

Conducted Output Power

The EUT was tested according to the requirements of the FCC 3G procedures and the TS 34.121. The HSPA function supported by EUT is Release 6 version supporting HSDPA Category 8, and HSUPA Category 5, as well as the EUT does not support VOIP function over the HSPA function. A detailed analysis of the output power for WCDMA, HSPDA, and HSPA(HSUPA&HSDPA) modes is provided in the following table. According to the FCC 3G procedures, handsets with both HSDPA and HSUPA should be tested according to Release 6 HSPA test procedures. The HSPA output levels are less than ¼ dB higher than the basic 12.2 kbps RMC configurations in WCDMA, as met by FCC 3G SAR procedures, therefore the PBA is fulfilled.

Mode	Symbol Rates (Kbps)	SF	K	Data	Reference Channel Type (Data Rates)	WCDMA band V -850			WCDMA band II -1900		
						Ch 4132	Ch 4182	Ch 4233	Ch 9262	Ch 9400	Ch 9538
						826.4	836.4	846.6	1852.4	1880.0	1907.6
DPDCH1	60	64	2	40	RMC 12.2 Kbps	23.38	23.36	23.21	23.28	23.22	23.08
	240	16	4	160	RMC 64 Kbps	23.36	23.39	23.26	23.48	23.38	23.37
	480	8	5	320	RMC 144 Kbps	23.49	23.38	23.24	23.48	23.37	23.35
	960	4	6	640	RMC 384 Kbps	23.48	23.45	23.35	23.5	23.43	23.36
	60	64	2	40	AMR 12.2kbps	23.5	23.38	23.41	23.24	23.41	23.22

Data: Bits/Slot; SF: Spreading Factor; K: Number of bits per uplink DPDCH slot.

Table 1 Conducted output power for WCDMA

Mode	Sub-test	Band	WCDMA band V -850			WCDMA band II -1900		
		Channel	4132	4182	4233	9262	9400	9538
R6-HSDPA	1	βc(2/15)	23.15	23.31	23.16	23.37	23.38	23.25
	2	βc (12/15)	23.21	23.22	23.09	23.14	23.24	23.04
	3	βc (15/15)	22.15	21.8	22.75	22.35	22.04	22.04
	4	βc (2/15)	21.67	21.14	21.56	21.49	21.35	21.48

Table 2 Conducted output power for HSDPA

Mode	Sub-test	Band	WCDMA band V -850			WCDMA band II -1900		
		Channel	4233	9262	4233	9262	4233	9262
R6- HSPA (HSUPA& HSDPA)	1	βc (11/15)	22.61	22.64	22.92	22.53	22.68	22.43
	2	βc (6/15)	23.23	23.2	23.23	23.26	23.32	23.03
	3	βc (15/9)	22.90	22.86	22.76	22.82	23.01	22.81
	4	βc (2/15)	23.47	23.43	23.27	23.28	23.43	23.08
	5	βc(15/15)	22.77	22.68	22.64	22.73	22.89	22.84

