Appendix F - FCC 3G SAR Measurement Procedures

1. WCDMA

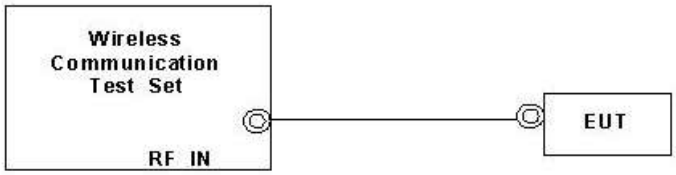
1.1 Conducted Output Power:

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

1.2 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

1.3 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

1.4 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 subtest's E-TFCI
d. The transmitted maximum output power was recorded.

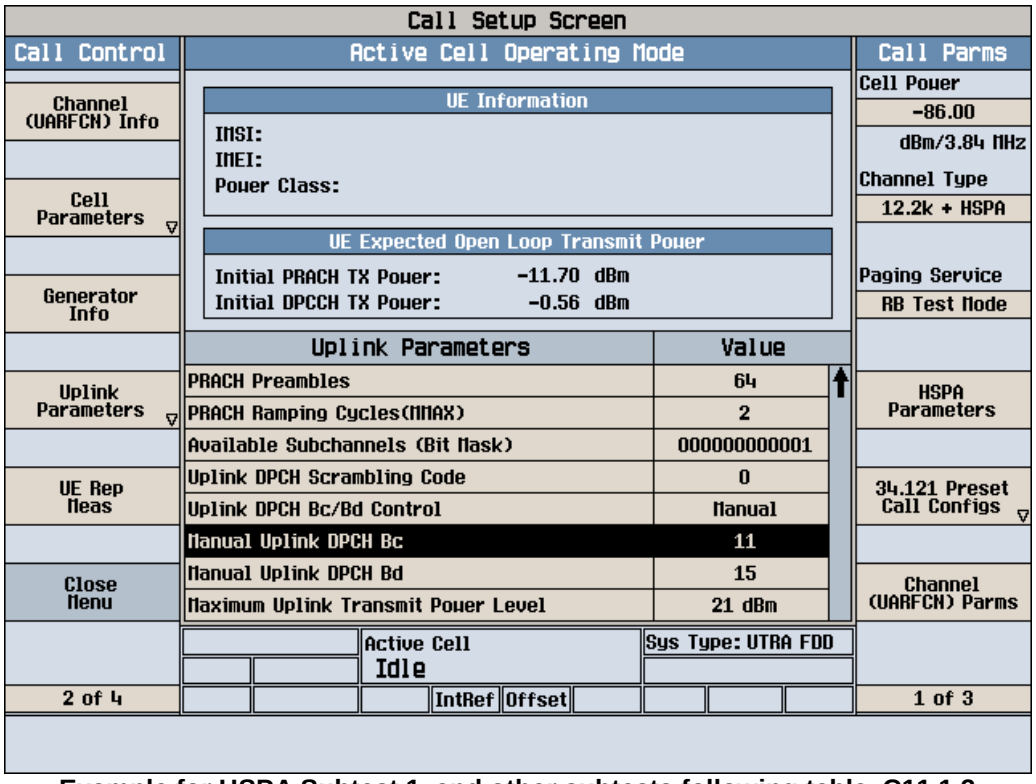
Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

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	$\beta_{ed}1$: 47/15 $\beta_{ed}2$: 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

