## Appendix F.　FCC 3G SAR Measurement Procedures

Conducted Output Power:

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.

WCDMA SAR Test mode - Conducted Power									
Mode	Setup	Cell band (850)			AWS band (1700)			PCS band (1900)		
		CH4132	CH4182	CH4233	CH1312	CH1413	CH1513	CH9262	CH9400	CH9538
		826.4 (MHz)	836.4 (MHz)	846.6 (MHz)	1712.4 (MHz)	1732.6 (MHz)	1752.6 (MHz)	1852.4 (MHz)	1880.0 (MHz)	1907.6 (MHz)
WCDMA	RMC 12.2Kbps	22.38	22.59	22.21	18.71	17.90	18.39	18.28	17.85	18.02
HSDPA	Subtest 1	21.47	21.55	21.33	17.42	16.70	17.22	17.40	16.88	16.95
	Subtest 2	21.48	21.47	21.44	17.45	16.70	17.19	17.56	16.80	16.91
	Subtest 3	21.42	21.61	21.38	17.20	16.41	17.29	17.48	16.93	16.94
	Subtest 4	21.47	21.66	21.36	17.15	16.32	17.26	17.48	16.92	16.96
HSUPA	Subtest 1	21.94	22.11	21.76	17.93	17.15	17.62	17.91	17.49	17.64
	Subtest 2	21.14	21.20	21.05	16.99	16.13	16.64	17.14	16.71	16.64
	Subtest 3	21.62	21.87	21.53	17.98	17.21	17.72	17.53	17.09	17.25
	Subtest 4	21.01	21.24	20.89	17.00	16.11	16.85	16.99	16.57	16.79
	Subtest 5	21.59	21.81	21.46	18.11	17.42	17.94	17.55	17.14	17.38

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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.
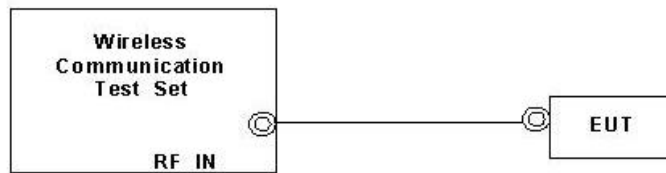
Setup Configuration

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 (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} (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 (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} (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"

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```
                         Call Setup Screen
┌──────────────┬─────────────────────────────────────┬──────────────┐
│ Call Control │      Active Cell Operating Mode     │  Call Parms  │
├──────────────┼─────────────────────────────────────┼──────────────┤
│              │                                     │  Cell Power  │
│   Channel    │ ┌─────── UE Information ──────────┐  │    -86.00    │
│ (UARFCN) Info│ │ IMSI:                          │  │              │
│              │ │ IMEI:                          │  │ dBm/3.84 MHz │
│    Cell      │ │ Power Class:                   │  │ Channel Type │
│  Parameters  │ └────────────────────────────────┘  │  12.2k + HSPA│
│              │ ┌─ UE Expected Open Loop Transmit─┐  │              │
│              │ │ Initial PRACH TX Power: -11.70  │  │Paging Service│
│  Generator   │ │ Initial DPCCH TX Power:  -0.56  │  │ RB Test Mode │
│    Info      │ └────────────────────────────────┘  │              │
```

Uplink Parameters	Value
PRACH Preambles	64
PRACH Ramping Cycles(MMAX)	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

Call Parms (right side): HSPA Parameters / 34.121 Preset Call Configs / Channel (UARFCN) Parms

Active Cell: **Idle** Sys Type: UTRA FDD

2 of 4 | IntRef | Offset | 1 of 3

Example for HSPA Subtest 1, and other subtests following table, C11.1.3

(Gain Factors (β_c = 11 and β_d = 15))

```
                         Call Setup Screen
┌──────────────┬─────────────────────────────────────┬──────────────┐
│ Call Control │      Active Cell Operating Mode     │ Serving Grant│
├──────────────┼─────────────────────────────────────┼──────────────┤
│  Additional  │                                     │   AG Mode    │
│   Screens    │ ┌─────── UE Information ──────────┐  │  Single Shot │
│              │ │ IMSI:                          │  │              │
│    Cell      │ │ IMEI:                          │  │Single Shot AG│
│  Parameters  │ │ Power Class:                   │  │ 20: (119/15)^2│
│              │ └────────────────────────────────┘  │              │
│  Generator   │ ┌─ UE Expected Open Loop Transmit─┐  │ Send Single  │
│    Info      │ │ Initial PRACH TX Power: -11.70  │  │ Shot Absolute│
│              │ │ Initial DPCCH TX Power:  -0.56  │  │    Grant     │
│   Uplink     │ └────────────────────────────────┘  │              │
│  Parameters  │    Call Processing Status           │ Send Relative│
```

Call Processing Status:
- Current Service Type: None
- MM Status:
- GMM State:
- Current DPCH

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

HSUPA Information:
- UE Rep E-DCH ... DSCH Cat: ----
- Last Received ... Ratio: ---- %
- Throughput: ---- kbps
- ACKs Transmitted ... smitted: ----

Serving Grant (right side): Send Relative Grant Up / Send Relative Grant Down / Return

Active Cell: **Idle** Sys Type: UTRA FDD

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    │     E-TFCI Recording State      │        15        │
│ (UARFCN) Info│              Idle               │                  │
│              │                                 │                  │
├──────────────┤                                 │  Start Recording │
│    HSPA      │      Recorded E-TFCI Values     │  E-TFCI Values   │
│ Information  │   1:  75  11:  75  21: ----  31: ----  41: ----   │
│              │   2:  75  12:  75  22: ----  32: ----  42: ----   │
├──────────────┤   3:  75  13:  75  23: ----  33: ----  43: ----   │
│E-TFCI Recording  4:  75  14:  75  24: ----  34: ----  44: ----   │
│ Information  │   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: ----  │
├──────────────┤  10:  75  20: ----  30: ----  40: ----  50: ----  │
│    Clear     │                                 │  Send Step Down  │
│   UE Info    │             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