



Appendix F - FCC 3G SAR Measurement Procedures

1. WCDMA

1.1 Conducted Output Power:

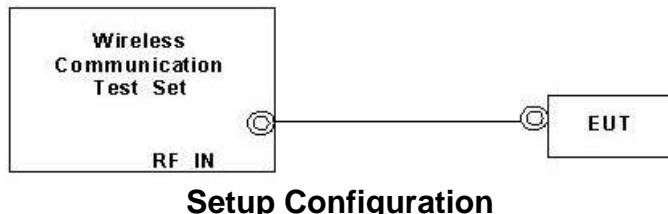
The PBA is fulfilled. The EUT was tested according to the requirements of the FCC 3G procedures and the TS 34.121. The EUT's WCDMA and HSPA function is Release 6 version supporting HSDPA Category 8, and HSUPA Category 5. A detailed analysis of the output power for all WCDMA, HSPDA, and HSPA (HSUPA&HSDPA) 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
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.



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(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 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 $\beta_c = 11/15$ and $\beta_d = 15/15$.

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 (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} (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	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	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						CallParms	
Channel (UARFCN) Info		UE Information						Cell Power	
Cell Parameters		IMSI: IMEI: Power Class:						-86.00	
Generator Info		UE Expected Open Loop Transmit Power						dBm/3.84 MHz	
Uplink Parameters		Initial PRACH TX Power: -11.70 dBm Initial DPCCH TX Power: -0.56 dBm						Channel Type	
UE Rep Meas		12.2k + HSPA						Paging Service	
Close Menu		Uplink Parameters Value						RB Test Mode	
2 of 4		PRACH Preambles 64 PRACH Ramping Cycles(11MAX) 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						HSPA Parameters	
		Active Cell Idle Sys Type: UTRA FDD						34.121 Preset Call Configs	
		IntRef Offset						Channel (UARFCN) Params	
								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	
Cell Parameters		IMSI: IMEI: Power Class:						Single Shot	
Generator Info		UE Expected Open Loop Transmit Power						Single Shot AG	
Uplink Parameters		Initial PRACH TX Power: -11.70 dBm Initial DPCCH TX Power: -0.56 dBm						20: (119/15)^2	
UE Rep Meas		Call Processing Status						Send Single Shot Absolute Grant	
Trig Output Setup		Current Service Type: None IMI Status: Abs Single Shot AG GMM State: Index 15: (67/15)^2 Current DPCH Index 16: (75/15)^2						Send Relative Grant Up	
Sys Frame Clock		HSUPA Info UE Rep E-DCH Last Received Throughput: Index 17: (84/15)^2 Index 18: (95/15)^2 Index 19: (106/15)^2 Index 20: (119/15)^2						Send Relative Grant Down	
2 of 4		DSCH Cat: ---- Ratio: ---- % Throughput: ---- kbps ACKs Transmitted: ----						Return	
		Active Cell Idle Sys Type: UTRA FDD						1 of 2	

Example: AG – Index = 20 for HSPA subtest 1



Call Setup Screen		Recorded E-TFCI Information		E-TFCI Record			
Screen Ctrl	Channel (UARFCN) Info	Recorded E-TFCI Information		E-TFCI Record			
E-TFCI Recording State			E-TFCI Rec Count				
Idle			15				
Recorded E-TFCI Values			Start Recording E-TFCI Values				
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: ----			Send Step Up TPC Bit Pattern				
15/15			Send Step Down TPC Bit Pattern				
Background Active Cell Sys Type: UTRA FDD Connected			Return				
IntRef Offset							

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:

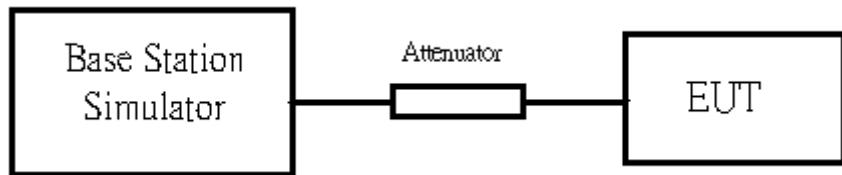
The EUT was tested according to the requirements of the FCC 3G procedures and the 3.1.2.3.4. A detailed analysis of the output power verification is provided as the table below:

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.

