS-DPCCH and E-DCH for tests in band XXV and XXVI

Subtest in Table 10	Power C	lass 3	Power Class 4		
	Power (dBm)	Tol. (dB)	Power (dBm)	Tol. (dB)	
1	+24	+1.7/-7.7	+21	+2.7/-6.7	
2	+22	+3.7/-6.2	+19	+4.7/-5.2	
3	+23	+2.7/-6.2	+20	+3.7/-5.2	
4	+22	+3.7/-6.2	+19	+4.7/-5.2	
5	+24	+1.7/-4.7	+21	+2.7/-3.7	
Notes:		•			

Notes:

The test procedure will result in a power slightly below the maximum; therefore, the lower limits in Table 17 are made lower by 1.5 dB.

The test procedure allows the UE to decrease its maximum transmit power for E-TFC selection in subtests 1 and 5; therefore, the lower limits of Subtests 1 and 5 in Table 17 are made lower by 1.5 dB.

Table 18: Maximum output power with HS-DPCCH and E-DCH (Table 5.2B.6 of TS 34.121 [1]).

Configure the fixed reference channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message, downlink physical channels, and serving cell parameters on the R&S[®]CMW500 as specified in section 2.1. The test comprises five subtests with

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

different signal configurations. The test procedure is common for Subtests 1 through 4 and differs for Subtest 5. The test procedure for Subtests 1 through 4 requires a dynamic TPC pattern, reacting to the E-TFCI received from the UE.

The test procedure to be followed to determine the maximum output power for **Subtests 1 through 4** is described below.

- a. Set the initial UE power to be at least 7.5 dB lower than the maximum UE power.
- b. Increase the UE power via TPC commands until the UE sends a decreased E-TFCI.
- c. Use Algorithm 2 and check the E-TFCI after each +1 TPC_cmd (11111 pattern).
- d. Decrease the UE power via a single –1 TPC_cmd (00000 pattern, algorithm 2). If the UE still sends a decreased E-TFCI, repeat the –1 TPC_cmd once.
- e. Check that the UE sends the expected target E-TFCI (for Subtests 1 through 4: 75, 67, 92, 71). If the target E-TFCI is not reached, the UE has failed the test.
- f. Keep the power constant (alternating pattern, algorithm 2), and measure the UE power (mean value over at least one slot).
- g. The progress of the test can be monitored via the displayed TPC state, target E-TFCI and monitored E-TFCI as listed in the legend of the following figure.

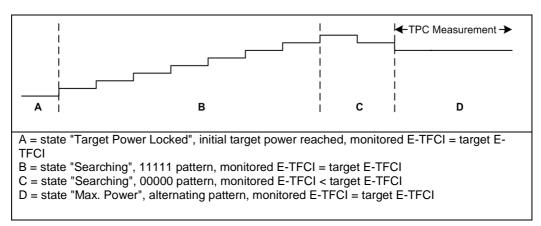
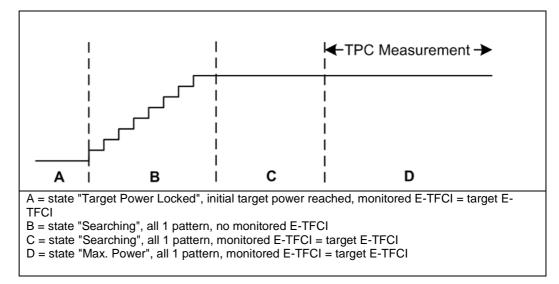


Figure 13: Arriving at the max. power condition for Subtests 1 through 4.

Subtest 5 requires only a static "All 1" TPC pattern. The basic test procedure is as follows:

- a. Set the initial UE power to be at least 7.5 dB lower than the maximum UE power.
- b. Send an "All 1" TPC pattern, using algorithm 1.
- c. When the maximum power is reached, the signaling application monitors the sent E-TFCI for 150 ms.
- d. Measure the UE power (mean value over at least one slot).



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

Figure 14: Arriving at the max. power condition for Subtest 5.

Establish an HSUPA call as mentioned in section 2.1. The R&S[®]CMW500 automatically handles the test procedure mentioned above to arrive at the maximum output power for Subtests 1 through 4. The end user only needs to configure the TPC pattern to be "Max. Power E-DCH" and wait for the measurement to be completed. The measurement results are available in the "TPC Measurement" application in the "WCDMA Tx Meas" function group or, alternatively, under the "UE Power" display available under "WCDMA Multi Evaluation".

For Subtest 1, configure the R&S[®]CMW500 as follows: Refer to section 2.1, Table 10 and Figure 7 to configure the gain factors, AG Index and E-TFCI in line with Subtest 1. In addition, the following TPC setting is to be made:

TPC Measurement \rightarrow ON

Repeat the test for Subtests 2 through 5 by changing the following configuration:

WCDMA-UE Signaling \rightarrow Config \rightarrow Physical Uplink Settings \rightarrow Gain Factors \rightarrow change β c and β d values according to Table 10 Signaling Parameter \rightarrow HSUPA \rightarrow E-AGCH \rightarrow AG Pattern \rightarrow AG Index \rightarrow change value according to the subtest TPC Measurement \rightarrow Restart/Stop

The measurement results for the maximum output power, along with an indication of the expected target E-TFCI and monitored current E-TFCI values, are displayed on the R&S[®]CMW500 in the TPC Measurement application. If the values for the Current E-TFCI and the Target E-TFCI differ, this indicates that the UE failed the test.

Figure 15 shows the measurement results for a Power Class 3 device transmitting HS-DPCCH and E-DCH simultaneously.

Connection Status		Cell Setup					
	ISDPA+ CPC	Band	Band 1	-			WCDMA 1 TX Meas
	HSUPA		Downlink		Uplink		TX Meds
ircuit Switched	Call Established	Channel	10563	Ch	9613	Ch	WCDMA 1
acket Switched 🛛 🙇	Connection Established	Frequency	2112.6	MHz	1922.6	MHz	RX Meas
MVV Demod. Info	Pange In Some	Output Power	-86.00	dBm			├
Event Log	Total Output	-86.00	dBm			Go to	
1:17:24 Call Established	A	Scrambling Code	θ	hex	0	hex	
1:17:24 🕤 Test Loop Closed 1:17:23 🕤 CS and PS Radiol		P-CPICH 💌	-10.0	dB	Code	0	
1:17:22 🕜 CS Radiobearer E		PS Domain	Reduced	Signali	ng		Routing
1:17:19 🚹 RRC Connection E 1:17:19 🚹 RRC Connection F		Connection Set	up				<u></u>
1:17:18 Establish RMC+H		UE term. Connect	Test M	ode			
TPC			RMC +	HSPA			
Active TPC Setup	Max. Power E-DCH	F	kbps	UI 12	2 kbns		}
TPC State	Precond. Execute		de 1 RLC		in make		
TPC Condition	Max Power (press 'Precor	nd.' or 'Execute')	ne i MLC			1	
- Max. Power E-DCH	Target E-TFCI: 75 Current		on CS +	HSPA 3	4,108		Signaling
	2 / 1dB / with (SRB, βD=0):	17 100					Paramete
Alg. / Step Size	Total - 15.0 ubil						WCDMA-L
Target Power	Target Power		0				
N .	Target Power m*11111+n*0000001 / w	ith (SRB, βD=0): 1	19	10 %	6		Signaling ON

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

Figure 15: TPC pattern for the Max. Power condition.



Figure 16: Measurement results for Maximum Output Power with HS-DPCCH and E-DCH.

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

The limit lines are configured according to Table 17 when you navigate from the signaling function to the "WCDMA Tx Meas" using the "Goto" tab. Alternatively, it is also user configurable as shown in Figure 17.