Table 3 Conducted output power for HSUPA

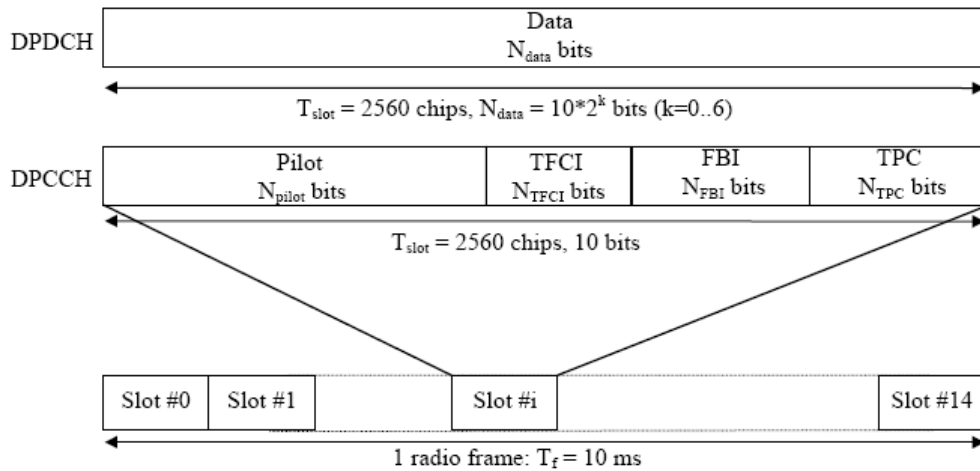


Test Records for Body SAR Test

The channel 4182 in Cell band and the channel 9400 in PCS band of HSPA subtest 4 were additionally performed for verification, and those SAR values of HSUPA met the FCC limit, please refer it at the page 35 of 36 of SAR test report.

PDA	Battery	Battery Cover	Ear-phone	EUT Slide	Position	Band	Ch.	Mode	Measured 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Power Drift
A	1	1	1	Off	Face with 1.5cm	WCDMA850	4182	12.2K	0.09	0.067	0.075
A	1	1	1	Off	Bottom with 1.5cm	WCDMA850	4182	12.2K	0.37	0.266	0.058
A	1	1	1	Off	Bottom with 1.5cm	WCDMA850	4182	HSUPA	0.305	0.219	0.00191
A	1	1	1	Off	Bottom with 1.5cm	WCDMA850	4132	12.2K	0.342	0.246	-0.131
A	1	1	1	Off	Bottom with 1.5cm	WCDMA850	4233	12.2K	0.354	0.253	0.054
A	1	1	1	Off	Face with 1.5cm	WCDMA1900	9400	12.2K	0.324	0.205	0.109
A	1	1	1	Off	Bottom with 1.5cm	WCDMA1900	9400	12.2K	0.918	0.522	-0.0019
A	1	1	1	Off	Bottom with 1.5cm	WCDMA1900	9400	HSUPA	0.735	0.418	0.054
A	1	1	1	Off	Bottom with 1.5cm	WCDMA1900	9262	12.2K	0.747	0.424	0.029
A	1	1	1	Off	Bottom with 1.5cm	WCDMA1900	9538	12.2K	0.807	0.459	0.053

Followed by FCC suggestions [1]:



Frame structure for uplink DPDCH/DPCCH

The parameter K in the figure determines the number of bits per uplink DPDCH slot. It is related to the spreading factor SF of the DPDCH as $SF = 256/2^k$. The DPDCH spreading factor may range from 256 down to 4. The spreading factor of the uplink DPCCH is always equal to 256, i.e. there are 10 bits per uplink DPCCH slot.

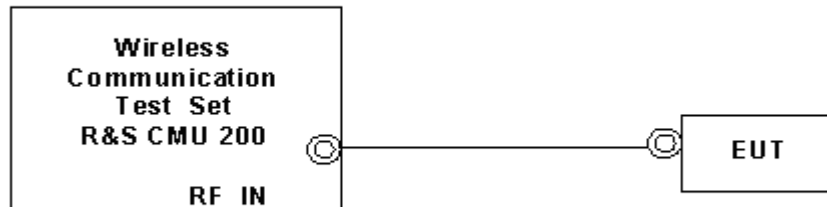
	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	Spreading Factor	Spreading Code Number	Bits/Slot
DPCCH	15	15	256	0	10
DPDCH ₁	15	15	256	64	10
	30	30	128	32	20
	60	60	64	16	40
	120	120	32	8	80
	240	240	16	4	160
	480	480	8	2	320
	960	960	4	1	640
DPDCH _n	960	960	4	1, 2, 3	640

