WCDMA FDD Band Receiver Quality	Connect Control
Max.Level: Auto         Low noise         Freq.Offset: + 0.000         KHz         Chan./Freq: 9612 / 1922.4         MHz           +1000         \$\$: / Off         \$\$: / Off	HSUPA E-AGCH
+800 +700 +600 +500	Applic. 2 Applic. 1
+400 +300 +200 +100	Analyzer Level
E-TFCI 28 67 81 MissDet. Detected Events Of E-TFCI 28 E-TFCI 67 E-TFCI 81 E-TFCI E-TFCI E-TFCI E-TFCI E-TFCI	UE Signal Ana.Set. BS Sig. Lvl.
566         567         567 <td>HSDPA HSUPA BS Signal</td>	HSDPA HSUPA BS Signal
1700         Detected E-TFCI Events         Expected E-TFCI Selection Auto           0         Missed Detections         0         Nr. of O HappyOrs	Settings Marker
0.000 %     Missed Detection Probability     Measure       Repetition     Measure     Measure	Menus

Products: R&S<sup>®</sup> CMU200

## Operation Guide for HSUPA Test Set-up According to 3GPP TS 34.121

### **Application Note**

This operation guide describes how to measure HSUPA test cases according to 3GPP TS 34.121 V8.0 with R&S<sup>®</sup>CMU200. Setting files according to the test requirements are attached.



Subject to change - Jenny Chen 03.08 - RCS0712-0053

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### **1** Overview

This operation guide is a simple step by step guide to perform measurement on HSUPA test cases (TC) according to 3GPP TS 34.121 V8.00 [2]. It does not include a technical introduction to HSUPA, which you can find in [1].

With firmware version 5.01, R&S<sup>®</sup>CMU200 can support eight test cases so far, including five transmitter (Tx) test cases and three performance (Px) test cases:

### TX test cases

- 1) Maximum Output power with HS-DPCCH and E-DCH (TC 5.2B)
- 2) Adjacent Channel Leakage Power Ratio (ACLR) with E-DCH (TC 5.9B)
- 3) Spectrum Emission Mask with E-DCH (TC 5.10B)
- 4) UE relative Code Domain Power Accuracy for HS-DPCCH and E-DCH (TC 5.2D)
- 5) Relative Code Domain Error with HS-DPCCH and E-DCH (TC 5.13.2B)

#### PX test cases

- 6) Detection of E-DCH HARQ ACK Indicator Channel (EHICH) (TC 10.2.1.1 & 10.2.1.2)
- 7) Detection of E-DCH Relative Grant Channel (E-RGCH) (TC 10.3.1.1 & 10.3.1.2)
- 8) Demodulation of E-DCH Absolute Grant Channel (E-AGCH) (TC 10.4.1)

Section 2 describes step by step the general configuration of R&S<sup>®</sup>CMU200 for a HSUPA call setup. It applies to both transmitter and performance tests according to 3GPP TS 34.121.

Section 3 provides the step by step guide how to configure R&S<sup>®</sup>CMU200 for Tx tests, and section 4 how to configure it for Px tests.

A set of files with prepared settings (for CMU200 firmware V5.00) is attached to allow users to recall the settings and perform the measurements as described in this operation guide.

## 2 General Configuration for a HSUPA Call Setup

The general configuration for a HSUPA call setup is done in four steps:

- 1. Enable Packet Switch Domain.
- 2. Set the packet switched mode to be 'HSUPA Test Mode' and activate HSPA channels
- 3. Configure HSDPA channels
- 4. DL channel power general settings

#### Step 1. Enable Packet Switch Domain.

#### Select Network > Packet Switched Domain > 'On'

Ch. Ch. 2		/CDM/	A FDD <sup>Ba</sup>	Ind Spe	ectrum	CM		Connect Control
😑 W	CDMA	FDD Conne	ction Conti	rol 🛔	PS:	Idle	CS:	Signal On
Г	Setup					Packet Switc	hed Domain	
	Defa WCD Pack • Netw • Rand • WCD • WCD • GSM	ult All Setting MA Band Se et Switched Iork Identity Iorn Access S lested UE Da MA Intra Neig MA Inter Neig Neighbour C	is lect Domain Settings ata ghbour Cell Li ghbour Cell Li ell List	st st	Operating On	Band I		
Con	nection	Handover	UE Signal	BS Sign	al Networ	k AF/RF	⊕+ Sync.	1 2

Figure 1: Activate packet switched domain

Step 2. Set the packet switched mode to be 'HSUPA Test Mode' and activate HSPA channels

Test mode connection: RMC 12.2 kbps + HSPA 34.108 with loop mode 1 Select **BS Signal > Circuit Switched > DCH (Dedicated Chn) Type >** '**RMC**'.

Select BS Signal > Circuit Switched > RMC Settings > Reference Channel Type > '12.2kbps + HSPA 34.108'

Select BS Signal > Circuit Switched > RMC Settings > HSPA > HSUPA UL RLC SDU Size > '2936 Bit' (According to TS 34.121 Annex C.11.3)

	WCDM/	A FDD Ba	and Mc	dulation	CM OF HSUP. HSDP.		Connect Control
	MAFDD Conne	ction Cont	rol 🛔	PS:	Idle	CS:	Signal On
_Se <sup>-</sup>	:up				Circuit Switche	d/	Q
►N ▼C	ode-B Settings ircuit Switched Default Settings	3					
_	DCH (Dedicated RMC Settings	1Chn.) Type		RMC			
	Reference Cha DL DTCH Tra	annel Type nsport Form	at	12.2 kbps + H 12.2 kbps	ISPA 34.10	8	
	DL Resources UL CRC (Sym Test Mode	in Use Loop Mode :	2)	100 % Off Loop Mode	1 RLC TM		
	Channel Data: • HSPA	Source DTC	Ή	PRBS9			
	HSUPAUL F HSPA Test I	LC SDU Siz	re	2936 віt Loop Mode	1		
	RMC with HSD	PA Settings	6				
Connecti	on Handover	UE Signal	BS Sig	nal Network	AF/RF 🤆	→ Sync.	1 2

Figure 2: RMC Setting for HSUPA test

Rohde & Schwarz Regional Customer Support Centre-Asia Pacific Select BS Signal > Downlink Physical Channels > HSDPA Channels > 'ON'

BS Signal > Downlink Physical Channels > > HSUPA channels > 'On'

¢	WCDMA FDD	dulation	CM OFF HSUPA HSDPA		onnect ontrol
<u> </u>	ICDMA FDD Connection Control 🛔	PS:	idle (	C <mark>S:</mark> Signa	ll On
Г	-Setup		Downlink Physical Cl	nannels/	
	PICH	-5.0 dB			
	PICH Channel Code	3			
	Paging Indicators per Frame	18			
	AICH	-5.0 dB			
	AICH Channel Code	6			
		Level	Minimum	Maximum	
	DPDCH Level Config	-7.0 dB	- 18.0	dB 7.0 dB	
	DPCH Channel Code	192			
	Power Offset (DPCCH/DPDCH)	0.0 dB			
	DL DPCH Timing Offset	0 x 256 cl	hip		
_	Secondary Scrambl Code	0			
	HSUPA Channels	On			
4				1	
	►E-RGCH/E-HICH				
	Data Gen. during Frequency change	On			
Con	nection Handover UE Signal BS Sig	nal Network	AF/RF ⊕+	Sync.	1 2

Figure 3: Activate HSDPA and HSUPA channels

Step 3. Configure HSDPA channels

CQI feedback cycle	4 ms
CQI repetition factor	2
ACK-NACK repetition factor	3

### HS-DSCH settings: Fixed Reference Channel with H-Set 1 with QPSK

All these settings are according to Contents of RADIO BEARER SETUP message defined in all the Tx test cases.

H-Set 1 with QPSK is used according to the test specification.

WCDMA FDD Band Re	ceiver Quality	CM OFF HSUPA HSDPA	1.	Connect Control
😑 WCDMA FDD Connection Control 🛔	PS:	ldle	CS: Si	gnal On
Setup	HS	DPA HS-DSCH	١/	0
▼HSDPA HS-DSCH				
Default Settings				
DataPattern	PRBS9			
Force NACK	Off	_		
CQI Feedback Cycle	4 ms			
CQI Repetition Factor	2			
ACK/NACK Repetition Factor	3 UE Canability	Poport		
LE Category Selection	8 OL Capability	Report		
T1 Release Timer	50 ms			
Receiver Mindow Size	2047			
Channel Configuration Type	Fixed Referen	ice Channe	əl	
Fixed Reference Channel				
H-Set Selection	H-Set 1 QPSk	<		
RV Coding Sequence	<del>{0,2,5,6}</del>			
Connection Handover UE Signal BS Sig	nal Network	AF/RF ⊕	Sync.	1 2

Figure 4: HSDPA settings

Step 4. DL channel power general settings (according to TS 34.121 Annex E.5A)

The level reference should be set as 'Output channel Power (lor)'

Select BS Signal> Node-B Settings > level reference > 'Output channel Power (lor)'

The power setting can be found at **BS Signal > Downlink Physical Channels**. The power setting should be done before connecting the DUT with CMU200.

Channel	Level (dB)
P-CPICH	-10
S-CPICH	Off
P-SCH	-15
S-SCH	-15
P-CCPCH	-12
S-CCPCH	-12
PICH	-15
AICH	-12
DPDCH	-10

WCDMA FDD I Re	ceiver Qua	¢		ode Domain I	Pwr. CM OFF HSUPA HSDPA	Conne Contr
WCDMA FDD Connection Control	PS:		WCDMA FDD Connection Control 🛓	PS:	ldle (	C <mark>S:</mark> Signal Or
Setup Downlink Physical Channels Default Settings P-CPICH S-CPICH	- 10.0 dB		Setup S-CCPCH S-CCPCH Channel Code PICH PICH Channel Code	- 12.0 ав 2 - 15.0 ав 3	Downlink Physical C	hannels/
S-CPICH Channel Code S-CPICH Sec. Scrambling Code S-CPICH Phase	7 0 0 °		Paging Indicators per Frame AICH AICH Channel Code	18 - 12.0 dB 6 Level	Minimum	Maximum
P-SCH S-SCH P-CCPCH S-CCPCH	- 15.0 ав - 15.0 ав - 12.0 ав - 12.0 ав		DPDCH Level Config DPCH Channel Code Power Offset (DPCCH/DPDCH)	<mark>⊿ - 10.0 ав</mark> 96 0.0 ав	- 24.1	ав - 13.1 ав
S-CCPCH Channel Code PICH PICH Channel Code Paging Indicators per Frame	2 - 15.0 ав - 3 - 18		Secondary Scrambl. Code Secondary Scrambl. Code Secondary Scrambl. Code (HSDPA) HSDPA Channels	0 * 256 ch 0 0 On	qu	
connection Handover UE Signal BS Sig	nal Networ	Cor	nnection Handover UE Signal BS Sig	jnal Network	AF/RF (↔	Sync.