TPC Measurement → Config → Measurement Control → Max. Power E-DCH → TPC Auto Execute → ON (checkmark) TPC Measurement → Config → Limit → Max. Power E-DCH → ON (checkmark) TPC Measurement → Config → Limit → Max. Power E-DCH → Nominal Maximum Power → set according to power class of the UE as per Table 17 TPC Measurement → Config → Limit → Max. Power E-DCH → Upper Limit → set according to the UE's power class in line with Table 17 TPC Measurement → Config → Limit → Max. Power E-DCH → Lower Limit → set according to the UE's power class in line with Table 17

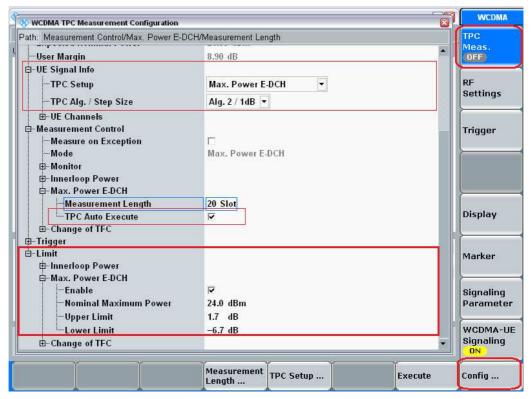


Figure 17: Configuration of limit lines in line with Table 17.

Ĩ	Press the "WIZARD" hardkey without the call established, and choose:	
	Application Wizard → HSUPA Maximum Ouput Power → Subtest Selection → Subtest15 → Finish WCDMA-UE Signaling → Connect Test Mode Goto → WCDMA Tx Meas. → TPC Measurement → ON	
	For Subtests 1 through 5: Disconnect the call and repeat the above steps with "Subtest Selection" set accordingly.)

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

"UE relative code domain power accuracy" measures the UE's ability to correctly set the level of the 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:

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

A code's nominal CDP is relative to the sum 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 sum of all active code powers remains unchanged or for one timeslot, whichever is longer. This test applies to all FDD user equipment for Release 6 and for later releases that support HSDPA and E-DCH.

Figure 18 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 10 and an 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 10 ms E-DCH TTI as shown in Figure 18.

The relative code domain power of each active code is measured at the measurement points as specified in Figure 18. Each measurement is over a half-slot period. Measurement Point 1 is the last timeslot before TTI1. Measurement Point 2 is the first timeslot of TTI1 and Measurement Point 3 is the first timeslot of TTI2. The 25 µs transient periods at the ends of each measured timeslot shall not be included.

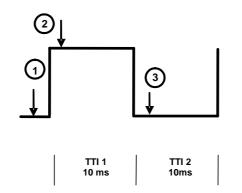


Figure 18: Transmit power profile for UE CDP accuracy.

Nominal ra	Nominal ratios for the UE relative code domain power										
Subtest in	Measurement		Expected relative code domain power in dB								
Table 10	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 19: Nominal ratios for the "UE relative code domain power" (Table 5.2D.7 of TS 34.121 [1]).

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

Table 20: Test requirements for the UE relative code domain power accuracy (Table 5.2D.8 of TS 34.121 [1]).

Configure the fixed reference channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message, Subtest 1, downlink physical channels, and serving cell are configured on the R&S[®]CMW500 as specified in section 2.1.

Establish an HSUPA call. Set the UE power to 15 dBm \pm 2 dB by referring to Figure 19. Send alternating "0" and "1" TPC commands in the downlink to satisfy the condition of obtaining TPC_cmd = 0.

Configure the R&S[®]CMW500 as follows: Signaling Parameter \rightarrow TPC \rightarrow Active TPC Setup \rightarrow Closed Loop Signaling Parameter \rightarrow TPC \rightarrow Alg. /Step Size \rightarrow Alg.2 /1 dB Signaling Parameter \rightarrow TPC \rightarrow Target Power \rightarrow Total \rightarrow 15.0 dBm

WCDMA UE Signaling 1 - X	3.0.40.11						WCDMA
onnection Status	HSDPA+ HSUPA	Cell Setup Band	Band 1 Downlink	•	Uplink		WCDMA 1 TX Meas
rcuit Switched	Call Established	Channel	10563	Ch	9613	Ch	WCDMA 1
cket Switched 🛛 📩	Connection Established	Frequency	2112.6	MHz	1922.6	MHz	RX Meas
IW Demod. Info Rower	In Sange In Sono	Output Power	-86.00	dBm			<u>}</u>
/ent Log 32:09 🕦 Reconfiguration	in the second	Total Output Scrambling Code	-86.00 0	dBm hex	0	hex	Go to
32:08 Reconfiguration 32:01 Call Established 32:01 Test Loop Close 32:01 CS and PS Radi	l ed		-10.0 I Reduced		Code ng	0	Routing
32:00 CS Radiobearer 31:56 RRC Connection		Connection Set UE term. Connect					
Active TPC Setup	Closed Loop		kbps /	11 12	2 kbps		
TPC State TPC Condition	Precond. Execute Target Power Locked		de 1 RLC		ic kups		<u> </u>
Alg. / Step Size Target Power	Alg. 2 / 1dB 💌 Total 💌 15.0 dBm		on CS + I	ISPA 3	4.108		Signaling Paramete
Precondition Configuration	None Target Power		9	10 %	-		WCDMA-L Signaling ON
				100700 22	dilata a		1

Figure 19: TPC setup to stimulate a UE transmitting at 15dBm ±2dB.

A repeating pattern with alternating value of absolute grants for Subtest 1 and an absolute grant index of Zero_Grant is generated.

Configure the R&S[®]CMW500 as follows:

Signaling Parameter \rightarrow HSUPA \rightarrow E-AGCH \rightarrow AG Pattern \rightarrow Pattern Length \rightarrow 2 Signaling Parameter \rightarrow HSUPA \rightarrow E-AGCH \rightarrow AG Pattern \rightarrow AG Index \rightarrow 20, 0

WCDMA UE Signaling 1 - X3.0.40.1	1						WCDMA
Connection Status Cell (1997) HSDP		Cell Setup Band	Band 1 Downlink	•	Uplink		WCDMA 1 TX Meas
Circuit Switched	Call Established Connection Established	Channel Frequency Output Power	10563 2112.6 -86.00	MHz	9613 1922.6		WCDMA 1 RX Meas
Event Log 0:32:09 () Reconfiguration Finish 0:32:08 () Reconfiguration Starte	ed	Total Output Scrambling Code	-86.00	dBm hex	0 Code	hex 0	Go to
0:32:01 Call Established 0:32:01 Test Loop Closed 0:32:01 CS and PS Radiobeare 0:32:00 CS Radiobearer Establ 0:31:56 RRC Connection Establ		E-HICH/E-RGCI					Routing
UE Measurement Report UTRA FDD (Current Cell) CPICH RSCP (dBm) CPICH Ec/No (dB) Log10(TCH BLER) Transmitted UE Power (dBm) UE RX-TX Time Difference [Chip]	Primary UE-ID Secondary UE-ID AG Pattern — Pattern Length — AG Index — AG Scope — ID Type AG Pattern Repetition	Continuous -	이번 전문한 전문	Г		₹ 10	Signaling Paramete
Pathloss (dB)	AG Pattern Execution Unscheduled TTI	DTX					WCDMA-U Signaling ON
Physical DL Settings	TPC PRACH	I HSDPA	HSUP	A			Config

Figure 20: Alternating pattern of absolute grant allocation to the UE.

The E-TFCI transmitted by the UE is verified and has to be confirmed to be equal to the target E-TFCI in Table 10. If the values for the Current E-TFCI and the Target E-TFCI differ, this indicates that the UE failed the test.

The E-TFCI measurement results are available on the R&S[®]CMW500 under WCDMA Rx Meas.:

Goto \rightarrow WCDMA Rx Meas. \rightarrow UL Logging \rightarrow E-TFCI

Figure 21 shows the E-TFCI transmitted by the UE.

The UE relative code domain power accuracy for HS-DPCCH and E-DCH is repeated with different combinations of β values for Subtests 2, 3 and 4 as specified in Table 10.

The measurement results for the UE relative code domain power accuracy with HS-DPCCH and E-DCH are available in the R&S[®]CMW500's *CDP vs. Slot measurement.*

Configure the R&S[®]CMW500 as follows: WCDMA Tx Meas \rightarrow Multi Evaluation \rightarrow Display \rightarrow CDP vs. Slot

Rohde & Schwarz recommends using frame triggering for UE relative code domain power accuracy with HS-DPCCH and E-DCH.