Table 2 DPCCH and DPDCH

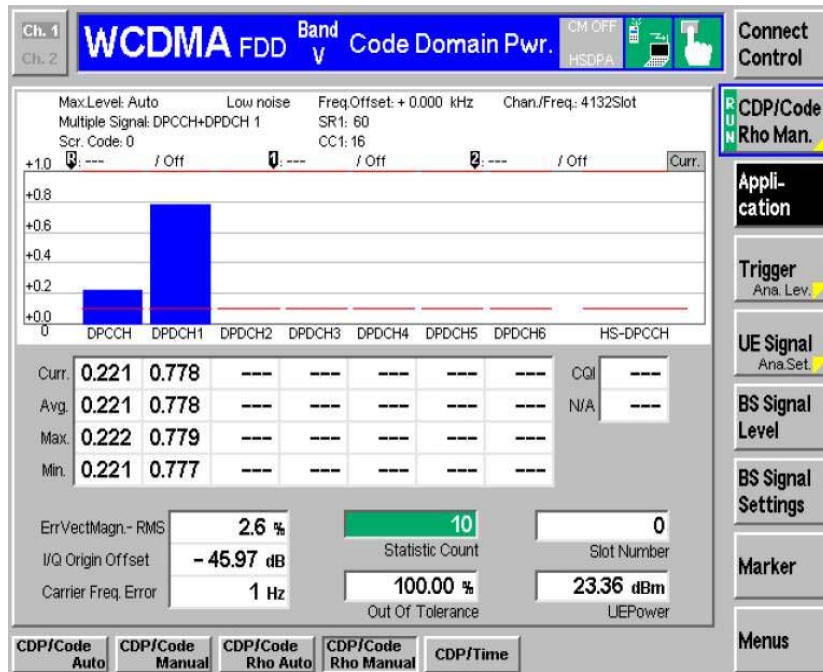
There is only one DPCCH per radio link. Data rates, channelization codes and spread factor information for DPCCH and DPDCH_n are indicated in the following Table. Spreading Rate (SF) * Symbol Rate = 3.84 Mcps.

WCDMA Setup Configuration:

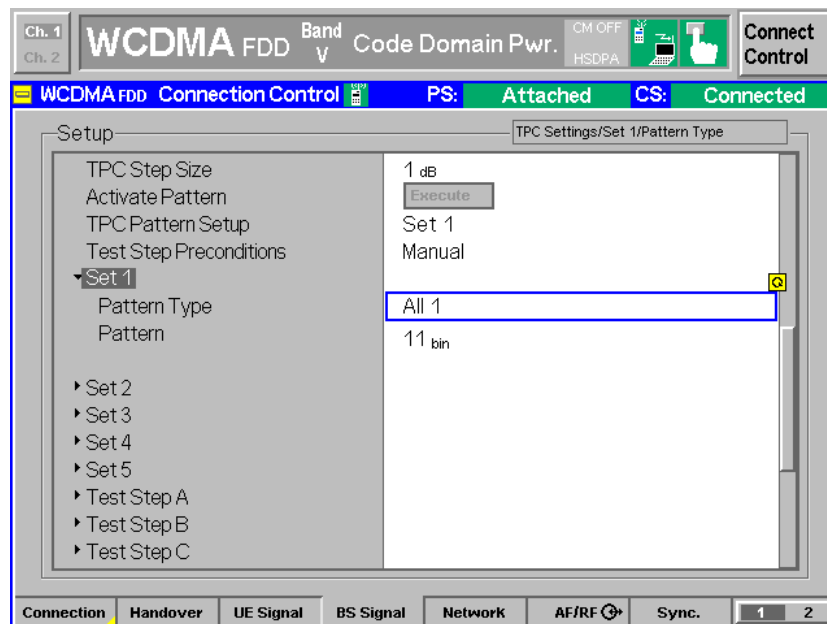
- a. The EUT was connected to Base Station referred to the drawing of Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting
 - i. Data rates: Varied from RMC 12.2Kbps to 384Kbps for each measurement.
 - ii. RMC Test Loop=Loop Mode 1 RLC TM
 - iii. TPC with All Up.
- d. The transmitted maximum output power was recorded.



Setup Configuration



Example : Single DPCCH with only one DPDCH at RMC 12.2Kbps (Symbol Rate 60 Kbps)



Example : TPC with All "1" (Continuous transmitting)

HSDPA Setup Configuration

- a. The EUT was connected to Base Station referred to the drawing of Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting:
 - i. Set RMC12.2Kbps with HSDPA mode.
 - ii. RMC Test Loop=Loop Mode 1 RLC TM
 - iii. TPC with All Up
 - iv. Channel Configuration Type=FRC with H-set 1 (QPSK)
 - v. CQI Feedback Cycle=4ms, CQI Repetition Factor=2
 - vi. RV Coding Sequence {0.2.5.6}
 - vii. Gain Factors(β_c , and β_d) and parameters were set according to each specific sub-test in the following table, C10.1.4, quoted from the TS 34.121.
- d. The transmitted maximum output power was recorded.

