MOTOROLA

Class 2 Permissive Change SAR Test Report

Tests Requested By:	Motorola Mobility, LLC 600 N. US Highway 45 Libertyville, IL 60048
Test Report #:	25324-1F
Date of Report:	Mar 27, 2013
Date of Test:	Jan 9, 2013 to Jan 18, 2013 and Mar 22, 2013 to Mar 26, 2013
FCC ID #:	IHDP56ND1
IC ID #:	N/A
Generic Name:	M0DB6
Test Laboratory:	Motorola Mobility, LLC - 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), along with other published guidance indicated in the references at the end of this report, 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	Mar-27-2013	Initial report release

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], [5], and per FCC KDB 941225 D06 for mobile hotspot operation. 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. These measurements were performed using a DASY52™ system manufactured by Schmid & Partner Engineering AG (SPEAG), of Zurich Switzerland.

Transmit Band	Head SAR (1 g $^{W}/_{kg}$)	Body-Worn Accessory SAR (1 g $^{W}/_{kg}$)	Mobile Hotspot SAR (1 g $^{W}/_{kg}$)
GSM 850	0.99	1.26	1.26
GSM 1900	0.42	0.92	0.92
WCDMA 850	0.64	1.24	1.24
WCDMA 1900	0.67	1.22	1.22
Wi-Fi 2.45 GHz	1.09	0.36	0.39
Bluetooth	N/A		
Simultaneous SAR	1.60		

2 Details of the Device Under Test

2.1 Sample Information

Serial Number(s) (Functional Use)	353209050049820 (GSM/WCDMA conducted power measurements, GSM/WCDMA SAR testing) 353208050050691 (Wi-Fi 2.4 GHz SAR testing) 353208050050346 (Wi-Fi 2.4 GHz 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

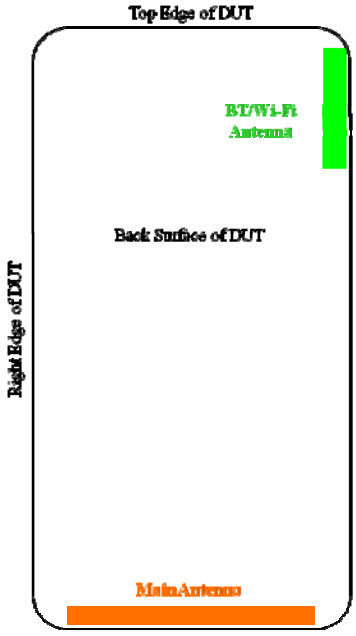
2.2 Antenna Description

Main (850/1900 MHz) Antenna

Type	Internal	
Location	Bottom of Transceiver	
Dimensions	Width	12.93 mm
	Length	55.67 mm

Bluetooth/Wi-Fi 2.4 GHz Antenna

Type	Internal	
Location	Left-Side Rear of Transceiver	
Dimensions	Width	5.6 mm
	Length	14.94 mm



2.3 Transmission Band Summary

Mode(s) of Operation	Modulation Mode(s)	Target Output Power Setting	Tune-Up Tolerance	Duty Cycle	Transmitting Frequency Range(s)
GSM 850	GMSK	31.8 dBm	-1.0 dB / +1.0 dB	1:8	824.2 - 848.8 MHz
GPRS/EDGE 850	GMSK	31.8 dBm	-1.0 dB / +1.0 dB	1:8, 2:8, 3:8, 4:8	824.2 - 848.8 MHz
EDGE 850	8PSK	26.5 dBm	-1.0 dB / +1.0 dB	1:8, 2:8, 3:8, 4:8	824.2 - 848.8 MHz
GSM 1900	GMSK	28.8 dBm	-1.0 dB / +1.0 dB	1:8	1850.2 - 1909.8 MHz
GPRS/EDGE 1900	GSMK	28.8 dBm	-1.0 dB / +1.0 dB	1:8, 2:8, 3:8, 4:8	1850.2 - 1909.8 MHz
EDGE 1900	8PSK	25.5 dBm	-1.0 dB / +1.0 dB	1:8, 2:8, 3:8, 4:8	1850.2 - 1909.8 MHz
WCDMA 850	QPSK	22.5 dBm	-1.0 dB / +1.0 dB	1:1	826.4 - 846.6 MHz
WCDMA 1900	QPSK	21.4 dBm	-1.0 dB / +1.0 dB	1:1	1852.4 - 1907.6 MHz
Wi-Fi 802.11b/g/n	BPSK	15.34 dBm		1:1	2412.0 - 2462.0 MHz
Bluetooth	GFSK	8.71 dBm		1:1	2402.0 – 2480.0 MHz

2.4 Device Test Setup, Operating Configurations, and Conducted Power Measurements

2.4.1 GSM

Technical Description

The phone under test contains a GSM transmitter that supports voice (circuit-switched) capability, and data (packet-switched) capabilities over GPRS/EDGE (GMSK) or EDGE (8PSK).

