3GPP Release 6 HSPA (HSUPA/HSDPA) devices are currently excluded from TCB approval. This document includes preliminary procedures for testing the SAR of Release 6 HSPA data devices, without the detail explanations. These interim procedures are intended to provide grantees and their test labs with certain basic information required to conduct SAR tests for HSUPA products seeking equipment certification. Additional discussions and explanations are under preparation to provide TCBs with the necessary guidance to certify HSPA products. The additional procedures included in this document for WCDMA handsets and Release 5 HSDPA devices are supplemental information that relates to Release 6 HSPA testing. These additional procedures, when finalized, will become effective when additional guidance is available for TCBs to certify HSPA products.

Release 6 HSPA Data Devices

(Preliminary)

The following procedures are applicable to HSPA (HSUPA/HSDPA) data devices operating under 3GPP Release 6.[1] Body exposure conditions generally apply to these devices, including handsets and data modems operating in various electronic devices. HSUPA operates in conjunction with WCDMA and HSDPA. SAR is initially measured in WCDMA test configurations without HSPA. The default test configuration is to establish a radio link between the DUT and a communication test set to configure a 12.2 kbps RMC (reference measurement channel) in Test Loop Mode 1. SAR for HSPA is selectively measured with HS-DPCCH, E-DPCCH and E-DPDCH, all enabled, along with a 12.2 kbps RMC using the highest SAR configuration in WCDMA with 12.2 kbps RMC only.[2] An FRC is configured according to HS-DPCCH Sub-test 1 using H-set 1 and QPSK.[3] HSPA is configured according to E-DCH Sub-test 5 requirements. SAR for other HSPA sub-test configurations is also confirmed selectively according to output power, exposure conditions and E-DCH UE Category. Maximum output power is verified according to procedures in applicable versions of 3GPP TS 34.121 and SAR must be measured according to these maximum output conditions. The UE Categories for HS-DPCCH and HSPA should be clearly identified in the SAR report. The following procedures are applicable only if Maximum Power Reduction (MPR) is implemented according to Cubic Metric (CM) requirements.[4]

Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to Release 6 procedures in section 5.2 of 3GPP TS 34.121, using the appropriate RMC, FRC and E-DCH configurations. When E-DCH is not active, TPC (transmit power control) is set to all "1's"; otherwise, inner loop power control with power control algorithm 2 is required to maintain E-TFCI requirements. When HSPA is active output power for the applicable HSPA modes should be measured for E-DCH Sub-test 1 - 5.[5] Results for all applicable physical channel configurations (DPCCH, DPDCH and spreading codes, HS-DPCCH, E-DPCCH, E-DPDCH$_k$) should be tabulated in the SAR report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations should be clearly identified.[6]

[1] Test conditions and requirements should be established according to procedures in applicable versions of 3GPP documents, including TS 34.108, TS 34.109 and TS 34.121 etc. Additional considerations are necessary for Release 7 or higher; therefore, case-by-case considerations are required until procedures are available.
[2] HSPA should be configured according to the HSDPA and HSUPA UE categories of the test device.
[3] See TS 34.121 Tables C.10.1 – C.10.4 for setup requirements.
[4] Otherwise, contact the FCC Laboratory for measurement requirements and filing restrictions.
[5] Applicable HSPA modes are determined by the E-DCH UE category. Test supported modes only.
[6] Contact the FCC Laboratory for recommendations on measurement or equipment difficulties before conducting measurements.

SAR Measurements

When voice transmission and head exposure conditions are applicable to a WCDMA/HSPA data device, head exposure is measured according to the 'Head SAR Measurements' procedures in the 'WCDMA Handsets' section of this document. SAR for body exposure configurations are measured according to the 'Body SAR Measurements' procedures in the 'WCDMA Handsets' section of this document. In *addition*, body SAR is also measured for HSPA when the maximum average output of each RF channel with HSPA active is at least ¼ dB higher than that measured without HSPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is above 75% of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 with power control algorithm 2, according to the highest body SAR configuration in 12.2 kbps RMC without HSPA.[7] When VOIP is applicable for head exposure, SAR is not required when the maximum output of each RF channel with HSPA is less than ¼ dB higher than that measured using 12.2 kbps RMC; otherwise, the same HSPA configuration used for body measurements should be used to test for head exposure.

Due to inner loop power control requirements in HSPA, a commercial communication test set should be used for the output power and SAR tests.[8] The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSPA should be configured according to the β values indicated below as well as other applicable procedures described in the 'WCDMA Handset' and 'Release 5 HSDPA Data Devices' sections of this document.

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	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 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$.
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 signaled 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 signaled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.
Note 6: β_{ed} can not be set directly; it is set by Absolute Grant Value.