Call Setup Screen			CallParms
Call Control	Active Cell Operating Mode		Cell Power
	Mobile Station Information		-86.00
	ESN (Hex):	0x6C32D3AE	dBm/1.23 dB
	ESN (Dec):	108-03330990	Cell Band
	IMSI:		US PCS
	IMSI:		
	MSIN:	3163712588	Channel
	Slot Class:	Slotted	1175
	Slot Cycle Index:	2	
FCH Service Option Setup			Protocol Rev
	Service Option for Fud1, Rus1	S055 (Loopback)	6 (IS-2000)
	Service Option for Fud2, Rus2	S09 (Loopback)	
	Service Option for Fud3, Rus3	S032 (+ SCH)	
	Service Option for Fud4, Rus3	S055 (Loopback)	
	Service Option for Fud5, Rus4	S055 (Loopback)	
Close Menu	Background	Active Cell Idle	Radio Config
		Sys Type: IS-2000	(Fud1, Rus1)
			S055 (Loopback)
			FCH Service Option Setup
			▼
			1 of 3

Test Mode 1 in Radio Configuration 1 (FCH)



Call Setup Screen																																				
Call Control	Active Cell Operating Mode	CallParms																																		
Operating Node		Cell Power																																		
Active Cell		-86.00																																		
System Type		dBm/1.23 MHz																																		
IS-2000		Cell Band																																		
End Call		US PCS																																		
Paging INSI Setup	<table border="1"> <tr><th colspan="2">Mobile Station Information</th></tr> <tr><td>ESN (Hex):</td><td>0x6C32D3AE</td></tr> <tr><td>ESN (Dec):</td><td>108-03330990</td></tr> <tr><td>MCC:</td><td></td></tr> <tr><td>MNC:</td><td></td></tr> <tr><td>MSIN:</td><td>3163712588</td></tr> <tr><td>Slot Class:</td><td>Slotted</td></tr> <tr><td>Slot Cycle Index:</td><td>2</td></tr> <tr><td>Protocol Revision:</td><td>6 (IS-2000_Rev0)</td></tr> <tr><td>Band Class:</td><td>US CELL US PCS</td></tr> <tr><td>IS Operating</td><td>Radio Config</td></tr> <tr><td>Max EIRP (dB (Fud1, Rvs1)</td><td>7</td></tr> <tr><td>Registration (Fud2, Rvs2)</td><td></td></tr> <tr><td>QPCH Support (Fud3, Rvs3)</td><td></td></tr> <tr><td>Enhanced RC (Fud4, Rvs3)</td><td></td></tr> <tr><td>Min Power Control (Fud5, Rvs4)</td><td></td></tr> <tr><td>IS Called Party</td><td></td></tr> </table>	Mobile Station Information		ESN (Hex):	0x6C32D3AE	ESN (Dec):	108-03330990	MCC:		MNC:		MSIN:	3163712588	Slot Class:	Slotted	Slot Cycle Index:	2	Protocol Revision:	6 (IS-2000_Rev0)	Band Class:	US CELL US PCS	IS Operating	Radio Config	Max EIRP (dB (Fud1, Rvs1)	7	Registration (Fud2, Rvs2)		QPCH Support (Fud3, Rvs3)		Enhanced RC (Fud4, Rvs3)		Min Power Control (Fud5, Rvs4)		IS Called Party		Channel
Mobile Station Information																																				
ESN (Hex):	0x6C32D3AE																																			
ESN (Dec):	108-03330990																																			
MCC:																																				
MNC:																																				
MSIN:	3163712588																																			
Slot Class:	Slotted																																			
Slot Cycle Index:	2																																			
Protocol Revision:	6 (IS-2000_Rev0)																																			
Band Class:	US CELL US PCS																																			
IS Operating	Radio Config																																			
Max EIRP (dB (Fud1, Rvs1)	7																																			
Registration (Fud2, Rvs2)																																				
QPCH Support (Fud3, Rvs3)																																				
Enhanced RC (Fud4, Rvs3)																																				
Min Power Control (Fud5, Rvs4)																																				
IS Called Party																																				
Handoff Setup		1175																																		
		Protocol Rev																																		
		6 (IS-2000)																																		
		Radio Config																																		
		(Fud3, Rvs3)																																		
		S032 (+ SCH)																																		
		FCH Service Option Setup																																		
1 of 2	Background Active Cell Connected + Data Sys Type: IS-2000	1 of 3																																		
	IntRef Offset																																			

Test Mode 3 in Radio Configuration 3 (Service Option32)

Call Setup Screen		
Call Control	Active Cell Operating Mode	CallParms
Operating Node		Cell Power
Active Cell		-60.00
Start Data Connection		dBm/1.23 MHz
Close Session		Cell Band
Handoff Setup		US PCS
AT Max Power		Channel
23 dBm/1.23 MHz		675
1 of 3	Background Active Cell Session Open Sys Type: IS-856	1 of 3
	IntRef Offset RTAP	

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