



## 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 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 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.

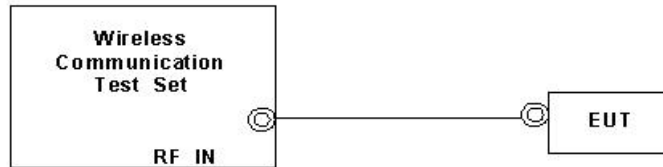
WCDMA SAR Test mode - Conducted Power				
Mode	Setup	AWS band (1700)		
		CH1312	CH1413	CH1513
		1712.4 (MHz)	1732.6 (MHz)	1752.6 (MHz)
R99 - WCDMA	RMC 12.2Kbps	22.68	22.77	22.91
R5 - HSDPA	HSDPA - subtest 1	22.61	22.68	22.85
	HSDPA - subtest 2	22.60	22.64	22.70
	HSDPA - subtest 3	22.23	22.21	22.30
	HSDPA - subtest 4	22.22	22.24	22.32
R6 - HSPA (HSUPA&HSDPA)	HSUPA - subtest 1	22.59	22.65	22.84
	HSUPA - subtest 2	21.05	21.11	21.33
	HSUPA - subtest 3	21.34	21.55	21.49
	HSUPA - subtest 4	21.06	21.12	21.35
	HSUPA - subtest 5	22.56	22.67	22.86

For MPR, declare by HTC as follow:

We, HTC, don't follow the MPR recommended by 3GPP TS34.121 due to RF performance consideration. But we still utilize maximum power reduction (MPR) with 0, 1.5, 1, 1.5, 0 corresponding to sub-test 1, 2, 3, 4, 5. To reduce back-off power from 2 to 1.5 is in order to enhance the operation range and stability. At the same time, we also make sure the CM will not break the range specified by 3GPP. The difference of MPR between 3GPP recommendation and DUT is only 0.5dB less power reduction on subtest 2 and 4, other subtests keep the same as recommendation by 3GPP.

**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 subtests' 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 (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 DPCCCH TX Power: -0.56 dBm		Channel Type
Generator Info	Uplink Parameters		12.2k + HSPA
	Value		Paging Service
Uplink Parameters	PRACH Preambles	64	RB Test Mode
	PRACH Ramping Cycles(MMAX)	2	
UE Rep Params	Available Subchannels (Bit Mask)	000000000001	HSPA Parameters
	Uplink DPCH Scrambling Code	0	
Close Menu	Uplink DPCH Bc/Bd Control	Manual	34,121 Preset Call Configs
	Manual Uplink DPCH Bc	11	
2 of 4	Manual Uplink DPCH Bd	15	Channel (UARFCH) Parms
	Maximum Uplink Transmit Power Level	21 dBm	
Active Cell		Sys Type: UTRA FDD	
Idle			
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 DPCCCH TX Power: -0.56 dBm		20: $(119/15)^2$
Generator Info	Call Processing Status		Send Single Shot Absolute Grant
	Current Service Type: Mode MM Status: GMM State: Current DPCH		Send Relative Grant Up
Uplink Parameters	HSUPA In UE Rep E-DCH Last Received Throughput: ACKs Transmit		Send Relative Grant Down
	Abs Single Shot AG Index 15: $(67/15)^2$ Index 16: $(75/15)^2$ Index 17: $(84/15)^2$ Index 18: $(95/15)^2$ Index 19: $(106/15)^2$ Index 20: $(119/15)^2$		Return
Trig Output Setup Sys Frame Clock	Active Cell		Sys Type: UTRA FDD
	Idle		
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: ----	Send Step Up TPC Bit Pattern
	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 Down TPC Bit Pattern
Return						Return
	Background	Active Cell Connected		Sys Type: UTRA FDD		
			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