

Appendix F. FCC 3G SAR Measurement Procedures

Conducted Output Power:

The EUT was tested according to the requirements of the FCC 3G procedures and the TS 34.121. The EUT supports WCDMA and HSPA function. A detailed analysis of the output power for all WCDMA, HSPDA, and HSPA (HSUPA & HSDPA) modes is provided in the tables below. According to the FCC 3G procedures, handsets with both HSDPA and HSUPA should be tested according to Release 6 HSPA test procedures, and the EUT does not support VOIP function over the HSPA function. Device was tested according to procedure KDB941225 - section Release 6 HSPA Data Devices as documented/evaluated in the following table.

<without Power Reduction>

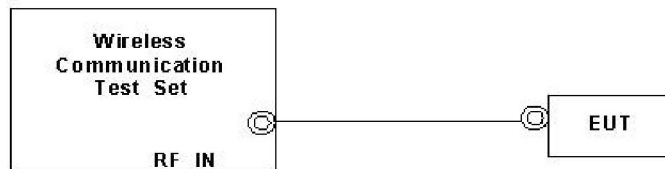
WCDMA SAR Test mode - Conducted Power							
Mode	Setup	Cell band (850)			PCS band (1900)		
		CH4132	CH4182	CH4233	CH9262	CH9400	CH9538
		826.4 (MHz)	836.4 (MHz)	846.6 (MHz)	1852.4 (MHz)	1880.0 (MHz)	1907.6 (MHz)
WCDMA	RMC 12.2Kbps	23.19	23.25	23.19	23.05	23.03	22.91
HSDPA	Subtest 1	23.34	23.39	23.33	22.33	22.26	22.15
	Subtest 2	23.32	23.36	23.32	22.29	22.25	22.11
	Subtest 3	22.78	22.86	22.77	21.76	21.74	21.50
	Subtest 4	22.76	22.86	22.78	21.82	21.77	21.63
HSUPA	Subtest 1	22.20	22.29	22.27	22.22	22.18	22.04
	Subtest 2	20.18	20.24	20.22	20.21	20.29	20.15
	Subtest 3	20.26	21.26	20.41	21.21	21.19	21.01
	Subtest 4	20.17	20.22	20.23	20.18	20.10	20.05
	Subtest 5	22.07	21.82	22.29	22.20	22.14	22.02

<with Power Reduction>

WCDMA SAR Test mode - Conducted Power							
Mode	Setup	Cell band (850)			PCS band (1900)		
		CH4132	CH4182	CH4233	CH9262	CH9400	CH9538
		826.4 (MHz)	836.4 (MHz)	846.6 (MHz)	1852.4 (MHz)	1880.0 (MHz)	1907.6 (MHz)
WCDMA	RMC 12.2Kbps	19.23	19.27	19.26	19.09	19.06	18.91
HSDPA	Subtest 1	19.36	19.46	19.35	18.39	18.59	18.15
	Subtest 2	19.41	19.38	19.63	18.29	18.25	18.11
	Subtest 3	18.80	18.90	18.79	17.76	17.76	17.56
	Subtest 4	18.77	18.88	18.83	17.86	17.77	17.63
HSUPA	Subtest 1	19.01	19.18	19.25	18.27	18.21	18.02
	Subtest 2	17.12	17.08	17.18	16.27	16.18	16.20
	Subtest 3	18.11	18.19	18.20	16.76	17.20	17.11
	Subtest 4	17.15	17.13	17.18	16.18	16.21	16.17
	Subtest 5	19.12	19.20	19.14	18.21	18.18	18.01

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
 - ii. RMC Test Loop = Loop Mode 1
 - iii. Power Ctrl Mode = All Up bits
- d. The transmitted maximum output power was recorded.

**Setup Configuration**

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 Gain Factors (β_c and β_d) and parameters were set according to each
 - ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
 - iii. Set RMC12.2Kbps + HSDPA mode.
 - iv. Set Cell Power = -86 dBm
 - v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
 - vi. Select HSDPA Uplink Parameters
 - vii. Set DeltaACK, DeltaNACK and DeltaCQI = 8
 - viii. Set Ack-Nack Repetition Factor to 3
 - ix. Set CQI Feedback Cycle (k) to 4 ms
 - x. Set CQI Repetition Factor to 2
 - xi. Power Ctrl Mode = All Up bits
- 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 DPDCCH, 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 $\beta_d = 15/15$.

Setup Configuration

HSPA (HSUPA & HSPDA) 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. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
 - ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
 - iii. Set Cell Power = -86 dBm
 - iv. Set Channel Type = 12.2k + HSPA
 - v. Set UE Target Power
 - vi. Power Ctrl Mode= Alternating bits
 - vii. Set and observe the E-TFCI
 - viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
- 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_c/β_d	β_{HS} (Note 1)	β_{ec}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/25	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	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 $\beta_c/\beta_d=12/15$, $\beta_{HS}/\beta_c=24/15$. 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 β_c/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_c/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.													