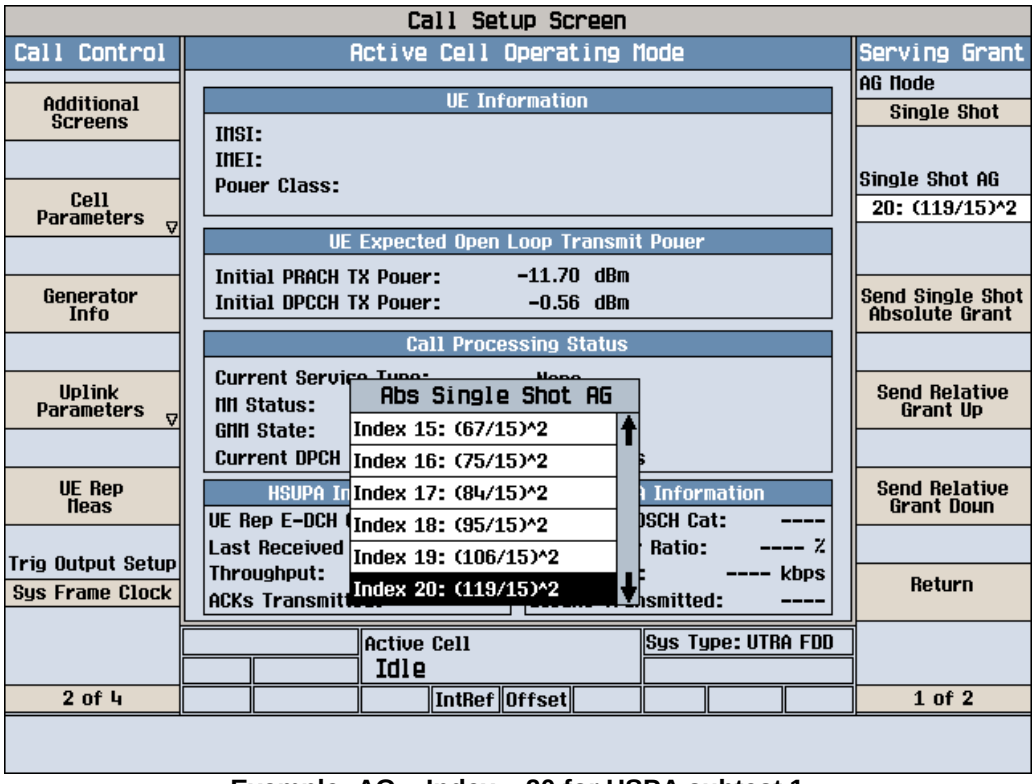
Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for 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

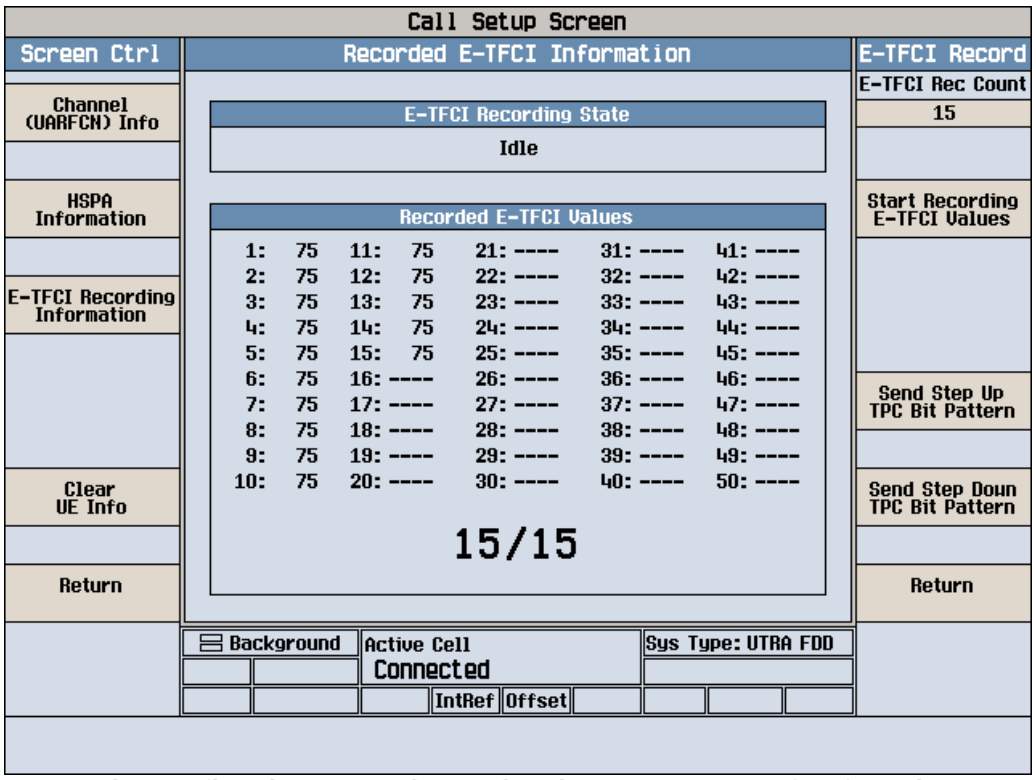
Note: For details settings in the Agilent 8960 test equipment, please refer to the user guide "HSUPA Measurement Guide with 8960 V7.5.0 Release 7 (2007-06) Ver.: v.02.18"