Configure the R&S[®]CMW500 as follows: Trigger \rightarrow Trigger Source \rightarrow Frame

BER	HSDPA ACK	E-HICH	RI	.C Throughput	0	IL Logging				UL Logging
SFN	Slot A	CK/NACK	CQI	E-TFCI	RSN	Happy Bit		D	РССН 🔺	RDY
3472	0	ACK	26	75	0	Unhappy	On	On	On	
3472	3	ACK	28	75	0	Unhappy	On	On	On	
3472	6	ACK	28	75	0	Unhappy	On	On	On	
3472	9	ACK	26	75	0	Unhappy	On	On	On	
3472	12	ACK	26	75	0	Unhappy	On	On	On	Í
3473	0	ACK	26	0	0	Unhappy	On	On	On	
3473	3	ACK	26	0	0	Unhappy	On	On	On	
3473	6	ACK	27	0	0	Unhappy	On	On	On	
3473	9	ACK	27	0	0	Unhappy	On	On	On	
3473	12	ACK	24	0	0	Unhappy	On	On	On	
3474	0	ACK	24	75	0	Unhappy	On	On	On	<u> </u>
3474	3	ACK	25	75	0	Unhappy	On	On	On	Display
3474	6	ACK	25	75	0	Unhappy	On	On	On	
3474	9	ACK	24	75	0	Unhappy	On	On	On	<u> </u>
3474	12	ACK	24	75	0	Unhappy	On	On	On	
3475	0	ACK	26	0	0	Unhappy	On	On	On	
3475	3	ACK	26	0	0	Unhappy	On	On	On	<u></u>
3475	6	ACK	26	0	0	Unhappy	On	On	On	Signaling
3475	9	ACK	26	0	0	Unhappy	On	On	On	Paramete
3475	12	ACK	25	0	0	Unhappy	On	On	On 🗸	
N HSD HSL		Call Establishe	d	PS: 📩	Conne	ction Established		ower in 1 Sync	Range	WCDMA-U Signaling ON
oetition .]	T T		leasure ubframes	Start S	FN		Ť		Config

Figure 21: Verification of the E-TFCI value in line with the selected subtest (refer to Table 10).

🚯 WCDMA UE TX Measurement - X3.0.40.11 WCDMA Multi Evaluation TPC Measurement PRACH Multi Evaluation UL Frequency: 1922.6000000 MHz Ref. Level: 28.00 dBm Connector: RF1COM Meas, Period: Half Slot RDY CDP vs Slot dB E-DPDCH1 [dB] trace RF 0 Settings -10 Trigger -20 Slot 2 22 26 4 8 10 12 14 16 18 20 24 28 30 32 34 36 38 6 Statistic Count 1st Measured Slot No 0 Average Statistics @ Slot 14.5 Current Min Max StdDev Display -9.42 DPCCH [dB] -9.42 9.42 -9.42 0.00 DPDCH [dB] -6.63 -6.63 -6.63 -6.63 0.00 HS-DPCCH [dB] -3.30 -3.30 -3.30 -3.30 0.00 Marker E-DPCCH [dB] -7.27 -7.27 -7.27 -7.27 0.00 E-DPDCH1 [dB] -18.86 -18.86 -18.86 -18.86 0.00 E-DPDCH2 [dB] Signaling E-DPDCH3 [dB] for Measurement points 2 and 3 change Parameter E-DPDCH4 [dB] the Slot number to 15.5 and 30.5 resp. Min = 0.0 Slot WCDMA-UE e ower in Range HSDPA-Call Establish nection Established Signaling Modulation/CDP 14.5 n Syne ON X Scale Select Slot Number Select Trace Y Scale Confia ... View ... CDP CDP Table ... CDP

Figure 22 shows the UE relative code domain power accuracy for HS-DPCCH and E-DCH measurement results.

Figure 22: UE relative code domain power accuracy for HS-DPCCH and E-DCH measurement results.

You can configure the position of the measurement points by changing the *Slot Number* as required for the different measure points in the R&S[®]CMW500.

Configure the R&S[®]CMW500 as follows:

Menus \rightarrow Code Dom. Power \rightarrow Applic. 1 \rightarrow CDP/Relative WCDMA MultiEvaluation \rightarrow Display \rightarrow Slot Number Table \rightarrow 0.0 [Measure Point 1] WCDMA MultiEvaluation \rightarrow Display \rightarrow Slot Number Table \rightarrow 0.5 [Measure Point 2] WCDMA MultiEvaluation \rightarrow Display \rightarrow Slot Number Table \rightarrow 1.5 [Measure Point 3]

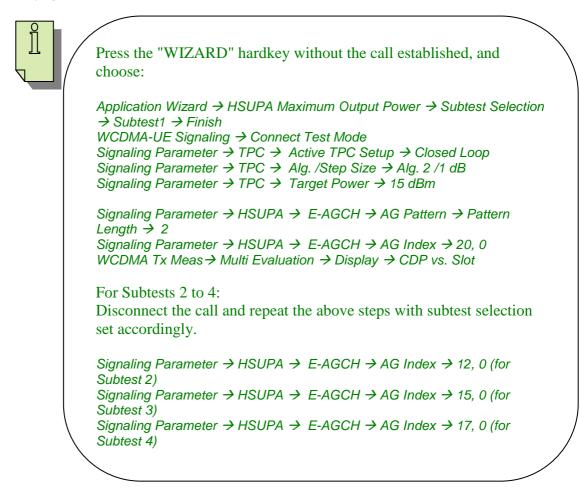
The diagram of the measurement result shows the E-DPDCH transmission from the UE, which matches the transmit power profile in Figure 18. The diagram can be configured to display either DPCCH, DPDCH1, HS-DPCCH, E-DPDCH1 or E-DPDCH2 (or all of them) by choosing the trace to be displayed.

Configure the R&S[®]CMW500 as follows: $WCDMA MultiEvaluation \rightarrow Display \rightarrow Select View \rightarrow CDP vs. Slot$ $WCDMA MultiEvaluation \rightarrow Display \rightarrow Select Trace CDP \rightarrow E-DPDCH1 [dB]$

The span of the X- and Y-scale of both diagrams can be configured by changing *Scale X* and *Scale Y* in the R&S[®]CMW500.

Configure the R&S[®]CMW500 as follows: $Display \rightarrow Y Scale CDP$

Display \rightarrow X Scale CDP



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

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

This test verifies that the UE emission's power does not exceed the limit in Table 21 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 10. The maximum output power with HS-DPCCH and/or E-DCH is specified in

Spectrum Emission Mask with E-DCH (5.9B)

section 2.2. Excess emission increases interference with other channels or with other systems.

Tables 21, 22, 23 and 24 show the spectrum emission mask requirement and additional spectrum emission limits. Δf is the separation between the carrier frequency and the center 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 requireme	ents	Measurement bandwidth				
	Relative requirement	Absolute requirement	weasurement bandwidth				
2.5 to 3.5	$\left\{-33.5-15\left(\frac{\Delta f}{MHz}-2.5\right)\right\}dBc$	-69.6 dBm	30 kHz				
3.5 to 7.5	$\left\{-33.5-1\left(\frac{\Delta f}{MHz}-3.5\right)\right\} dBc$	–54.3 dBm	1 MHz				
7.5 to 8.5	$\left\{-37.5-10\left(\frac{\Delta f}{MHz}-7.5\right)\right\}dBc$	-54.3 dBm	1 MHz				
8.5 to 12.5	–47.5 dBc	–54.3 dBm	1 MHz				

Table 21: Spectrum emission mask requirements (Table 5.9B.3 of TS 34.121 [1]).

Additional spectrum emission limits for Bands II, IV, X							
Δf in MHz	Frequency offset of measurement filter center frequency, f_offset	Measurement bandwidth					
2.5 MHz ≤ ∆f < 3.5 MHz	2.515 MHz \leq f_offset < 3.485 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 22: 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 center frequency, f_offset	Additional requirements Band V	Measurement bandwidth					
2.5 MHz ≤ ∆f < 3.5 MHz	2.515 MHz \leq f_offset < 3.485 MHz	–15 dBm	30 kHz					
$3.5 \text{ MHz} \leq \Delta f \leq 12.5 \text{ MHz}$	$3.55 \text{ MHz} \leq f_{offset} < 12.45 \text{ MHz}$	–13 dBm	100 kHz					

Table 23: Additional spectrum emission limits for Bands V (Table 5.9B.3B of TS 34.121 [1]).