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

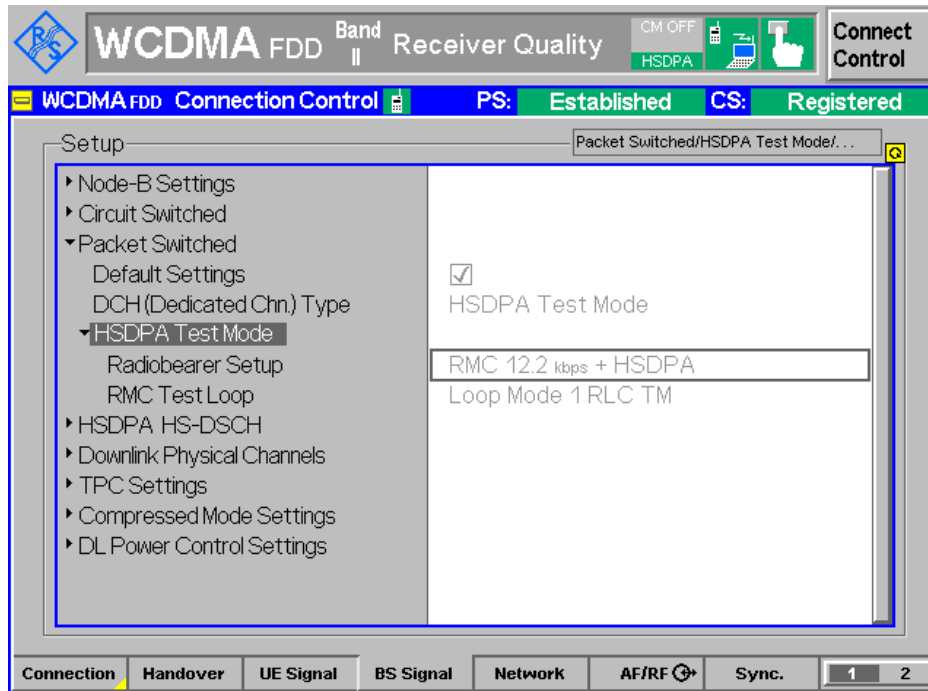
Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (Note 1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and $\Delta_{NACK} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$, and $\Delta_{CQI} = 24/15$ with $\beta_{hs} = 24/15 * \beta_c$.

Note 3: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$.



