Portable Cellular Phone SAR Test Report

Tests Requested By:	Motorola Mobility, Inc. 600 N. US Highway 45 Libertyville, IL 60048
Test Report #:	25018-1
Date of Report:	Aug-27-2012
Date of Test:	Jun-08-2012 to Jul-25-2012
FCC ID #:	IHDT56NG7
Generic Name:	M0D0A
Test Laboratory:	Motorola Mobility, Inc. - ADR Test Services Laboratory 600 N. US Highway 45 Libertyville, IL 60048
Report Author:	Ketal Patel RF Engineer

Accreditation:

This laboratory is accredited to ISO/IEC 17025-2005 to perform the following tests:

Tests:	Procedures:
Electromagnetic Specific Absorption Rate	IEC 62209-1 RSS-102 IEEE 1528 - 2003 FCC OET Bulletin 65 (*including Supplement C*) Australian Communications Authority Radio Communications (Electromagnetic Radiation – Human Exposure) Standard 2003 CENELEC EN 50360 ARIB Std. T-56 (2002)

2404

On the following products or types of products:
Wireless Communications Devices (Examples): Two Way Radios; Portable Phones (including Cellular, Licensed Non-Broadcast and PCS); Low Frequency Readers; and Pagers

Statement of Compliance:

Motorola declares under its sole responsibility that the portable cellular telephone model to which this declaration relates, is in conformity with the appropriate General Population/Uncontrolled RF exposure standards, recommendations and guidelines (FCC 47 CFR §2.1093) as well as with CENELEC en50360:2001 and ANSI / IEEE C95.1. It also declares that the product was tested in accordance with IEEE 1528 / CENELEC EN62209-1 (2006), as well as other appropriate measurement standards, guidelines and recommended practices. Any deviations from these standards, guidelines and recommended practices are noted below:

(none)

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Revision History

Revision Version	Date	Notes
Rev. 0	02-Aug-2012	Initial report release
Rev. A	27-Aug-2012	Updated per FCC Inquiry

1. Introduction

The Motorola Mobility ADR Test Services Laboratory has performed measurements of the maximum potential exposure to the user of the portable cellular phone covered by this test report. The Specific Absorption Rate (SAR) of this product was measured. The portable cellular phone was tested in accordance with [1], [4] and [5]. The SAR values measured for the portable cellular phone are below the maximum recommended levels of 1.6 W/kg in a 1 g average set in [3] and 2.0 W/kg in a 10 g average set in [2].

For ANSI / IEEE C95.1 (1 g), the final stand-alone SAR readings for this phone are given in the table below. For ANSI / IEEE C95.1 (1 g), the final simultaneous-transmission SAR readings for this phone are 1.54 W/kg for head-adjacent use and 0.56 W/kg for body-worn use. These measurements were performed using a DASY4™ v4.7 or DASY52™ system manufactured by Schmid & Partner Engineering AG (SPEAG), of Zurich Switzerland.

Transmit Band	Head SAR (1 g $^{W}/_{kg}$)	Body SAR (1 g $^{W}/_{kg}$)	Mobile Hotspot SAR (1 g $^{W}/_{kg}$)
GSM 850	**0.27**	**0.37**	**0.62**
GSM 1900	**0.30**	**0.25**	**0.91**
WCDMA 850	**0.43**	**0.56**	**0.97**
WCDMA 1900	**0.63**	**0.45**	**0.97**
Wi-Fi 2.45 GHz	**1.54**	**0.03**	**0.42**
Wi-Fi 5.2 GHz	**0.55**	**0.05**	**N/A**
Wi-Fi 5.8 GHz	**0.97**	**0.04**	**0.15**

2. Description of the Device Under Test

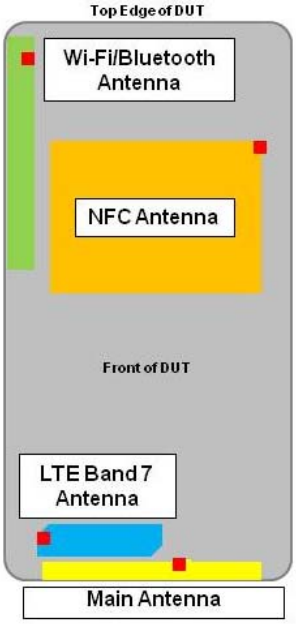
2.1 Antenna description

Main (850/1900 MHz) Antenna

Type	Internal	
Location	Bottom of Transceiver	
Dimensions	Width	4.6 mm
	Length	50.2 mm

Bluetooth/Wi-Fi (2.4/5 GHz) Antenna

Type	Internal	
Location	Right-Side Rear of Transceiver	
Dimensions	Width	5.5 mm
	Length	55.2 mm



2.2 Device Signaling[1,2]

Serial Number(s) (Functional Use)	LVUE250086 (GSM/WCDMA conducted power measurements, GSM/WCDMA SAR testing) LVUEB20043 (Wi-Fi 802.11b/g/n SAR testing, 802.11a/n SAR testing) LVUEB20029 (Bluetooth/Wi-Fi 802.11a/n conducted power measurements) LVUEB20032 (Wi-Fi 802.11b/g/n conducted power measurements)
Production Unit or Identical Prototype (47 CFR §2..908)	Identical Prototype
Device Category	Portable (Mobile Station Class B)
RF Exposure Limits	General Population / Uncontrolled

Mode(s) of Operation	Modulation Mode(s)	Maximum Output Power Setting	Duty Cycle	Transmitting Frequency Range(s)
GSM 850	GMSK	33.5 dBm	1:8	824.2 - 848.8 MHz
GSM 1900	GMSK	30.5 dBm	1:8	1850.2 - 1909.8 MHz
WCDMA 850	QPSK	24.0 dBm	1:1	826.4 - 846.6 MHz
WCDMA 1900	QPSK	24.0 dBm	1:1	1852.4 - 1907.6 MHz
Wi-Fi 802.11b/g/n	BPSK	18.01 dBm	1:1	2412.0 - 2462.0 MHz
Wi-Fi 802.11a/n	BPSK	16.05 dBm	1:1	5180.0 - 5240.0 MHz, 5745.0 - 5825.0 MHz
Bluetooth	GFSK	8.913 dBm	1:1	2402.0 – 2480.0 MHz

GSM Data Functionality	GPRS/EDGE Class 12 (4 uplink timeslots; 4 downlink timeslots; 5 total timeslots per frame)
	Class B (DTM not supported)

Mode(s) of Operation	GPRS/EDGE 850				GPRS/EDGE 1900			
Modulation	GMSK				GMSK			
Maximum Output Power Setting (dBm)	33.50	**31.50**	29.50	27.50	30.50	**28.50**	26.50	24.50
Time Average Output Power Setting (dBm)	24.50	**25.50**	25.24	24.50	21.50	**22.50**	22.24	21.50
Duty Cycle	1:8	**2:8**	3:8	4:8	1:8	**2:8**	3:8	4:8
Transmitting Frequency Range(s)	824.2 - 848.8 MHz				1850.2 - 1909.8 MHz			

Mode(s) of Operation	EDGE 850				EDGE 1900			
Modulation	8PSK				8PSK			
Maximum Output Power Setting (dBm)	27.50	**25.50**	23.50	21.50	26.50	**24.50**	22.50	20.50
Time Average Output Power Setting (dBm)	18.50	**19.50**	19.24	18.50	17.50	**18.50**	18.24	17.50
Duty Cycle	1:8	**2:8**	3:8	4:8	1:8	**2:8**	3:8	4:8
Transmitting Frequency Range(s)	824.2 - 848.8 MHz				1850.2 - 1909.8 MHz			

[1] **Bolded** entries indicate data mode configurations of highest time-average power output per band and data mode type, and thus were utilized for SAR testing in this report.

[2] This device contains an integrated Near Field Communications (NFC) module. Evaluation of SAR test requirements for the NFC transmitter was performed per the guidance in FCC KDB 447498, FCC KDB 865664 and FCC KDB 648474. FCC KDB 865664 specifies that the FCC SAR test requirements are applicable to 100 MHz - 6 GHZ only, but states that numerical SAR simulation may be appropriate for transmit frequencies below 100 MHz. Additionally, KDB 447498 provides guidance on test exclusion based on maximum transmit power capabilities, which this NFC transmitter falls into. Finally, KDB 648474 states that "phones with built-in NFC, wireless charging or similar functions that do not require separate SAR testing for these specific capabilities can generally be tested according to the normally required SAR measurement procedures. The SAR influence of the additional accessory hardware and functionality to the transmitters and antennas that require SAR Testing are considered during the required SAR testing; therefore, it is transparent to the testing process." Therefore, no SAR measurements of the NFC transmitter are required.

2.2.1 Transmitter power reduction conditions and modes

The DUT utilizes reduced limits for the maximum transmit power for its transmitters when operating under the following noted conditions to ensure SAR exposure compliance is maintained. Tables of the reduced limits used for testing are given below. A complete description of this functionality is provided in the "Operational Description" contained within Exhibit 12. The implementation to trigger the reduction in power requires the device to be radiating, which prevents conducted power measurements of this functionality without modification to the unit.

While operating in body-adjacent exposure configurations during a mobile hotspot session, a reduced maximum power limit is enforced on the GSM 1900 or WCDMA 1900 transmitters. Tables of the reduced limits used for testing are given below.

Mode(s) of Operation	WCDMA 1900
Channel Ranges	9262-9538
Maximum Output Power Setting (dBm)	24
Reduced Maximum Output Power Setting (dBm)	17

Mode(s) of Operation	GPRS 1900				EDGE 1900			
Channel Range	975-124				975-124			
Modulation	GMSK				8PSK			
Duty Cycle	1:8	2:8	3:8	4:8	1:8	2:8	3:8	4:8
Maximum Output Power Setting (dBm)	30.50	**28.50**	26.50	24.50	26.50	**24.50**	22.50	20.50
Time Average Output Power Setting (dBm)	21.50	**22.50**	22.24	21.50	17.50	**18.50**	18.24	17.50
Reduced Maximum Output Power Setting (dBm)	26.50	**24.50**	22.50	20.50	22.50	**20.50**	18.50	16.50
Reduced Time Average Output Power Setting (dBm)	17.50	**18.50**	18.24	17.50	13.50	**14.50**	14.24	13.50

See section 6.4 for tables detailing the complete interoperation of this power limit reduction schema.

2.3 Device Conducted Power Measurements

2.3.1 GSM modes

Band	Channel	Conducted power (dBm) for GSM modes[3] (Burst Average Power)								
		GSM *CS Voice* (1 Slot)	GPRS *PS Data* (1 Slot)	GPRS *PS Data* (2 Slots)	GPRS *PS Data* (3 Slots)	GPRS *PS Data* (4 Slots)	EDGE *PS Data* (1 Slot)	EDGE *PS Data* (2 Slots)	EDGE *PS Data* (3 Slots)	EDGE *PS Data* (4 Slots)
GSM 850	128	33.49	33.50	31.49	29.37	27.53	27.70	25.70	23.70	21.55
	190	33.45	33.48	31.35	29.56	27.49	27.56	25.60	23.56	21.45
	251	33.37	33.43	31.37	29.49	27.48	27.52	25.41	23.64	21.42
GSM 1900	512	30.67	30.61	28.54	26.40	24.47	26.30	24.61	22.61	20.73
	661	30.30	30.68	28.44	26.46	24.58	26.41	24.46	22.32	20.60
	810	30.49	30.45	28.39	26.50	24.35	26.50	24.65	22.52	20.56

Band	Channel	Conducted power (dBm) for GSM modes[3] (Source-Based Time-Averaged Power)								
		GSM *CS Voice* (1 Slot)	GPRS *PS Data* (1 Slot)	GPRS *PS Data* (2 Slots)	GPRS *PS Data* (3 Slots)	GPRS *PS Data* (4 Slots)	EDGE *PS Data* (1 Slot)	EDGE *PS Data* (2 Slots)	EDGE *PS Data* (3 Slots)	EDGE *PS Data* (4 Slots)
GSM 850	128	24.49	24.50	25.49	25.11	24.53	18.70	19.70	19.44	18.55
	190	24.45	24.48	25.35	25.30	24.49	18.56	19.60	19.30	18.45
	251	24.37	24.43	25.37	25.23	24.48	18.52	19.41	19.38	18.42
GSM 1900	512	21.67	21.61	22.54	22.14	21.47	17.30	18.61	18.35	17.73
	661	21.30	21.68	22.44	22.20	21.58	17.41	18.46	18.06	17.60
	810	21.49	21.45	22.39	22.24	21.35	17.50	18.65	18.26	17.56

[3] *CS Voice* denotes circuit-switched transmission for voice calling, and *PS Data* denotes packet-switched transmission for data sessions.