Setup Configuration

Note: For details settings in the Agilent 8960 test equipment, please refer to the user guide “ HSUPA Measurement Guide with 8960 V7.5.0 Release 7 (2007-06) Ver.: v.02.18”

Call Setup Screen									
Call Control		Active Cell Operating Mode						Call Params	
Channel (UARFCN) Info		UE Information INSI: INEI: Power Class:						Cell Power	
Cell Parameters		UE Expected Open Loop Transmit Power Initial PRACH TX Power: -11.70 dBm Initial DPCCH TX Power: -0.56 dBm						-86.00 dBm/3.84 MHz	
Generator Info								Channel Type	
								12.2k + HSPA	
								Paging Service	
								RB Test Mode	
		Uplink Parameters				Value			
Uplink Parameters		PRACH Preambles				64		HSPA Parameters	
		PRACH Ramping Cycles(NMAX)				2			
		Available Subchannels (Bit Mask)				000000000001			
UE Rep Meas		Uplink DPCCH Scrambling Code				0		34.121 Preset Call Configs	
		Uplink DPCCH Bc/Bd Control				Manual			
		Manual Uplink DPCCH Bc				11			
Close Menu		Manual Uplink DPCCH Bd				15		Channel (UARFCN) Params	
		Maximum Uplink Transmit Power Level				21 dBm			
		Active Cell				Sys Type: UTRA FDD			
		Idle							
2 of 4		IntRef Offset						1 of 3	

Example for HSPA Subtest 1, and other subtests following table, C11.1.3
(Gain Factors ($\beta_c = 11$ and $\beta_d = 15$))

Call Setup Screen									
Call Control		Active Cell Operating Mode						Serving Grant	
Additional Screens		UE Information INSI: INEI: Power Class:						AG Mode	
Cell Parameters		UE Expected Open Loop Transmit Power Initial PRACH TX Power: -11.70 dBm Initial DPCCH TX Power: -0.56 dBm						Single Shot	
Generator Info								Single Shot AG	
								20: (119/15)*2	
								Send Single Shot Absolute Grant	
Uplink Parameters		Call Processing Status Current Service Type: None NIN Status: Abs Single Shot AG GINI State: Index 15: (67/15)*2 Current DPCCH: Index 16: (75/15)*2 HSUPA In: Index 17: (84/15)*2 UE Rep E-DCH: Index 18: (95/15)*2 Last Received: Index 19: (106/15)*2 Throughput: Index 20: (119/15)*2 ACKs Transmitted:						Send Relative Grant Up	
UE Rep Meas		Information DPCCH Cat: ---- Ratio: ---- % : ---- kbps Transmitted: ----						Send Relative Grant Down	
Trig Output Setup									
Sys Frame Clock								Return	
		Active Cell				Sys Type: UTRA FDD			
		Idle							
2 of 4		IntRef Offset						1 of 2	

Example: AG – Index = 20 for HSPA subtest 1

Call Setup Screen																																																																																																													
Screen Ctrl	Recorded E-TFCI Information							E-TFCI Record																																																																																																					
Channel (UARFCN) Info	E-TFCI Recording State Idle							E-TFCI Rec Count																																																																																																					
								15																																																																																																					
HSPA Information	Recorded E-TFCI Values <table border="1"> <tr><td>1:</td><td>75</td><td>11:</td><td>75</td><td>21:</td><td>----</td><td>31:</td><td>----</td><td>41:</td><td>----</td></tr> <tr><td>2:</td><td>75</td><td>12:</td><td>75</td><td>22:</td><td>----</td><td>32:</td><td>----</td><td>42:</td><td>----</td></tr> <tr><td>3:</td><td>75</td><td>13:</td><td>75</td><td>23:</td><td>----</td><td>33:</td><td>----</td><td>43:</td><td>----</td></tr> <tr><td>4:</td><td>75</td><td>14:</td><td>75</td><td>24:</td><td>----</td><td>34:</td><td>----</td><td>44:</td><td>----</td></tr> <tr><td>5:</td><td>75</td><td>15:</td><td>75</td><td>25:</td><td>----</td><td>35:</td><td>----</td><td>45:</td><td>----</td></tr> <tr><td>6:</td><td>75</td><td>16:</td><td>----</td><td>26:</td><td>----</td><td>36:</td><td>----</td><td>46:</td><td>----</td></tr> <tr><td>7:</td><td>75</td><td>17:</td><td>----</td><td>27:</td><td>----</td><td>37:</td><td>----</td><td>47:</td><td>----</td></tr> <tr><td>8:</td><td>75</td><td>18:</td><td>----</td><td>28:</td><td>----</td><td>38:</td><td>----</td><td>48:</td><td>----</td></tr> <tr><td>9:</td><td>75</td><td>19:</td><td>----</td><td>29:</td><td>----</td><td>39:</td><td>----</td><td>49:</td><td>----</td></tr> <tr><td>10:</td><td>75</td><td>20:</td><td>----</td><td>30:</td><td>----</td><td>40:</td><td>----</td><td>50:</td><td>----</td></tr> </table>							1:	75	11:	75	21:	----	31:	----	41:	----	2:	75	12:	75	22:	----	32:	----	42:	----	3:	75	13:	75	23:	----	33:	----	43:	----	4:	75	14:	75	24:	----	34:	----	44:	----	5:	75	15:	75	25:	----	35:	----	45:	----	6:	75	16:	----	26:	----	36:	----	46:	----	7:	75	17:	----	27:	----	37:	----	47:	----	8:	75	18:	----	28:	----	38:	----	48:	----	9:	75	19:	----	29:	----	39:	----	49:	----	10:	75	20:	----	30:	----	40:	----	50:	----	Start Recording E-TFCI Values	
1:								75	11:	75	21:	----	31:	----	41:	----																																																																																													
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Background Active Cell Connected Sys Type: UTRA FDD																																																																																																													
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Example: Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1

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.] HSUPA Measurement Guide with 8960 V7.5.0 Release 7 (2007-06) Ver.: v.02.18