Figure 5: WCDMA downlink channel power level settings

### **3** Transmitter Tests

### 3.1 General Settings for Transmitter Tests

### 3.1.1 Test Specific DL Power Settings

Select **BS Signal > Node-B Settings > Output Channel Power (I**or) >'-86 dBm' (according to the Ior setting defined in the Tx test cases)

Select **BS Signal > Downlink Physical Channels** and change the power setting according to the table below (set E-AGCH and E-HICH power, followed by HS-PDSCH power). These settings are defined in TS 34.121 Annex E.5A.1.

Channel	Level (dB)
HS-SCCH	-8
HS-PDSCH	-3
E-AGCH	-20
E-RGCH/E-HICH	-20
E-RGCH Active	Off
Î <sub>or</sub> (Output Channel power)	-86



Figure 6: HSUPA power settings for Tx test

### 3.1.2 UE Target Power

The UE target power upon connection should be 6 dB less than the maximum power. It can be accessed via '**UE Signal > UE Power Control > UL Target Power > Power**' or set at connection control page. This setting is defined in TC 5.2B.4.2 and it is used for all other Tx test cases.

### 3.1.3 TPC Setting

Algorithm 2 is used as default setting (according to Contents of RADIO BEARER SETUP message defined in TC5.2B and 5.2D, which are used for 5.9B, 5.10B and 5.13.2B),

Change the pattern setting for Set 2, Set 3 and set 4 (used in 5.2D), which will be used in the test. '11111' means TPC = +1 in algorithm 2. '00000' means TPC = -1 in algorithm 2. '0101010101' means TPC = 0 in algorithm 2.

#### Connect Band WCDMA FDD Code Domain Pwr Control WCDMA FDD Connection Control PS: Idle CS: Signal On TPC Settings/Activate Pattern -Setup-Activate Pattern TPC Pattern Setup Set 1 Test Step Preconditions Auto Set 1 ▼Set 2 Pattern Type Single Pattern+Alternating Pattern 11111 <sub>bin</sub> Set 3 Single Pattern+Alternating Pattern Type Pattern 00000 <sub>bin</sub> Set 4 Pattern Type Continuous Pattern Pattern 0101010101 <sub>bin</sub> UE Signal BS Signal AF/RF 🕀 Network Sync. Connection 1 2

### The setting can be found at BS Signal > TPC Settings

Figure 7: General TPC settings for Tx test

### 3.1.4 HSUPA-Specific Signalling Settings

Parameter	Value
E-TFCI table index	0
E-DCH minimum set E-TFCI	9
PLnon-max	0.84
Max. number channelization codes	2xSF4
Initial Serving Grant Value	Off

These settings are defined in TS 34.108 section 9.2.1, which is quoted by TS 34.121 Annex C.11.1.

Select **UE Signal > HSUPA** and change the related parameter accordingly.

WCDMA FDD Band Re	ceiver Qualit	Y CM OFF HSUPA HSDPA	<b>b</b>	Connect Control
😑 WCDMA FDD Connection Control 🛔	PS:	Idle	CS: Sig	gnal On
Setup	H	SUPA		<mark>0</mark>
▼HSUPA				
Default Settings E-DCH Physical Laver Category				Compress
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	2xSF4			
► Initial Service Grant				
Value	Off			
Туре	Primary			
▼RAB H-ARQ Profile				
H-ARQ Power Offset	0 dB			
Max. Number of Retransmissions	7			
Connection Handover UE Signal BS Sig	nal Network	AF/RF ⊕+	Sync.	1 2

Figure 8: HSUPA signaling setting for Tx test

### 3.1.5 Subtest Settings

There are *five subtests* defined with different absolute grant (AG) values. Each sub-test has its own reference TFCI and gain setting. It is important to set the parameters correctly for different subsets. The following values are derived from TS 34.121 Annex C.11.1

### **Beta Values and Absolute Grant Values**

Subtest	AG	β <sub>c</sub>	$\boldsymbol{\beta}_{\mathrm{d}}$	ß <sub>hs</sub> l β <sub>c</sub>
1	20	11	15	2
2	12	6	15	2
3	15	15	9	2
4	17	2	15	2
5	21	15	15	2

### **HSUPA Reference E-TFCIs**

Subtest	1,2,4,5				
Number of Ref. ETFCIs	5				
Referece of E-TFCI	11	67	71	75	81
Ref. E-TFCI Power Offset	4	18	23	26	27

Subtest	3		
Number of Ref. ETFCIs	2		
Referece of E-TFCI	11	92	
Ref. E-TFCI Power Offset	4	18	

### **HSUPA Gain Factors**

Subtest	ΔE-DPCCH
1	6
2	8
3	8
4	5
5	7

The settings for each subtest have to be done in three steps with the values according to the tables above. The following figures are given as example

#### Step 1. Absolute Grant index setting is defined in BS Signal > HSUPA > E-AGCH >AG Pattern > AG Index

	> w			Band Re	ceiv	er Qual	ity	CM OFF HSUPA HSOPA	<sup>1</sup> ,	Ъ	Connect Control
<u> </u>	ICDMA	FDD Conne	ction Con	trol 📄		PS:	Idle		CS:	Si	gnal On
Г	Setup						HSUPA/6	-AGCH/A	G Patte	rn/AG V	alue 😡
	+HSUF	PA									
	Def	ault Settings	5								
	TTI	Mode			- 10	ms					
	▼E-A	(GCH									
	Pr	imary UE-ID			AA	۹A					
	Se	econdary UE	-D		12/	٩A					-
	₹A(	GPattern									
	F	Pattern Leng	nth		1	_					
	1	AG Index			21						
		AG Scope (/	Per HARQ proc.)	)							
	1	AGID Type (	<ul> <li>secondary D)</li> </ul>	1							
	A	GPatternRe	epetition		Co	ntinuous					
	Ur	nscheduled T	п		DT	X					
	►E-R	GCH/E-HIC	H								
	*Down	nink Physical	Channels								
				_							
Con	nection	Handover	UE Signal	BS Sig	nal	Network	AF	/RF 🕀	Syr	IC.	1 2

Figure 9: AG Index setting for Tx subtest 1

Step 2. Gain settings for RMC and HSDPA channels are defined in **UE Signal**:

The ΔACK, ΔNACK and ΔCQI values should be 8, which calculated from  $\beta_{hs}$  /  $\beta_{c}.$ 

	WCDMA FDD Band Co	ide Doi	main F	Wr. HSUF		Conn Cont	ect rol
😑 W	CDMA FDD Connection Control 🛓	PS		ldle	CS:	Signal O	n
	Setup		[	UE Gain Facto	rs/ <u>RMC</u>		Q
	Default All Settings						T
	• Analyzer Settings						
	<ul> <li>Measurement Settings</li> </ul>						
	UE Power Control						
	▼UE Gain Factors	βο	βd	<b>∆ACK</b>	<b>ANACK</b>	∆CQI	
	RIVIC						
	Uplink 12.2	11	15			Compr	ess
	Uplink 64	5	15				
	Uplink 144	4	15				
	Uplink 384	4	15				
	Voice	11	15				
	▶ Video						
	Packet Data						
	HSDPA	11	15	8	8	8	
	Default Settings						
Con	nection Handover UE Signal BS Sig	inal N	etwork	AF/RF (	€ Syne	c. 1	2

Figure 10: RMC and HSDPA channel gain settings for Tx subtest 1

Step 3. HSUPA gain settings are defined in UE Signal > HSUPA >HSUPA Gain Factors:

WCDMA FDD Band Re	eceiver Quali	ty CM OFF HSUPA HSDPA	• <b>L</b>	Connect Control
😑 WCDMA FDD_Connection Control 📄	PS:	Idle	CS: Si	gnal On
_Setup	[	HSUPA/HSUPA Ga	ain Factors	<mark>0</mark>
Happy Bit Delay Condition Puncturing Limit PLnon max Maximum Channelisation Code Initial Service Grant Value Type RAB H-ARQ Profile H-ARQ Power Offset Max Number of Retransmissions	100 ms 0.84 2xSF4 Off Primary 0 dB 7			
▼HSUPA Gain Factors	_			
A F-DPCCH Number of Reference E-TFCIs Reference E-TFCI 14 Reference E-TFCI 5.8 Reference E-TFCI Power Offset	5 5 11 6 81 12 4 18 23	7 71 25 126 3 26 27	<b>75</b> 127 0 0	
Connection Handover UE Signal BS Sig	gnal Network	AF/RF ↔	Sync.	1 2

Figure 11: HSUPA gain settings for Tx subtest 1,2,4,5

	WCDMA FDD Band Co	de Domain	Pwr.	ISUPA	Connect Control
<mark>—</mark> W	CDMA FDD Connection Control 🛓	PS:	ldle	CS:	Signal On
F	Setup		-HSUPA/HS	SUPA Gain Facto	rs Q
	H-ARQ Redundancy Versions Minimum Set E-TFCI Happy Bit Delay Condition Puncturing Limit PLnon-max Maximum Channelisation Code Initial Serving Grant RAB H-ARQ Profile H-ARQ Profile H-ARQ Power Offset Max. Number of Retransmissions	Always RV 9 100 ms 0.84 2xSF4 0 ав 7	0		
	Δ E-DPCCH	8			Compress
	Number of Reference E-TFCls Reference E-TFCl 1.4 Reference E-TFCl 5.8 Reference E-TFCl Power Offset	2 11 9 81 9 4 18 2	<b>92</b> 90 23 26	71 100 27 28	75 127 29 29
Cont	section Handover IIE Signal BS Sig	nal Network			

Figure 12: HSUPA gain settings for Tx subtest 3

After the setting, you can start your measurements by pressing '**Connect UE (CS)**'.

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

To verify that the error of the UE maximum output power with HS-DPCCH and E-DCH does not exceed the range prescribed by the maximum output power and tolerance defined in table 5.2B.5.

In this test case there are two parameters that need to be observed:

1. Maximum output power

#### 2. E-TFCI.

To observe E-TFCI:

- a) Go to measurement page, press 'Menus'
- b) Press 'Receiver Quality' at bottom

c) Press Applic. 1 at the right side, until you see E-AG bottom, then press E-AGCH. You will see the following	сн <sub>at the</sub>
WCDMA FDD Band Receiver Quality	Connect Control
MaxLevel: Auto         Low noise         Freq.Offset: + 0.000         kHz         Chan./Freq: 9612 /1922.4         MHz           +2000         \$\$:         / Off         \$\$:         / Off         \$\$:         / Off	N E-AGCH
+1800 +1600 +1400 +1200 +1000	Applic. 2 Applic. 1
+600 +600 +400 +200	Analyzer Level
+0 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 Detected Events Of E TECL 25 E TECL E TECL E TECL E TECL E TECL	<b>UE Signal</b> Ana.Set.
	HSUPA BS Sig. Lvi. HSDPA
1000         Measured Frames         AG fildex         20         Comparing the second sec	BS Signal Settings
	Marker
HSUPA HSUPA E-DPCCH E-AGCH E-HICH Logging	Menus

#### Figure 13: E-TFCI transmitted

The expected E-TFCI is shown in the following table

Subtest	1	2	3	4	5
Expected E-TFCI	75	67	92	71	81

The procedures described in the specifications are as follows<sup>2</sup>.