2.3.2 WCDMA modes

Per the "SAR Measurement Procedures for 3G Devices" released in October, 2007, 12.2 kbps RMC, 12.2 kbps AMR, HS-DPCCH Sub-test 1-4, and E-DCH Sub-test 1-5 modes were considered. The conducted power measurements (per section 5.2 of 3GPP TS 34.121) for each mode are shown in the table below.

Band	Channel	Conducted power (dBm) for WCDMA modes		Conducted Power (dBm) for WCDMA – HSDPA (Rel 5) Modes				Conducted Power (dBm) for WCDMA – HSPA (HSUPA/HSDPA-Rel 6) Modes				
		RMC	AMR	Subtest 1	Subtest 2	Subtest 3	Subtest 4	Subtest 1	Subtest 2	Subtest 3	Subtest 4	Subtest 5
WCDMA 850	4132	23.95	24.10	24.10	24.11	24.10	24.11	24.09	24.12	24.05	24.11	24.11
	4180	23.99	24.12	24.18	24.17	24.15	24.19	24.17	24.12	24.15	24.11	24.13
	4233	23.85	24.01	24.05	24.07	24.04	24.03	24.06	24.02	24.05	23.98	24.00
WCDMA 1900	9262	24.00	24.10	24.11	24.07	24.14	24.08	24.12	24.05	24.09	24.03	24.13
	9400	23.94	24.01	23.99	23.98	24.00	24.03	24.04	24.00	23.98	24.01	24.06
	9538	23.90	24.07	24.00	24.05	23.98	24.00	23.97	24.01	24.01	23.99	24.01

Maximum Power Reduction (MPR)

According to 3GPP 25.101 sub-clause 6.2.2, the maximum output power is allowed to be reduced by following the table.

Table 6.1A: UE maximum output power with HS-DPCCH and E-DCH

UE transmit channel configuration	CM (dB)	MPR (dB)
For all combinations of; DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH	$0 \leq CM \leq 3.5$	MAX (CM-1, 0)
Note 1: 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.		

The device supports MPR to solve linearity issues (ACLR or SEM) due to the higher peak-to-average ratios (PAR) of the HSUPA signal. This prevents saturating the full range of the TX DAC inside of device and provides a reduced power output to the RF transceiver chip according to the Cubic Metric (a function of the combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH).

When E-DPDCH channels are present, the beta gains on those channels are reduced first to try to get the power under the allowed limit. If the beta gains are lowered as far as possible, then a hard limiting is applied at the maximum allowed level.

The SW currently recalculates the cubic metric every time the beta gains on the E-DPDCH are reduced. The cubic metric will likely get lower each time this is done. However, there is no reported reduction of maximum output power in the HSUPA mode since the device also provides a mechanism to compensate for the power back-off by increasing the gain of TX_AGC in the transceiver (PA) device.

The end effect is that the DUT output power is identical to the case where there is no MPR in the device.

2.3.3 Wi-Fi 802.11 modes

Per "SAR Measurement Procedures for 802.11 a/b/g Transmitters" (FCC KDB 248227), power measurements were performed for 802.11 operational modes. The average conducted power measurements for each mode are shown in the tables below. SAR testing for 802.11 was performed with the transmitter set to the lowest data rate on the default test channels **highlighted in bold** in the tables below.

Mode	Freq [MHz]	Channel	Detector	802.11b Conducted Power [dBm] Data Rate [Mbps]			
				1	2	5.5	11
802.11b	2412	1	AVG	17.18	17.11	17.12	17.13
			PEAK	19.95	19.77	19.78	19.79
802.11b	2437	6	AVG	**18.01**	18.07	17.98	18.05
			PEAK	20.74	20.79	20.73	20.76
802.11b	2462	11	AVG	17.63	17.56	17.66	17.55
			PEAK	20.32	20.28	20.38	20.33

Mode	Freq [MHz]	Channel	Detector	802.11g Conducted Power [dBm] Data Rate [Mbps]							
				6	9	12	18	24	36	48	54
802.11g	2412	1	AVG	12.04	12.13	12.03	12.07	12.01	11.92	11.88	12.06
			PEAK	18.92	18.82	19.02	18.85	18.59	19.06	18.84	18.74
802.11g	2437	6	AVG	15.43	15.41	15.43	15.29	15.26	15.25	15.28	15.38
			PEAK	21.43	21.40	21.51	21.41	21.21	21.50	21.43	21.36
802.11g	2462	11	AVG	11.12	10.86	10.93	10.78	10.76	10.67	10.63	10.78
			PEAK	18.34	17.89	18.37	17.97	17.53	18.24	17.64	17.66

Mode	Freq [MHz]	Channel	Detector	802.11n (2.4GHz - 400ns GI) Conducted Power [dBm] Data Rate [Mbps]							
				7.2	14.4	21.7	28.9	43.4	57.8	65.0	72.2
802.11n	2412	1	AVG	12.18	12.15	12.05	11.91	12.07	11.92	11.94	12.04
			PEAK	19.01	18.79	18.98	19.00	19.02	18.94	19.21	18.99
802.11n	2437	6	AVG	15.49	15.48	15.37	15.65	15.34	15.26	15.13	15.36
			PEAK	21.58	21.41	21.42	21.66	21.45	21.42	21.54	21.52
802.11n	2462	11	AVG	10.98	10.95	10.81	10.72	10.86	10.82	10.73	10.90
			PEAK	18.16	17.95	18.04	18.22	18.39	18.34	18.48	18.21

Mode	Freq [MHz]	Channel	Detector	802.11n (2.4GHz - 800ns GI) Conducted Power [dBm] Data Rate [Mbps]							
				6.5	13.0	19.5	26.0	39.0	52.0	58.5	65.0
802.11n	2412	1	AVG	12.11	11.94	12.00	11.86	11.96	12.03	11.94	11.81
			PEAK	18.97	18.85	18.85	18.89	19.07	18.71	19.30	19.01
802.11n	2437	6	AVG	15.43	15.39	15.30	15.15	15.20	15.29	15.26	15.31
			PEAK	21.57	21.42	21.37	21.45	21.44	21.29	21.55	21.52
802.11n	2462	11	AVG	10.89	10.88	10.89	10.62	10.74	10.78	10.77	10.77
			PEAK	18.21	17.99	18.07	18.12	18.20	17.83	18.52	18.45

Mode	Freq	Channel	Detector	802.11a Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			6	9	12	18	24	36	48	54
802.11a	5180	36	AVG	14.16	14.13	14.19	14.06	12.98	12.81	11.71	11.75
802.11a	5200	40	AVG	15.40	15.47	14.55	14.41	13.38	13.23	12.31	12.46
802.11a	5220	44	AVG	**16.05**	15.96	15.04	14.95	14.00	13.83	12.90	12.69
802.11a	5240	48	AVG	15.93	16.00	14.89	14.78	13.83	13.79	12.81	12.86

Mode	Freq	Channel	Detector	802.11n (5GHz - 400ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			7.2	14.4	22	29	43	58	65	72
802.11n	5180	36	AVG	13.78	13.81	12.93	12.83	11.91	10.68	9.71	8.86
802.11n	5200	40	AVG	14.49	14.58	13.42	13.21	12.38	11.33	10.26	9.48
802.11n	5220	44	AVG	15.01	15.03	13.84	13.91	12.82	11.88	10.92	9.94
802.11n	5240	48	AVG	14.77	14.77	13.74	13.79	12.81	11.81	10.87	9.84

Mode	Freq	Channel	Detector	802.11n (5GHz - 800ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			6.5	13	20	16	39	52	59	65
802.11n	5180	36	AVG	14.10	14.03	12.92	12.59	11.87	10.76	9.79	8.94
802.11n	5200	40	AVG	14.41	14.43	13.38	13.17	12.32	11.37	10.42	9.22
802.11n	5220	44	AVG	15.10	14.97	13.93	13.78	12.89	11.99	10.93	9.70
802.11n	5240	48	AVG	14.92	14.94	13.73	13.60	12.82	11.82	10.90	9.81

Mode	Freq	Channel	Detector	40MHz BW 802.11n (5GHz - 400ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			7.2	14.4	21.7	28.9	43.3	57.8	65.0	72.2
802.11n	5190	38	AVG	11.39	11.38	11.38	11.39	11.35	11.18	10.20	9.31
802.11n	5230	46	AVG	14.28	14.31	13.20	13.18	12.23	11.06	10.20	9.33

Mode	Freq	Channel	Detector	40MHz BW 802.11n (5GHz - 800ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			6.5	13	20	26	39	52	59	65
802.11n	5190	38	AVG	11.36	11.33	11.36	11.35	11.33	10.80	9.71	8.97
802.11n	5230	46	AVG	13.97	13.95	12.85	12.92	11.79	10.94	9.84	9.00

Mode	Freq	Channel	Detector	802.11a Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			6	9	12	18	24	36	48	54
802.11a	5745	149	AVG	15.20	15.19	14.16	14.13	13.02	12.94	12.06	12.16
			PEAK	19.71	19.86	19.52	19.43	18.92	18.96	18.44	18.25
802.11a	5765	153	AVG	15.14	15.15	14.01	14.02	13.15	13.11	11.99	12.07
			PEAK	19.68	19.80	19.42	19.40	18.97	19.02	18.31	18.27
802.11a	5785	157	AVG	15.04	15.06	13.98	13.95	13.20	13.04	12.05	12.12
			PEAK	19.61	19.76	19.36	19.32	18.97	18.99	18.40	18.27
802.11a	5805	161	AVG	14.90	14.95	13.97	13.80	13.02	12.87	11.91	12.01
			PEAK	19.49	19.63	19.32	19.23	18.80	18.87	18.27	18.16
802.11a	5825	165	AVG	14.78	14.82	13.66	13.66	12.72	12.63	11.58	11.67
			PEAK	19.43	19.55	19.17	19.10	18.67	18.64	18.06	17.88

Mode	Freq	Channel	Detector	20MHz BW 802.11n (5GHz - 400ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			7.2	14.4	21.7	28.9	43.4	57.8	65.0	72.2
802.11n	5745	149	AVG	14.08	14.15	13.01	13.00	12.10	11.15	10.25	9.37
			PEAK	19.38	19.29	19.11	18.87	18.50	17.99	17.43	16.43
802.11n	5765	153	AVG	14.01	14.08	13.04	13.14	11.93	11.10	10.19	9.30
			PEAK	19.33	19.21	19.03	18.97	18.38	17.82	17.39	16.33
802.11n	5785	157	AVG	13.94	13.96	13.00	13.06	12.11	11.06	10.13	9.23
			PEAK	19.27	19.16	19.02	18.88	18.45	17.77	17.27	16.33
802.11n	5805	161	AVG	13.80	13.90	12.91	12.91	12.02	10.91	9.99	9.02
			PEAK	19.17	19.06	18.94	18.76	18.34	17.66	17.16	16.22
802.11n	5825	165	AVG	13.61	13.64	12.70	12.73	11.67	10.70	9.84	8.86
			PEAK	19.01	18.9	18.80	18.62	18.10	17.58	16.96	15.92