Additional spectrum emission limits for Bands XII, XIII, XIV							
Δf in MHz	Frequency offset of measurement filter center frequency, f_offset	Measurement bandwidth					
2.5 MHz ≤ ∆f < 2.6 MHz	2.515 MHz \leq f_offset < 2.585 MHz	–13 dBm	30 kHz				
2.6 MHz $\leq \Delta f \leq$ 12.45 MHz	2.65 MHz \leq f_offset < 12.45 MHz	–13 dBm	100 kHz				

Table 24: Additional spectrum emission limits for Bands XII, XIII, XIV (Table 5.9B.3C of TS 34.121 [1]).

Spectrum Emission Mask with E-DCH (5.9B)

Configure the fixed reference channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message, Subtest 1, downlink physical channels, and serving cell on the R&S[®]CMW500 as specified in section 2.1. Establish an HSUPA call. Set the UE's maximum output power as specified in section 2.2.

Repeat the spectrum emission mask with E-DCH with different combinations of β values as specified in Table 10.

The measurement results for the spectrum emission mask with E-DCH are available in the *Emission Mask* display on the R&S[®]CMW500:

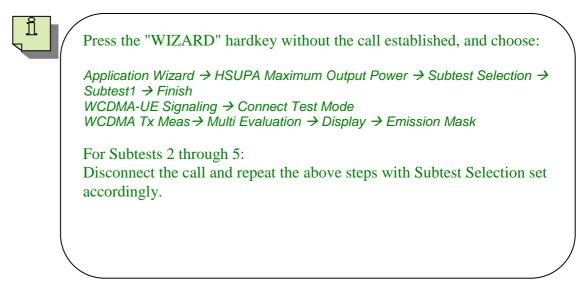
WCDMA Multi Evaluation → Display → Emission Mask

🚯 WCDMA UE TX Measurement - X3.0.40.11 WCDMA Multi Evaluation TPC Measurement PRACH Multi Evaluation UL Frequency: 1922.6000000 MHz Ref. Level: 33.90 dBm Connector: RF1COM Meas, Period: Full Slot RUN **Emission Mask** 🔷 🖟 🗙 🔷 🖗 🗙 Off 🔶 🛈 🗙 Off Off Y: RF 0 dB Current Settings Trigger -50 representation of the property of the second kHz 11000 -3000 -1000 1000 3000 5000 7000 9000 11000 -9000 -7000 5000 Display > TPC M DO CB BA -16.04 -12.17 -11.83 Active TPC Setup Max. Power E-DCH -8460 4050 8550 Marker TPC State Precond. Execute **TPC** Condition M Max Power (press 'Precond.' or 'Execute') **UE** Power 18.74 dBm Target E-TFCI: 75 Current E-TFCI: 75 - Max. Power E-DCH (Current) Signaling Alg. / Step Size 2 / 1dB / with (SRB, BD=0): 1 / 1dB arameter Statistics 100 / 100 Total 🔻 0.0 dBm Target Power Precondition Target Power WCDMA-UE er in Range tablished Signaling m*11111+n*00000...01... / with (SRB, βD=0): 11. Configuration ON Physical DL трс ... PRACH ... HSDPA ... HSUPA ... Confia ... Settings ..

Figure 23 shows the spectrum emission mask while the UE is transmitting E-DCH.

Figure 23: Measurement results for the spectrum emission mask.

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



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

This test verifies that a UE emission's power does not exceed the limit in Table 25 for all values of βc , βd and β_{HS} , β_{ec} and β_{ed} as specified in Table 10. The maximum output power with E-DCH is specified in section 2.2.

Configure the fixed reference channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message, Subtest 1, downlink physical channels, and serving cell on the R&S[®]CMW500 as specified in section 2.1. Establish an HSUPA call. Set the UE's maximum output power as specified in section 2.2.

The ACLR with HS-DPCCH is repeated with different combinations of β values as specified in Table 10.

The measurement results for ACLR with E-DCH are available in the ACLR Filter on the R&S[®]CMW500.

Configure the R&S[®]CMW500 as follows: WCDMA Tx Meas \rightarrow Multi Evaluation \rightarrow Display \rightarrow ACLR

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

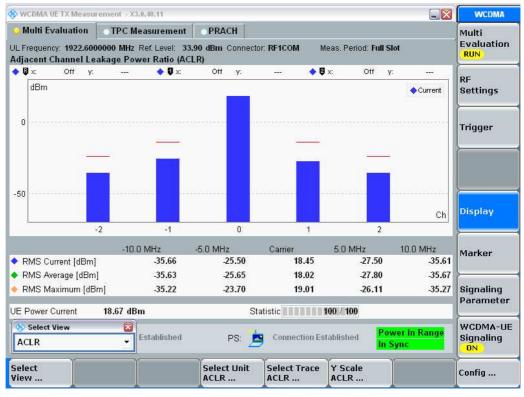
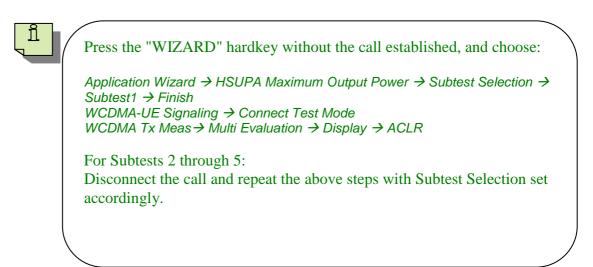


Figure 24: ACLR with E-DCH measurement results.

The measured ACLR shall be higher than the limit specified in Table 25.



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

The 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 μ s at each end of the slot.

The 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 the nominal CDP ratio as specified in TS 25.101 [4].

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

The relative code domain error is not applicable when either of the following channel conditions occurs (or if both occur):

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

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

Tables 26, 27 and 28 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. The relative code domain error must meet the test requirements in Table 28 for the parameters specified in Table 26.

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

Notes:

Less any 25 μs transient periods
 The longest period over which the nominal power remains constant

Table 26: Parameters for relative code domain error with HS-DPCCH and E-DCH (Table 5.13.2B.2 of TS 34.121 [1]).

Nominal ECDP ratios								
Subtest in Table 10	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				
3	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 27: Nominal ECDP ratios (Table 5.13.2B.8 of TS 34.121 [1]).

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

Table 28: Relative code domain error test requirements (Table 5.13.2B.9 of TS 34.121 [1]).

Configure the fixed reference channels (FRC H-Set 1, QPSK version), RADIO BEARER SETUP message, Subtest 1, downlink physical channels, and serving cell on the R&S[®]CMW500 as specified in section 2.1.

Measure the relative code domain error with HS-DPCCH and E-DCH at a UE power level of 15 dBm ± 2 dB, and repeat this measurement for -18 dBm ± 2 dB.

Establish an HSUPA call. Set the UE power to 15 dBm ± 2 dB by referring to Figure 19.

Configure the R&S[®]CMW500 as follows:

Signaling Parameter \rightarrow TPC \rightarrow Active TPC Setup \rightarrow Closed Loop Signaling Parameter \rightarrow TPC \rightarrow Alg. /Step Size \rightarrow Alg.2 /1 dB Signaling Parameter \rightarrow TPC \rightarrow Target Power \rightarrow Total \rightarrow 15.0 dBm

Verify the E-TFCI transmitted by the UE. It has to be confirmed to be equal to the target E-TFCI in Table 10. If the values for the Current E-TFCI and the Target E-TFCI differ, this indicates that the UE failed the test.

The measurement results for E-TFCI are available in the R&S[®]CMW500 under *HSUPA E-AGCH* as shown in Figure 20.

Configure the R&S[®]CMW500 as follows: Goto \rightarrow WCDMA Rx Meas. \rightarrow UL Logging

Repeat the relative code domain error measurement at a UE power level of -18 dBm with a $\pm 2 \text{ dB}$ tolerance. You can configure these settings on the R&S[®]CMW500 by referring to Figure 19.

Configure the R&S[®]CMW500 as follows: Signaling Parameter \rightarrow TPC \rightarrow Active TPC Setup \rightarrow Closed Loop Signaling Parameter \rightarrow TPC \rightarrow Alg. /Step Size \rightarrow Alg.2 /1 dB Signaling Parameter \rightarrow TPC \rightarrow Target Power \rightarrow Total \rightarrow -18.0 dBm

Repeat the relative code domain error measurement with different combinations of β values for Subtests 2, 3 and 4 as specified in Table 10 at a UE power level of 15 dBm ±2 dB and -18 dBm with a ±2 dB tolerance.