[7] The highest body SAR measured in Antenna Extended & Retracted configurations on a channel in 12.2 kbps RMC. The possible channels are the High, Middle & Low channel. Contact the FCC Laboratory for test and approval requirements if the maximum output power measured in E-DCH Sub-test 2 – 4 is higher than Sub-test 5.
[8] When test mode must be used, contact the FCC Laboratory for measurement requirements and filing restrictions.

WCDMA Handsets

The following procedures are applicable to WCDMA handsets operating under 3GPP Release 99, Release 5 and Release 6.[9] The default test configuration is to measure SAR with an established radio link between the DUT and a communication test set using a 12.2 kbps RMC (reference measurement channel) configured in Test Loop Mode 1. SAR is selectively confirmed for other physical channel configurations (DPCCH & $DPDCH_n$), HSDPA and HSPA (HSUPA/HSDPA) modes according to output power, exposure conditions and device operating capabilities. Both uplink and downlink should be configured with the same RMC or AMR, when required. SAR for Release 5 HSDPA and Release 6 HSPA are measured using the applicable FRC (fixed reference channel) and E-DCH reference channel configurations. Maximum output power is verified according to applicable versions of 3GPP TS 34.121 and SAR must be measured according to these maximum output conditions. When Maximum Power Reduction (MPR) is not implemented according to Cubic Metric (CM) requirements for Release 6 HSPA, the following procedures do not apply.[10]

Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the procedures described in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all "1's" for WCDMA/HSDPA or applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, $DPDCH_n$ and spreading codes, HSDPA, HSPA) should be tabulated in the SAR report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations should be clearly identified.[11]

Head SAR Measurements

SAR for head exposure configurations in voice mode is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". SAR in AMR configurations is not required when the maximum average output of each RF channel for 12.2 kbps AMR is less than ¼ dB higher than that measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel in 12.2 kbps AMR with a 3.4 kbps SRB (signaling radio bearer) using the exposure configuration that results in the highest SAR in 12.2 kbps RMC for that RF channel.[12]

Body SAR Measurements

SAR for body exposure configurations in voice and data modes is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". SAR for other spreading codes and multiple

[9] Additional considerations are necessary for Release7 or higher, which may require case-by-case considerations until procedures are available.

[10] Contact the FCC Laboratory for measurement requirements and filing restrictions.

[11] Contact the FCC Laboratory for recommendations on measurement or equipment difficulties before conducting the measurements.

[12] The highest head SAR measured for the left & right side, in touch & tilt positions with antenna extended and retracted on a channel in 12.2 kbps RMC. The possible channels are the High, Middle & Low channel.

$DPDCH_n$, when supported by the DUT, are not required when the maximum average output of each RF channel, for each spreading code and $DPDCH_n$ configuration, are less than ¼ dB higher than those measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel with an applicable RMC configuration for the corresponding spreading code or $DPDCH_n$ using the exposure configuration that results in the highest SAR with 12.2 kbps RMC.[13] When more than 2 $DPDCH_n$ are supported by the DUT, it may be necessary to configure additional $DPDCH_n$ for a DUT using FTM (Factory Test Mode) or other chipset based test approaches with parameters similar to those used in 384 kbps and 768 kbps RMC.[14]

Handsets with Release 5 HSDPA

Body SAR is not required for handsets with HSDPA capabilities when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75% of the SAR limit.[15] Otherwise, SAR is measured for HSDPA, using the ***additional*** body SAR procedures in the "Release 5 HSDPA Data Devices" section of this document, on the maximum output channel with the body exposure configuration that results in the highest SAR in 12.2 kbps RMC for that RF channel.[13] Handsets with both HSDPA and HSUPA should be tested according to Release 6 HSPA test procedures.

Handsets with Release 6 HSPA (HSDPA/HSUPA)

Body SAR is not required for handsets with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than ¼ dB higher than that measured without HSUPA/HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75% of the SAR limit.[12] Otherwise, SAR is measured for HSPA using the ***additional*** body SAR procedures in the "Release 6 HSPA Data Devices" section of this document, on the maximum output channel with the body exposure configuration that results in the highest SAR in 12.2 kbps RMC for that RF channel.[13] When VOIP is applicable for head exposure in HSPA, SAR is not required when the maximum output of each RF channel with HSPA is less than ¼ dB higher than that measured using 12.2 kbps RMC; otherwise, the same HSPA configuration used for body measurements should be tested for head exposure.

[13] The highest body SAR measured in Antenna Extended & Retracted configurations on a channel in 12.2 kbps RMC. The possible channels are the High, Middle & Low channel.