Mode	Freq	Channel	Detector	20MHz BW 802.11n (5GHz - 800ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			6.5	13.0	19.5	26.0	39.0	52.0	58.5	65.0
802.11n	5745	149	AVG	14.18	14.18	13.10	12.94	12.09	11.23	10.29	9.32
			PEAK	19.44	19.36	19.11	18.97	18.49	17.88	17.42	16.63
802.11n	5765	153	AVG	14.10	14.08	13.05	12.97	12.03	11.12	10.26	9.25
			PEAK	19.35	19.31	19.07	18.92	18.47	17.72	17.47	16.60
802.11n	5785	157	AVG	14.03	14.05	12.93	12.79	11.96	11.14	10.26	9.18
			PEAK	19.30	19.28	19.01	18.84	18.47	17.68	17.45	16.53
802.11n	5805	161	AVG	13.99	13.91	12.91	12.73	11.95	10.99	10.03	9.06
			PEAK	19.23	19.12	19.01	18.73	18.33	17.71	17.28	16.40
802.11n	5825	165	AVG	13.76	13.76	12.65	12.46	11.60	10.61	9.67	8.67
			PEAK	19.09	19.03	18.81	18.55	18.17	17.35	16.93	16.14

Mode	Freq	Channel	Detector	40MHz BW 802.11n (5GHz - 400ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			15.0	30.0	45.0	60.0	90.0	120.0	135.0	150.0
802.11n	5755	151	AVG	13.93	13.96	12.84	12.83	11.76	10.86	9.75	9.06
			PEAK	19.45	19.45	18.92	18.92	18.34	17.47	16.68	16.03
802.11n	5775	155	AVG	13.95	13.98	12.51	12.80	11.74	10.81	9.69	8.96
			PEAK	19.49	19.45	18.61	18.84	18.27	17.57	16.72	15.99
802.11n	5795	159	AVG	13.91	13.94	12.90	12.81	11.78	10.76	9.74	9.01
			PEAK	19.52	19.48	18.74	18.89	18.30	17.54	16.69	16.01
802.11n	5815	163	AVG	13.90	13.93	12.88	12.78	11.85	10.77	9.76	9.02
			PEAK	19.42	19.49	18.93	18.87	18.29	17.51	16.67	16.06

Mode	Freq	Channel	Detector	40MHz BW 802.11n (5GHz - 800ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			13.5	27.0	40.5	54.0	81.0	108.0	121.5	135.0
802.11n	5755	151	AVG	13.97	13.92	12.86	12.91	11.74	10.84	9.73	8.94
			PEAK	19.45	19.49	18.91	18.91	18.19	17.54	16.69	15.91
802.11n	5775	155	AVG	13.98	13.94	12.79	12.83	11.77	10.85	9.80	9.08
			PEAK	19.49	19.41	18.90	18.91	18.28	17.53	16.74	16.10
802.11n	5795	159	AVG	13.90	13.92	12.86	12.84	11.80	10.72	9.59	8.97
			PEAK	19.46	19.55	18.81	18.78	18.07	17.51	16.58	16.02
802.11n	5815	163	AVG	13.96	13.96	12.79	12.75	11.81	10.92	9.71	8.96
			PEAK	19.49	19.5	18.88	18.80	17.89	17.64	16.62	15.91

2.3.4 Bluetooth modes and test exclusion

Frequency [MHz]	Data Rate [Mbps]	Channel Number	Peak Conducted Power [mW]
2402	1.0	0	5.649
2441	1.0	39	6.653
2480	1.0	78	6.053
2402	2.0	0	7.112
2441	2.0	39	8.375
2480	2.0	78	7.568
2402	3.0	0	7.551
2441	3.0	39	8.913
2480	3.0	78	8.017

Frequency [MHz]	Mode	Channel Number	Peak Conducted Power [mW]
2402	LE	0	5.395
2440	LE	19	6.637
2480	LE	39	5.916

The Bluetooth transmitter of the device under test can be excluded from stand-alone and simultaneous SAR evaluation, per the highlighted requirements from FCC KDB 648474 D01, as follows:

1. The highest output conducted power measured for Bluetooth on the device under test is 8.913 mW [≤ 24 mW]
2. The separation distance between the Bluetooth antenna and the main antenna is 6.75 cm [≥ 5.0 cm]

Pictorial representation of the antenna locations and separation distances are given in Exhibit 7d.

3. Test Equipment Used

3.1 Dosimetric System

The Motorola Mobility ADR Test Services Laboratory utilizes a Dosimetric Assessment System (DASY4™ v4.7 or DASY52™) manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All the SAR measurements are taken within a shielded enclosure. The overall 10 g RSS uncertainty of the measurement system is ±10.8% (K=1) with an expanded uncertainty of ±21.6% (K=2). The overall 1 g RSS uncertainty of the measurement system is ±11.1% (K=1) with an expanded uncertainty of ±22.2% (K=2). The measurement uncertainty budget is given in Appendix 6. Per IEEE 1528, this uncertainty budget is applicable to the SAR range of 0.4 W/kg to 10 W/kg.

The list of calibrated equipment used for the measurements is shown in the following table.

Description	Serial Number	Cal Date	Cal Due Date
DASY4™ DAE V1	376	Aug-31-2011	Aug-31-2012
E-Field Probe ES3DV3	3124	Aug-23-2011	Aug-23-2012
DASY4™ DAE V1	1310	Jan-11-2012	Jan-11-2013
E-Field Probe ES3DV3	3284	Jan-10-2012	Jan-10-2013
DASY4™ DAE V1	440	May-23-2012	May-23-2013
DASY4™ DAE V1	1312	May-29-2012	May-29-2013
E-Field Probe EX3DV4	3728	Apr-24-2012	Apr-24-2013
S.A.M. Phantom used for 800/900 MHz	TP-1156		
S.A.M. Phantom used for 1800/1900/2450 MHz	TP-1319		
S.A.M. Phantom used for 2450 MHz	TP-1162		
S.A.M. Phantom used for 5 GHz	TP-1106		
Dipole Validation Kit, DV835V2	4D128	Jan-11-2012	Jan-11-2013
Dipole Validation Kit, DV1800V2	259TR	Oct-20-2011	Oct-20-2012
Dipole Validation Kit, DV2450V2	877	Jan-10-2012	Jan-10-2013
Dipole Validation Kit, DV2450V2	863	Mar-17-2011	Mar-14-2013
Dipole Validation Kit, D5GHzV2	1088	May-20-2011	Mar-22-2013
Dipole Validation Kit, D5GHzV2	1098	Jan-17-2012	Jan-17-2013

3.2 Additional Equipment

Description	Serial Number	Cal Date	Cal Due Date
Signal Generator HP8648C	3847A04810	Sep-26-2011	Sep-26-2013
Power Meter E4419B	GB39511090	Aug-12-2011	Aug-12-2013
Power Sensor #1 - E9301A	US39210917	Nov-16-2011	Nov-16-2012
Power Sensor #2 - E9301A	US39210918	Nov-16-2011	Nov-16-2012
Signal Generator HP8648C	3847M01245	Aug-23-2011	Aug-23-2013
Power Meter E4419B	GB39511084	Mar-28-2011	Mar-28-2013
Power Sensor #1 - E9301A	US39210931	Jan-19-2012	Jan-19-2013
Power Sensor #2 - E9301A	US39210932	Jan-19-2012	Jan-19-2013
Signal Generator HP8648C	3847A04632	Aug-13-2011	Aug-13-2013
Power Meter E4419B	GB39511086	Nov-04-2011	Nov-04-2013
Power Sensor #1 - E9301A	US39210915	Sep-09-2011	Sep-09-2012
Power Sensor #2 - E9301A	US39210916	Sep-09-2011	Sep-09-2012
Signal Generator N5181A	MY50143026	Oct-27-2011	Oct-27-2014
Power Meter E4419A	GB41293246	Nov-05-2011	Nov-05-2013
Power Sensor #1 - E9301A	US39211009	Aug-16-2011	Aug-16-2012
Power Sensor #2 - E9301A	US39211013	Aug-16-2011	Aug-16-2012
Network Analyzer HP8753ES	US39171846	May-19-2011	May-19-2012
Network Analyzer E5071C	MY46212851	May-10-2012	May-10-2013
Dielectric Probe Kit DAK-3.5	1030		

4. Electrical parameters of the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity, ε_r, and the conductivity, σ, of the tissue simulating liquids were measured with a HP85070 Dielectric Probe Kit These values, along with the temperature of the simulated tissue are shown in the table below. The recommended limits for permittivity and conductivity are also shown. A mass density of $\rho = 1\ ^{g}/_{cm^3}$ was entered into the system in all the cases. It can be seen that the measured parameters are within tolerance of the recommended limits specified in [1] and [5].

E-field probes calibrated at 1810 MHz were used for "1900 MHz" band (1850 MHz - 1910 MHz) SAR measurements. FCC KDB 450824 provides additional requirements on page 3 of 6 for SAR testing that is performed with probe calibration points that are more than 50 MHz removed from the measured bands. The KDB requires; "(2) When nominal tissue dielectric parameters are specified in the probe calibration data, the tissue dielectric parameters measured for routine measurements should be less than the target Er and higher than the target Sigma values to minimize SAR underestimations". The 1900 MHz simulated tissues listed below meet this criteria.

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			ε_r	σ (S/m)	Temp (°C)
835	**Head**	**Measured,** Jun-10-2012	41.6	0.93	19.0
		Recommended Limits	41.5 ±5%	0.90 ±5%	18-25
	Body	**Measured,** Jun-09-2012	55.5	1.00	19.0
		Measured, Jun-10-2012	55.5	1.00	19.0
		Recommended Limits	55.2 ±5%	0.97 ±5%	18-25
1880	**Head**	**Measured,** Jun-08-2012	38.5	1.47	19.1
		Recommended Limits	40.0 ±5%	1.40 ±5%	18-25
	Body	**Measured,** Jun-08-2012	51.4	1.59	19.3
		Measured, Jul-12-2012	51.8	1.59	21.0
		Recommended Limits	53.3 ±5%	1.52 ±5%	18-25
2450	**Head**	**Measured,** Jul-13-2012	38	1.79	19.2
		Recommended Limits	39.2 ±5%	1.80 ±5%	18-25
	Body	**Measured,** Jul-17-2012	51.1	2	19.3
		Measured, Jul-18-2012	51.1	2	19.3
		Recommended Limits	52.7 ±5%	1.95 ±5%	18-25
5210	**Head**	**Measured,** Jul-25-2012	35.8	4.62	19.7
		Recommended Limits	36.0 ±10%	4.66 ±5%	18-25
	Body	**Measured,** Jul-24-2012	46.6	5.31	19.7
		Recommended Limits	49.0 ±10%	5.31 ±5%	18-25
5785	**Head**	**Measured,** Jul-25-2012	34.9	5.25	19.6
		Recommended Limits	35.4 ±10%	5.25 ±5%	18-25
	Body	**Measured,** Jul-23-2012	45.7	6.27	19.2
		Measured, Jul-24-2012	45.2	6.15	19.7
		Recommended Limits	48.2 ±10%	5.98 ±5%	18-25

The list of ingredients and the percent composition used for the simulated tissues are indicated in the table below.

Ingredient	782 / 835 / 900 MHz Head	782 / 835 / 900 MHzBody	1800 MHz / 1900 MHz Head	1800 MHz / 1900 MHz Body	2450 MHz Head	2450 MHz Body	5 GHz Body
Sugar	57	44.9	--	--	--	--	--
DGBE	--	--	47	30.8	6.89	8	--
Diacetin	--	--	--	--	--	--	--
Water	40.45	53.06	52.62	68.8	57.95	71.8	78.66
Salt	1.45	0.94	0.38	0.4	0.15	0.2	--
HEC	1	1	--	--	--	--	--
Bact.	0.1	0.1	--	--	--	--	--
Triton X-100	--	--	--	--	35.02	20	10.67
Di(ethylene glycol) Hexyl Ether	--	--	--	--	--	--	10.67

All 5 GHz Head SAR testing was performed using HBBL3500-5800V5 tissue simulating liquids from Schmid & Partner Engineering AG. Prior to conducting SAR measurements, the relative permittivity, ε_r, and the conductivity, σ, of the liquids were measured as shown above.

