



Appendix F. FCC 3G SAR Measurement Procedures

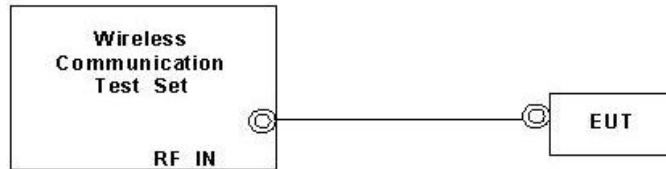
Conducted Output Power:

The PBA is fulfilled. 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 7 version supporting HSDPA Category 14, and HSUPA Category 6. A detailed analysis of the output power for all WCDMA and HSPA (HSDPA & HSUPA) 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. Power values for HSPA are less than ¼ dB higher than the basic 12.2 kbps RMC configurations in WCDMA.

WCDMA SAR Test mode - Conducted Power				
Mode	Setup	Band IV (1700)		
		CH1312	CH1413	CH1513
		1712.4 MHz	1732.6 MHz	1752.6 MHz
WCDMA	RMC 12.2Kbps	22.63	22.65	22.67
HSDPA	HSDPA - subtest 1	22.72	22.68	22.74
	HSDPA - subtest 2	22.15	22.19	22.27
	HSDPA - subtest 3	22.16	22.20	22.26
	HSDPA - subtest 4	22.17	22.20	22.25
HSUPA	HSUPA - subtest 1	21.93	21.91	21.94
	HSUPA - subtest 2	20.46	20.49	20.41
	HSUPA - subtest 3	21.35	21.38	21.41
	HSUPA - subtest 4	20.47	20.48	20.46
	HSUPA - subtest 5	21.69	21.67	21.61

RMC 12.2Kbps 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

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. 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	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	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 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 Parms																		
Channel (UARFCH) Info	UE Information				Cell Power																		
	INSI: INEI: Power Class:				-86.00																		
Cell Parameters	UE Expected Open Loop Transmit Power				dBm/3.84 MHz																		
	Initial PRACH TX Power: -11.70 dBm Initial DPCCH TX Power: -0.56 dBm				Channel Type																		
Generator Info	Uplink Parameters				12.2k + HSPA																		
	<table border="1"> <thead> <tr> <th>Uplink Parameters</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>PRACH Preambles</td> <td>64</td> </tr> <tr> <td>PRACH Ramping Cycles(MAX)</td> <td>2</td> </tr> <tr> <td>Available Subchannels (Bit Mask)</td> <td>000000000001</td> </tr> <tr> <td>Uplink DPCH Scrambling Code</td> <td>0</td> </tr> <tr> <td>Uplink DPCH Bc/Bd Control</td> <td>Manual</td> </tr> <tr> <td>Manual Uplink DPCH Bc</td> <td>11</td> </tr> <tr> <td>Manual Uplink DPCH Bd</td> <td>15</td> </tr> <tr> <td>Maximum Uplink Transmit Power Level</td> <td>21 dBm</td> </tr> </tbody> </table>				Uplink Parameters	Value	PRACH Preambles	64	PRACH Ramping Cycles(MAX)	2	Available Subchannels (Bit Mask)	000000000001	Uplink DPCH Scrambling Code	0	Uplink DPCH Bc/Bd Control	Manual	Manual Uplink DPCH Bc	11	Manual Uplink DPCH Bd	15	Maximum Uplink Transmit Power Level	21 dBm	Paging Service
Uplink Parameters	Value																						
PRACH Preambles	64																						
PRACH Ramping Cycles(MAX)	2																						
Available Subchannels (Bit Mask)	000000000001																						
Uplink DPCH Scrambling Code	0																						
Uplink DPCH Bc/Bd Control	Manual																						
Manual Uplink DPCH Bc	11																						
Manual Uplink DPCH Bd	15																						
Maximum Uplink Transmit Power Level	21 dBm																						
Uplink Parameters					RB Test Mode																		
					HSPA Parameters																		
UE Rep Params					34,121 Preset Call Configs																		
					Channel (UARFCH) Parms																		
Close Menu																							
			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				AG Mode																		
	INSI: INEI: Power Class:				Single Shot																		
Cell Parameters	UE Expected Open Loop Transmit Power				Single Shot AG																		
	Initial PRACH TX Power: -11.70 dBm Initial DPCCH TX Power: -0.56 dBm				20: (119/15)^2																		
Generator Info	Call Processing Status				Send Single Shot Absolute Grant																		
	<table border="1"> <thead> <tr> <th colspan="2">Current Service Type: None</th> </tr> </thead> <tbody> <tr> <td>MM Status:</td> <td>Abs Single Shot AG</td> </tr> <tr> <td>MM State:</td> <td>Index 15: (67/15)^2</td> </tr> <tr> <td>Current DPCH</td> <td>Index 16: (75/15)^2</td> </tr> <tr> <td>HSUPA In</td> <td>Index 17: (84/15)^2</td> </tr> <tr> <td>UE Rep E-DCH</td> <td>Index 18: (95/15)^2</td> </tr> <tr> <td>Last Received</td> <td>Index 19: (106/15)^2</td> </tr> <tr> <td>Throughput:</td> <td>Index 20: (119/15)^2</td> </tr> <tr> <td>ACKs Transmitted:</td> <td></td> </tr> </tbody> </table>				Current Service Type: None		MM Status:	Abs Single Shot AG	MM State:	Index 15: (67/15)^2	Current DPCH	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
Current Service Type: None																							
MM Status:	Abs Single Shot AG																						
MM State:	Index 15: (67/15)^2																						
Current DPCH	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:																							
Uplink Parameters					Send Relative Grant Down																		
					Return																		
UE Rep Params																							
Trig Output Setup																							
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	E-TFCI Recording State	E-TFCI Rec Count																																																																																																				
	Idle	15																																																																																																				
HSPA Information	Recorded E-TFCI Values	Start Recording E-TFCI Values																																																																																																				
E-TFCI Recording Information	<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:	----	
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:	----																																																																																													
Clear UE Info	15/15	Send Step Up TPC Bit Pattern																																																																																																				
Return		Send Step Down TPC Bit Pattern																																																																																																				
	<table border="1"> <tr> <td><input type="checkbox"/> Background</td> <td>Active Cell</td> <td>Sys Type: UTRA FDD</td> </tr> <tr> <td></td> <td>Connected</td> <td></td> </tr> <tr> <td></td> <td>IntRef</td> <td>Offset</td> </tr> </table>	<input type="checkbox"/> Background	Active Cell	Sys Type: UTRA FDD		Connected			IntRef	Offset	Return																																																																																											
<input type="checkbox"/> Background	Active Cell	Sys Type: UTRA FDD																																																																																																				
	Connected																																																																																																					
	IntRef	Offset																																																																																																				

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