To calculate the ECDP and the nominal CDP, the instrument must know the configured channels, their beta factors and the spreading factors (SF). Use the "Expected ECDP" section of the configuration dialog box to specify this information. If the combined signal path scenario is active, the required information is delivered by the signaling application and displayed as shown in Figure 25.

Rohde & Schwarz recommends using frame triggering for UE relative code domain power accuracy with HS-DPCCH and E-DCH.

Configure the R&S[®]CMW500 as follows: Trigger \rightarrow Trigger Source \rightarrow Frame

Depending on the gain factor values, you might need to adjust the measurement threshold. The recommended value is -10 dB.

Configure the R&S[®]CMW500 as follows:

WCDMA Multi Evaluation \rightarrow Measurement Control \rightarrow Modulation / CDP \rightarrow Chn. Detect Threshold $\rightarrow -10 \text{ dB}$

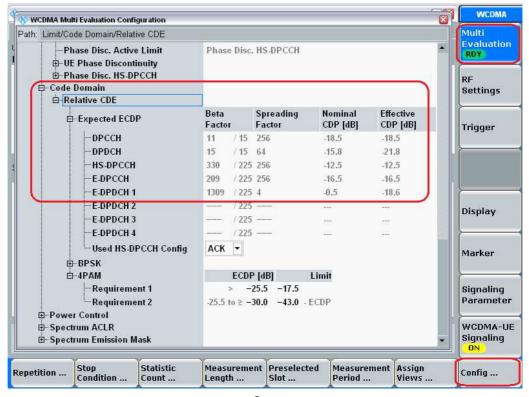


Figure 25: Expected ECDP displayed on the R&S[®]CMW500.

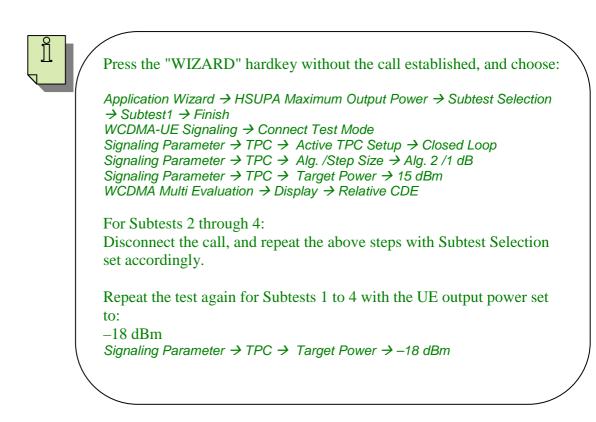
The measurement results for the relative code domain error with HS-DPCCH and E-DCH is available on the R&S[®]CMW500 under *Relative CDE*.

Configure the R&S[®]CMW500 as follows: WCDMA Multi Evaluation \rightarrow Display \rightarrow Relative CDE

Figure 26 shows the relative code domain error with HS-DPCCH and E-DCH measurement results.

Multi Evaluation JL Frequency: 1922.6000	TPC Meas		PRACI		сом	Meas. Perio	d: Full Slo	t	Multi Evaluation
Relative CDE vs Slot									RUT
dB									RF Settings
								Slot	Trigger
tatistic Count	_					0			
Ist Measured Slot No	7 Curr		Мах	StdDev	SE	Overall C			1
Statistics @ Slot 0 DPCCH [dB]	-36.76	Avg -36,76	-36.76	StaDev 0.00	256	State On	SF 256	Modulation BPSK	Display
JECCHINDI	-30.70		-30.76	0.00	64	On	64	BPSK	
	21.50	21 50						DESU	
ОРДСН [4В]	-31.50	-31.50		0.00		100.00		PDCK	ſ
DPDCH [dB] HS-DPCCH [dB]	-111.38	-111.38	-111.38	0.00	256	On	256	BPSK	Marker
DPDCH [dB] HS-DPCCH [dB] E-DPCCH [dB]				0.00 0.00 0.00		On On		BPSK	Marker
DPDCH (dB) HS-DPCCH (dB) E-DPCCH (dB) E-DPDCH1 (dB)	-111.38 -47.00	-111.38 -47.00	-111.38 -47.00	0.00	256 256	On	256 256 4		
DPDCH [dB] HS-DPCCH [dB] E-DPCCH [dB] E-DPDCH1 [dB] E-DPDCH2 [dB]	-111.38 -47.00 -42.47	-111.38 -47.00 -42.47	-111.38 -47.00 -42.47	0.00 0.00	256 256 4	On On On	256 256	BPSK	Signaling
DPDCH [dB] HS-DPCCH [dB] E-DPCCH [dB] E-DPDCH1 [dB] E-DPDCH1 [dB] E-DPDCH2 [dB] E-DPDCH3 [dD] E-DPDCH4 [dB]	-111.38 -47.00 -42.47	-111.38 -47.00 -42.47	-111.38 -47.00 -42.47	0.00 0.00 	256 256 4	On On On Off	256 256 4	BPSK	
DPDCH [dB] HS-DPCCH [dB] E-DPCCH [dB] E-DPDCH1 [dB] E-DPDCH2 [dB] E-DPDCH2 [dB]	-111.38 -47.00 -42.47 	-111.38 -47.00 -42.47	-111.38 47.00 42.47 	0.00 0.00	256 256 4 	On On On Off	256 256 4 	BPSK BPSK 	Signaling

Figure 26: Measurement results for the relative code domain error with HS-DPCCH and E-DCH.



3 Rel-6 Performance Requirements

3.1 Generic Call Setup for Performance Requirements

All parameters for the 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. The E-DCH call is setup according to 7.3.9 of TS 34.108 [3]. Table 2 shows the UL RLC SDU size for the E-DCH performance requirements supported by the R&S[®]CMW500. Configure an HSUPA call on the R&S[®]CMW500 as shown in Figure 1 and 2.

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

Configure the R&S[®]CMW500 as follows: Signaling Parameter \rightarrow TPC \rightarrow Active TPC Setup \rightarrow Closed Loop Signaling Parameter \rightarrow TPC \rightarrow Alg. /Step Size \rightarrow Alg.2 /1 dB Signaling Parameter \rightarrow TPC \rightarrow Target Power \rightarrow Total \rightarrow 0.0 dBm

Configure the UL RLC SDU size on the R&S[®]CMW500 according to Table 2.

Configure the R&S[®]CMW500 as follows:

Config \rightarrow Connection Configuration \rightarrow Test Mode \rightarrow HSPA \rightarrow HSUPA UL RLC SDU Size \rightarrow 2936 bits (for section 3.2, 3.3) or 5872 bits (for section 3.4, 3.5)

Use the RADIO BEARER SETUP message in 9.2.1 of TS 34.108 [3], as shown in Tables 29 and 30, to configure the E-DCH call.

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

Table 29: Contents of the RADIO BEARER SETUP message: AM or UM (Test Loop Mode 1; Subset of 9.2.1 of TS 34.108 [3]).

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)	
$-\Delta_{ACK}$		3	
$-\Delta_{NACK}$		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 channelization 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 channelization 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	
$-\Delta$ 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	

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

Table 30: Contents of the RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA) (Subset of 9.2.1 of TS 34.108 [3])