5. System Accuracy Verifications

A system accuracy verification of the DASY4™ was performed using the measurement equipment listed in Section 3.1. The daily system accuracy verification occurs within the flat section of the SAM phantom.

A SAR measurement was performed to verify the measured SAR was within ±10% from the target SAR indicated in Appendix 7. These frequencies are within ±10% of the compliance test mid-band frequency as required in [1] and [5]. The test was conducted on the same days as the measurement of the DUT. Recommended limits for permittivity and conductivity, specified in [5], are shown in the table below. The obtained results from the system accuracy verification are also displayed in the table below. SAR values are normalized to 1 W forward power delivered to the dipole. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values. The distributions of SAR compare well with those of the reference measurements (see Appendix 1). For frequencies below 3 GHz, the simulated tissue depth was verified to be 15.0 cm ± 0.5 cm. For frequencies above 3 GHz, the simulated tissue depth was verified to be 10 cm ± 0.5 cm. Z-axis scans showing the SAR penetration are also included in Appendix 1.

System Accuracy Verification Measurements for Head SAR Measurements							
f **(MHz)**	**Description**	**Dipole**	**SAR (W/kg), 1 gram**	**Dielectric Parameters**		**Ambient Temp (°C)**	**Tissue Temp (°C)**
				ε_r	σ (S/m)		
835	**Measured,** Jun-10-2012	4D128	10.0	41.6	0.93	21.0	19.0
	Recommended Limits		9.45	41.5 ±5%	0.90 ±5%	18-25	18-25
1800	**Measured,** Jun-08-2012	259tr	38.05	38.9	1.38	21.1	19.1
	Recommended Limits		38.1	40.0 ±5%	1.40 ±5%	18-25	18-25
2450	**Measured,** Jul-12-2012	877	52.0	38	1.79	20.8	19.2
	Recommended Limits		52.1	39.2 ±5%	1.80 ±5%	18-25	18-25
5200	**Measured,** Jul-25-2012	1098	78.5	35.8	4.61	20.8	19.7
	Recommended Limits		79.2	36.0 ±10%	4.65 ±5%	18-25	18-25
5800	**Measured,** Jul-25-2012	1098	74.7	34.9	5.27	20.9	19.6
	Recommended Limits		78.2	35.4 ±10%	5.27 ±5%	18-25	18-25

The following probe conversion factors were used on the E-Field probe(s) used with the system accuracy verification measurements for head SAR measurements:

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3124	835	6.08	5 of 11
		1810	5.03	5 of 11
E-Field Probe ES3DV3	3284	2450	4.56	5 of 11
E-Field Probe EX3DV4	3728	5200	4.74	5 of 11
		5800	4.23	5 of 11

System Accuracy Verification Measurements for Body SAR Measurements							
f (MHz)	Description	Dipole	SAR (W/kg), 1 gram	Dielectric Parameters		Ambient Temp (°C)	Tissue Temp (°C)
				ε_r	σ (S/m)		
835	**Measured,** Jun-09-201	4D128	10.05	55.5	1.00	20.8	19.0
	Recommended Limits		9.45	55.2 ±5%	0.97 ±5%	18-25	18-25
1800	**Measured,** Jun-08-2012	259tr	39.35	51.8	1.49	21.1	19.3
	Measured, Jul-12-2012		39.35	52.1	1.49	21.0	21.0
	Recommended Limits		39.1	53.3 ±5%	1.52 ±5%	18-25	18-25
2450	**Measured,** Jul-17-2012	863	55.5	51.1	2.0	21.2	19.3
	Recommended Limits		52.8	52.7 ±5%	1.95 ±5%	18-25	18-25
5200	**Measured,** Jul-24-2012	1088	78.2	46.6	5.3	20.5	19.7
	Recommended Limits		75.5	49.03 ±10%	5.30 ±5%	18-25	18-25
5800	**Measured,** Jul-23-2012	1088	75.5	45.7	6.29	20.3	19.2
	Measured, Jul-24-2012		69.8	45.1	6.17	20.7	19.7
	Recommended Limits		75.4	48.2 ±10%	6.00 ±5%	18-25	18-25

The following probe conversion factors were used on the E-Field probe(s) used with the system accuracy verification measurements for body SAR measurements:

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3124	835	6.04	6 of 11
		1810	4.69	6 of 11
E-Field Probe EX3DV4	3728	2450	6.84	6 of 11
		5200	4.22	6 of 11
		5800	3.71	6 of 11

6. Test Results

For GSM and WCDMA modes, the test sample was operated using an actual transmission through a base station simulator. Wi-Fi testing was conducted using manufacturer test mode software, per guidance given in FCC KDB 248227. The base station simulator or test software was set up for the proper channels, transmitter power levels and transmit modes of operation.

The phone was tested in the configurations stipulated in [1], [4] and [5]. The phone was positioned into these configurations using the device holder supplied with the DASY4™ SAR measurement system The default settings for the "coarse" and "cube" scans were chosen and used for measurements. The grid spacing of the coarse scan was set to 15 mm or less as shown in the SAR plots included in Appendices 2 through 4. Please refer to the DASY4™ manual for additional information on SAR scanning procedures and algorithms used.

The Cellular Phone model covered by this report has the following battery options:

Model SNN5915A - 2530 mAH battery

The Model SNN5915A battery is an internally-sealed battery contained within the DUT, and may not be removed by the end-user. This battery was used to do all of the SAR testing. The phone was placed in the SAR measurement system with a fully charged battery.

6.1 Head Adjacent Test Results

The SAR results shown in tables 1 through 4 are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to the [6]. Also shown are the temperature of the simulated tissue after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is:

$$Extrapolated\ SAR = (Measured\ SAR) * 10^{(-drift/10)}$$

The SAR reported at the end of the measurement process by the DASY4™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test.

The left head and right head SAR contour distributions are similar. Because of this similarity, the cheek/touch and 15° tilt test conditions with the highest SAR values in each band are indicated as bold numbers in the following tables and are included in Appendix 2. All other test conditions measured lower SAR values than those included in Appendix 2.

The SAR measurements were performed using the SAM phantoms listed in section 3.1. Since the same phantoms and simulated tissue were used for the system accuracy verification and the device SAR measurements, the Z-axis scans included in Appendix 1 are applicable for verification of simulated tissue depth.

The following probe conversion factors were used on the E-Field probe(s) used for head-adjacent measurements:

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3124	835	6.08	5 of 11
		1810	5.03	5 of 11
E-Field Probe ES3DV3	3284	2450	4.56	5 of 11
E-Field Probe EX3DV4	3728	5200	4.74	5 of 11
		5800	4.23	5 of 11

Left Head Cheek Position																
f (MHz)	Mode	Battery/ Accessory	Channel	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value			1 g SAR value			Test Plot	
				Measured (dBm)	Power Reduction (dB)			Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Grid	Plot Page
835	GSM 850, CS Voice	SNN5915A	128												
			190	**33.45**		**18.9**	**0.07**	**0.201**	**0.20**		**0.266**	**0.27**		**5x5x7**	**A24**
			251												
	GPRS 850, PS Data (2 Upslots)		190	31.35		19.0	-0.05	0.199	0.20		0.266	0.27			
	WCDMA 850, 12.2 kbps RMC		4132												
			4180	**23.99**		**19.2**	**-0.15**	**0.311**	**0.32**		**0.412**	**0.43**		**5x5x7**	**A25**
			4233												
1880	GSM 1900, CS Voice		512												
			661	30.30		20	0.03	0.107	0.11		0.172	0.17			
			810												
	WCDMA 1900, 12.2 kbps RMC		9262												
			9400	23.94		20	0.09	0.223	0.22		0.358	0.36			
			9538												
2450	802.11b, 1 Mbps		1												
			6	18.01		19.2	-0.26	0.208	0.22		0.411	0.44			
			11												
5210	802.11a, 6 Mbps		44	16.05		19.4	-0.36	0.091	0.10		0.248	0.27			
5785	802.11a, 6 Mbps		149	15.20		19.4	-0.33	0.146	0.16		0.466	0.50			

Table 1: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

Right Head Cheek Position																
f (MHz)	Mode	Battery/ Accessory	Channel	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value			1 g SAR value			Test Plot	
				Measured (dBm)	Power Reduction (dB)			Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Grid	Plot Page
835	GSM 850, CS Voice	SNN5915A	128												
			190	33.45		18.9	-0.45	0.171	0.19		0.227	0.25			
			251												
	WCDMA 850, 12.2 kbps RMC		4132												
			4180	23.99		19.2	-0.04	0.287	0.29		0.378	0.38			
			4233												
1880	GSM 1900, CS Voice		512												
			661	**30.30**		**20**	**0.14**	**0.182**	**0.18**		**0.299**	**0.30**		**5x5x7**	**A26**
			810												
	GPRS 1900, PS Data (2 Upslots)		661	28.44		20	-0.08	0.23	0.23		0.378	0.39			
	WCDMA 1900, 12.2 kbps RMC		9262												
			9400	**23.94**		**18.5**	**0.09**	**0.382**	**0.38**		**0.627**	**0.63**		**5x5x7**	**A27**
			9538												
2450	802.11b, 1 Mbps		1	17.18		19.6	-0.16	0.442	0.46		1.13	1.17			
			6	**18.01**		**19.2**	**-0.11**	**0.594**	**0.61**		**1.5**	**1.54**		**5x5x7**	**A28**
			11	17.63		19.6	-0.07	0.46	0.47		1.24	1.26			
5210	802.11a, 6 Mbps		44	**16.05**		**19.4**	**-0.44**	**0.164**	**0.18**		**0.496**	**0.55**		**5x5x7**	**A29**
5785	802.11a, 6 Mbps		149	**15.20**		**19.4**	**-0.94**	**0.215**	**0.27**		**0.78**	**0.97**		**5x5x7**	**A30**

Table 2: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

Left Head 15° Tilt Position																
f (MHz)	Mode	Battery/ Accessory	Channel	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value			1 g SAR value			Test Plot	
				Measured (dBm)	Power Reduction (dB)			Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Grid	Plot Page
835	GSM 850, CS Voice	SNN5915A	128												
			190	33.45		18.9	0.02	0.104	0.14		0.135	0.14			
			251												
	WCDMA 850, 12.2 kbps RMC		4132												
			4180	23.99		19.1	0.08	0.173	0.17		0.221	0.22			
			4233												
1880	GSM 1900, CS Voice		512												
			661	**30.30**		**20**	**0**	**0.073**	**0.07**		**0.123**	**0.12**		**5x5x7**	**A31**
			810												
	WCDMA 1900, 12.2 kbps RMC		9262												
			9400	**23.94**		**20**	**-0.03**	**0.157**	**0.16**		**0.263**	**0.26**		**5x5x7**	**A32**
			9538												
2450	802.11b, 1 Mbps		1												
			6	18.01		19.2	-0.26	0.208	0.22		0.411	0.44			
			11												
5210	802.11a, 6 Mbps		44	16.05		19.4	-0.07	0.088	0.09		0.25	0.25			
5785	802.11a, 6 Mbps		149	15.20		19.4	-0.31	0.167	0.18		0.53	0.57			

Table 3: SAR measurement results at the highest possible output power, measured in a head tilt position against the ICNIRP and ANSI SAR Limit.