Example for HSPA Subtest 1, and other subtests following table, C11.1.3 (Gain Factors (βc = 11 and βd = 15))



Example: AG – Index = 20 for HSPA subtest 1



Example: Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1

2. CDMA2000

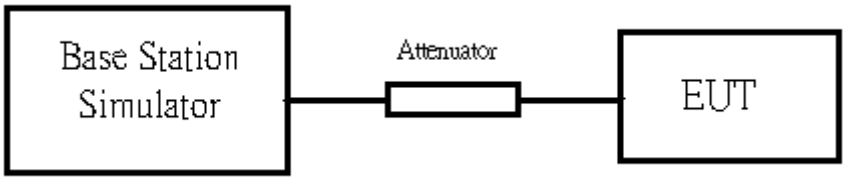
2.1 Conducted Output Power:

The EUT was tested according to the requirements of the FCC 3G procedures and the 3.1.2.3.4.
A detailed analysis of the output power verification is provided as the table below:

Function Type	Reverse Traffic Channel	Test Mode	Radio Configuration		Service Option	Data Rates (kbps)	Power Control	Low Ch	Midd Ch	High Ch
			Forward Traffic Channel (Fwd)	Reverse Traffic Channel (Rvs)				1013	384	777
CDMA2000 Cellular	FCH	1	1	1	55	Full	All Up	24.16	23.84	23.89
		3	3	3	55	Full	All Up	24.20	24.14	23.98
	FCH+SCH	3	3	3	32	FCH:Full,SCH 9.6	All Up	24.25	24.05	23.89
	EVDO Rev.0	Subtype:0				UL:9.6	All Up	23.75	23.65	23.62
	EVDO Rev.0	Subtype:0				UL:38.4	All Up	23.83	23.70	23.61
	EVDO Rev.0	Subtype:0				UL:153.6	All Up	23.90	23.57	23.62
	EVDO Rev.A	Subtype:0				RETAP_128Kbps	All Up	23.56	23.24	23.28
	EVDO Rev.A	Subtype:0				RETAP_2048Kbps	All Up	23.52	23.36	23.47
	EVDO Rev.A	Subtype:0				RETAP_12288Kbps	All Up	23.46	23.24	23.23

