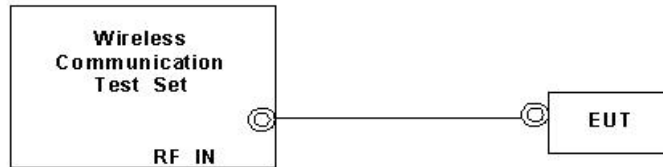## *Appendix F - FCC 3G SAR Measurement Procedures*

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)**		
		CH4132	**CH4182**	**CH4233**	**CH9262**	**CH9400**	**CH9538**
		826.4 (MHz)	**836.4 (MHz)**	**846.6 (MHz)**	**1852.4 (MHz)**	**1880.0 (MHz)**	**1907.6 (MHz)**
R99 - WCDMA	**RMC 12.2Kbps**	21.46	21.47	21.44	21.79	21.63	21.57
R5 - HSDPA	**HSDPA - subtest 1**	21.34	21.34	21.37	21.62	21.57	21.39
	HSDPA - subtest 2	21.19	21.28	21.21	21.51	21.49	21.44
	HSDPA - subtest 3	21.21	21.27	21.25	21.18	21.09	21.04
	HSDPA - subtest 4	21.25	21.24	21.26	21.12	21.05	21.02
R6 - HSPA (HSUPA & HSDPA)	**HSUPA - subtest 1**	21.20	21.17	21.24	21.23	21.33	21.13
	HSUPA - subtest 2	19.68	19.60	19.65	19.67	19.82	19.60
	HSUPA - subtest 3	20.31	20.41	20.32	20.36	20.32	20.00
	HSUPA - subtest 4	20.23	20.10	20.21	20.37	20.31	20.03
	HSUPA - subtest 5	20.88	20.75	20.65	21.40	21.18	21.24

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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.

```
┌─────────────────┐
│    Wireless     │
│  Communication  │
│    Test  Set    │                    ┌──────────┐
│                 │○───────────────○   │   EUT    │
│                 │                    └──────────┘
│      RF  IN     │
└─────────────────┘
```

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|
  Generator      |  Initial PRACH TX Power:   -11.70 dBm | Paging Service
    Info         |  Initial DPCCH TX Power:    -0.56 dBm |  RB Test Mode
                 |                                       |
                 |     Uplink Parameters    |    Value   |
   Uplink        |  PRACH Preambles         |    64    ↑ |    HSPA
 Parameters  ▽   |  PRACH Ramping Cycles(MMAX)|    2     |  Parameters
                 |  Available Subchannels (Bit Mask)|000000000001|
   UE Rep        |  Uplink DPCH Scrambling Code|    0   |  34.121 Preset
   Meas          |  Uplink DPCH Bc/Bd Control|  Manual   |  Call Configs ▽
                 |  Manual Uplink DPCH Bc   |    11     |
    Close        |  Manual Uplink DPCH Bd   |    15     |   Channel
    Menu         |  Maximum Uplink Transmit Power Level| 21 dBm |(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        |
   Uplink        |  Current Service Type:     None       | Send Relative
 Parameters  ▽   |  MM Status:      Abs Single Shot AG   |   Grant Up
                 |  GMM State:   Index 15: (67/15)^2  ↑  |
                 |  Current DPCH Index 16: (75/15)^2     | Send Relative
   UE Rep        |   HSUPA In Index 17: (84/15)^2 Information| Grant Down
   Meas          |  UE Rep E-DCH Index 18: (95/15)^2  DSCH Cat:  ----
                 |  Last Received Index 19: (106/15)^2  Ratio:  ---- %
 Trig Output Setup| Throughput: Index 20: (119/15)^2   ↓  ---- kbps
 Sys Frame Clock |  ACKs Transmitted          smitted:    ----| Return
                 |         Active Cell      |Sys Type: UTRA FDD|
                 |            Idle          |           |
    2 of 4       |        |IntRef|Offset|   |           |   1 of 2
```

Example: AG – Index = 20 for HSPA subtest 1

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```
                          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  │   │    Recorded E-TFCI Values  │ │E-TFCI Values │
│              │    1:  75  11:  75  21: ----  31: ----  41: ---- │
│              │    2:  75  12:  75  22: ----  32: ----  42: ---- │
│E-TFCI Recording   3:  75  13:  75  23: ----  33: ----  43: ---- │
│  Information │    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: ---- │Send Step Up
│              │    9:  75  19: ----  29: ----  39: ----  49: ---- │TPC Bit Pattern
│   Clear      │   10:  75  20: ----  30: ----  40: ----  50: ---- │
│  UE Info     │                                  │Send Step Down│
│              │              15/15               │TPC Bit Pattern│
│   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