Right Head 15° Tilt Position																
f (MHz)	Mode	Battery/ Accessory	Channel	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value			1 g SAR value			Test Plot	
				Measured (dBm)	Power Reduction (dB)			Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Grid	Plot Page
835	GSM 850, CS Voice	SNN5915A	128												
			190	**33.45**		**18.9**	**-0.34**	**0.101**	**0.11**		**0.13**	**0.14**		**5x5x7**	**A33**
			251												
	WCDMA 850, 12.2 kbps RMC		4132												
			4180	**23.99**		**19.2**	**0.08**	**0.176**	**0.18**		**0.228**	**0.23**		**5x5x7**	**A34**
			4233												
1880	GSM 1900, CS Voice		512												
			661	30.30		20	0.05	0.065	0.07		0.109	0.11			
			810												
	WCDMA 1900, 12.2 kbps RMC		9262												
			9400	23.94		18.5	-0.09	0.125	0.13		0.208	0.21			
			9538												
2450	802.11b, 1 Mbps		1												
			6	**18.01**		**19.2**	**0.05**	**0.265**	**0.27**		**0.647**	**0.65**		**5x5x7**	**A35**
			11												
5210	802.11a, 6 Mbps		44	**16.05**		**19.4**	**0.20**	**0.14**	**0.14**		**0.404**	**0.40**		**5x5x7**	**A36**
5785	802.11a, 6 Mbps		149	**15.20**		**19.4**	**-1.50**	**0.179**	**0.25**		**0.666**	**0.94**		**5x5x7**	**A37**

Table 4: SAR measurement results at the highest possible output power, measured in a head tilt position against the ICNIRP and ANSI SAR Limit.

6.2 Body Worn Test Results

The SAR results shown in tables 5 through 6 are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to [6]. Also shown are the temperature of the simulated tissue after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is:

$$Extrapolated\ SAR = (Measured\ SAR) * 10^{(-drift/10)}$$

The SAR reported at the end of the measurement process by the DASY4™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test.

The test conditions that produced the highest SAR values in each band are indicated as bold numbers in the following tables and are included in Appendix 3. All other test conditions measured lower SAR values than those included in Appendix 3.

A SPEAG™ MFP V5.1 C Triple Modular Phantom was used for the body-worn tests. The triple modular phantom consists of three identical modules that can be installed and removed separately without emptying the liquid. Each module of the triple phantom is constructed of glass-fiber reinforced vinylester (VG-GF) with a thickness at the bottom of 2.0 mm. It measures 29.2 cm(long) by 17.8 cm(wide) by 17.8 cm(tall).

The simulated tissue depth was verified to be 15.0 cm ± 0.5 cm for frequencies less than 3 GHz, or 10.0 cm ± 0.5 cm for frequencies greater than 3 GHz. The same device holder described in section 6 was used for positioning the phone. Functional accessories were divided into two categories, the ones with metal components and the ones with non-metal components. For non-metallic component accessories, testing was performed on the accessory that displayed the closest proximity to the flat phantom. Each metallic component accessory, if any, was checked for uniqueness of metal component so that each is tested with the device. If multiple accessories shared an identical metal component, only the accessory that dictates the closest spacing to the body was tested. The cellular phone was tested with a headset connected to the device for all body-worn SAR measurements.

There are no body-worn accessories available for this phone at the time of testing thus the device was tested per the Supplement C testing guidelines for devices that do not have body-worn accessories. A separation distance of 25 mm between the device and the flat phantom was used for testing body-worn SAR. The chosen separation distance of 25 mm is utilized in order to support any case or holder accessories offered or to be offered by Motorola for this product. The device was tested with the front and back of the device facing the phantom. Both sides of the device were tested for Body SAR for the purpose of including the SAR evaluation for body-worn accessories that support the device with the front side facing the user.

The cellular phone was also tested in data mode operations. For these tests, a separation distance of 25 mm between the device and the flat phantom was used. The device was tested in the worst-case SAR position and channel configuration from the voice-mode body-worn testing.

The following probe conversion factors were used on the E-Field probe(s) used for the body-worn measurements:

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3124	835	6.04	6 of 11
		1810	4.69	6 of 11
E-Field Probe EX3DV4	3728	2450	6.84	6 of 11
		5200	4.22	6 of 11
		5800	3.71	6 of 11

Body-Worn, Front of Phone 25 mm from Phantom																
f (MHz)	Mode	Battery/ Accessory	Channel	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value			1 g SAR value			Test Plot	
				Measured (dBm)	Power Reduction (dB)			Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Grid	Plot Page
835	GSM 850, CS Voice	SNN5915A	128												
			190	**33.45**		**18.2**	**0.06**	**0.279**	**0.28**		**0.37**	**0.37**		**5x5x7**	**A39**
			251												
	GPRS 850, PS Data (2 Upslots)		190	31.35		18.3	-0.02	0.252	0.25		0.333	0.33			
	EDGE 850, PS Data (2 Upslots)		190	25.60		18.3	0	0.153	0.15		0.203	0.20			
	WCDMA 850, 12.2 kbps RMC		4132												
			4180	**23.99**		**18.3**	**-0.12**	**0.414**	**0.43**		**0.548**	**0.56**		**5x5x7**	**A40**
			4233												
1880	GSM 1900, CS Voice		512												
			661	30.30		18.7	-0.01	0.117	0.12		0.193	0.19			
			810												
	GPRS 1900, PS Data (2 Upslots)		661	**28.44**		**18.5**	**-0.12**	**0.144**	**0.15**		**0.242**	**0.25**		**5x5x7**	**A41**
	EDGE 1900, PS Data (2 Upslots)		661	24.46		18.2	-0.05	0.143	0.14		0.235	0.24			
	WCDMA 1900, 12.2 kbps RMC		9262												
			9400	**23.94**		**18.8**	**-0.02**	**0.272**	**0.27**		**0.445**	**0.45**		**5x5x7**	**A42**
			9538												
2450	802.11b, 1 Mbps		1												
			6	18.01		19.5	0.99	0.01	0.01		0.012	0.01			
			11												
5210	802.11a, 6 Mbps		44	16.05		19.3	0	0.012	0.01		0.033	0.03			
5785	802.11a, 6 Mbps		149	**15.20**		**19.2**	**0.01**	**0.017**	**0.02**		**0.044**	**0.04**		**5x5x7**	**A43**

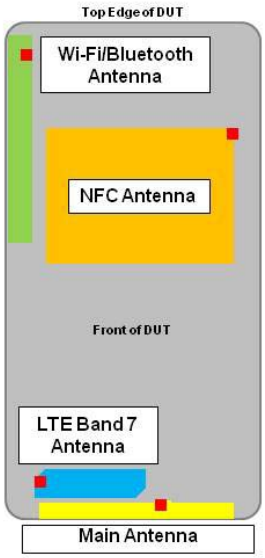
Table 5: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

Body-Worn, Back of Phone 25 mm from Phantom																
f (MHz)	Mode	Battery/ Accessory	Channel	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value			1 g SAR value			Test Plot	
				Measured (dBm)	Power Reduction (dB)			Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Grid	Plot Page
835	GSM 850, CS Voice	SNN5915A	128												
			190	33.45		18.2	0	0.251	0.25		0.334	0.33			
			251												
	WCDMA 850, 12.2 kbps RMC		4132												
			4180	23.99		18.3	0.05	0.369	0.37		0.489	0.49			
			4233												
1880	GSM 1900, CS Voice		512												
			661	30.30		18.7	0.03	0.102	0.10		0.167	0.17			
			810												
	WCDMA 1900, 12.2 kbps RMC		9262												
			9400	23.94		18.8	0	0.25	0.25		0.408	0.41			
			9538												
2450	802.11b, 1 Mbps		1												
			6	**18.01**		**19.5**	**0.2**	**0.016**	**0.02**		**0.029**	**0.03**		**5x5x7**	**A44**
			11												
5210	802.11a, 6 Mbps		44	**16.05**		**19.3**	**0.23**	**0.021**	**0.02**		**0.052**	**0.05**		**5x5x7**	**A45**
5785	802.11a, 6 Mbps		149	15.20		19.9	-0.48	0.003	0		0.010	0.01			

Table 6: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

6.4 Mobile Hotspot Test Results

The DUT is capable of functioning as a Wi-Fi to Cellular mobile hotspot. Additional SAR testing was performed according to the test guidelines provided per FCC KDB 941225 D06. Testing was performed with a separation of 1 cm between the DUT and the "flat" phantom. The DUT was positioned for SAR tests with the front and back surfaces facing the phantom, and also with the edges facing the phantom in which the transmitting antenna is less than 2.5 cm from the edge.



Mobile Hotspot Surfaces for SAR testing						
Mode	Front	Back	Left	Right	Top	Bottom
GSM	Yes	Yes	Yes	Yes	No	Yes
WCDMA	Yes	Yes	Yes	Yes	No	Yes
Wi-Fi	Yes	Yes	Yes	No	Yes	No

The SAR results shown in tables 7 through 12 are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to [6]. Also shown are the temperature of the simulated tissue after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is:

$$Extrapolated\ SAR = (Measured\ or\ Corrected\ SAR) * 10^{(-drift/10)}$$

The SAR reported at the end of the measurement process by the DASY4™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test.

The DUT utilizes a reduced limit for the maximum transmit power when the mobile hotspot functionality is enabled, as described above in 2.2.2. A complete description of this functionality is provided in the "Operational Description" contained within Exhibit 12.

The test conditions that produced the highest SAR values in each band are indicated as bold numbers in the following tables and are included in Appendix 4. All other test conditions measured lower SAR values than those included in Appendix 4.

A SPEAG™ MFP V5.1 C Triple Modular Phantom was used for the body-worn tests. The triple modular phantom consists of three identical modules that can be installed and removed separately without emptying the liquid. Each module of the triple phantom is constructed of glass-fiber reinforced vinylester (VG-GF) with a thickness at the bottom of 2.0 mm. It measures 29.2 cm(long) by 17.8 cm(wide) by 17.8 cm(tall).

The simulated tissue depth was verified to be 15.0 cm ± 0.5 cm for frequencies below 3 GHz, or 10.0 cm ± 0.5 cm for frequencies greater than 3 GHz. The same device holder described in section 6 was used for positioning the phone.

The following probe conversion factors were used on the E-Field probe(s) used for the body-worn mobile hotspot measurements:

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3124	835	6.04	6 of 11
		1810	4.69	6 of 11
E-Field Probe EX3DV4	3728	2450	6.84	6 of 11
		5200	4.22	6 of 11
		5800	3.71	6 of 11

Mobile Hotspot, Bottom Edge of Phone 10 mm from Phantom															
f (MHz)	Mode	Battery/ Accessory	Channel	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value			1 g SAR value			Test Plot	
				Measured (dBm)	Power Reduction (dB)			Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Grid	Plot Page
835	GPRS 850, PS Data (2 Upslots)	SNN5915A	128												
			190	31.35	0	18	0.06	0.032	0.03		0.06	0.06			
			251												
	WCDMA 850, 12.2 kbps RMC		4132												
			4180	23.99	0	18.7	0.07	0.048	0.05		0.090	0.09			
			4233												
1880	GPRS 1900, PS Data (2 Upslots)		512	28.54	4	19.5	0.07	0.493	0.49		0.965	0.97			
			661	**28.44**	**4**	**19.5**	**0.09**	**0.495**	**0.50**		**0.973**	**0.97**		**5x5x7**	**A47**
			810	28.39	4	19.5	0.09	0.484	0.48		0.955	0.96			
	WCDMA 1900, 12.2 kbps RMC		9262	24.00	7	19.5	0	0.1454	0.45		0.906	0.91			
			9400	23.94	7	19.5	0.07	0.416	0.42		0.827	0.83			
			9538	**23.90**	**7**	**19.5**	**0.06**	**0.487**	**0.49**		**0.97**	**0.97**		**5x5x7**	**A48**

Table 7: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot, Left Edge of Phone 10 mm from Phantom															
f (MHz)	Mode	Battery/ Accessory	Channel	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value			1 g SAR value			Test Plot	
				Measured (dBm)	Power Reduction (dB)			Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Grid	Plot Page
835	GPRS 850, PS Data (2 Upslots)	SNN5915A	128												
			190	**31.35**	0	**18.1**	**0**	**0.42**	**0.42**		**0.619**	**0.62**		**5x5x7**	**A49**
			251												
	WCDMA 850, 12.2 kbps RMC		4132												
			4180	23.99	0	18.7	0.01	0.531	0.53		0.782	0.78			
			4233												
1880	GPRS 1900, PS Data (2 Upslots)		512												
			661	28.44	4	19.5	-0.02	0.014	0.01		0.026	0.03			
			810												
	WCDMA 1900, 12.2 kbps RMC		9262												
			9400	23.94	7	19.5	-0.07	0.013	0.01		0.021	0.02			
			9538												
2450	802.11b, 1 Mbps		1												
			6	**18.01**	0	**19.5**	**0.36**	**0.125**	**0.13**		**0.417**	**0.42**		**5x5x7**	**A50**
			11												
5785	802.11a, 6 Mbps		149	15.20	0	19.3	0.03	0.032	0.03		0.107	0.11			