1)-3) have been implemented through the general setting

4) Send power control bits to give one TPC\_cmd=+1 command to the UE.

5) The SS checks the received E-TFCI for 150 ms. If UE does not send any decreased E-TFCI within the 150ms then go back to step 4) otherwise proceed to step 6).

6) Send power control bits to give one TPC\_cmd = -1 command to the UE.

7) The SS checks the received E-TFCI for 150 ms. If UE sends any decreased E-TFCI within the 150 ms, then send new power control bits to give another TPC\_cmd = -1 command to the UE and wait 150 ms.

8) Confirm that the E-TFCI transmitted by the UE is equal to the target E-TFCI in Table C.11.1.3. If the E-TFCI transmitted by the UE is not equal to the target E-TFCI, then fail the UE.

9) Measure the mean power of the UE. The mean power shall be averaged over at least one timeslot.

10) Repeat the measurement for the different combinations of beta values as given in table C.11.1.3.

In order to implement these steps in CMU200:

- d) Press 'BS Signal Settings' at right
- e) Press 'TPC Pattern Setup' at bottom and select 'Set 2'
- f) Press 'Activate Pattern' once to send TPC\_cmd = +1
- g) Keep on pressing 'Activate Pattern' until a E-TFCI drops, and then press 'TPC Pattern Setup' at bottom and select 'Set 3' and press 'Activate Pattern' once to send TPC\_cmd = -1 (step 6).
- h) If UE sends any decreased E-TFCI, press 'Activate Pattern' button again (step 7).
- i) If the E-TFCI is still a decreased value, fail the UE (step 8).
- j) If not, measure the power by selecting 'Overview / WCDMA' in 'Modulation' measurement (step 9)<sup>2</sup>.
- k) Repeat the measurement for different subtest (step 10)

 $<sup>^2</sup>$  NOTE: These steps fulfills the test condition for TC 5.2D, 5.9B, 5.10B, 5.13.2B.

		and Modula	ation		Connect Control
MaxLevel: Auto Multiple Signal: DPC Scr. Code: 0	Low noise CH+DPDCH 1 CC Mode: Manual	Freq.Offset: + 0. SR1: 30 CC1: 32	000 kHz Chan.	/Freq.: 9612 /1922.4 MHz	R Overview WCDMA
	Current	Average	Max./Min.		Applic, 1
Err.Vect. Magn.— Peak	9.5 %	9.48 %	26.9 %		Applic. 2
LRMS	3.7 %	3.50 %	4.5 %		<u>Analyzer</u>
Magn. Error —— Peak	- 7.9 %	7.25 %	- 26.8 %		Lev. Trian
	2.5 %	2.30 %	3.4 %		ngg.
Phase Error — Peak	- 11.3 °	11.60 °	15.5 °	2560 av	UE Signal
RMS	2.5 °	2.44 °	2.9 °	Meas Length	Ana.Set.
I/Q Origin Offset	- <b>36</b> .87 dB	- 38.24 dB	- 35.09 dB	0	HSUPA
I/Q Imbalance	- 36.49 dB	- 36.28 dB	- 35.55 dB	Clot Number	BS Sig. Lvl. HSDPA
Carrier Frequency Error	29 Hz	14 Hz	49 Hz	23.63 dBm	BS Signal
Waveform Quality	0.9987	0.99877	0.9980	UEPower	Settings
Peak Code Dom. Error	- 35.97 dB	- 36.63 dB	- 31.27 dB	10	
PCDE Code	Q 0		3	Statistic Count	
Transmit Time Error	- 1.00 Chip	- 1.00 Chip	- 1.25 Chip	0.00 %	
				Out of Tolerance	
RF RF Channel Freque	RF ncy Freq.Offse	Test Step t Precond.	TPC Pattern T Config.	PC Pattern Activate Setup Pattern	Menus

### Figure 14: UE Maximum output power

The maximum power should be within the limits defined:

Sub-test in	Power Class 3		Power Class 4		
table C.11.1.3	Power	Tol	Power	Tol	
	(dBm)	(dB)	(dBm)	(dB)	
1	+24	+1.7/-5.2	+21	+2.7/-4.2	
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/-5.2	+21	+2.7/-4.2	

### Table 5.2B.5: Maximum Output Powers with HS-DPCCH and E-DCH for test

## 3.3 Spectrum Emission Mask with E-DCH (TC 5.9B)

The setting for this test is the same as the maximum output power setting described in *section 3.2 Maximum Output Power with HS-DPCCH and E-DCH*. After taking the maximum output power measurement, press '**Menus**' at the right side; '**Spectrum**' at the bottom; '**Application**' at the right side and '**Emission Mask**' at the bottom. You will see the measurement as below:



Figure 15: Spectrum emission mask with E-DCH

$\Delta f$ in MHz	Minimum requirement (Note 2)	Additional	Measurement		
	Relative requirement	Absolute requirement	Band II, IV, V, X (Note 3)	(Note 6)	
2.5 to 3.5	$\left\{-35 - 15 \cdot \left(\frac{\Delta f}{MHz} - 2.5\right)\right\} dBc$	-71.1 dBm	-15 dBm	30 kHz	
3.5 to 7.5	$\left\{-35 - 1 \cdot \left(\frac{\Delta f}{MHz} - 3.5\right)\right\} dBc$	-55.8 dBm	-13 dBm	1 MHz	
7.5 to 8.5	$\left\{-39-10\cdot\left(\frac{\Delta f}{MHz}-7.5\right)\right\}dBc$	-55.8 dBm	-13 dBm	1 MHz	
8.5 to 12.5 MHz	-49 dBc	-55.8 dBm	-13 dBm	1 MHz	

The test should be repeated with different subtests.

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

The setting for this test is the same as the maximum output power setting described in *section 3.2 Maximum Output Power with HS-DPCCH and E-DCH*. After taking the maximum output power measurement, press '**Menus**' at the right side; '**Spectrum**' at the bottom; '**Application**' at the right side and '**ACLR FFT/OBW**' at the bottom. You will see the measurement as below:



Figure 16: ACLR with E-DCH measurement

The requirements are given in Table 5.10B.1

Table 5.10B.1: UE ACLR limit

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

The test should be repeated with different subtests.

# 3.5 UE relative Code Domain Power Accuracy for HS-DPCCH and E-DCH (TC 5.2D)

The UE Relative code domain power accuracy is a measure of the ability of the UE to correctly set the level of individual code powers 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((*Measured code power*) / (*Measured total power of all active codes*))

Nominal CDP ratio = 10\*log((Nominal CDP) / (Sum of all nominal CDPs))

The nominal CDP of a code is relative to the total of all codes and is derived from beta factors. The sum of all nominal CDPs will equal 1 by definition (according to TS 25.101 section 6.2.3)

This test case setting can be based on TC 5.2B.

After taking the measurement result for TC 5.2B, TC 5.9B and TC 5.10B, do the following steps:

- a) Press 'BS Signal Settings' at right
- b) Press 'TPC Pattern Setup' at bottom and select 'Set 4'
- c) Press '**Menus**' at the right bottom and select '**Code Dom. Power**' at the bottom
- d) Press '**Application**' at the right and select '**CDP Relative**' at the bottom to activate the measurement



e) Press (**BS SIGLAT**), at the right and select '**Channel Settings**' and set the AG Pattern Len to be 2, and the first AG value should be '0', and the second should be the value defined in the corresponding subtest testing (please refer to table in section 3.1.5), shown as in *Figure 17* for subtest 1 as an example.

🪸 <mark>W</mark>	CDMA FDD Band Code	Domain Pwr. HSUPA	Connect Control
Max.Lev <mark>e</mark>	HSUPA Channel Settings		CDP
<b></b>	[[	E-AGCH/AG Pattern/AG Value	Relative
+24 +23 0 3 -3 -4 0 Meas. Point 1 Meas. Point 2		AAA 2AA 20 20 0 ntinuous xecute	Appli- cation Trigger Ana.Lev. UE Signal Ana.Set. HSUPA BS Sig.LM. HSUPA BS Signal Settings
Meas. Point 3	Mode Al	ternating (TTI)	Dianlass
Meas. Point 4			Marker
HSUPA Level	Channel Settings	AG Pattern RG Pattern Activate Activate	Menus

Figure 17: AG Pattern setting for TC 5.2D

- f) Press 'Trigger Ana.Lev' at the right and select 'Trigger Source' at the bottom, and set it to be 'Frame'
- g) Press 'CDP Relative' at the right and 'Diagram Type' at the bottom, select 'E-DPDCH1'. Select 'Measure Length' and set it as '45'. Select 'Measure Points' and set the points in accordance with what shown in Figure 18.



Figure 18: Mearsure points for relative CDP accuracy measurement.

The measured CDP ratio for each channel and each measurement point are shown as in *Figure 18*.

The UE relative code domain power nominal ratio and the test requirement is shown as in Table 5.2D.7 and Table 5.2D.8 respectively.

Sub-Test	Measure	Expected Relative Code Domain Power in dB						
C.11.1.3	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 5.2D.8: UE relative code domain power accuracy test requirements

Nominal CDP ratio	Accuracy (dB)
≥ -10 dB	±1.7
-10 dB to ≥ -15 dB	±2.3
-15 dB to ≥ -20 dB	±2.9

The test should be repeated with different subtests.

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

The Relative Code Domain Error for every non-zero beta code in the domain is defined as the ratio of the mean power of the projection onto that non-zero beta code, to the mean power of the non-zero beta code in the composite reference waveform.

The Effective Code Domain Power (ECDP) is defined as following:

 $ECDP_k = (Nominal CDP ratio)_k + 10^*log10(SF_k/256),$ 

where the nominal CDP ratio is defined in section 3.5 UE relative Code Domain Power Accuracy for HS-DPCCH and E-DCH (TC 5.2D).

The requirements for Relative Code Domain Error are not applicable when either or both of the following channel combinations occur:

- when the ECDP of any code channel is < -30dB.
- when the nominal code domain power of any code channel is < 20 dB

The calculated ECDP value for different subtest is shown as in Table 5.13.2B.8 and the minimum requirement is shown as in Table 5.13.2B.9.

Sub-Test in Table C.11.1.3	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	-16.8
	E-DPDCH	-0.5	4	-18.6
	DPCCH	-14.0	256	-13.9
	DPDCH	-6.0	64	-11.9
2	HS-DPCCH	-8.0	256	-7.8
	E-DPCCH	-8.0	256	-8.8
	E-DPDCH	-4.1	4	-22.0
	DPCCH	-14.6	256	-15.2
	DPDCH	-19.1	64	-25.6
2	HS-DPCCH	-8.6	256	-9.2
5	E-DPCCH	-8.6	256	-6.2
	E-DPDCH1	-4.7	4	-23.4
	E-DPDCH2	-4.7	4	-23.4
4	DPCCH	-19.7	256	-19.7
	DPDCH	-2.2	64	-8.2
	HS-DPCCH	-13.7	256	-13.7
	E-DPCCH	-19.7	256	-19.4
	E-DPDCH	-4.7	4	-22.9

Table 5.13.2B.8: Nominal ECDP ratios

### Table 5.13.2B.9: Relative Code Domain Error test requirement

ECDP dB	Relative Code Domain Error dB
-21 < ECDP	≤ -15.5
-30 ≤ ECDP ≤ -21	≤ -36.5 – ECDP
ECDP < -30	No requirement

The test procedure defined from the standard is shown as following:

1) Set UE to maximum output power according to 5.2.B.4.2 steps 1 to 8.

