

## Appendix F. FCC 3G SAR Measurement Procedures for WCDMA

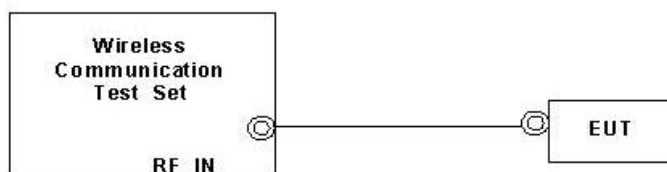
### Conducted Output Power:

The EUT was tested according to the requirements of the FCC 3G procedures and the TS 34.121. The EUT's WCDMA and HSPA function is Release 6 version supporting HSDPA Category 8, and HSUPA Category 5. 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 function. Device was tested according to procedure KDB941225 - section Release 6 HSPA Data Devices as documented/evaluated in the following table.

WCDMA SAR Test mode - Conducted Power										
Mode	Setup	Cell band (850)			AWS band (1700)			PCS band (1900)		
		CH4132	CH4182	CH4233	CH1312	CH1413	CH1513	CH9262	CH9400	CH9538
		826.4 (MHz)	836.4 (MHz)	846.6 (MHz)	1712.4 (MHz)	1732.6 (MHz)	1752.6 (MHz)	1852.4 (MHz)	1880.0 (MHz)	1907.6 (MHz)
WCDMA	RMC 12.2Kbps	23.30	23.35	23.34	23.71	23.68	23.59	23.68	23.58	23.48
HSDPA	Subtest 1	23.10	23.02	23.11	22.06	22.40	22.81	23.56	23.39	23.42
	Subtest 2	23.06	23.14	23.20	23.25	23.44	23.35	23.55	23.44	23.28
	Subtest 3	22.59	22.68	22.74	22.79	22.89	22.87	23.00	22.96	22.78
	Subtest 4	22.66	22.58	22.65	22.95	23.10	22.81	23.01	22.93	22.85
HSUPA	Subtest 1	22.80	23.04	22.67	23.36	23.10	23.26	23.05	22.97	23.15
	Subtest 2	21.41	21.73	21.66	21.66	21.40	21.96	21.77	21.73	21.69
	Subtest 3	21.65	22.02	21.75	22.19	21.95	22.20	22.28	21.99	22.12
	Subtest 4	21.92	22.08	22.20	22.37	22.15	22.57	22.14	22.08	22.32
	Subtest 5	22.79	23.08	22.98	22.92	22.92	22.82	22.90	22.91	23.13

**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 ( $\beta_c$  and  $\beta_d$ ) 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:  $\beta$  values for transmitter characteristics tests with HS-DPCCH**

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{hs}$ (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:  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  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,  $\Delta_{ACK}$  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  $\beta_c/\beta_d$  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 ( $\beta_c$  and  $\beta_d$ ) 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:  $\beta$  values for transmitter characteristics tests with HS-DPCCH and E-DCH**

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{HS}$ (Note 1)	$\beta_{ec}$	$\beta_{ed}$ (Note 5) (Note 6)	$\beta_{ed}$ (SF)	$\beta_{ed}$ (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	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	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	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:  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  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  $\beta_c/\beta_d$  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  $\beta_c/\beta_d$  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:  $\beta_{ed}$  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 Parms	
Channel (UARFCN) Info		<div>UE Information</div> <div>           INSI:            INEI:            Power Class:         </div>						<div>Cell Power</div> <div>-86.00</div> <div>dBm/3.84 MHz</div>	
Cell Parameters		<div>UE Expected Open Loop Transmit Power</div> <div>           Initial PRACH TX Power: -11.70 dBm            Initial DPCCH TX Power: -0.56 dBm         </div>						<div>Channel Type</div> <div>12.2k + HSPA</div>	
Generator Info		<div>Uplink Parameters</div> <div>           PRACH Preambles: 64            PRACH Ramping Cycles(MAX): 2            Available Subchannels (Bit Mask): 000000000001            Uplink DPCCH Scrambling Code: 0            Uplink DPCCH Bc/Bd Control: Manual            Manual Uplink DPCCH Bc: 11            Manual Uplink DPCCH Bd: 15            Maximum Uplink Transmit Power Level: 21 dBm         </div>						<div>Paging Service</div> <div>RB Test Mode</div>	
Uplink Parameters		Value						HSPA Parameters	
UE Rep Meas		<div>Manual Uplink DPCCH Bc</div> <div>11</div>						34.121 Preset Call Configs	
Close Menu		<div>Manual Uplink DPCCH Bd</div> <div>15</div>						Channel (UARFCN) Parms	
		<div>Maximum Uplink Transmit Power Level</div> <div>21 dBm</div>							
		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		<div>UE Information</div> <div>           INSI:            INEI:            Power Class:         </div>						<div>AG Mode</div> <div>Single Shot</div>	
Cell Parameters		<div>UE Expected Open Loop Transmit Power</div> <div>           Initial PRACH TX Power: -11.70 dBm            Initial DPCCH TX Power: -0.56 dBm         </div>						<div>Single Shot AG</div> <div>20: (119/15)^2</div>	
Generator Info		<div>Call Processing Status</div> <div>           Current Service Type: None            MM Status: Abs Single Shot AG            MM 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:         </div>						<div>Send Single Shot Absolute Grant</div>	
Uplink Parameters		<div>Information</div> <div>           DPCCH Cat: ----            Ratio: ---- %            : ---- kbps            Transmitted: ----         </div>						<div>Send Relative Grant Up</div>	
UE Rep Meas								<div>Send Relative Grant Down</div>	
Trig Output Setup								Return	
Sys Frame Clock									
		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	<div style="border: 1px solid black; padding: 5px;"> <div style="border: 1px solid black; padding: 2px; text-align: center;">E-TFCI Recording State</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">Idle</div> <div style="border: 1px solid black; padding: 2px; margin-top: 10px;"> <div style="text-align: center;">Recorded E-TFCI Values</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <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> </div> <div style="text-align: center; font-size: 24px; margin-top: 10px;">15/15</div> </div>							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:	----	E-TFCI Rec Count
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Return		Return																																																																																																										
<div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> Background         </div> <div>           Active Cell Connected         </div> <div>           Sys Type: UTRA FDD         </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div>IntRef</div> <div>Offset</div> </div>																																																																																																												

**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