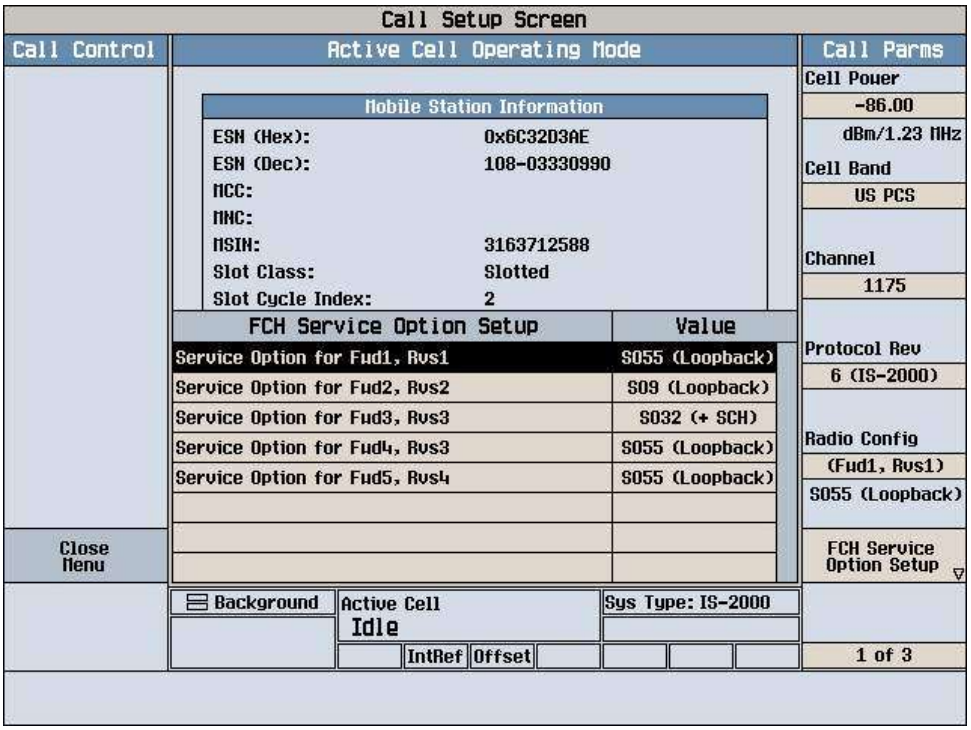
Function Type	Reverse Traffic Channel	Test Mode	Radio Configuration		Service Option	Data Rates (kbps)	Power Control	Low Ch	Midd Ch	High Ch
			Forward Traffic Channel (Fwd)	Reverse Traffic Channel (Rvs)				25	600	1175
CDMA2000 PCS	FCH	1	1	1	55	Full	All Up	24.17	24.51	24.20
		3	3	3	55	Full	All Up	24.13	24.53	24.22
	FCH+SCH	3	3	3	32	FCH:Full,SCH 9.6	All Up	24.12	24.56	24.17
	EVDO Rev.0	Subtype:0				UL:9.6	All Up	23.77	24.29	23.76
	EVDO Rev.0	Subtype:0				UL:38.4	All Up	23.89	24.32	23.87
	EVDO Rev.0	Subtype:0				UL:153.6	All Up	23.96	24.54	23.99
	EVDO Rev.A	Subtype:0				RETAP_128Kbps	All Up	23.54	24.09	23.40
	EVDO Rev.A	Subtype:0				RETAP_2048Kbps	All Up	23.61	24.18	23.56
	EVDO Rev.A	Subtype:0				RETAP_12288Kbps	All Up	23.68	24.19	23.45