2) Measure the Relative Code Domain Error of the DPCCH, DPDCH, HS-DPCCH, E-DPCCH and E-DPDCH(s).

3) Repeat steps 1 through 2 for the other combinations of beta values as given in Table C.11.1.3.

4) Set the power level of UE to -18 dBm or send Down power control commands (1 dB step size should be used) to the UE until UE output power shall be -18 dBm with  $\pm 2$  dB tolerance.

5) Measure the Relative Code Domain Error of the DPCCH, DPDCH, HS-DPCCH, E-DPCCH and E-DPDCH(s).

6) Repeat steps 4 and 5 for all the combinations of beta values for sub-tests 1, 2, 3, and 4 as given in Table C.11.1.3.

After taking the measurement result for TC 5.2B, TC 5.9B and TC 5.10B, do the following steps:

- a) Press '**Menus**' at the right bottom and select '**Code Dom. Power**' at the bottom
- b) Press 'Application' at the right and select 'CDE Relative' at the bottom to activate the measurement (*step 2*). The test result is shown as in *Figure 19*.
- c) Press '**UE Signal**' at the right and select '**UL Target Power**' at the bottom and set it to be -18dBm
- d) Repeat the measurement.
- e) Repeat a)-d) for subtest 1-4.



Figure 19: Code Domain Error measurement for TC 5.13B.2

### **4 Performance Tests**

### 4.1 General Settings for Performance Tests

All receiver performance measurements should be carried out in multi-path fading environments (VA30), and AWGN should be activated. The hardware connection is shown as below, with a fading simulator, R&S SMU or R&S AMU with fading option, to provide VA30 fading profile and AWGN.



Figure 20: Px test setup

The AWGN and fading profile can be set in R&S SMU200. The detail description can be found in application note 1MA  $130^4$ .

To configure the output channel power  $\hat{I}_{o}$  and level reference:

Select BS Signal> Node-B Settings >Output Channel Power > '-60dbm'

BS Signal> Node-B Settings >Level Reference > 'Output Channel Power lor)'

UCDMA FDD       Connection Control       PS:       Idle       CS:       Signal C         -Setup       Node-B Settings            • Node-B Settings           • Node-B Settings             • Node-B Settings           • Node-B Settings             • Node-B Settings           • Onde-B Settings             • Node-B Settings           • Inscrete Settings             • RF Channel Downlink           Band [I]           • 10562           • Inscrete Settings             • Primary Scrambling Code           • Output Channel Power (lor)           • 0.000           • Hz             • Output Channel Power (lor)           • 0.01         • dBm           • 25.8           • BB             • OCNS (R99)           • 25.8           • BB           • 60.0             • Circuit Switched           • 60.0           • 60.0             • Packe	WCDMA FDD Band Mo	dulation	OM OI HSUP HSDP	F L	Conne Contro
Setup       Node-B Settings         ▼Node-B Settings       Channel Frequency       Uplink         RF Channel Downlink Band [I]       10562       2112.4 MHz       1922.4 MHz       Came         Frequency Offset       + 0.000 kHz       190.000 MHz       190.000 MHz       190.000 MHz         Primary Scrambling Code       Q       Q       Q       Q       Q         Level Reference       Output Channel Power (lor)       - 60.0 dBm       Q       Q         OCNS (R99)       - 25.8 dB       Q       Q         AWGN Noise Pwr. (@3.84 MHz, loc)       Off           Total Output Power (lor+loc)       - 60.0 dBm       -       60.0 dBm         Cricuit Switched       + HSDPA HS-DSCH       + HSUPA       -	ICDMA FDD Connection Control 🛔	PS:	ldle	CS: S	ignal On
Node-B Settings       Channel Frequency       Uplink         RF Channel Downlink       Band [I]       10562       2112.4 MHz       1922.4 MHz       Come         Frequency Offset       + 0.000 kHz       190.000 MHz       190.000 MHz       Primary Scrambling Code       9         Level Reference       Output Channel Power (lor)       - 60.0 dBm       OCNS (R99)       - 25.8 dB         OCNS (R99)       - 25.8 dB       Off        -         AWGN Noise Pwr. (@3.84 MHz, loc)       Off        -       60.0 dBm         Circuit Switched       + HSDPA HS-DSCH       + HSUPA        -       -	Setup		Node-B Setting	<b>j</b> 8	
RF Channel Downlink       Band [I]       10562       2112.4 мHz       1922.4 мHz       Come         Frequency Offset       + 0.000 kHz       190.000 MHz       190.000 MHz       190.000 MHz         Primary Scrambling Code       9       0       0       0       0         Level Reference       Output Channel Power (lor)       - 60.0 dBm       0       0       0         OCNS (R99)       - 25.8 dB       0       0       0       0       0       0         AWGN Noise Pwr. (@3.84 MHz, loc)       0       0       0       0       0       0       0         Geometry Factor (lor/loc)        -       60.0 dBm       0       0       0         • Circuit Switched       • HSDPA HS-DSCH       -       60.0 dBm       0       0       0	▼Node-B Settings	Channel	Frequency	Uplink	
Frequency Offset       + 0.000 KHz         RX/TX Separation       190.000 MHz         Primary Scrambling Code       9         Level Reference       Output Channel Power (lor)         Output Channel Power (lor)       - 60.0 dBm         OCNS (R99)       - 25.8 dB         AWGN Noise Pwr. (@3.84 MHz, loc)       Off         Geometry Factor (lor/loc)          Total Output Power (lor+loc)       - 60.0 dBm         Circuit Switched          HSDPA HS-DSCH	RF Channel Downlink Band [I]	10562	2112.4 мнz	1922.4 мн	Iz Compre
RX/TX Separation       190.000 MHz         Primary Scrambling Code       9         Level Reference       Output Channel Power (lor)         Output Channel Power (lor)       - 60.0 dBm         OCNS (R99)       - 25.8 dB         AWGN Noise Pwr. (@3.84 MHz, loc)       Off         Geometry Factor (lor/loc)          Total Output Power (lor+loc)       - 60.0 dBm          Circuit Switched          HSDPA HS-DSCH          HSUPA	Frequency Offset	+ 0.000	kHz		- 11
Primary Scrambling Code       9         Level Reference       Output Channel Power (lor)         Output Channel Power (lor)       - 60.0 dBm         OCNS (R99)       - 25.8 dB         AWGN Noise Pwr. (@3.84 MHz, loc)       Off         Geometry Factor (lor/loc)          Total Output Power (lor+loc)       - 60.0 dBm          Circuit Switched          HSDPA HS-DSCH          HSUPA	RX/TX Separation	190.000	MHz		- 11
Level Reference       Output Channel Power (lor)         Output Channel Power (lor)       - 60.0 dBm         OCNS (R99)       - 25.8 dB         AWGN Noise Pwr. (@3.84 MHz, loc)       Off         Geometry Factor (lor/loc)          Total Output Power (lor+loc)       - 60.0 dBm          Circuit Switched          Packet Switched          HSDPA HS-DSCH	Primary Scrambling Code	9			
Output Channel Power (lor)       - 60.0 dBm         OCNS (R99)       - 25.8 dB         AWGN Noise Pwr. (@3.84 MHz, loc)       Off         Geometry Factor (lor/loc)          Total Output Power (lor+loc)       - 60.0 dBm         Circuit Switched       - 60.0 dBm         Packet Switched       - 80.0 dBm         HSDPA HS-DSCH       - HSUPA	Level Reference	Output	Channel Power	(lor)	
OCNS (R99) AWGN Noise Pwr. (@3.84 MHz, loc) Geometry Factor (lor/loc) Total Output Power (lor+loc) Circuit Switched Packet Switched HSDPA HS-DSCH HSUPA	Output Channel Power (lor)	- 60.0 a	Bm		
AWGN Noise Pwr. (@3.84 MHz, loc) Geometry Factor (lor/loc) Total Output Power (lor+loc) Circuit Switched Packet Switched HSDPA HS-DSCH HSUPA	OCNS (R99)	- 25.8 d	в		
Geometry Factor (lor/loc) Total Output Power (lor+loc) - 60.0 dBm • Circuit Switched • Packet Switched • HSDPA HS-DSCH • HSUPA	AWGN Noise Pwr. (@3.84 MHz, loc)	Off			- 11
Total Output Power (lor+loc) - 60.0 dBm • Circuit Switched • Packet Switched • HSDPA HS-DSCH • HSUPA	Geometry Factor (lor/loc)				
<ul> <li>Circuit Switched</li> <li>Packet Switched</li> <li>HSDPA HS-DSCH</li> <li>HSUPA</li> </ul>	Total Output Power (lor+loc)	- 60.0 d	Bm		- 11
Packet Switched     HSDPA HS-DSCH     HSUPA	Circuit Switched				- 11
HSDPA HS-DSCH     HSUPA	▶ Packet Switched				
▶ HSUPA	⊁HSDPA HS-DSCH				
	▶ HSUPA				
	Hoorn				
				2	

Figure 21: Output channel power for Px test

The HSDPA setting is the same as for Tx testing. There is no subtest definition for  $\mathsf{Px}$  tests.

The following table is the DL power requirement:

### Table E.5A.2: Downlink Physical Channel parameters for E-DCH singlelink performance tests

Parameter	Unit	Value	Remark			
During Measurement						
P-CPICH_Ec/lor	dB	-10				
P-CCPCH and SCH_Ec/lor	dB	-12				
PICH _Ec/lor	dB	-15				
HS-PDSCH	dB	-3	During TTIs, in which the HS-PDSCH is not allocated to the UE via HS- SCCH signalling, the HS-PDSCH shall be transmitted continuously with constant power			
HS-SCCH_1	dB	-7.5	During TTIs, in which the HS-SCCH is not allocated to the UE the HS-SCCH shall be transmitted continuously with constant power.			
DPCH_Ec/lor	dB	-10	·			
E-AGCH	dB	Test specific	Test-specific value or -20dB is used			
E-HICH	dB	Test specific	Test-specific value or DTX'd is used			
E-RGCH	dB	Test specific	Test-specific value or DTX'd is used			
OCNS_Ec/lor	dB	Necessary	OCNS interference consists of 6			
		power so that total transmit power spectral density of Node B (Ior) adds to one	dedicated data channels as specified in table E.5A.4			
NOTE 1: For dynamic power correction required to compensate for the presence of transient channels, e.g.						
control channels, a subset of the OCNS DPCH channels may be used						

Compared to Tx tests, the HS-SCCH1 power needs to be changed, but please be alerted that in order to set it at '-7.5 dB', the E-HICH power may

need to be set at lower level initially as the total power should not exceed -60 dBm.