Example : RMC 12.2Kbps with HSDPA function

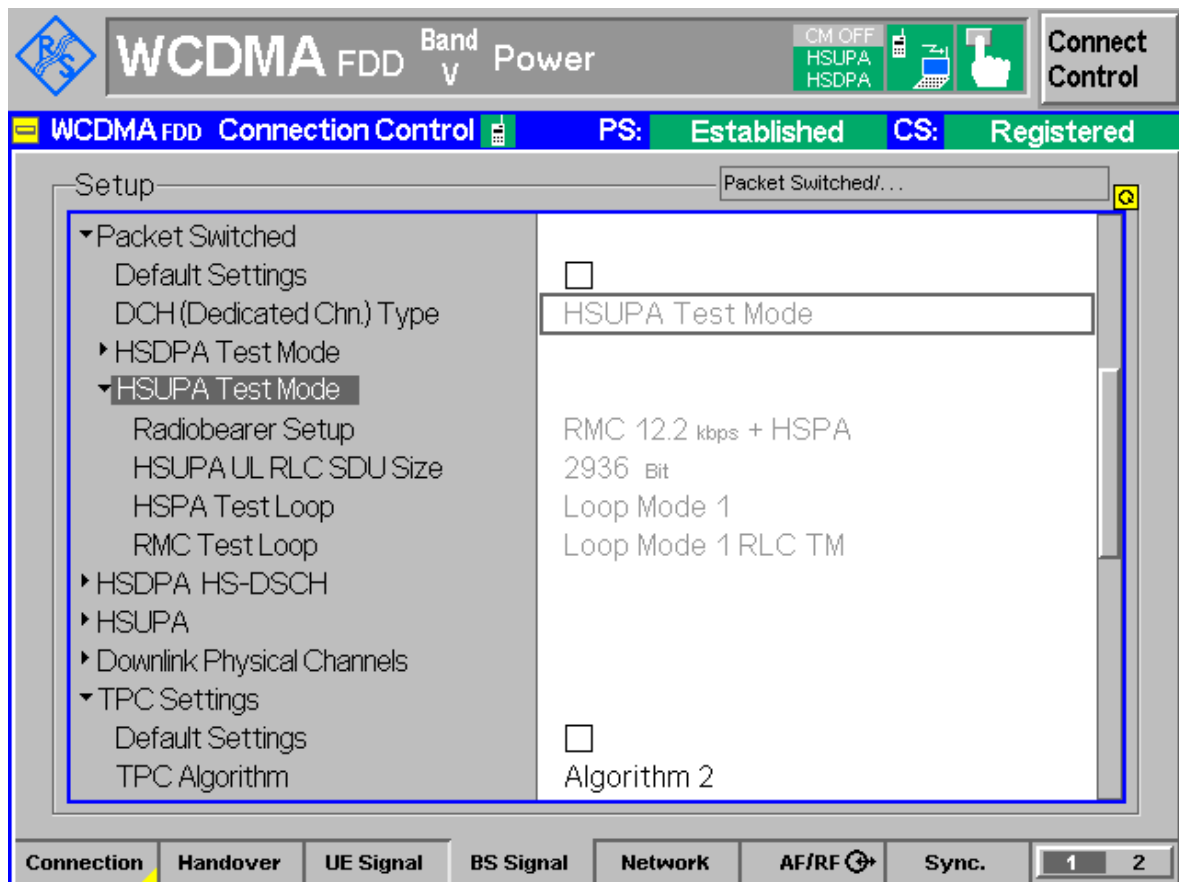
HSUPA Setup Configuration

- a. The EUT was connected to Base Station referred to the drawing of Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting:
 - i. Set HSUPA mode.
 - ii. RMC Test Loop=Loop Mode 1 RLC TM
 - iii. Power control algorithm 2
 - iv. HS-DSCH Channel Configuration Type=FRC with H-set 1 (QPSK)
 - v. Gain Factors (β_c , and β_d) and parameters were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121.
- d. The transmitted maximum output power was recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_o/β_d	β_{HS} (Note 1)	β_{ec}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/25	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1} : 47/15 β_{ed2} : 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 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

- Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$.
- Note 2: CM = 1 for $\beta_o/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. 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 β_o/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$.
- Note 4: For subtest 5 the β_o/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$.
- Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.
- Note 6: β_{ed} can not be set directly, it is set by Absolute Grant Value.



The screenshot shows the 'WCDMA FDD Connection Control' interface. At the top, it displays 'WCDMA FDD Band v Power' and 'Connect Control' with status indicators for 'CM OFF', 'HSUPA', and 'HSDPA'. The main status bar shows 'PS: Established' and 'CS: Registered'. The 'Setup' window is open, showing a tree view on the left with 'HSUPA Test Mode' selected. The right pane displays the following settings:

- HSUPA Test Mode
- RMC 12.2 kbps + HSPA
- 2936 Bit
- Loop Mode 1
- Loop Mode 1 RLC TM
- Algorithm 2

At the bottom, there are tabs for 'Connection', 'Handover', 'UE Signal', 'BS Signal', 'Network', 'AF/RF', and 'Sync.', along with a '1 2' indicator.

Example : HSUPA function



Reference:

- [1.] 941225 D01 SAR test for 3G devices v02, SAR Measurement Procedures for 3G Devices CDMA 2000/Ev-Do/WCDMA/HSDPA/HSPA Oct. 2007 Laboratory Division Office of Engineering and Technology Federal Communications Commission
- [2.] TS 34.121 Universal Mobile Telecommunications System (UMTS); Terminal Conformance Specification, Radio Transmission and Reception (FDD)
- [3.] Operation Guide for HSUPA Test Set-up According to 3GPP TS 34.121 written by Rohde & Schwarz RCS-07 12-0053