Table 8: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot, Right Edge of Phone 10 mm from Phantom																
f (MHz)	Mode	Battery/ Accessory	Channel	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value			1 g SAR value			Test Plot	
				Measured (dBm)	Power Reduction (dB)			Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Grid	Plot Page
835	GPRS 850, PS Data (2 Upslots)	SNN5915A	128												
			190	31.35	0	18.1	0	0.349	0.35		0.512	0.51			
			251												
	WCDMA 850, 12.2 kbps RMC		4132	23.95	0	20.2	-0.02	0.377	0.38		0.55	0.55			
			4180	**23.99**	**0**	**18.7**	**0.04**	**0.614**	**0.61**		**0.905**	**0.91**		**5x5x7**	**A51**
			4233	23.85	0	20.2	0.03	0.504	0.50		0.741	0.74			
1880	GPRS 1900, PS Data (2 Upslots)		512												
			661	28.44	4	19.5	-0.02	0.086	0.09		0.147	0.15			
			810												
	WCDMA 1900, 12.2 kbps RMC		9262												
			9400	23.94	7	19.5	0.04	0.074	0.07		0.127	0.13			
			9538												

Table 9: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot, Front of Phone 10 mm from Phantom																
f (MHz)	Mode	Battery/ Accessory	Channel	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value			1 g SAR value			Test Plot	
				Measured (dBm)	Power Reduction (dB)			Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Grid	Plot Page
835	GPRS 850, PS Data (2 Upslots)	SNN5915A	128												
			190	31.35	0	18.2	-0.08	0.447	0.46		0.579	0.59			
			251												
	WCDMA 850, 12.2 kbps RMC		4132	23.95	0	20.2	-0.01	0.513	0.51		0.663	0.66			
			4180	23.99	0	18.7	-0.02	0.632	0.63		0.82	0.82			
			4233	23.85	0	20.2	0.07	0.653	0.65		0.855	0.86			
1880	GPRS 1900, PS Data (2 Upslots)		512												
			661	28.44	4	19.5	-0.07	0.351	0.36		0.661	0.67			
			810												
	WCDMA 1900, 12.2 kbps RMC		9262												
			9400	23.94	7	19.5	-0.08	0.267	0.27		0.497	0.51			
			9538												
2450	802.11b, 1 Mbps		1												
			6	18.01	0	19.5	-0.07	0.080	0.08		0.175	0.18			
			11												
5785	802.11a, 6 Mbps		149	15.20	0	19.2	0.03	0.027	0.03		0.074	0.07			

Table 10: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot, Back of Phone 10 mm from Phantom																
f (MHz)	Mode	Battery/ Accessory	Channel	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value			1 g SAR value			Test Plot	
				Measured (dBm)	Power Reduction (dB)			Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Grid	Plot Page
835	GPRS 850, PS Data (2 Upslots)	SNN5915A	128												
			190	31.35	0	18.1	-0.02	0.396	0.40		0.519	0.52			
			251												
	WCDMA 850, 12.2 kbps RMC		4132												
			4180	23.99	0	18.7	0.01	0.582	0.58		0.758	0.76			
			4233												
1880	GPRS 1900, PS Data (2 Upslots)		512												
			661	28.44	4	19.5	0.03	0.297	0.30		0.545	0.55			
			810												
	WCDMA 1900, 12.2 kbps RMC		9262												
			9400	23.94	7	19.5	-0.1	0.254	0.26		0.47	0.48			
			9538												
2450	802.11b, 1 Mbps		1												
			6	18.01	0	19.5	0.06	0.054	0.05		0.167	0.17			
			11												
5785	802.11a, 6 Mbps		149	15.20	0	19.3	0.09	0.01	0.01		0.033	0.03			

Table 11: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

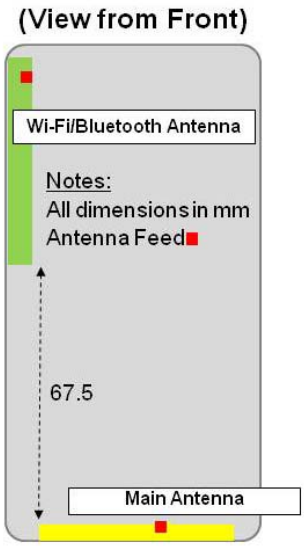
Mobile Hotspot, Top Edge of Phone 10 mm from Phantom																
f (MHz)	Mode	Battery/ Accessory	Channel	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value			1 g SAR value			Test Plot	
				Measured (dBm)	Power Reduction (dB)			Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Corrected (W/kg)	Grid	Plot Page
2450	802.11b, 1 Mbps	SNN5915A	1												
			6	18.01	0	19.5	-0.19	0.008	0.01		0.029	0.03			
			11												
5785	802.11a, 6 Mbps		149	**15.20**	**0**	**19.3**	**-0.18**	**0.053**	**0.05**		**0.148**	**0.15**		**5x5x7**	**A52**

Table 12: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

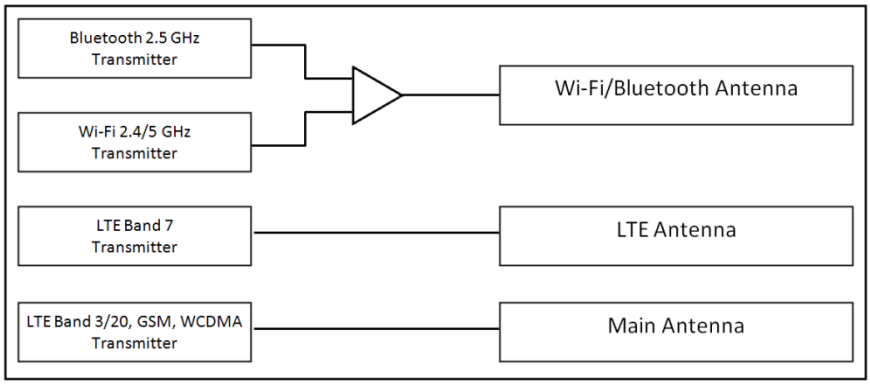
6.5 Description and Evaluation of Simultaneous Transmitters

Per "SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas" (FCC KDB 648474), the necessity of stand-alone and simultaneous SAR testing was evaluated for the licensed and unlicensed transmitters of the device under test.

By device design the GSM or WCDMA transmitters may operate simultaneously with the Wi-Fi transmitter as described in the tables on the following pages. GSM and WCDMA supports both voice and data transmission. Wi-Fi support data transmission only. Bluetooth may also operate simultaneously with these modes, but is omitted from evaluation as described in section 2.3.4 above. The separation distances between the antennas are depicted in the layout diagram below, and a simplified model of the transmit paths is provided in the block diagram below.



Simplified DUT Transmit Path Block Diagram



For the transmitters requiring stand-alone SAR testing (GSM, WCDMA, and Wi-Fi), the KDB guidelines direct that if the sum of the 1 g SAR measured for the simultaneously transmitting antennas is less than the SAR limit, SAR measurement for simultaneous transmission is not required. Further, if the SAR-to-peak-location separation ratio for two simultaneously transmitting antennas is less than 0.3 then SAR measurement for simultaneous transmission is likewise not required. Simultaneous SAR summations for the head, body-worn accessory, and mobile hotspot exposure conditions with the worst-case SAR transmitter configurations are presented in tables 13 to 18 below[4].

Head Exposure Conditions; Simultaneous Transmit Configurations, including Power Conditions or Reduced Limits					
Case	Transmitter #1		Transmitter #2		Notes
	Transmitter Configuration	PWR	Transmitter Configuration	PWR	
H1	GSM 850 CS Voice	*N/A*	Wi-Fi 2.4 GHz	*N/A*	Voice + Background Data
H2	GSM 1900 CS Voice	*N/A*	Wi-Fi 2.4 GHz	*N/A*	Voice + Background Data
H3	WCDMA 850	*N/A*	Wi-Fi 2.4 GHz	*N/A*	Voice + Background Data
H4	WCDMA 1900	*N/A*	Wi-Fi 2.4 GHz	*N/A*	Voice + Background Data
H5	GSM 850 CS Voice	*N/A*	Wi-Fi 5 GHz	*N/A*	Voice + Background Data
H6	GSM 1900 CS Voice	*N/A*	Wi-Fi 5 GHz	*N/A*	Voice + Background Data
H7	WCDMA 850	*N/A*	Wi-Fi 5 GHz	*N/A*	Voice + Background Data
H8	WCDMA 1900	*N/A*	Wi-Fi 5 GHz	*N/A*	Voice + Background Data

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)			
						Case H1	Case H2	Case H5	Case H6
Band		GSM 850	GSM 1900	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	GSM 850 + Wi-Fi 2.4 GHz	GSM 1900 + Wi-Fi 2.4 GHz	GSM 850 + Wi-Fi 5 GHz	GSM 1900 + Wi-Fi 5 GHz
Power Condition or Reduced Limit		*N/A*	*N/A*	*N/A*	*N/A*				
Position	Left Head Cheek	0.27	0.17	0.44	0.5	0.71	0.61	0.77	0.67
	Left Head 15° Tilt	0.14	0.12	0.16	0.57	0.30	0.28	0.71	0.69
	Right Head Cheek	0.25	0.30	1.54	0.97	**>1.60**	**>1.60**	1.22	1.27
	Right Head 15° Tilt	0.14	0.11	0.65	0.94	0.79	0.76	1.08	1.05

Table 13: SAR summations for simultaneous evaluation – GSM in Head Positions

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)			
						Case H3	Case H4	Case H7	Case H8
Band		WCDMA 850	WCDMA 1900	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	WCDMA 850 + Wi-Fi 2.4 GHz	WCDMA 1900 + Wi-Fi 2.4 GHz	WCDMA 850 + Wi-Fi 5 GHz	WCDMA 1900 + Wi-Fi 5 GHz
Power Condition or Reduced Limit		*N/A*	*N/A*	*N/A*	*N/A*				
Position	Left Head Cheek	0.43	0.36	0.44	0.5	0.87	0.80	0.93	0.86
	Left Head 15° Tilt	0.22	0.26	0.16	0.57	0.38	0.42	0.79	0.83
	Right Head Cheek	0.38	0.63	1.54	0.97	**>1.60**	**>1.60**	1.35	**>1.60**
	Right Head 15° Tilt	0.23	0.21	0.65	0.94	0.88	0.86	1.17	1.15

Table 14: SAR summations for simultaneous evaluation – WCDMA in Head Positions

[4] A description of the power conditions or reduced limits for simultaneous transmit modes is provided in section 2.2.1 and in expanded detail in Exhibit 12. The notation used in the "Exposure Condition" tables is as follows for the **PWR** column:

- *N/A* indicates the transmitter in this case has no reduced power limit enforced and may operate up to its maximum power, and no conditions are contingent on this transmitter's operation.
- *17* and *24.5* indicate an enforced power limit, at the value stated in dBm, on the noted transmitter for this case.