WCDMA FDD Band Re	ceiver Quality	CM OFF HSUPA HSDPA	Connect Control			
😑 WCDMA FDD Connection Control 🔮	PS: Id	le <mark>CS</mark>	<mark>8:</mark> Signal On			
-Setup	Dowr	hlink Physical Char	nnels/AICH			
AICH	<mark>⊿</mark> - 12.0 dB					
AICH Channel Code	6					
	Level	Minimum	Maximum			
DPDCH Level Config	-10.0 ав	-21.3 d⊟	з - 10.3 ав 📘 .			
DPCH Channel Code	96					
Power Offset (DPCCH/DPDCH)	0.0 dB					
DL DPCH Timing Offset	0 * 256 chip					
Secondary Scrambl. Code	0					
Secondary Scrambl. Code (HSDPA)	0					
HSDPA Channels	Off					
▼HS-SCCH	Level Ch.Co	ode UEID	Dummy UE ID			
HS-SCCH#1	-7.5 dB 12	AAAA	5555			
HS-SCCH#2	Off 13		12AA			
HS-SCCH#3	Off 14		1AAA			
HS-SCCH#4	Off 15		1FAA			
Connection Handover UE Signal BS Sig	nal Network	AF/RF ⊕+	Sync. 1 2			

Figure 22: HS-SCCH channel power setting for Px test

In the test cases described in this application notes, the AGCH power should be -20dBm.

WCDMA FDD Band Re	ceiver Quali	ty HSUPA	Connect Control
😑 WCDMA FDD Connection Control 🛔	PS:	Idle C	<mark>S: Si</mark> gnal On
_Setup	[	Downlink Physical Ch	annels/E-AGCH/
<ul> <li>▼HS-PDSCH         <ul> <li>Level (All Active Codes)</li> <li>Meas. Power Offset Control</li> <li>Meas. Power Offset</li> <li>1st Used Chan. Code</li> <li>Unscheduled Subframes</li> <li>HSUPA Channels</li> <li>▼E-AGCH</li> </ul> </li> </ul>	-3.0 dB Auto 7.0 dB 2 Dummy Data On	3	
E-AGCH E-AGCH Chan. Code ▼E-RGCH/E-HICH E-RGCH/E-HICH E-RGCH Active E-RGCH/E-HICH Chan. Code Data Gen. During Signalling Change	<mark>2 - 20.0 d⊟</mark> 2 - 35.1 d⊟ Off 6 Off		
Connection Handover UE Signal BS Sign	nal Network	AF/RF ⊕+	Sync. 1 2

Figure 23: E-AGCH power setting for Px test

The value for **UL RLC SDU size** should be '2936 bits' for TTI = 10ms and '5872 bits' for TTI = 2ms (according to Annex C.11.3) for the test cases described in this application note. The setting can be found at **BS Signal > Circuit Switched > RMC Settings > HSPA > HSUPA UL RLC SDU Size**.

'Connect CS' should be used to setup a connection in Px test.

# 4.2 Detection of E-DCH HARQ ACK Indicator Channel (EHICH)

### 4.2.1 Single Link Performance – 10ms TTI (TC 10.2.1.1)

Evaluation of the receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH based on the determination of missed ACK and false ACK probability.

Two tests are defined:

- Missed ACK for 10 ms TTI
- False ACK for 10 ms TTI

### Table 10.2.1.1.2.1: Parameters for E-HICH – Serving E-DCH cell

Parameter	Unit	Missed ACK	False ACK	
Inc	dBm/ 3.84		-60	
00	MHz			
Phase reference	-	P-CPICH		
P-CPICH E <sub>c</sub> /I <sub>or</sub>	dB	-10		
E-HICH signalling pattern	-	100% ACK	100% DTX	

Step 1. Set E-HICH power:

Select **BS Signal> Downlink Physical Channels > E-RGCH/E-HICH> E-RGCH/E-HICH > '-35.1 dB'** (according to Table 10.2.1.1.2.2 )

\$		Ind Reco	eiver Qua	Ity SUPA	ي و ا	Connect Control
😑 MO	CEMARDE Connection Cont	rcl 👔	PS	Idle	CS: \$1	gnal On
1	Setup			Dr wnlink Physicial	Chan acits!	<u>o</u>
	Secondary Scrambl Code Secondary Scrambl Code (H HSDPA Channels MS-SOUH MS-PDSCH HSUPA Channels MSUPA Channels ME-ACCH ME-RSCHJE-HICH	ISDPA)	011			
1	E-RGOH/E-HCH F-RGOH/E-HCHChan, Co Data Get, during Frequency : TPC Settings Compressed Mode Settings DLPower Central Settings	ide change	35.1_48 Off 6 On			
Conne	telion Handover UESianal	BSSigne	I Notwork	AFTRE Q+	Sync.	1 2

Figure 24: E-RGCH/E-HICH power level setting for TC 10.2.1.1

Step 2. Set the TTI Mode to '10ms', the AG Index to '5' and RLC PDU Size to '112' (according to the radio bearer setup message defined in section 10.2.1.1.4.2)

	WCDMA FDD Band Re	ceiver Qualit	Y CM OFF HSUPA HSDPA	1	Connect Control
😑 W(	CDMA FDD Connection Control 🔮	PS: At	tached	CS: Re	gistered
L,	Setup	H	SUPA/E-AGCH//	AG Pattern/	
	►HSDPA HS-DSCH				
	►HSUPA Default Settings				
	TTI Mode	10 ms			
	RLC PDU Size	112			
	▼E-AGCH				
	Secondary LIE-ID	12AA			
	<ul> <li>AG Pattern</li> </ul>	121111			
	Pattern Length	1			
	AGIndex	5			
	AG SCOPE (#:PerHARQ.proc)				
	AGID Type (v: secondaryD) AC Dattorn Depotition				
	Unscheduled TTI	DTX			
		·			
Conn	ection Handover UE Signal BS Sig	nal Network	AF/RF ↔	Sync.	1 2

Figure 25: AG Index and RLC PDU Size setting for TC 10.2.1.1

Step 3. Set Maximum re-transmission to '15' and Happy bit delay condition to '10ms' (according to the radio bearer setup message defined in section 10.2.1.1.4.2)

Ŷ	WCDMA FDD Band Mc	dulation	CM HS HS	1 OFF SUPA	Connect Control
<u> </u>	VCDMA FDD Connection Control 🛔	PS:	Attached	l <mark>CS:</mark>	Registered
Г	-Setup			B H-ARQ Profile	Q
	<ul> <li>UE Gain Factors</li> <li>HSUPA</li> <li>Default Settings</li> <li>E-DCH Physical Layer Category</li> <li>E-TFCI Table Index</li> <li>H-ARQ Redundancy Versions</li> <li>Minimum Set E-TECI</li> </ul>	D 5 0 Always R' 9	V 0		
	Happy Bit Delay Condition	10 ms			
	Puncturing Limit PLnon-max Maximum Channelisation Code Initial Serving Grant	0.84 2xSF4		•	
	▼RABH-ARQ Profile				Compress
Ľ	H-ARQ Power Offset Max. Number of Retransmissions NISUPA Cain Factors	<u>U ав</u> 15		]	
Con	nection Handover UE Signal BS Sig	nal Netwo	rk AF/R	tF⊕+ Syn	c. <u>1</u> 2

Figure 26: Happy Bit and Retransmissions setting for TC 10.2.1.1

Now you can press 'Connect UE (CS)' to start the measurement.

The measurement item is 'HSUPA E-HICH'.

Go to measurement page, press 'Menus', press 'Receiver Quality' at bottom.

press Applic. 2 press Applic. 1 at the right side one or two times, until you see '**HSUPA E-HICH**' at the bottom, press it and you will see the following:

WCDMA FDD Band Rece	eiver Quality	CM OFF HSUPA HSDPA	Connect Control
0       False E-HICH Reception         2140       Correct E-HICH Reception         2140       All Valid E-HICH Receptions         0.000 %       False E-HICH Ratio         71.600 кВіt/s       Curr. Throughput         71.600 кВіt/s       Max. Possible Throughput         2140       Measured Frames	Settings Settings Signalling State Circuit Switched Packet Switched Packet Switched Packet Switched Packet Switched Dedicated Chn. Type DL Resources in Use Test Mode UL CRC Data Sour. DTCH Connection Info (PS) Dedicated Chn. Type SRB HSUPA TTI Mode E-TFCI Table Index VE-AGCH Primary UE-ID Secondary UE-ID AG Pattern Pattern Length	Connected Established RMC 2.5 kbps 12.2kbps+HSPA34 100 % Loop Mode 1 RLC On PRBS9 HSUPA Test Mod 10 ms 0 AAAA 12AA 1	R HSUPA E-HICH Applic. 2 Applic. 1 Analyzer Level UE Signal Ana.Set. HSUPA HSUPA BS Sign.Lvt BS Signal Settings
HSDPA Level Config H - Set			Menus

Figure 27: Test page for TC10.2.1.1

Step 4. Set E-HICH for 'Missed Ack' testing. The E-HICH mode should be 'All Ack'

Select BS Signal> HSUPA > E-RGCH/E-HICH > HARQ Feedback (E-HICH) > Mode > 'All Ack'

	Modulation	CM HSI HSI	OFF	Connect Control
😑 WCDMA FDD Connection Control	PS:	ldle	CS:	Signal On
-Setup		HSUPA/RLC	PDU Size	<mark>0</mark>
<ul> <li>Packet Switched</li> <li>HSDPA HS-DSCH</li> <li>HSUPA</li> <li>Default Settings</li> <li>TTI Mode</li> <li>RLC PDU Size</li> <li>E-AGCH</li> <li>E-RGCH/E-HICH</li> <li>Fill up Frame with Dummies</li> <li>HARO Eeedback (E-HICH)</li> </ul>	□ 10 ms 112			
Mode	All ACK			
Signature ▼Relative Grant (E-RGCH) Mode Pattern Length	1 Alterna 1	ting		
Connection Handover UE Signal BS	Signal Netv	vork AF/RF	⊕+ Sync.	. 1 2

Figure 28: Missed Ack test setting for TC 10.2.1.1

WCDMA FDD Band Rece	eiver Quality	CM OFF HSUPA	Connect Control
0       False E-HICH Reception         2140       Correct E-HICH Reception         2140       All Valid E-HICH Receptions         0.000 %       False E-HICH Ratio         71.600       kBit/s         Curr. Throughput         71.600       kBit/s         Max. Possible Throughput         2140       Measured Frames	Settings Settings Signalling State Circuit Switched Packet Switched Packet Switched Connection Info (CS) Dedicated Chn. Type SRB Reference Chn. Type DL Resources in Use Test Mode UL CRC Data Sour. DTCH Connection Info (PS) Dedicated Chn. Type SRB SHSUPA TTI Mode E-TFCI Table Index -E-AGCH Primary UE-ID Secondary UE-ID Secondary UE-ID AG Pattern Pattern Length	Connected Established RMC 2.5 kbps 12.2kbps+HSPA34 100 % Loop Mode 1 RLC On PRBS9 HSUPA Test Mod 10 ms 0 AAAA 12AA 1	R HSUPA E-HICH Applic. 2 Applic. 1 Analyzer Level UE Signal Ana.Set. HSUPA BS Sig.Lvl BS Signal Settings
HSDPA Level HS-DSCH Config H - Set			Menus

Figure 29: Missed Ack test result for TC 10.2.1.1

The expected UL datarate is 71.6 kbps corresponding to E-TFC Index 45.

