



Appendix F - FCC 3G SAR Measurement Procedures

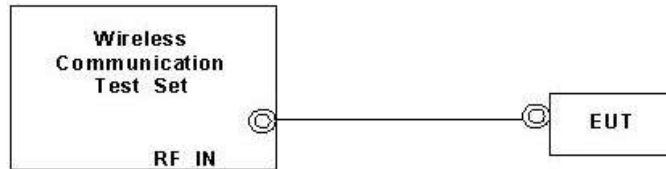
Conducted Output Power:

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 | 24.12 | 24.11 | 24.12 | 24.04 | 24.08 | 23.83 |
| R5 - HSDPA | HSDPA - subtest 1 | 24.04 | 23.98 | 23.96 | 23.94 | 24.07 | 23.73 |
| | HSDPA - subtest 2 | 23.85 | 23.79 | 23.80 | 23.84 | 23.98 | 23.69 |
| | HSDPA - subtest 3 | 23.37 | 23.28 | 23.33 | 23.41 | 23.58 | 23.51 |
| | HSDPA - subtest 4 | 23.32 | 23.38 | 23.31 | 23.30 | 23.60 | 23.29 |
| R6 - HSPA (HSUPA & HSDPA) | HSUPA - subtest 1 | 23.84 | 23.55 | 23.82 | 23.35 | 23.48 | 23.23 |
| | HSUPA - subtest 2 | 22.18 | 22.13 | 22.02 | 22.06 | 21.93 | 21.86 |
| | HSUPA - subtest 3 | 22.61 | 22.52 | 22.44 | 22.40 | 22.47 | 22.44 |
| | HSUPA - subtest 4 | 22.23 | 22.19 | 22.14 | 22.17 | 22.82 | 22.04 |
| | HSUPA - subtest 5 | 23.81 | 23.62 | 23.83 | 23.01 | 23.52 | 23.48 |

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} (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: Δ_{ACK} , Δ_{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, Δ_{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 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 $\beta_c = 11/15$ 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 (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 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} (Note 1) | 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 | 209/25 | 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_{ed1} : 47/15 β_{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 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 $\beta_c = 10/15$ and $\beta_d = 15/15$.

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 $\beta_c = 14/15$ 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: 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 | | | | | | | | | | | | | | | | | | |
| 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 DPCCH TX Power: -0.56 dBm | | | | Channel Type | | | | | | | | | | | | | | | | | | |
| Generator Info | Uplink Parameters | | | | 12.2k + HSPA | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Uplink Parameters</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>PRACH Preambles</td> <td>64</td> </tr> <tr> <td>PRACH Ramping Cycles(MAX)</td> <td>2</td> </tr> <tr> <td>Available Subchannels (Bit Mask)</td> <td>000000000001</td> </tr> <tr> <td>Uplink DPCH Scrambling Code</td> <td>0</td> </tr> <tr> <td>Uplink DPCH Bc/Bd Control</td> <td>Manual</td> </tr> <tr> <td>Manual Uplink DPCH Bc</td> <td>11</td> </tr> <tr> <td>Manual Uplink DPCH Bd</td> <td>15</td> </tr> <tr> <td>Maximum Uplink Transmit Power Level</td> <td>21 dBm</td> </tr> </tbody> </table> | | | | Uplink Parameters | Value | PRACH Preambles | 64 | PRACH Ramping Cycles(MAX) | 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 | Paging Service |
| Uplink Parameters | Value | | | | | | | | | | | | | | | | | | | | | | |
| PRACH Preambles | 64 | | | | | | | | | | | | | | | | | | | | | | |
| PRACH Ramping Cycles(MAX) | 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 | | | | | | | | | | | | | | | | | | | | | | |
| Uplink Parameters | | | | | RB Test Mode | | | | | | | | | | | | | | | | | | |
| | | | | | HSPA Parameters | | | | | | | | | | | | | | | | | | |
| UE Rep Params | | | | | 34,121 Preset Call Configs | | | | | | | | | | | | | | | | | | |
| | | | | | Channel (UARFCH) Parms | | | | | | | | | | | | | | | | | | |
| Close Menu | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 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 ($\beta_c = 11$ 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 DPCCH TX Power: -0.56 dBm | | | | 20: $(119/15)^2$ | | | | | | | | | | | | | | | | | | |
| Generator Info | Call Processing Status | | | | Send Single Shot Absolute Grant | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th colspan="2">Call Processing Status</th> </tr> </thead> <tbody> <tr> <td>Current Service Type:</td> <td>None</td> </tr> <tr> <td>MM Status:</td> <td>Abs Single Shot AG</td> </tr> <tr> <td>MM State:</td> <td>Index 15: $(67/15)^2$</td> </tr> <tr> <td>Current DPCH:</td> <td>Index 16: $(75/15)^2$</td> </tr> <tr> <td>HSUPA In:</td> <td>Index 17: $(84/15)^2$</td> </tr> <tr> <td>UE Rep E-DCH:</td> <td>Index 18: $(95/15)^2$</td> </tr> <tr> <td>Last Received Throughput:</td> <td>Index 19: $(106/15)^2$</td> </tr> <tr> <td>ACKs Transmitted:</td> <td>Index 20: $(119/15)^2$</td> </tr> </tbody> </table> | | | | Call Processing Status | | Current Service Type: | None | MM Status: | Abs Single Shot AG | MM State: | Index 15: $(67/15)^2$ | Current DPCH: | Index 16: $(75/15)^2$ | HSUPA In: | Index 17: $(84/15)^2$ | UE Rep E-DCH: | Index 18: $(95/15)^2$ | Last Received Throughput: | Index 19: $(106/15)^2$ | ACKs Transmitted: | Index 20: $(119/15)^2$ | Send Relative Grant Up |
| Call Processing Status | | | | | | | | | | | | | | | | | | | | | | | |
| Current Service Type: | None | | | | | | | | | | | | | | | | | | | | | | |
| MM Status: | Abs Single Shot AG | | | | | | | | | | | | | | | | | | | | | | |
| MM State: | Index 15: $(67/15)^2$ | | | | | | | | | | | | | | | | | | | | | | |
| Current DPCH: | Index 16: $(75/15)^2$ | | | | | | | | | | | | | | | | | | | | | | |
| HSUPA In: | Index 17: $(84/15)^2$ | | | | | | | | | | | | | | | | | | | | | | |
| UE Rep E-DCH: | Index 18: $(95/15)^2$ | | | | | | | | | | | | | | | | | | | | | | |
| Last Received Throughput: | Index 19: $(106/15)^2$ | | | | | | | | | | | | | | | | | | | | | | |
| ACKs Transmitted: | Index 20: $(119/15)^2$ | | | | | | | | | | | | | | | | | | | | | | |
| Uplink Parameters | | | | | Send Relative Grant Down | | | | | | | | | | | | | | | | | | |
| | | | | | Return | | | | | | | | | | | | | | | | | | |
| UE Rep Params | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| Trig Output Setup | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| Sys Frame Clock | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 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 |
| 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: ---- 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 Up TPC Bit Pattern |
| Return | | Send Step Down TPC Bit Pattern |
| | Background Active Cell Sys Type: UTRA FDD | |
| | Connected | |
| | IntRef Offset | |
| | | Return |

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