[14] The highest data rate defined for RMC is 768 kbps, which contains 2 $DPDCH_n$. When a communication test set is not used, consult with the FCC Laboratory on applicable test setup requirements.

[15] HSDPA is tested with FRC. See 'Release 5 HSDPA Data Devices' (next section) and Appendix D on output power measurement and FRC configurations requirements.

Release 5 HSDPA Data Devices

The following procedures are applicable to HSDPA data devices operating under 3GPP Release 5.[16] Body exposure conditions are typically required for these devices, including handsets and data modems operating in various electronic devices. HSDPA operates in conjunction with WCDMA and requires an active DPCCH. The default test configuration is to measure SAR in WCDMA without HSDPA, with an established radio link between the DUT and a communication test set using a 12.2 kbps RMC (reference measurement channel) configured in Test Loop Mode 1. SAR for HSDPA is selectively measured using the highest SAR configuration in WCDMA with an FRC (fixed reference channel) in H-set 1 and a 12.2 kbps RMC.[17] SAR is selectively confirmed for other physical channel configurations (DPCCH & $DPDCH_n$) according to output power, exposure conditions and device operating capabilities. Maximum output power is verified according to the applicable versions of 3GPP TS 34.121 and SAR must be measured according to these maximum output conditions. The DUT must be tested according to its UE Category and explained in the SAR report.

Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the Release 5 procedures described in section 5.2 of 3GPP TS 34.121, using an FRC with H-set 1 and a 12.2 kbps RMC with TPC (transmit power control) set to all "1's". When HSDPA is active output power is measured according requirements for HS-DPCCH Sub-test 1 - 4.[18] Results for all applicable physical channel configurations (DPCCH, $DPDCH_n$ and spreading codes, HS-DPCCH etc.), with and without HSDPA active, should be tabulated in the SAR report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations should be clearly identified in the SAR report.[19]

SAR Measurements

When voice transmission and head exposure conditions are applicable to a WCDMA/HSDPA data device, head exposure is measured according to the 'Head SAR Measurements' procedures in the 'WCDMA Handsets' section of this document. SAR for body exposure configurations is measured according to the 'Body SAR Measurements' procedures of that section. In ***addition***, body SAR is also measured for HSDPA when the maximum average output of each RF channel with HSDPA active is at least ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is above 75% of the SAR limit.[20] Body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC

[16] Due to Cubic Metric (CM) and Maximum Power Reduction (MPR) requirements, Release 6 HSPA devices should be tested according to Release 6 HSPA configurations and procedures.
[17] HSDPA is a primary mode of operation for data devices; SAR is selectively verified according to SAR levels.
[18] See TS 34.121 Tables C.10.1 – C.10.4 for setup requirements.
[19] Contact the FCC Laboratory for recommendations on measurement or equipment difficulties before conducting measurements.
[20] Contact the FCC Laboratory for test and approval requirements if the maximum output power measured in HS-DPCCH Sub-test 2 – 4 is higher than Sub-test 1.

configured in Test Loop Mode 1, using the highest body SAR configuration in 12.2 kbps RMC without HSDPA.[21]

HSDPA should be configured according to the UE category of a test device. The number of HS-DSCH/HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors(β_c, β_d), and HS-DPCCH power offset parameters (Δ_{ACK}, Δ_{NACK}, Δ_{CQI}) should be set according to values indicated in the Table below.[22] The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.[23]

Sub-Test 1 Setup for Release 5 HSDPA

Sub-test	β_c	β_d	β_d *(SF)*	β_c/β_d	β_{hs} (1)	CM (dB)(2)
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15(3)	15/15(3)	64	12/15(3)	24/15	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 8 $\Leftrightarrow$ $A_{hs} = \beta_{hs}/\beta_c$ = 30/15 $\Leftrightarrow$ β_{hs}= 30/15 *β_c
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15.
Note 3: 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 signaled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

[21] The highest body SAR measured in Antenna Extended & Retracted configurations on a channel in 12.2 kbps RMC. The possible channels are the High, Middle & Low channel. The β values for 12.2 kbps RMC is set according to Table C.10.1.4 of TS 34.121; also see Table C.10.1.1.

[22] In order to achieve maximum output, β_c/β_d < 1 should be maintained to avoid triggering any power setback required by higher β ratios.

[23] Many of the operating parameters are automatically checked and set by a communication test set to ensure there is no conflict in the HS-DPCCH setup. In addition to the specific uplink HSDPA parameters, many of the downlink parameters that do not affect UE transmitter operations must also be set accordingly to ensure proper HSDPA operation. See Annex C.10.1, C.8.1.1 and Table C.10.1.4 of TS 34.121 for HSDPA setup requirements.