The test requirement is shown as the following table:

## Table 10.2.1.1.2.2: Minimum requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – Serving E-DCH cell

Test	Propagation		Reference value			
Number	Conditions	E-HICH $E_c / I_{or}$ (dB)	E-HICH $E_c / I_{or}$ (dB) $\hat{I}_{or} / I_{oc}$ (dB)			
2	VA30	-35.1	0	0.01		

Step 5. Set E-HICH for 'False Ack' testing. The E-HICH mode should be 'All DTX'

Select **BS Signal> HSUPA > E-RGCH/E-HICH > HARQ Feedback (E-HICH) > Mode > 'All DTX'** 

×.	WCDMA FDD I MC	dulation	CM OFF HSUPA HSDPA		Connect Control
<u> </u>	ICDMA FDD Connection Control 🛔	PS:	ldle	CS: Si	gnal On
Г	-Setup		HSUPA		<mark>0</mark>
	<ul> <li>Packet Switched</li> <li>HSDPA HS-DSCH</li> </ul>				
	▼HSUPA				
	Default Settings TTI Mode	10 ms			Compress
	RLC PDU Size	112			
	▶E-AGCH				
	▼E-RGCH/E-HICH				
	Fill up Frame with Dummies				1
	▼HARQ Feedback (E-HICH)				
	Mode	AIIDTX			
	Signature	1			
	Mode Dottorn Longth				
	Fatternitengti				
Con	nection Handover UE Signal BS Sig	inal Network	AF/RF ↔	Sync.	1 2

Figure 30: False Ack test setting for TC 10.2.1.1

The test requirement is shown as the following table:

Table 10.2.1.1.2.3: Minimum requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – single link

Test	Propagation	Reference value		
Number	Conditions	$\hat{I}_{or}$ / $I_{oc}$ (dB)	False ACK probability	
4	VA30	0	0.5	

WCDMA FDD Band Rece	eiver Quality	CM OFF	Connect Control
110       False E-HICH Reception         922       Correct E-HICH Reception         1032       Air Value E-HICH Receptions         10.659       False E-HICH Ratio         1060       Correct CRC         0       CRC Error         0.000       BLER         71.600       KBit/s         Curr. Throughput         71.600       KBit/s         Max. Possible Throughput         1060	Settings Signalling State Circuit Switched Packet Switched Packet Switched Connection Info (CS) Dedicated Chn. Type DL. Resources in Use Test Mode UL CRC Data Sour. DTCH Connection Info (PS) Dedicated Chn. Type SRB +HSUPA TTI Mode E-TFCI Table Index -E-AGCH Primary UE-ID Secondary UE-ID AG Pattern Pattern Length	Registered Established RMC 2.5 kbps 12.2kbps+HSPA34 100 % Loop Mode 1 RLC On PRBS9 HSUPA Test Mod 10 ms 0 AAAA 12AA 1	Applic. 2 Applic. 1 Analyzer Level UE Signal Ana.Set. BS Sig. LVI. HSDPA HSUPA BS Signal Settings
Repetition Measure Frame	s		Menus

Figure 31: False Ack test result for TC 10.2.1.1

### 4.2.2 Single Link Performance – 2ms TTI (TC 10.2.1.2)

Compared to TC 10.2.1.1, this test case is for devices that support 2ms TTI with E-HICH power -28.3 dB, absolute grant 4 and the UL RLC SDU size should be 5872 bits (2\*DL RLC SDU). Here are the few settings that should be changed based on the settings for TC 10.2.1.1.

1. Set E-DCH TTI to be '2ms'

### Select BS Signal> HSUPA > TTI Mode > '2ms'

2. Set the absolute grant to be '4'. The parameter can be found as shown in *Figure 25*.

Select BS Signal>HSUPA>E-AGCH>AG Pattern>AG Index>'4'

3. Set the Happy bit delay condition to '2ms'. The parameter can be found as shown in *Figure 26*.

Select UE Signal> HSUPA > Happy Bit Delay > '2ms'

4. Set the E-HICH power to be '-28.3 dB'. The parameter can be found as shown in *Figure 24*.

Select BS Signal> Downlink Physical Channels > E-RGCH/E-HICH> E-RGCH/E-HICH > '-28.3 dB'

5. Set the UL RLC SDU size to be '5872 bits' (According to TS 34.121 Annex C.11.3).

Select BS Signal > Circuit Switched > RMC Settings > HSPA > HSUPA UL RLC SDU Size > '5872 Bit'

### Table 10.2.1.2.2.1: Parameters for E-HICH – Serving E-DCH cell

Parameter	Unit	Missed ACK	False ACK
I <sub>oc</sub>	dBm/3.84 MHz	-6	60
Phase reference	-	P-CF	PICH
P-CPICH E <sub>c</sub> /I <sub>or</sub>	dB	-1	0
E-HICH signalling pattern	-	100% ACK	100% DTX

## Table 10.2.1.2.2.2: Minimum requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – Serving E-DCH cell

Test	Propagation		Reference value	
Number	Conditions	E-HICH $E_c/I_{or}$ (dB)	$\hat{I}_{or}$ / $I_{oc}$ (dB)	Missed ACK probability
1	VA30	-28.3	0	0.01

#### Table 10.2.1.2.2.3: Minimum requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – Serving E-DCH cell

Test	Propagation	Referenc	e value
Number	Conditions	$\hat{I}_{or}/I_{oc}$ (dB)	False ACK probability
2	VA30	0	0.5

# 4.3 Detection of E-DCH Relative Grant Channel (E-RGCH)

The receive characteristics of the E-DCH Relative Grant Channel (E-RGCH) in multi-path fading environment is determined by the 'missed UP/DOWN' and 'missed HOLD' measurement, the detail is described in the test procedure.

### 4.3.1 Single link performance (10ms TTI) (TC 10.3.1.1)

The test requirement and power setting for this test case is shown as following:

Table 10.3.1.1.2.1: Parameters	for E-RGCH – Serving E-DCH cell
--------------------------------	---------------------------------

Parameter	Unit	Missed UP/DOWN	Missed HOLD
Inc	dBm/3.84	-6	60
	MHz		
Phase reference	-	P-CF	NCH
P-CPICH E <sub>c</sub> / I <sub>or</sub>	dB	-1	0
E-RGCH signalling pattern	-	50% UP	100% HOLD
		50% DOWN	

## Table 10.3.1.1.2.2: Minimum requirement for Missed UP/DOWN when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH cell

Test	Propagation		Reference value	
Number	Conditions	E-RGCH $E_c/I_{or}$ (dB)	$\hat{I}_{or}$ / $I_{oc}$ (dB)	Missed UP/DOWN probability
1	VA30	-31	0	0.05/0.05

## Table 10.3.1.1.2.3: Minimum requirement for Missed HOLD when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH cell

Test	Propagation	Referen	ce value
Number	Conditions	$\hat{I}_{\it or}$ / $I_{\it oc}$ (dB)	Missed HOLD probability
2	VA30	0	0.1

Step 1: The power setting and E-RGCH channel activation is shown as in *Figure 32*.

WCDMA FDD Band Re	ceiver Quality
😑 WCDMA FDD Connection Control 🛔	PS: Attached CS: Registered
-Setup	Downlink Physical Channels/
Power Offset (DPCCH/DPDCH) DL DPCH Timing Offset Secondary Scrambl. Code Secondary Scrambl. Code (HSDPA) HSDPA Channels HS-SCCH HS-PDSCH HSUPA Channels E-AGCH	0.0 dB 0 * 256 chip 0 0 0 On On
E-RGCH/E-HICH E-RGCH Active E-RGCH/E-HICH Chan. Code Data Gen. During Signalling Change • TPC Settings	0n 6 On
Connection Handover UE Signal BS Sig	nal Network AF/RF 🗇 Sync. 🔟 2

Figure 32: Activate E-RGCH channel and E-RGCH power setting

Step 2: Set the TTI Mode to be '10ms'. The **RLC PDU Size** for single link performance test should be 112 (according the the RAB message defined in the test cases), which is the same as TC 10.2.1, shown as in *Figure 25*.

Select BS Signal > HSUPA > TTI Mode > '10ms'

### > RLC PDU Size > '112'

Step 3: The 'Missed UP/DOWN' is configured as 4 consecutive "down" and 4 consecutive "up" on the E-RGCH. In CMU200, this is configured as '**per H-ARQ process**' for E-RGCH test mode, shown as in *Figure 33*.

Set the Absolute Grant to 5 and E-HICH Feedback to 'ALL DTX'.

Select BS **Signal > HSUPA** to find all the settings.

WCDMA FDD Connection Control R PS: Attached CS: Registered  Setup  Pattern Length  AG Index 5  AG Scope (x:Per HARQPOC)  AG D Type (x: secondary D)  AG Pattern Repetition  Activate Pattern  Unscheduled TTI DTX  ERecute Unscheduled TTI DTX  Fill up Frame with Dummies  HARQ Feedback (E-HICH)  Mode All DTX  Signature 1  Relative Grant (E-RGCH)  Mode Alternating H-ARQ Cycle	WCDMA FDD Band Co	ode Domain Pwr. HSDPA
HSUPA/E-AGCH/AG Pattern/         Pattern Length       Image: Colspan="2">Image: Colspan="2" Co	WCDMA FDD Connection Control 🛔	PS: Attached CS: Registered
PatternLength       Image: Construct of the second and t	Setup	HSUPA/E-AGCH/AG Pattern/
AG Index       5         AG Scope (x:PerHARQIPCC)	Pattern Length	1
AG Scope (x: Per HARQIPCC)	AGIndex	5
AG D Type (v: scoretary D)	AG Scope (v:PerHARaproc)	
AG Pattern Repetition       Continuous         Activate Pattern       Execute         Unscheduled TTI       DTX         *E-RGCH/E-HICH       Image: Continuous         Fill up Frame with Dummies       Image: Continuous         *HARQ Feedback (E-HICH)       Image: Continuous         Mode       All DTX         Signature       1         *Relative Grant (E-RGCH)       Alternating H-ARQ Cycle         Artiviste Dataset       Image: Continuous	AG ID Type (v: secondary D)	
Activate Pattern     Execute       Unscheduled TTI     DTX       *E-RGCH/E-HICH     Image: Constraint of the second of the s	AG Pattern Repetition	Continuous
Unscheduled TTI DTX E-RGCH/E-HICH Fill up Frame with Dummies HARQ Feedback (E-HICH) Mode All DTX Signature Relative Grant (E-RGCH) Mode Alternating H-ARQ Cycle Attiviste Dettern	Activate Pattern	Execute
*E-RGCH/E-HICH         Fill up Frame with Dummies         *HARQ Feedback (E-HICH)         Mode         All DTX         Signature         1         *Relative Grant (E-RGCH)         Mode         Alternating H-ARQ Cycle	Unscheduled TTI	DTX _
Hillup Frame with Dummes	▼E-RGCH/E-HICH	
*HARQ Feedback (E-HICH)         Mode       All DTX         Signature       1         *Relative Grant (E-RGCH)         Mode       Alternating H-ARQ Cycle         Activate Dataset	Fill up Frame with Dummies	
Mode     AILDIX       Signature     1       *Relative Grant (E-RGCH)       Mode       Alternating H-ARQ Cycle	HARQ Feedback (E-HICH)	
Signature 1  Relative Grant (E-RGCH)  Mode Alternating H-ARQ Cycle	Mode	AIIDIX
Mode Alternating H-ARQ Cycle	Signature	
Anternating France Cycle		Alternating H-APO Cycle
	Activate Dattern	
	Activate Fattern	

Figure 33: Absolute grant and HARQ feedback settings for TC 10.3.1.1

Step 4: The UE shall not retransmit any data and the happy bit delay condition is 10 ms, the setting is shown as in *Figure 34*.