Configure the R&S[®]CMW500 as follows: Config \rightarrow HSDPA \rightarrow CQI Feedback Cycle \rightarrow 2 ms Config \rightarrow HSDPA \rightarrow CQI Repetition Factor \rightarrow 1 Config \rightarrow HSDPA \rightarrow ACK/NACK Repetition Factor \rightarrow 1 Config \rightarrow HSDPA \rightarrow Channel Configuration Type \rightarrow Fixed Reference Channel Config \rightarrow HSDPA HS-DSCH \rightarrow Channel Configuration \rightarrow Fixed Reference Channel \rightarrow Config \rightarrow HSDPA HS-DSCH \rightarrow Channel Configuration \rightarrow Fixed Reference \rightarrow H-Set \rightarrow H-Set 1 QPSK Config → HSUPA → RLC PDU Size → 336 Config \rightarrow HSUPA \rightarrow E-TFCI Table Index \rightarrow 0 Config \rightarrow HSUPA \rightarrow Minimum Set E-TFCI \rightarrow 9 Config \rightarrow HSUPA \rightarrow Happy Bit Delay Condition \rightarrow 100 ms Config \rightarrow HSUPA \rightarrow Puncturing Limit PLnon-max \rightarrow 0.84 Config \rightarrow HSUPA \rightarrow Maximum Channelization Code \rightarrow 2xSF4 (for E-DCH Category 1 to 5) or 2xSF2 and 2xSF4 (for E-DCH Category 6) Config \rightarrow HSUPA \rightarrow Initial Serving Grant \rightarrow Value \rightarrow Off Config → Physical Uplink Settings → Gain Factors → HSUPA → Number of Reference E-TFCIs \rightarrow 1 (for E-DCH Category 1 to 5) or 2 (for E-DCH Category 6) Config \rightarrow Physical Uplink Settings \rightarrow Gain Factors \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) Config \rightarrow Physical Uplink Settings \rightarrow Gain Factors \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) Config \rightarrow Physical Uplink Settings \rightarrow Gain Factors \rightarrow HSDPA $\rightarrow \beta c \rightarrow 8$ Config \rightarrow Physical Uplink Settings \rightarrow Gain Factors \rightarrow HSDPA $\rightarrow \beta d \rightarrow 15$ Config \rightarrow Physical Uplink Settings \rightarrow Gain Factors \rightarrow HSDPA $\rightarrow \triangle ACK \rightarrow 3$ Config \rightarrow Physical Uplink Settings \rightarrow Gain Factors \rightarrow HSDPA $\rightarrow \triangle$ NACK \rightarrow 3 Config \rightarrow Physical Uplink Settings \rightarrow Gain Factors \rightarrow HSDPA $\rightarrow \triangle CQI \rightarrow 5$

You can configure the R&S[®]CMW500 for these settings by referring to section 2.1 in Figures 3 to 6.

Table 31 shows the downlink physical channels for the 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].

annal parameters for E DCH single li

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)		

Farameter 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)

Downlink physi

OCNS_Ec/lor	dB	Necessary power so that total transmit power spectral density of Node B (lor) adds to one
Notes:		

Notes:

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

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

Configure the R&S[®]CMW500 as follows:

Config \rightarrow Physical Downlink Settings \rightarrow P-CPICH \rightarrow -10.0 dB Config \rightarrow Physical Downlink Settings \rightarrow P-SCH \rightarrow –15.0 dB Config \rightarrow Physical Downlink Settings \rightarrow S-SCH \rightarrow –15.0 dB Config \rightarrow Physical Downlink Settings \rightarrow P-CCPCH \rightarrow -12.0 dB Config \rightarrow Physical Downlink Settings \rightarrow PICH \rightarrow –15.0 dB Config \rightarrow Physical Downlink Settings \rightarrow DPCH \rightarrow -10.0 dB Config \rightarrow Physical Downlink Settings \rightarrow HS-SCCH#1 \rightarrow Level \rightarrow -7.5 dB Config \rightarrow Physical Downlink Settings \rightarrow HS-SCCH#2 \rightarrow Level \rightarrow Off Config \rightarrow Physical Downlink Settings \rightarrow HS-SCCH#3 \rightarrow Level \rightarrow Off Config \rightarrow Physical Downlink Settings \rightarrow HS-SCCH#4 \rightarrow Level \rightarrow Off Config \rightarrow Physical Downlink Settings \rightarrow HS-SCCH Enhanced \rightarrow Selection \rightarrow 1 Config \rightarrow Physical Downlink Settings \rightarrow HS-SCCH Enhanced \rightarrow Number of HS-SCCH $\rightarrow 4$ Config → Physical Downlink Settings → HS-SCCH Enhanced → Unscheduled Subframes → Transmit Dummy UEID Config \rightarrow Physical Downlink Settings \rightarrow HS-PDSCH \rightarrow -3.0 dB Config \rightarrow Physical Downlink Settings \rightarrow E-AGCH \rightarrow -20.0 dB Config \rightarrow Physical Downlink Settings \rightarrow E-HICH \rightarrow Test-specific value Config \rightarrow Physical Downlink Settings \rightarrow E-RGCH \rightarrow OFF (ON for E-RGCH testspecific value)

You can configure the R&S[®]CMW500 for these settings by referring to Figures 3 to 6. Set the value for the absolute grant scope to 0 ("All HARQ Processes").

Configure the R&S[®]CMW500 as follows:

Config \rightarrow HSUPA \rightarrow E-AGCH \rightarrow AG Pattern \rightarrow AG Scope (per HARQ proc.) \rightarrow (unchecked)

All performance requirements mentioned in this application note require fading channel simulation to generate a VA30 multipath fading signal. An R&S[®]CMW500 with the necessary hardware and software installed can induce multipath fading in accordance with the profiles as described in TS 34.121 [1]. This application note explains such a setup using a standalone R&S[®]CMW500 with a built-in fading simulator.

h: Scenario	111 P. //
Scenario	Standard Cell Fading 👻 Fading: Internal
RF Settinas	
ERF Power Downlink	-59.40 dBm
- AWGN Noise (loc) - Geometric Factor (lor/loc) - Total Output Power (lor+loc) ⊞-RF Power Uplink	■ -60.00 dBm -56.68 dBm
-Internal Fading ⊡-Fading Simulator -Enable	
Profile	ITU VA30
Restart Event Start Seed ⊡Insertion Loss Doppler Frequency D. Settings	Auto 💌 O 58.72 Hz
Ė-Fading Module AWGN −Enable −Noise −Signal/Noise Ratio	I⊽ -60.00 dBm 0.60 dB

Physical Downlink Settings

Set the Output Power (lor) according to the test requirements as mentioned under the specific test case. Enable the AWGN under Fading Module AWGN, and set the noise power so as to maintain the lor/loc ratio required for the test case at hand. The noise power enabled under "Internal Fading" ensures that the AWGN is added after the fading as required by 3GPP TS 34.121[1], Figure A.10.

Configure the R&S[®]CMW500 as follows:

Config → Scenario → Standard Cell Fading → Internal Config → Internal Fading → Fading Simulator → Enable → ON (check mark) Config → Internal Fading → Fading Simulator → ITU VA30 Config → RF Settings → Fading Module AWGN → Enable → ON (check mark) Config → RF Settings → Fading Module AWGN → Noise → -60 dBm Config → RF Settings → Fading Module AWGN → Signal/Noise Ratio → 0.6 dB (satisfies the condition lor/loc = 0.6 dB)

Set up an HSUPA call according to TS 34.108 [3], subclause 7.3.9. To establish an HSUPA connection, press "Connect Test Mode" (E-DCH category 1 to 5) or "Connect

Figure 27: Internal fading simulator on the R&S®CMW500.

HSPA" (E-DCH category 6) on the $R\&S^{\mbox{\ensuremath{\mathbb{R}}}}CMW500$ once the UE has registered with/ attached to the $R\&S^{\mbox{\ensuremath{\mathbb{R}}}}CMW500$.

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

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) in different multipath fading environments are determined by the Missed ACK and False ACK values. This test will verify the average probability for Missed ACK and False ACK, when E-HICH is transmitted using 12 consecutive slots. The test applies to all FDD UE for Release 6 and to later releases that support HSDPA and E-DCH.

Upon the UE transmission on E-DPCCH and E-DPDCH, the system simulator (SS, i.e. the R&S[®]CMW500) 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 latter is interpreted as NACK by higher layers and causes retransmission.

Configure the fixed reference channels (FRC H-Set 1, QPSK version) and the RADIO BEARER SETUP message as specified in section 3.1 on the R&S[®]CMW500 adding the settings defined in the in Table 32, RADIO BEARER SETUP message. Configure the internal fading simulator with the VA30 fading signal.

RADIO BEARER SETUP: Specific message content				
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 32: RADIO BEARER SETUP: Specific message content (section 10.2.1.1.4.2 and section 10.2.1.1A.4.2 of TS 34.121 [1]).

Configure the R&S[®]CMW500 as follows:

Config → HSUPA → TTI Mode → 10 ms Config → HSUPA → RLC PDU Size → 112 Config → HSUPA → Happy Bit Delay Condition → 10 ms Config → HSUPA → RAB H-ARQ Profile → Max. Number of Retransmission → 15

These settings can be configured in the R&S[®]CMW500 by referring to Figures 3 to 6 in section 2.1.