2.2 CDMA2000 Setup Configuration:

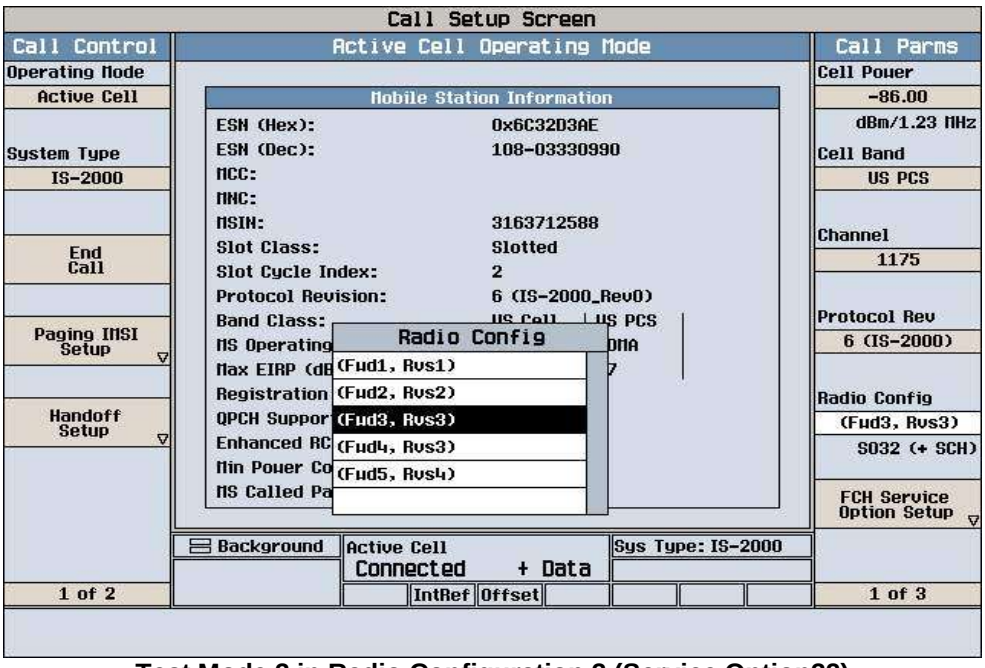


Setup Configuration

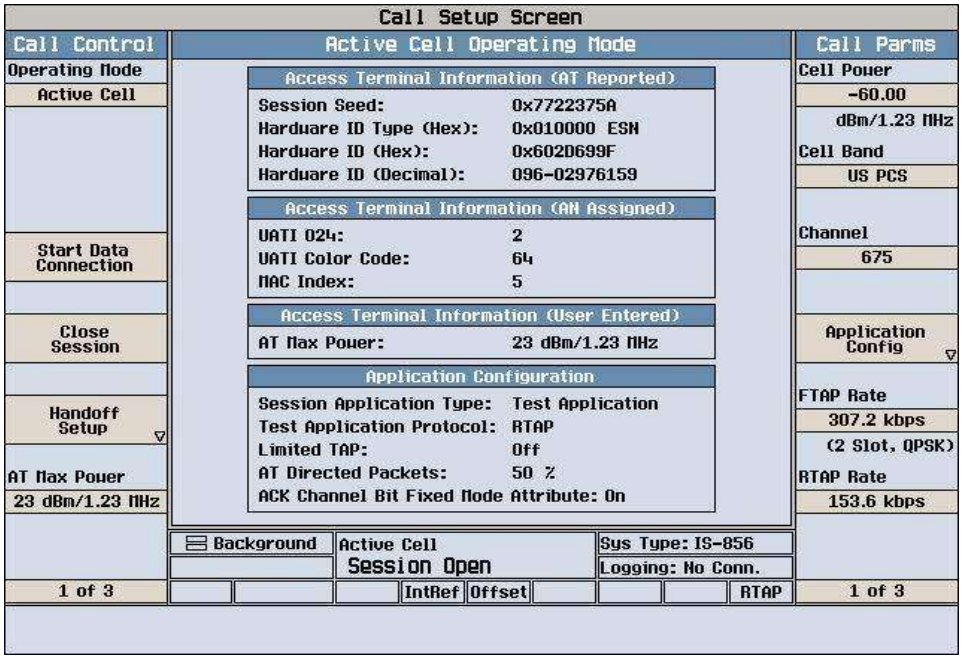
2. The EUT was connected to Base Station, Agilent 8960. Refer to the drawing of Setup Configuration.
3. The RF path losses were compensated into the measurements.
4. A call was established between EUT and Base Station with following setting:
   a. Set the test mode1 and test mode 3
   b. Set the Power control All Up for (FCH) and (FCH+SCH)
5. The transmitted maximum output power was recorded.



Test Mode 1 in Radio Configuration 1 (FCH)



Test Mode 3 in Radio Configuration 3 (Service Option32)



1xEV-DO setting with RTAP 153.6kbps

3. 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

[4] SAR Measurement Procedures for 3G Devices CDMA 2000/Ev-Do/WCDMA/HSDPA, June 2006 Laboratory Division Office of Engineering and Technology Federal Communications Commission

[5] 3.1.2.3.4 Maximum RF Output Power 3GPP2 C.S0033-0 Version 2.0, Date: 12 December 2003 Recommended Minimum Performance Standards for cdma2000 High Rate Packet Data Access Terminal