WCDMA FDD Band Co	de Domain Pwr.	Connect Control
😑 WCDMA FDD Connection Control 🛔	PS: Attached	CS: Registered
_Setup	HSUPA/RAB I	H-ARQ Profile
<ul> <li>UE Gain Factors</li> <li>HSUPA         <ul> <li>Default Settings</li> <li>E-DCH Physical Layer Category</li> <li>E-TFCI Table Index</li> <li>H-ARQ Redundancy Versions</li> <li>Minimum Set E-TFCI</li> <li>Happy Bit Delay Condition</li> <li>Puncturing Limit PLnon-max</li> <li>Maximum Channelisation Code</li> <li>Initial Serving Grant</li> </ul> </li> </ul>	0 Always RV 0 9 10 ms 0.84 2xSF4	
▼RABH-ARQProfile		
H-ARQ Power Offset Max. Number of Retransmissions	0 dB	Compress
Connection Handover UE Signal BS Sig	al Network AF/RF	🕀 Sync. 1 2

Figure 34: UE signal settings for TC 10.3.1.1

Step 5: This measurement page can be accessed by pressing 'Menus' at the right and followed by 'Receiver Quality' at the bottom, then press

**'Applic.2/Applic.1**' once or twice at the right and select **'HSUPA E-RGCH**' at bottom. The measurement page is shown as in *Figure 35*.

K WCDMA FDE	Band Receiver Quality	Connect Control
Missed UP/DOMN Test	Missed HOLD Test	HSUPA Te-RGCH
Missed UP	Missed HOLD     Correct HOLD	Applic. 2
500 Correct UP	0 All Valid HOLD	Applic. 1
	Missed HOLD Ratio	Level
0 000 % Missed LP Ratio		UE Signal Ana.Set.
0.000 % Missed DOWN Ratio		BS SÍG. LVI. HSDPA HSUPA
1000 Measured Frames	Expected E-TFCI 19 28 35 40 45 52 59	BS Signal Settings
	Initial E-TFCI 5 Mode Alternating H-ARQ Cycle	
Repetition	Measure Frames	Menus

Figure 35: E-RGCH measurement for TC 10.3.1.1

Step 6: It is recommended to do a single shot for this test case. This can be configured by pressing **HSUPA E-RGCH** at the right twice to get the page shown as below. Set the **Repetition** to be 'Single Shot' and the number of measure frames can be configured as well.

😑 ReceiverQua	ality Configu	iratio	n			WCDMA F	DD 🛔
Control		L	imits.				
Setup			HSUPA E-R	GCH/Defa	ult Setting	8	
▼HSUPAE-F	RGCH						
Default Se	ettings				_		
Repetition			Single	Shot			
Measure F	rames		1000				
Nr. Of Exp	ected E-TFC	l's	7				
Initial E-TF	CI		5				
E-TFCIV	alue Selection		Auto				
Expected	E-TFCI Val. 1	4	19	28	35	40	
Expected	E-TFCI Val. 5	.8	45	52	59		
Expected	E-TFCI Val. 9	.11					
►-DPCCHI	_ogging						
WCDMA Ne	ighbour Cell						
► GSM Neight	our Cell						

Figure 36: Configure the single shot test for TC 10.3.1.1

After UE connected for 3 second, start the fading simulator, and then activate the measurement. The '**Missed UP/DOWN**' measurement will be done automatically, shown as in *Figure 35*.

Step 7: To test the 'Missed HOLD' condition, the E-RGCH Mode needs to BS Sig. Lvl.

be changed to 'All DTX'. This can be done by pressing HSDPA twice to get the HSUPA setting show at the bottom. Press **Channel Settings** and change the **Mode** to '**All DTX**', shown as in *Figure 37*.

🪸 <mark>W</mark>		eceiver Quality	CM OFF HSUPA HSOPA	Connect Control
Missed UP/E	HSUPA Channel Settings	E-RGCH/Mode		HSUPA E-RGCH
	AG Scope (*:Per HARQproc) AG ID Type (*: accord D) AG Pattern Repetition Activate Pattern *E-HICH Mode Signature *E-RGCH Mode Activate Pattern Pattern Len. Pattern (1:Uq0:Down-:DTX) Signature	Continuous Execute All DTX 1 All DTX 1 All DTX Execute 1 0 0 0 0 0 0		Applic. 2 Applic. 1 Analyzer Level UE Signal Ana.Set HSUPA BS Sig. Lvi. HSDPA BS Signal Settings
HSUPA Level	Channel Settings	A	G Pattern RG Pattern Activate Activate	Menus

Figure 37: 'Missed HOLD' test setting for TC 10.3.1.1

Activate the **HSUPA E-RGCH** test again and the '**Missed HOLD**' test will be done automatically.

### 4.3.2 Single link performance 2ms TTI (TC 10.3.1.2)

Compared to TC 10.3.1.1, this test case is for devices that support 2ms TTI with E-HICH power -24.4 dB, absolute grant 4 and the UL RLC SDU size should be 5872 bits (2\*DL RLC SDU). The test limits are the same as well.

## Table 10.3.1.2.2.2: Minimum requirement for Missed UP/DOWN when relative scheduling grant is transmitted using 3 consecutive slots – Serving E-DCH cell

Test	Propagation		Reference value	
Number	Conditions	E-RGCH $E_c/I_{or}$ (dB)	$\hat{I}_{or}/I_{oc}$ (dB)	Missed UP/DOWN probability
1	VA30	-24.4	0	0.05/0.05

Here are the few settings that should be changed based on the settings for TC 10.3.1.1.

1. Set E-DCH transmission time to be '2ms'

#### Select BS Signal> HSUPA > TTI Mode > '2ms'

2. Set the Happy bit delay condition to '2ms'. The parameter can be found as shown in *Figure 26*.

Select UE Signal> HSUPA > Happy Bit Delay > '2ms'

3. Set the E-RGCH power to be -24.4 dB. The parameter can be found as shown in *Figure 24*.

Select BS Signal> Downlink Physical Channels > E-RGCH/E-HICH> E-RGCH/E-HICH > '-24.4 dB'

4. Set the absolute grant to be '4'. The parameter can be found as shown in *Figure 25*.

Select BS Signal>HSUPA>E-AGCH>AG Pattern>AG Index>'4'

5. Set the UL RLC SDU size to be '5872 bits' (According to TS 34.121 Annex C.11.3).

## Select BS Signal > Circuit Switched > RMC Settings > HSPA > HSUPA UL RLC SDU Size > '5872 Bit'

The test procedure is the same as TC 10.3.1.1 except the "Miss UP/DOWN" is configured as 8 consecutive "down" and 8 consecutive "up" on the E-RGCH. This setting is automatically done when '2ms' TTI is selected.

### 4.6 Demodulation of E-DCH Absolute Grant Channel (E-AGCH) (TC 10.4.1)

This test case is defined to verify the demodulation of the E-AGCH channel.

Step 1. The E-HICH should be set as 'All ACK'.

Step 2. The AGCH value should be a sequence of '4, 8, 10'. (according to Table 10.4.1.3 of TS 34.121)

R	WCDMA FDD Band Re	eceiver Quality
<mark>-                                    </mark>	NCDMA FDD Connection Control 🚆	PS: Established <mark>CS:</mark> Connected
Г	-Setup	HSUPA/E-RGCH/E-HICH/
	<ul> <li>▼E-AGCH</li> <li>Primary UE-ID</li> <li>Secondary UE-ID</li> <li>▼AG Pattern</li> <li>Pattern Length</li> <li>AG Value</li> </ul>	AAAA 12AA 3 4 8 10
	AG Scope (⊮:PerHARQproc) AG ID Type (⊮:secondaryD) AG Pattern Repetition Unscheduled TTI ▼E-RGCH/E-HICH Fill up Frame with Dummies	Continuous DTX

Figure 38: E-AGCH settings for TC 10.4.1

Step 3. Power setting

a. Set the Output Channel Power (lor) to '-59.4 dBm'

WCDMA FDD	dulation	CM OFF HSUPA HSDPA	الي 🖌	Connec Control
WCDMA FDD Connection Control 🛔	PS:	Idle	CS: Si	gnal On
-Setup		Node-B Settings/		Q
<ul> <li>Node-B Settings</li> <li>RF Channel Downlink Band []</li> <li>Frequency Offset</li> <li>RX/TX Separation</li> <li>Primary Scrambling Code</li> </ul>	Channel         Free           10562         2           + 0.000         kHz           190.000         MH:           9         2	quency 2112.4 мнz z	<b>Uplink</b> 1922.4 мн	z
Output Channel Power (lor)	onn cha ∎ - 59.4 dBm	ппегеомесц	orj	
OCNS (R99) AWGN Noise Pwr. (@3.84 MHz, loc) Geometry Factor (lor/loc) Total Output Power (lor+loc)	-25.8 dB -60.0 dBm 0.6 dB -56.7 dBm			
<ul> <li>Circuit Switched</li> <li>Packet Switched</li> <li>HSDPA HS-DSCH</li> <li>HSUPA</li> </ul>				
nnection Handover UE Signal BS Sig	nal Network	AF/RF 🕀	Sync.	1 2