Body-Worn Accessory Exposure Conditions; Simultaneous Transmit Configurations, including Power Conditions or Reduced Limits					
Case	Transmitter #1		Transmitter #2		Notes
	Transmitter Configuration	PWR	Transmitter Configuration	PWR	
B1	GSM 850 CS Voice	*N/A*	Wi-Fi 2.4 GHz	*N/A*	Voice + Background Data
B2	GSM 1900 CS Voice	*N/A*	Wi-Fi 2.4 GHz	*N/A*	Voice + Background Data
B3	WCDMA 850	*N/A*	Wi-Fi 2.4 GHz	*N/A*	Voice + Background Data
B4	WCDMA 1900	*N/A*	Wi-Fi 2.4 GHz	*N/A*	Voice + Background Data
B5	GSM 850 CS Voice	*N/A*	Wi-Fi 5 GHz	*N/A*	Voice + Background Data
B6	GSM 1900 CS Voice	*N/A*	Wi-Fi 5 GHz	*N/A*	Voice + Background Data
B7	WCDMA 850	*N/A*	Wi-Fi 5 GHz	*N/A*	Voice + Background Data
B8	WCDMA 1900	*N/A*	Wi-Fi 5 GHz	*N/A*	Voice + Background Data

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)			
						Case B1	Case B2	Case B5	Case B6
Band		GSM 850	GSM 1900	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	GSM 850 + Wi-Fi 2.4 GHz	GSM 1900 + Wi-Fi 2.4 GHz	GSM 850 + Wi-Fi 5 GHz	GSM 1900 + Wi-Fi 5 GHz
Power Condition or Reduced Limit		*N/A*	*N/A*	*N/A*	*N/A*				
Position	Body Worn, Front of Phone 25 mm from Phantom	0.37	0.19	0.01	0.04	0.38	0.20	0.41	0.23
	Body Worn, Back of Phone 25 mm from Phantom	0.33	0.17	0.03	0.01	0.36	0.20	0.34	0.18

Table 15: SAR summations for simultaneous evaluation – GSM in Body-Worn Accessory Positions

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)			
						Case B3	Case B4	Case B7	Case B8
Band		WCDMA 850	WCDMA 1900	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	WCDMA 850 + Wi-Fi 2.4 GHz	WCDMA 1900 + Wi-Fi 2.4 GHz	WCDMA 850 + Wi-Fi 5 GHz	WCDMA 1900 + Wi-Fi 5 GHz
Power Condition or Reduced Limit		*N/A*	*N/A*	*N/A*	*N/A*				
Position	Body Worn, Front of Phone 25 mm from Phantom	0.56	0.45	0.01	0.04	0.57	0.46	0.60	0.49
	Body Worn, Back of Phone 25 mm from Phantom	0.49	0.41	0.03	0.01	0.52	0.44	0.50	0.42

Table 16: SAR summations for simultaneous evaluation – WCDMA in Body-Worn Accessory Positions

Mobile Hotspot Exposure Conditions; Simultaneous Transmit Configurations, including Power Conditions or Reduced Limits					
Case	Transmitter #1		Transmitter #2		Notes
	Transmitter Configuration	PWR	Transmitter Configuration	PWR	
M1	GPRS 850	*N/A*	Wi-Fi 2.4 GHz	*N/A*	Mobile Hotspot session
M2	GPRS 1900	*24.5*	Wi-Fi 2.4 GHz	*N/A*	Mobile Hotspot session
M3	WCDMA 850	*N/A*	Wi-Fi 2.4 GHz	*N/A*	Mobile Hotspot session
M4	WCDMA 1900	*14*	Wi-Fi 2.4 GHz	*N/A*	Mobile Hotspot session
M5	GPRS 850	*N/A*	Wi-Fi 5.785 GHz	*N/A*	Mobile Hotspot session
M6	GPRS 1900	*24.5*	Wi-Fi 5.785 GHz	*N/A*	Mobile Hotspot session
M7	WCDMA 850	*N/A*	Wi-Fi 5.785 GHz	*N/A*	Mobile Hotspot session
M8	WCDMA 1900	*14*	Wi-Fi 5.785 GHz	*N/A*	Mobile Hotspot session

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)			
						Case M1	Case M2	Case M5	Case M6
Band		GSM 850	GSM 1900	Wi-Fi 2.4 GHz	Wi-Fi 5.785 GHz	GSM 850 + Wi-Fi 2.4 GHz	GSM 1900 + Wi-Fi 2.4 GHz	GSM 850 + Wi-Fi 5.785 GHz	GSM 1900 + Wi-Fi 5.785 GHz
Power Condition or Reduced Limit		*N/A*	24.5 dBm	*N/A*	*N/A*				
Position	Front of Phone 10 mm from Phantom	0.59	0.67	0.18	0.07	0.77	0.85	0.66	0.74
	Back of Phone 10 mm from Phantom	0.52	0.55	0.17	0.03	0.69	0.72	0.55	0.58
	Left Edge of Phone 10 mm from Phantom	0.62	0.03	0.42	0.11	1.04	0.45	0.73	0.14
	Right Edge of Phone 10 mm from Phantom	0.51	0.15	0	0	0.51	0.15	0.51	0.15
	Top Edge of Phone 10 mm from Phantom	0	0	0.03	0.15	0.03	0.03	0.15	0.15
	Bottom Edge of Phone 10 mm from Phantom	0.06	0.97	0	0	0.06	0.97	0.06	0.97

Table 17: SAR summations for simultaneous evaluation – Positions during a Mobile Hotspot session

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)			
						Case M3	Case M4	Case M7	Case M8
Band		WCDMA 850	WCDMA 1900	Wi-Fi 2.4 GHz	Wi-Fi 5.785 GHz	WCDMA 850 + Wi-Fi 2.4 GHz	WCDMA 1900 + Wi-Fi 2.4 GHz	WCDMA 850 + Wi-Fi 5.785 GHz	WCDMA 1900 + Wi-Fi 5.785 GHz
Power Condition or Reduced Limit		*N/A*	17 dBm	*N/A*	*N/A*				
Position	Front of Phone 10 mm from Phantom	0.86	0.51	0.18	0.07	1.04	0.69	0.93	0.58
	Back of Phone 10 mm from Phantom	0.76	0.48	0.17	0.03	0.93	0.65	0.79	0.51
	Left Edge of Phone 10 mm from Phantom	0.78	0.02	0.42	0.11	1.20	0.44	0.89	0.13
	Right Edge of Phone 10 mm from Phantom	0.91	0.13	0	0	0.91	0.13	0.91	0.13
	Top Edge of Phone 10 mm from Phantom	0.00	0.00	0.03	0.15	0.03	0.03	0.15	0.15
	Bottom Edge of Phone 10 mm from Phantom	0.09	0.97	0	0	0.09	0.97	0.09	0.97

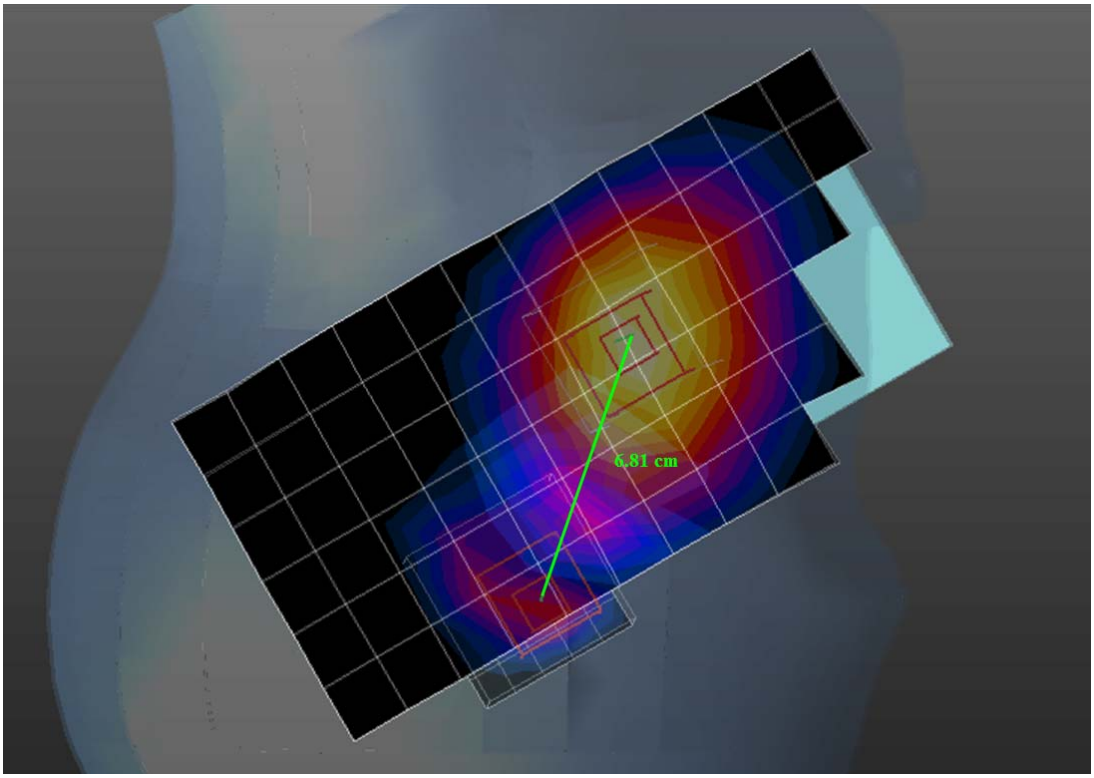
Table 18: SAR summations for simultaneous evaluation – Positions during a Mobile Hotspot session

Per the preceding analysis, the following configurations and transmitter combinations required further investigation:

- Case H1, Right Cheek, GSM 850 + Wi-Fi 2.4 GHz
- Case H2, Right Cheek, GSM 1900 + Wi-Fi 2.4 GHz
- Case H3, Right Cheek, WCDMA 850 + Wi-Fi 2.4 GHz
- Case H4, Right Cheek, WCDMA 1900 + Wi-Fi 2.4 GHz
- Case H8, Right Cheek, WCDMA 1900 + Wi-Fi 5 GHz

The guidelines provided in "SAR for Handsets with Multiple Transmitters" (KDB publication 648474 D01) were utilized for evaluation of the need for simultaneous transmission SAR testing. These guidelines direct that if the SAR-to-peak location separation ratio (SPLSR) for a pair of antennas is < 0.3 then SAR evaluation for simultaneous transmission is not required. Overlaid SAR plots, separation distances between RF peaks[5], and demonstration of these calculations are provided below for each noted case.

Case H1, Right Cheek, GSM 850 + Wi-Fi 2.4 GHz



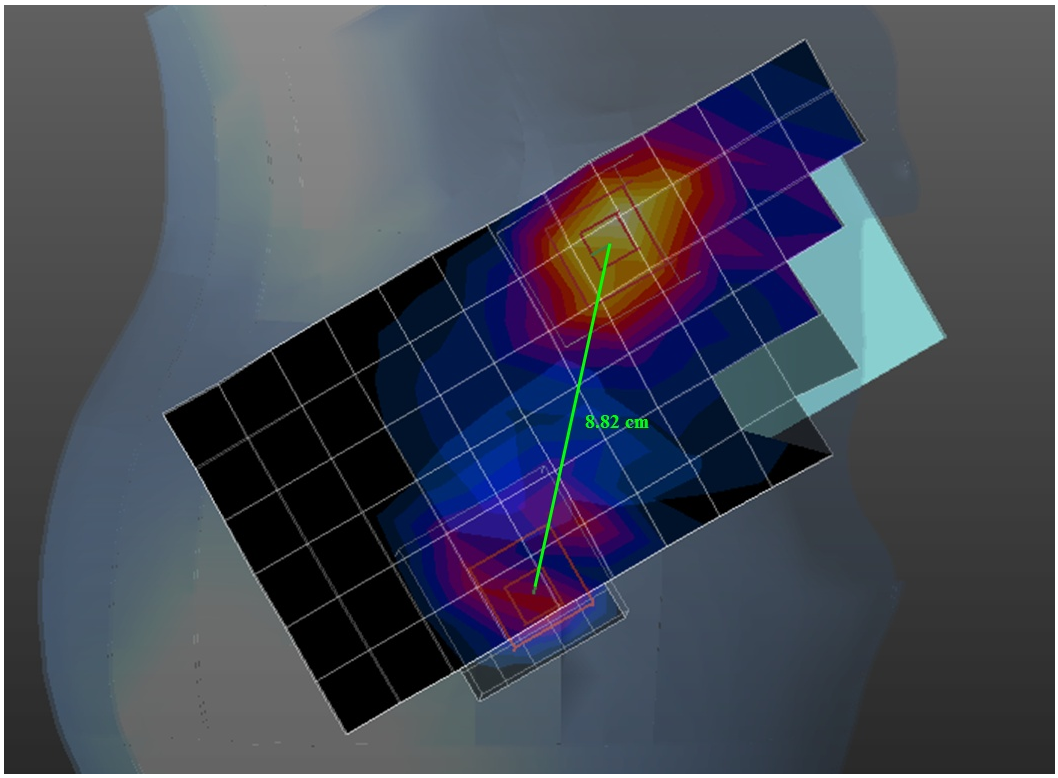
GSM 850 Right Head Cheek SAR overlaid with Wi-Fi 2.4 GHz Right Head Cheek SAR

Transmitter	1-g SAR
GSM 850	0.25
Wi-Fi 2.4 GHz	1.54
Sum	1.79
Peak separation distance	6.81 cm
SPLSR	*0.26*

As the SPLSR is below 0.30, no measurements to determine the aggregate 1-g SAR were required for this case.

