



Appendix F. FCC 3G SAR Measurement Procedures

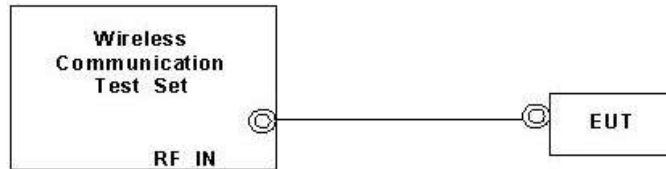
Conducted Output Power:

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	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: $\Delta_{ACK}, \Delta_{NACK}$ 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 (UARFCN) 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
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					HSPA Parameters																		
UE Rep Params					34,121 Preset Call Configs																		
					Channel (UARFCN) 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
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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	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
	<input type="checkbox"/> Background Active Cell Sys Type: UTRA FDD Connected <input type="checkbox"/> IntRef <input type="checkbox"/> Offset	Return

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