Figure 39: Output Channel Power for TC 10.4.1

**b.** Set the HSUPA downlink physical channel settings (according to Table 10.4.1.3a and Table 10.4.1.4 of TS 34.121):

E-AGCH	= -23.1 dB
E-RGCH/E-HICH	= -20 dB
E-RGCH Active	= OFF

	WCDMA FDD Band Re	ceiver Qua	l <b>lity</b> HS	OFF UPA DPA	Connect Control
<u> </u>	ICDMA FDD Connection Control 🛔	PS:	Idle	CS:	Signal On
Г	Setup		- Downlink Ph	ysical Channels/	E-AGCH
	HSDPA Channels • HS-SCCH • HS-PDSCH	Off			
	HSUPA Channels	Off			
	E-AGCH E-AGCH Chan. Code	-23.1 ав 2			Compress
	E-RGCH/E-HICH E-RGCH/E-HICH E-RGCH Active	-20.0 dB Оff			
	E-RGCH/E-HICH Chan. Code Data Gen. during Frequency change	6 On			
	<ul> <li>TPC Settings</li> <li>Compressed Mode Settings</li> <li>DL Power Control Settings</li> </ul>				
Con	nection Handover UE Signal BS Sig	inal Network	AF/R	F⊕+ Sync	. 1 2

Figure 40: HSUPA channel power level setting for TC 10.4.1

Step 4. UE Channel type and Gain Factors (according to Table 10.4.1.3 of TS 34.121):

RMC Uplink 12,2 kbps:  $\beta c = 15$ ;  $\beta d = 5$ 

HSDPA gain factors:  $\triangle ACK = 5$ ;  $\triangle NACK = 5$ ;  $\triangle CQI = 5$  ( $\beta_{hs} = 15$ )

MCDMA rpp. Connection Control		S. A4	tachod	CS.	Por	intorod
WCDMARDD Connection Control		o. Al	lacheu	00.	ney	Isterec
-Setup		U	E Gain Factor	s/HSDPA		
Default All Settings						
<ul> <li>Analyzer Settings</li> </ul>						
<ul> <li>Measurement Settings</li> </ul>						
► UE Power Control						
▼UE Gain Factors	βc	βd	ΔACK	ANACK	ACQI	
<u>∽RMC</u>						
Uplink 12.2	15	5				
Uplink 64	5	15				
Uplink 144	4	15				
Uplink 384	4	15				
Voice	15	9				
► Video						
▶ Packet Data						
HSDPA	15	5	5	5	-5	
Default Settings						

Figure 41: RMC and HSDPA gain setting for TC 10.4.1

Step 5. Set maximum number of retransmissions to '0' (according to the radio bearer setup message defined in section 10.4.1.4.2)

WCDMA FDD Band Mo	dulation	CM OFF HSUPA HSDPA	136	Connect Control
😑 WCDMA FDD Connection Control 🛔	PS:	Attached	CS: Re	gistered
-Setup		HSUPA/RAB H-/	ARQ Profile/	
<ul> <li>UE Gain Factors</li> <li>HSUPA         <ul> <li>Default Settings</li> <li>E-DCH Physical Layer Category</li> <li>E-TFCI Table Index</li> <li>H-ARQ Redundancy Versions</li> <li>Minimum Set E-TFCI</li> <li>Happy Bit Delay Condition</li> <li>Puncturing Limit PLnon-max</li> <li>Maximum Channelisation Code</li> <li>Initial Serving Grant</li> <li>RAB H-ARQ Profile</li> <li>H-ARQ Power Offset</li> <li>Max. Number of Retransmissions</li> </ul> </li> </ul>	С 5 0 Always RV 9 100 ms 0.84 2xSF4	· 0		
Connection Handover UE Signal BS Sig	nal Networl	K AF/RF 🕀	* Sync.	1 2

Figure 42: Maximum number of retransmissions setting for TC 10.4.1

Step 6. Set HSUPA UL RLC SDU Size to '8808' (according to Table C.11.3.1 of TS 34.121)

WCDMA FDD Band Mo	odulation Connect
WCDMA FDD Connection Control 🛔	PS: Idle CS: Signal On
Setup-	Circuit Switched
▶ Node-B Settings	
Default Settings	Compress
DCH (Dedicated Chn.) Type	RMC
Reference Channel Type	12.2 kbps + HSPA 34.108
DL DTCH Transport Format	12.2 kbps
LL CPC (Sym Loop Mode 2)	00 %
Test Mode	
Channel Data Source DTCH	
HSUPA UL RLC SDU Size	8808 Bit
HSPA Test Loop	Loop Wode 1
<ul> <li>RMC with HSDPA Settings</li> </ul>	
onnection Handover UE Signal BS Sig	nal Network AF/RF 🕀 Sync. 🚺 2

Figure 43: HSUPA UL RLC SDU Size setting for TC10.4.1

Step 7. Set HSUPA UL RLC PDU Size to '336' (default setup for all HSUPA test)

Ŷ	WCDMA FDD Band Re	ceiver Quality	CM OFF HSUPA HSUPA	Connect Control
<u> </u>	JCDMA FDD Connection Control 🛔	PS: Attack	ned <mark>CS:</mark> Re	egistered
Г	-Setup	HSUPA		Q
	<ul> <li>Packet Switched</li> <li>HSDPA HS-DSCH</li> </ul>			
	HSUPA			
	Default Settings TTI Mode	10 ms		Compress
	RLC PDU Size	336		
	▼E-AGCH			
	Primary UE-ID	AAAA		
	Secondary UE-ID	1288		
	*AG Patterni Datterni onath	2		
	AGIndex	ン オーター10		
	AG ID TVDe (v: secondary D)			
	AG Pattern Repetition	Continuous		
Con	nection Handover UE Signal BS Sig	nal Network A	IF/RF ⊕+ Sync.	1 2

Figure 44: HSUPA UL RLC PDU Size setting for TC 10.4.1

Step 8. Set number of Reference E-TFCIs to '1' (according to section 9.2.1 of TS 34.108, Contents of RADIO BEARER SETUP message: AM or UM (E-DCH and HSDPA), which is called in Annex C.11.1 of TS 34.121)

Ŷ		odula	tion		CI H H	M OFF SUPA SDPA	j	τ.	Connect Control
<u> </u>	JCDMA FDD Connection Control 🛔	F	°S:	Att	acheo	d (	CS:	Re	gistered
Г	-Setup			—HS	UPA/HS	UPA Gai	n Facto	ors	
	E-DCH Physical Layer Category E-TFCI Table Index H-ARQ Redundancy Versions Minimum Set E-TFCI Happy Bit Delay Condition Puncturing Limit PLnon-max Maximum Channelisation Code Initial Serving Grant RAB H-ARQ Profile	5 0 Alw 9 100 0.84 2xS	ays R I <sub>ms</sub> 1 6F4	VO					
	I ▼HSUPA Gain Factors	7							Compress
	Number of Reference E-TFCIs Reference E-TFCI 14	1 1		67		71		75	
	Reference E-TFCI 58 Reference E-TFCI Power Offset	81 4	18	90 23	26	100 27	28	127 29	29
Con	nection Handover UE Signal BS Sig	jnal	Netwo	orK	AF/F	ર⊧ ⊕•	Syı	1C.	1 2

Figure 45: HSUPA Gain Factors setting for TC 10.4.1

Now you can press 'Connect UE (CS)' to start the measurement.

Go to measurement page, press 'Menus', then 'Receiver Quality' at

bottom, followed by Applic 1 at the right side until you see 'HSUPA E-AGCH' at the bottom, press it to activate the measurement. Press 'HSUPA E-AGCH' at the right side, you will see 'Measure Type' button at the bottom, press it and select 'Missed Detection' and you will see the following:

WCDMA FDD Band Receiver Quality	Connect Control
Max.Level: Auto         Low noise         Freq.Offset: + 0.000         KHz         Chan./Freq: 9612 / 1922.4         MHz           +1000         \$\$: / Off         \$\$: / Off	RHSUPA E-AGCH
+900 +800 +700 +600 +500	Applic. 2 Applic. 1
+400 +300 +200 +100 +0	Analyzer Level
E-TFCI         28         67         81             MissDet.           Detected Events Of         E-TFCI 28         E-TFCI 67         E-TFCI 81         E-TFCI         E-TFCI </td <td>UE Signal Ana.Set.</td>	UE Signal Ana.Set.
566         567         567 <td>HSDPA HSUPA</td>	HSDPA HSUPA
Expected E-TFCI 28         67         81              1700         Detected E-TFCI Events         Expected E-TFCI Selection         Auto	BS Signal Settings
0     Missed Detections     0     Nr. of (C) Happy (O) is       0.000 %     Missed Detection Probability     Missed Detection	Marker
Missed Detection           Repetition         Measure Frames         Measure Type	Menus

Figure 46: Test result for TC 10.4.1

The test requirement is shown as following table:

Test	Propagation Conditions	Reference value		
Number		E-AGCH $E_c/I_{or}$ (dB)	$\hat{I}_{or}/I_{oc}$ (dB)	Miss detection probability
1	VA30	-23.1	0.6	0.01

### **5** Literature

- 1. Reiner Stuhlfauth, "High Speed Uplink Packet Access, HSUPA RF measurements with CMU200 radio communication tester"
- 2. 3GPP TS 34.121-1 version 8.0.0 Release 8
- 3. 3GPP TS 34.108 version 8.0.0 Release 8
- 4. 1MA130, "Measurements on 3GPP UE's according to TS34.121 with additional Instruments and CMUgo"

For comments and suggestions regarding this operation guide, please contact

customersupport.asia@rohde-schwarz.com.

## **6** Ordering information

Type of instrument		
R&S®CMU200	Universal radio communication tester for MS/UE test	1100.0008.02
R&S®CMU-B11	HW-option for CMU200: Reference oscillator OXCO, aging 2x10E-7/year	1100.5000.02
R&S®CMU-B12	HW-option for CMU200: Reference oscillator OXCO, aging 2x10E-8/year	1100.5100.02
R&S®CMU-B17	HW-option for CMU200: IQ/IF interface, analog, one channel	1100.6906.02
R&S®CMU-B21	HW-option for CMU200: Universal signaling unit, CMU- B21 V14 incl CMU-B54	1100.5200.54
R&S®CMU-B56	HW-option for CMU200: 3GPP signaling module for HSPA application test (for CMU-B21 V14 or V54)	1150.1850.54
R&S®CMU-B68	HW-option for CMU200 layer 1 – board (3GPP/FDD, DL+UL)	1149.9809.02
R&S®CMU-PK60	SW option for CMU200: WCDMA-Sig: 3GPP/FDD/UE, Tx-Test, Generator, Band 1-11	1159.3355.08
R&S®CMU-PK100	SW option for CMU200: GSM/GPRS/EGPRS+ WCDMA + C2K + 1xEV-DO + AMPS+ IS136	1159.3455.10



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R&S® CMU-K60	SW option for CMU200: HSDPA 14Mbps ext. 3GPP/FDD/UE, Rel.5 (CMU- K64 necessary)	1200.8200.02
R&S® CMU-K64	SW option for CMU200: HSDPA 3.6Mb/s 3GPP/FDD/UE, REL.5 (CMU-B68, B21V14, B56 necassary)	1157.3970.02
R&S® CMU-K56	SW option for CMU200: HSUPA 5.7Mbps 3GPP/FDD/UE, Rel.6 (CMU-B68,B21V14 or V54,B56 necessary)	1200.7803.02



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