# 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 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)**			**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)**
WCDMA	**RMC 12.2Kbps**	22.74	22.79	22.79	22.78	22.85	22.66
HSDPA	**Subtest 1**	22.72	22.76	22.82	22.73	22.77	22.58
	Subtest 2	22.24	22.30	22.36	22.61	22.78	22.38
	Subtest 3	22.54	22.58	22.63	22.34	22.32	22.17
	Subtest 4	22.14	22.09	22.15	22.27	22.26	22.13
HSUPA	**Subtest 1**	21.68	21.90	21.85	22.13	22.58	21.90
	Subtest 2	20.66	20.63	20.72	21.04	20.92	20.76
	Subtest 3	21.31	21.25	21.35	21.24	21.43	21.18
	Subtest 4	20.74	20.70	20.89	21.11	21.01	20.80
	Subtest 5	21.80	21.83	21.99	22.16	22.56	22.52

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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.
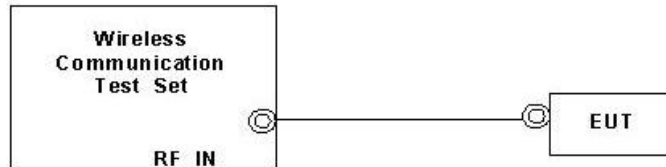
Setup Configuration

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     │┌─────────────────────────────────────────┐│    -86.00      │
│ (UARFCN) Info││            UE Information                ││ dBm/3.84 MHz   │
│              ││ IMSI:                                   ││ Channel Type   │
│              ││ IMEI:                                   ││ 12.2k + HSPA   │
│   Cell       ││ Power Class:                            ││                │
│ Parameters  ▽││                                         ││                │
│              │└─────────────────────────────────────────┘│ Paging Service │
│              │┌─────────────────────────────────────────┐│ RB Test Mode   │
│ Generator    ││  UE Expected Open Loop Transmit Power    ││                │
│   Info       ││ Initial PRACH TX Power:    -11.70 dBm   ││                │
│              ││ Initial DPCCH TX Power:     -0.56 dBm   ││                │
│              │├─────────────────────────────┬───────────┤│                │
│              ││    Uplink Parameters        │   Value   ││                │
│  Uplink      ││ PRACH Preambles             │    64    ▲││    HSPA        │
│ Parameters  ▽││ PRACH Ramping Cycles(NMAX)  │     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 (β_c = 11 and β_d = 15))

```
┌─────────────────────────────────────────────────────────────────────────┐
│                          Call Setup Screen                                │
├──────────────┬──────────────────────────────────────────┬────────────────┤
│ Call Control │       Active Cell Operating Mode         │ Serving Grant  │
│              │                                           │ AG Mode        │
│ Additional   │┌─────────────────────────────────────────┐│  Single Shot   │
│  Screens     ││            UE Information                ││                │
│              ││ IMSI:                                   ││ Single Shot AG │
│              ││ IMEI:                                   ││ 20: (119/15)^2 │
│   Cell       ││ Power Class:                            ││                │
│ Parameters  ▽││                                         ││                │
│              │└─────────────────────────────────────────┘│                │
│              │┌─────────────────────────────────────────┐│                │
│ Generator    ││  UE Expected Open Loop Transmit Power    ││ Send Single Shot│
│   Info       ││ Initial PRACH TX Power:    -11.70 dBm   ││ Absolute Grant │
│              ││ Initial DPCCH TX Power:     -0.56 dBm   ││                │
│              │├─────────────────────────────────────────┤│                │
│              ││        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   │     ││                │
│   UE Rep     ││┌ HSUPA In──│Index 17: (84/15)^2   │ormation│ Send Relative │
│   Meas       ││UE Rep E-DCH │Index 18: (95/15)^2   │DSCH Cat: ----│Grant Down│
│              ││Last Received│Index 19: (106/15)^2  │ Ratio:  ---- %│          │
│Trig Output Setup│Throughput:│Index 20: (119/15)^2 ▼│ ---- kbps│  Return   │
│Sys Frame Clock│ACKs Transmitted│              │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
                                                       Start Recording
     HSPA                                                E-TFCI Values
  Information            Recorded 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: ----  Send Step Up
                     7:  75   17: ----  27: ----  37: ----  47: ----  TPC Bit Pattern
                     8:  75   18: ----  28: ----  38: ----  48: ----
                     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