The tables 33 and 34 show the test parameters for E-HICH-Missed ACK when the hybrid ARQ acknowledgment indicator is transmitted using 12 consecutive slots. In addition, tables 33 and 35 show the test parameters E-HICH-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	-60			
Phase reference	-	P-CPICH			
E-HICH Ec/lor	dB	-35 (Test 1)	–∞ (Test 2)		
E-HICH signaling pattern	-	100 % ACK	100 % DTX		

Table 33: Test parameters for E-HICH – Serving E-DCH cell (Table 10.2.1.1.5.1 of TS 34.121 [1]).

Test requirements for Missed ACK when the hybrid ARQ acknowledgment indicator is
transmitted using 12 consecutive slots – Serving E-DCH cell

Test Number	Propagation		Reference Valu	e
rest Number	Conditions	E-HICH Ec/lor (dB)	lor/loc (dB)	Missed ACK probability
1	VA30	-35.0	0.6	0.01

Table 34: Test requirements for Missed ACK when the hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – Serving E-DCH cell (Table 10.2.1.1.5.2 of TS 34.121 [1]).

Test requirements for False ACK when the hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – Single link Propagation Reference Value

Test Number	Propagation	Reference Value	
Test Number	Conditions	lor/loc (dB)	False ACK probability
2	VA30	0.6	0.5

Table 35: Test requirements for False ACK when the hybrid ARQ acknowledgment indicator is transmitted using 12 consecutive slots – Single link (Table 10.2.1.1.5.3 of TS 34.121 [1]).

Configure the downlink physical channels in section 3.1, Tables 33, 34 and 35 in the R&S[®]CMW500. Set the absolute grant to 5. The relative grant is not configured. The expected UL data rate is 71.6 kbps, which corresponds to E-TFC Index 45.

Configure the R&S[®]CMW500 as follows: Signaling Parameter \rightarrow Physical Downlink Settings \rightarrow Output Power (lor) \rightarrow – 59.4 dBm Signaling Parameter \rightarrow Physical Downlink Settings \rightarrow E-HICH \rightarrow –35.0 dB Signaling Parameter \rightarrow Physical Downlink Settings \rightarrow E-RGCH \rightarrow Off (unchecked) Signaling Parameter \rightarrow HSUPA \rightarrow E-AGCH \rightarrow AG Pattern \rightarrow AG Index \rightarrow 5

You can configure the R&S[®]CMW500 for these settings by referring to Figures 8 and 9.

Establish an HSUPA call. Then switch on the internal fading simulator as shown in Figure 27, and set the fading profile to ITU VA30.

Missed ACK test:

For Missed ACK, the SS is configured to respond with 100 % ACK, than the UE can reacts in 2 possible ways:

- If the UE indicates on the E-DPCCH a retransmission, the UE received the ACK from the SS as NACK or DTX and this is counted as a missed ACK.

- If the UE indicates new data on the E-DPCCH, the UE received the ACK from the SS as an ACK, and this is counted as a correct ACK.

The number of retransmissions reaches the maximum number of retransmissions, because several false or missed ACK detections have occurred in series, the first new data on the E-DPDCH with E-DPCCH is not caused by the ACK, and this case is not counted as sample.

Configure the R&S[®]CMW500 as follows: Signaling Parameter \rightarrow HSUPA \rightarrow E-HICH/E-RGCH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow All ACK

07:59:07 🖰 WCDMA 3.0.40.11 Bas	🚯 HSUPA				×	Routing
	Common	E-AGCH	E-HICH/E-RGC	H]
	Fill-Up Fram	e With Du	mmies	Г		1
UE Measurement Report 🕶 🔽	HARQ Feedb	ack (E-HIC	CH)	All ACK)
UTRA FDD (Current Cell) CPICH RSCP [dBm] CPICH Ec/No [dB] Log10(TCH BLER)		nt (E-RGCI	H)	1 All Up		Signaling
Transmitted UE Power [dBm] UE RX-TX Time Difference [Chip] Pathloss [dB]	Signaturo RG Patter Pattern L Pattern	rn Executi	on	Execute	o 0:Down -:DTX)	WCDMA-UE Signaling
Physical DL Settings	трс	PRACH	HSDPA	HSUPA		Config

Figure 28: E-HICH configuration.

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

False ACK test:

For False ACK, the SS is configured to respond with 100 % DTX, than the UE can reacts in 2 possible ways:

- If the UE indicates "new data" on the E-DPCCH, the UE has recognized the DTX from the SS as an ACK, and this is counted as a false ACK.

- If the UE indicates "retransmission" on the E-DPCCH, the UE correctly recognized the DTX from the SS as DTX or NACK, and this is counted as correct reception.

The number of retransmissions will reach the maximum number of retransmissions due to several retransmissions in series. The first new data on the E-DPDCH with E-DPCCH is not the consequence of an ACK being received by the UE, and this case is not counted as a sample.

Configure the R&S[®]CMW500 as follows: Signaling Parameter \rightarrow HSUPA \rightarrow E-HICH/E-RGCH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow All DTX

The R&S[®]CMW500 can be configured for this setting by referring to Figure 28.

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

The measurement results for detection of the E-DCH HARQ indicator channel (E-HICH) are available on the R&S[®]CMW500 under *HSUPA E-HICH*.

Configure the R&S[®]CMW500 as follows: WCDMA Rx Meas. \rightarrow E-HICH \rightarrow HSUPA E-HICH \rightarrow ON

Figure 29 shows measurement results for detection of the E-DCH HARQ indicator channel (E-HICH).

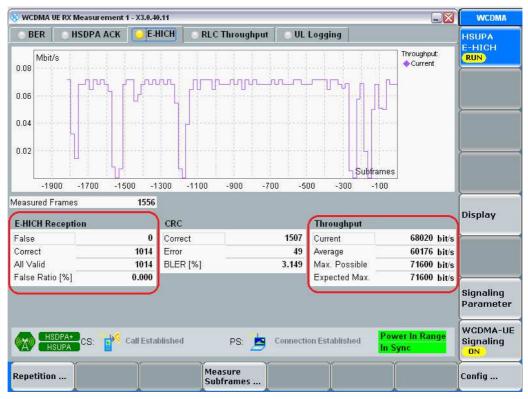


Figure 29: Measurement results for detection of the E-DCH HARQ indicator channel (E-HICH).

The False ratio for E-HICH reception must not exceed the limits as specified in Tables 34 and 35 for both cases, namely Missed ACK and False ACK respectively.

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

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) in different multipath fading environments are determined by the Missed ACK and False ACK values. This test will verify the average probability for Missed ACK and False ACK, when E-HICH is transmitted using 3 consecutive slots. The test applies to all FDD UE for 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 system simulator (SS, i.e. the 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 latter is interpreted as NACK by higher layers, and it causes retransmission.

Configure the fixed reference channels (FRC H-Set 1, QPSK version), and the RADIO BEARER SETUP message as specified in section 3.1 on the R&S[®]CMW500 adding the settings defined in the in Table 36 (RADIO BEARER SETUP message). The internal fading simulator is configured with the VA30 fading signal.

RADIO BEARER SETUP: Specific message content				
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 36: RADIO BEARER SETUP: Specific message content (Section 10.2.1.2.4.2 and section 10.2.1.2A.4.2 of TS 34.121 [1])

Configure the R&S[®]CMW500 as follows:

Config → Connection Configuration → Test Mode → HSUPA → HSUPA UL RLC SDU Size → 5872 bits Config → HSUPA → TTI Mode → 2-ms Config → HSUPA → RLC PDU Size → 112 Config → HSUPA → Happy Bit Delay Condition → 2-ms Config → HSUPA → RAB H-ARQ Profile → Max. Number of Retransmission → 15

You can configure the R&S[®]CMW500 for these settings by referring to Figures 3 to 6.

The tables 38 and 39 show the test parameters for E-HICH-Missed ACK when the hybrid ARQ acknowledgment indicator is transmitted using 3 consecutive slots. In addition, tables 38 and 40 show the test parameters for E-HICH-False ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 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	-60			
Phase reference	-	P-CPICH			
E-HICH Ec/lor	dB	-28.2 (test 1)	–∞ (test 2)		
E-HICH signaling pattern	-	100 % ACK	100 % DTX		

Table 37: Test parameters for E-HICH – Serving E-DCH cell (Table 10.2.1.2.5.1 of TS 34.121 [1]).

