## 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**	Cell band (850)			PCS band (1900)			AWS band (1700)		
		CH4132	CH4182	CH4233	CH9262	CH9400	CH9538	CH1312	CH1413	CH1513
		826.4 (MHz)	836.4 (MHz)	846.6 (MHz)	1852.4 (MHz)	1880.0 (MHz)	1907.6 (MHz)	1712.4 (MHz)	1732.6 (MHz)	1752.6 (MHz)
R99 - WCDMA	**RMC 12.2Kbps**	21.72	21.68	21.88	20.15	19.77	19.80	20.37	21.12	20.63
R5 - HSDPA	**HSDPA - subtest 1**	21.58	21.65	21.71	20.13	19.72	19.78	20.30	21.02	20.59
	HSDPA - subtest 2	21.46	21.47	21.56	20.00	19.64	19.61	20.26	20.99	20.51
	HSDPA - subtest 3	21.49	21.52	21.58	19.54	19.16	19.14	19.70	20.50	19.99
	HSDPA - subtest 4	21.40	21.43	21.46	19.49	19.15	19.10	19.67	20.44	20.00
R6 - HSPA (HSUPA & HSDPA)	**HSUPA - subtest 1**	21.20	21.02	21.18	19.97	19.50	19.31	19.78	20.50	20.33
	HSUPA - subtest 2	19.44	19.49	19.63	18.24	17.75	17.77	18.07	18.06	18.68
	HSUPA - subtest 3	20.01	20.34	20.63	18.56	18.12	18.24	18.64	19.40	19.07
	HSUPA - subtest 4	20.04	20.26	20.11	18.49	18.08	18.47	18.82	19.64	19.44
	HSUPA - subtest 5	21.05	21.00	21.15	19.99	19.66	19.30	19.53	20.25	20.33

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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.
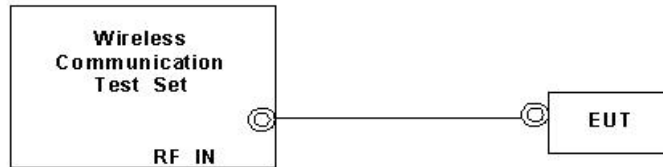
Setup Configuration

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(βc,and βd) 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} (Note1, 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 Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_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 Δ_{NACK} = 30/15 with β_{hs} = 30/15 * β_c, and Δ_{CQI} = 24/15 with β_{hs} = 24/15 * β_c.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, 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 β_c = 11/15 and β_d = 15/15.

Setup Configuration

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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 (βc,and βd) 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: 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} (Note1)	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	209/225	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	β_{ed}1: 47/15 β_{ed}2: 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: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c .

Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_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 β_c = 10/15 and β_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 β_c = 14/15 and β_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
                                                          Cell Power
  Channel                    UE Information                 -86.00
(UARFCN) Info     IMSI:                                   dBm/3.84 MHz
                  IMEI:                                   Channel Type
   Cell           Power Class:                            12.2k + HSPA
 Parameters
                  UE Expected Open Loop Transmit Power
                  Initial PRACH TX Power:     -11.70 dBm  Paging Service
  Generator       Initial DPCCH TX Power:      -0.56 dBm  RB Test Mode
    Info
                      Uplink Parameters        Value
                  PRACH Preambles                64         HSPA
  Uplink          PRACH Ramping Cycles(MMAX)      2       Parameters
 Parameters       Available Subchannels (Bit Mask) 000000000001
                  Uplink DPCH Scrambling Code      0      34.121 Preset
  UE Rep          Uplink DPCH Bc/Bd Control     Manual    Call Configs
   Meas           Manual Uplink DPCH Bc            11
                  Manual Uplink DPCH Bd            15
   Close          Maximum Uplink Transmit Power Level 21 dBm  Channel
   Menu                                                  (UARFCN) Parms
                           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 (βc = 11 and βd = 15))

```
                          Call Setup Screen
Call Control      Active Cell Operating Mode            Serving Grant
                                                        AG Mode
 Additional                UE Information               Single Shot
  Screens         IMSI:
                  IMEI:
   Cell           Power Class:                          Single Shot AG
 Parameters                                             20: (119/15)^2
                  UE Expected Open Loop Transmit Power
  Generator       Initial PRACH TX Power:     -11.70 dBm  Send Single Shot
    Info          Initial DPCCH TX Power:      -0.56 dBm  Absolute Grant
                        Call Processing Status
                  Current Service Type:      None
  Uplink          MM Status:      Abs Single Shot AG    Send Relative
 Parameters       GMM State:    Index 15: (67/15)^2       Grant Up
                  Current DPCH  Index 16: (75/15)^2
                   HSUPA In     Index 17: (84/15)^2     Send Relative
  UE Rep          UE Rep E-DCH  Index 18: (95/15)^2 SCH Cat:  ----  Grant Down
   Meas           Last Received Index 19: (106/15)^2  Ratio:  ---- %
Trig Output Setup Throughput:   Index 20: (119/15)^2      kbps   Return
Sys Frame Clock   ACKs Transmit                     nsmitted: ----
                           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│
├──────────────┤                                   ├──────────────┤
│              │                                   │E-TFCI Rec Count│
│   Channel    │                                   │      15      │
│ (UARFCN) Info│   ┌───────────────────────────┐   │              │
│              │   │   E-TFCI Recording State  │   │              │
│              │   │          Idle             │   │              │
├──────────────┤   └───────────────────────────┘   ├──────────────┤
│    HSPA      │                                   │ Start Recording│
│ Information  │   ┌───────────────────────────┐   │ E-TFCI Values│
│              │   │   Recorded E-TFCI Values  │   │              │
├──────────────┤   │ 1:  75  11:  75  21: ----  31: ----  41: ----│
│E-TFCI Recording│ │ 2:  75  12:  75  22: ----  32: ----  42: ----│
│ Information  │   │ 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: ----│ Send Step Up
│              │   │ 8:  75  18: ---- 28: ----  38: ----  48: ----│ TPC Bit Pattern
│              │   │ 9:  75  19: ---- 29: ----  39: ----  49: ----│
│    Clear     │   │10:  75  20: ---- 30: ----  40: ----  50: ----│ Send Step Down
│   UE Info    │   │                           │   │ TPC Bit Pattern│
│              │   │        15/15              │   │              │
│   Return     │   └───────────────────────────┘   │   Return     │
└──────────────┴──────────────────────────────────┴──────────────┘
     ┌─ 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