[5] Calculations of peak separation distances were evaluated per SPEAG Technical Note "Calculation of the Distance between Two Hotspot", *TN_110209_DASY_Calculate_HotSpot_Distance.pdf.*

Case H2, Right Cheek, GSM 1900 + Wi-Fi 2.4 GHz

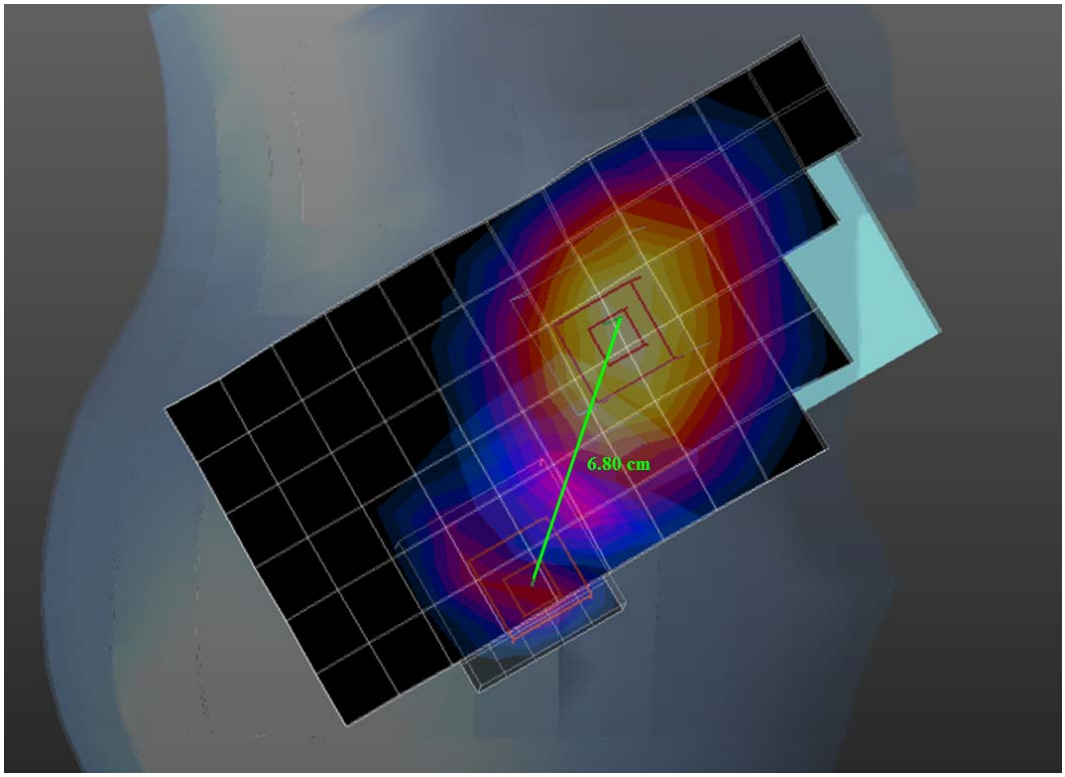


GSM 1900 Right Head Cheek SAR overlaid with Wi-Fi 2.4 GHz Right Head Cheek SAR

Transmitter	**1-g SAR**
GSM 1900	0.30
Wi-Fi 2.4 GHz	1.54
Sum	1.84
Peak separation distance	8.82 cm
SPLSR	*0.21*

As the SPLSR is below 0.30, no measurements to determine the aggregate 1-g SAR were required for this case.

Case H3, Right Cheek, WCDMA 850 + Wi-Fi 2.4 GHz

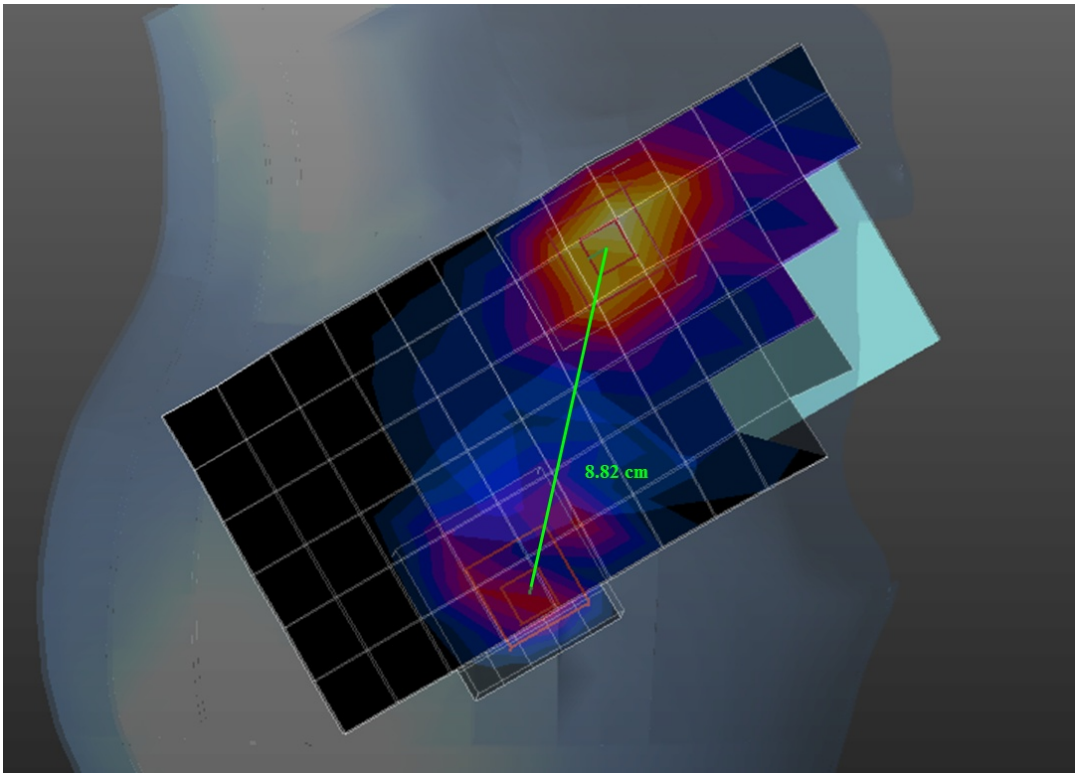


WCDMA 850 Right Head Cheek SAR overlaid with Wi-Fi 2.4 GHz Right Head Cheek SAR

Transmitter	**1-g SAR**
WCDMA 850	0.38
Wi-Fi 2.4 GHz	1.54
Sum	1.92
Peak separation distance	6.80 cm
SPLSR	*0.28*

As the SPLSR is below 0.30, no measurements to determine the aggregate 1-g SAR were required for this case.

Case H4, Right Cheek, WCDMA 1900 + Wi-Fi 2.4 GHz

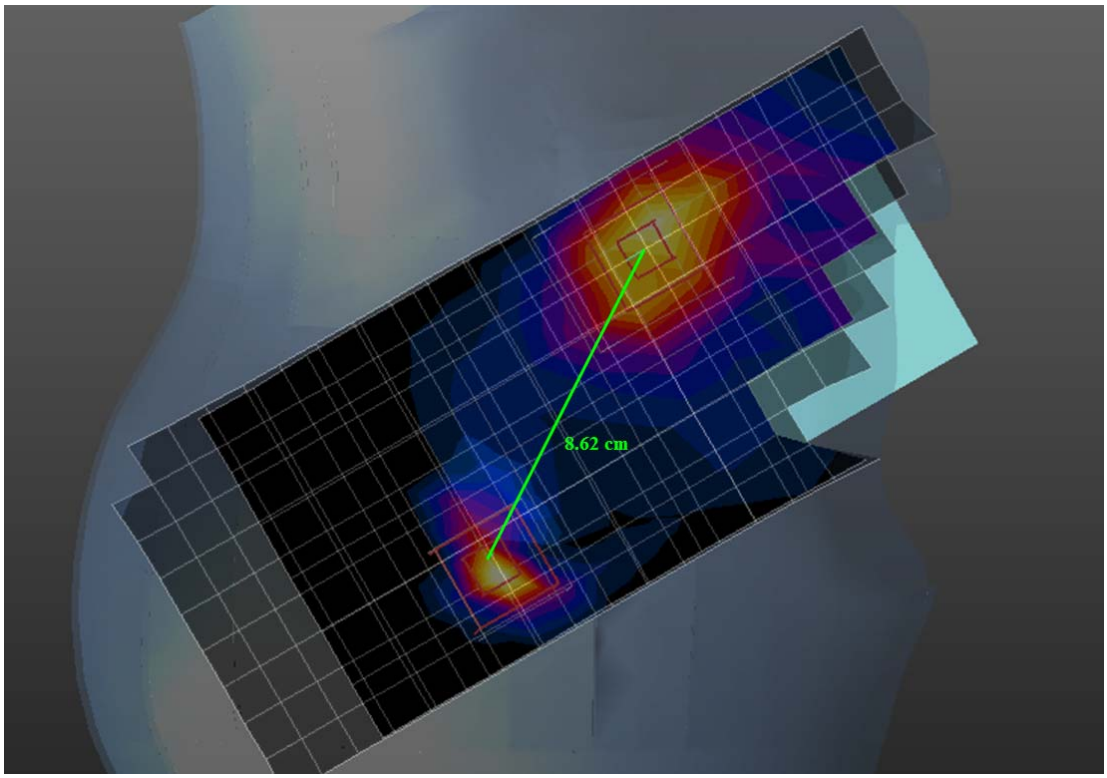


WCDMA 1900 Right Head Cheek SAR overlaid with Wi-Fi 2.4 GHz Right Head Cheek SAR

Transmitter	1-g SAR
WCDMA 1900	0.63
Wi-Fi 2.4 GHz	1.54
Sum	2.17
Peak separation distance	8.82 cm
SPLSR	*0.25*

As the SPLSR is below 0.30, no measurements to determine the aggregate 1-g SAR were required for this case.

Case H8, Right Cheek, WCDMA 1900 + Wi-Fi 5 GHz



WCDMA 1900 Right Head Cheek SAR overlaid with Wi-Fi 5 GHz Right Head Cheek SAR

Transmitter	1-g SAR
WCDMA 1900	0.63
Wi-Fi 5 GHz	0.97
Sum	1.60
Peak separation distance	8.62 cm
SPLSR	*0.19*

As the SPLSR is below 0.30, no measurements to determine the aggregate 1-g SAR were required for this case.

Simultaneous Evaluation Conclusion

As demonstrated by the summations and SPLSR calculations above, no measurements for simultaneous SAR are required.

References

[1] CENELEC, en62209-1:2006 “Human Exposure to Radio Frequency Fields From Hand - Held and Body - Mounted Wireless Communication Devices – Human Models, Instrumentation, and Procedures”

[2] CENELEC, en50360:2001 “Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)”.

[3] ANSI / IEEE, C95.1 1992 Edition “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”

[4] FCC OET Bulletin 65 Supplement C 01-01

[5] IEEE 1528 2003 Edition “IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”

[6] ICNIRP Guidelines “Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz)”