Test requirements for Missed ACK when the hybrid ARQ acknowledgment indicator is transmitted using 3 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	-28.2	0.6	0.01

Table 38: Test requirement for Missed ACK when the hybrid ARQ acknowledgment indicator is transmitted using 3 consecutive slots – Serving E-DCH cell (Table 10.2.1.2.5.2 of TS 34.121 [1]).

Test requirements for False ACK when the hybrid ARQ acknowledgment indicator is transmitted using 3 consecutive slots – Serving E-DCH cell				
Test Number	Propagation	Reference Value		
Test Number	Conditions	lor/loc (dB)	False ACK probability	
2	VA30	0.6	0.5	

Table 39: Test requirement for False ACK when the hybrid ARQ acknowledgment indicator is transmitted using 3 consecutive slots – Serving E-DCH cell (Table 10.2.1.2.5.3 of TS 34.121 [1]).

Configure the R&S[®]CMW500 for the downlink physical channels as described in section 3.1, Tables 37, 38 and 39. Set the absolute grant to 4. Do not set the relative grant. The expected UL data rate is 237 kbps, which corresponds to E-TFC Index 39.

Configure the R&S[®]CMW500 as follows: Signaling Parameter \rightarrow Physical Downlink Settings \rightarrow Output Power (Ior) \rightarrow – 59.4 dBm Signaling Parameter \rightarrow Physical Downlink Settings \rightarrow E-HICH \rightarrow E-HICH \rightarrow –28.2 dB Signaling Parameter \rightarrow Physical Downlink Settings \rightarrow E-RGCH \rightarrow Off Signaling Parameter \rightarrow HSUPA \rightarrow E-AGCH \rightarrow AG Pattern \rightarrow AG Index \rightarrow 4

Configure these settings on the R&S[®]CMW500 by referring to Figures 8 and 9.

Establish an HSUPA call. Switch on the internal fading simulator as shown in Figure 27, and set the fading profile to ITU VA30.

Missed ACK test:

For Missed ACK, the SS is configured to respond with 100 % ACK, than the UE can reacts in 2 possible ways:

- If the UE indicates on the E-DPCCH a retransmission, the UE received the ACK from the SS as NACK or DTX and this is counted as a missed ACK.

- If the UE indicates new data on the E-DPCCH, the UE received the ACK from the SS as an ACK, and this is counted as a correct ACK.

The number of retransmissions reaches the maximum number of retransmissions, because several false or missed ACK detections have occurred in series, the first new data on the E-DPDCH with E-DPCCH is not caused by the ACK, and this case is not counted as sample.

Configure the R&S[®]CMW500 as follows: Signaling Parameter \rightarrow HSUPA \rightarrow E-HICH/E-RGCH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow All DTX

You can configure this setting on the R&S[®]CMW500 by referring to Figure 28.

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

False ACK test:

For False ACK, the SS is configured to respond with 100 % DTX, than the UE can reacts in 2 possible ways:

- If the UE indicates "new data" on the E-DPCCH, the UE has recognized the DTX from the SS as an ACK, and this is counted as a false ACK.

- If the UE indicates "retransmission" on the E-DPCCH, the UE correctly recognized the DTX from the SS as DTX or NACK, and this is counted as correct reception.

The number of retransmissions will reach the maximum number of retransmissions due to several retransmissions in series. The first new data on the E-DPDCH with E-DPCCH is not the consequence of an ACK being received by the UE, and this case is not counted as a sample.

Configure the R&S[®]CMW500 as follows:

Signaling Parameter \rightarrow HSUPA \rightarrow E-HICH/E-RGCH \rightarrow HARQ Feedback (E-HICH) \rightarrow Mode \rightarrow All DTX

You can configure this setting on the R&S[®]CMW500 by referring to Figure 28.

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

The measurement results for detection of the E-DCH HARQ indicator channel (E-HICH) are available on the R&S[®]CMW500 under *HSUPA E-HICH*.

Configure the R&S[®]CMW500 as follows:

WCDMA Rx Meas. \rightarrow E-HICH \rightarrow HSUPA E-HICH \rightarrow ON

Figure 30 shows the detection of the E-DCH HARQ indicator channel (E-HICH) measurement results.

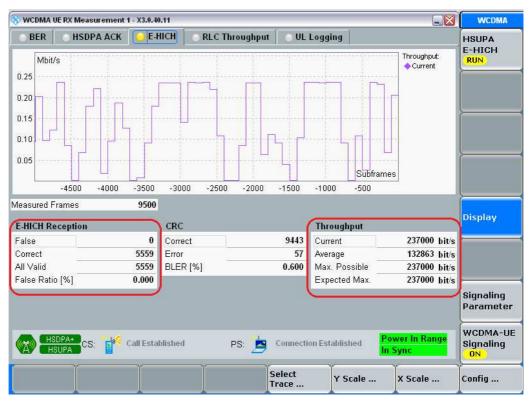


Figure 30: Measurement results for detection of E-HICH (2 ms case).

The False ratio for E-HICH reception must not exceed the limits as specified in Tables 38 and 39 for both cases, namely Missed ACK and False ACK respectively.

4 References

[1] Technical Specification Group Radio Access Network; User Equipment (UE) Conformance Specification; 3GPP TS 34.121-1 V9.5.0

[2] Technical Specification Group Radio Access Network; Common test environments for User Equipment (UE); 3GPP TS 34.108 V9.3.0

[3] Technical Specification Group Radio Access Network; Physical layer procedures (FDD); 3GPP TS 25.214 V9.5.0, May 2009

[4] Technical Specification Group Radio Access Network; User Equipment (UE) radio transmission and reception (FDD); 3GPP TS 25.101 V9.5.0

[5] Rohde & Schwarz; Reiner Stuhlfauth; High Speed Downlink Packet Access, HSDPA – RF measurements with CMW500 radio communication tester

[6] 1CM72 – Operation guide for HSDPA Test Setup according to 3GPP TS 34.121

5 Ordering Information

Ordering information				
Туре	Description	Order no.		
R&S [®] CMW500	Wideband Radio Communication Tester	1201.0002K50		
R&S [®] CMW-PS502	CMW500 Basic Assembly (mainframe), including one RF Converter Module and one Baseband Measurement Unit	1202.5408.02		
R&S [®] CMW-S550B	Baseband Interconnection Flexible Link	1202.4801.03		
R&S [®] CMW-S590D	RF Frontend, advanced functionality, not installable post factory, CMW module H590A (selection)	1202.5108.03		
R&S [®] CMW-S600B	CMW500 Front Panel with Display/Keypad	1201.0102.03		
R&S [®] CMW-B300A	Signaling Unit Wideband (SUW), for WCDMA / LTE, CMW module H300A (hardware option)	1202.6304.02		
R&S [®] CMW-B510F	Four Digital IQ Interfaces, connectors 1 to 4	1202.8007.07		
R&S [®] CMW-KM400	WCDMA Release 99, TX measurement, uplink (software license)	1203.0700.02		
R&S [®] CMW-KM401	WCDMA Release 5/6 HSPA , TX measurement, uplink (software license)	1203.2954.02		
R&S [®] CMW-KM403	WCDMA Release 7 HSPA+, TX measurement, uplink (software license)	1203.9007.02		
R&S®CMW-KS400	WCDMA Release 99, signaling/network emulation, basic functionality (software license)	1203.0751.02		
R&S [®] CMW-KS410	WCDMA Release 99, signaling/network emulation, advanced functionality (software license)	1203.9807.02		
R&S [®] CMW-KS401	WCDMA Release 5/6 HSPA, signaling/network emulation, basic functionality (software license)	1203.9907.02		
R&S®CMW-KS411	WCDMA Release 5/6 HSPA, signaling/network emulation, advanced functionality (software license)	1207.3503.02		
R&S [®] CMW-KS403	WCDMA Release 7 HSPA+, SISO, signaling/network emulation, basic functionality (software license)	1203.9959.02		
R&S [®] CMW-KS404	WCDMA Release 8, signaling/network emulation, basic functionality (software license)	1207.6154.02		
R&S [®] CMW-KE100	Fading enabler incl. AWGN generator(software license)	1207.5506.02		
R&S [®] CMW-KE400	3GPP Fading profiles for 3G	1207.5606.02		

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