Exposure Conditions and Test Exclusions

Mode	Type	Head-Adjacent	Body-Worn Accessory	Mobile Hotspot
GSM (GMSK 1-Slot)	Voice	Tested	Tested	N/A
GPRS/EDGE (GMSK Multi-Slot)	Data	Tested (1) (3)	Tested (1) (3)	Tested (3)
EDGE (8PSK Multi-Slot)	Data	Excluded (2) (3)	Excluded (2) (3)	Excluded (2) (3)

Notes:

(1) GPRS/EDGE (GMSK Multi-Slot), as a data-only mode, was tested against the Head and in Body-Worn Accessory exposure conditions to support evaluation for 3rd Party VOIP applications potentially installed and used by the end-user.

(2) EDGE (8PSK Multi-Slot) was excluded from testing per FCC KDB 941225 D03, as the source-based time-averaged output power in this mode is lower than that measured in normal GSM voice mode and GPRS/EDGE (GMSK Multi-Slot) data modes.

(3) GPRS/EDGE (GMSK Multi-Slot) and EDGE (8PSK Multi-Slot) utilize reduced output power as additional time slots are transmitted in the uplink frame, as demonstrated in the following table. The values noted are maximum limits, and conform to the same power tune-up tolerances noted in section 2.3 above. The multi-slot configuration that results in the highest source-based time-averaged output power from the device was chosen for testing when testing of these modes is required.

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 TX Burst Output Power Setting (dBm)	32.8	30.3	28.3	27.6	29.8	27.3	25.3	24.6
Maximum Time Average Output Power Setting (dBm)	23.8	24.3	24.1	24.6	20.8	21.3	21.1	21.6
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 TX Burst Output Power Setting (dBm)	27.5	25.0	23.0	22.3	26.5	24.0	22.0	21.3
Maximum Time Average Output Power Setting (dBm)	18.5	19.0	18.8	19.3	15.5	18.0	17.8	18.3
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			

Device Test Setup

For GSM modes, the test sample was operated using transmission to a base station simulator. The base station simulator was set up for the proper channel and transmit mode of operation on the phone's uplink. The transmitter power level and power control were set to maximum at power step 5 for GSM 850 band, and power step 0 for GSM 1900 band.

Conducted Power Measurements

Band	Channel	Conducted power (dBm) for GSM modes (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	32.80	32.81	30.29	28.09	27.12	27.11	24.74	22.70	21.78
	190	32.83	32.83	30.31	28.11	27.18	27.11	24.68	22.62	21.73
	251	32.76	32.76	30.25	28.04	27.13	27.02	24.62	22.50	21.60
GSM 1900	512	29.88	29.90	27.14	24.95	24.21	26.42	24.24	22.23	21.41
	661	29.72	29.74	26.97	24.77	23.98	26.12	23.89	21.85	20.91
	810	29.64	29.65	26.90	24.70	23.90	25.69	23.44	21.38	20.39

Band	Channel	Conducted power (dBm) for GSM modes (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	23.61	23.62	24.11	23.67	23.95	17.92	18.56	18.28	18.61
	190	23.64	23.64	24.13	23.69	24.01	17.92	18.50	18.20	18.56
	251	23.57	23.57	24.07	23.62	23.96	17.83	18.44	18.08	18.43
GSM 1900	512	20.69	20.71	20.96	20.53	21.04	17.23	18.06	17.81	18.24
	661	20.53	20.55	20.79	20.35	20.81	16.93	17.71	17.43	17.74
	810	20.45	20.46	20.72	20.28	20.73	16.50	17.26	16.96	17.22

Burst Average Power was measured using a power meter set to the appropriate profile to capture average power in the transmitting timeslot(s). Source-Based Time-Averaged Power, being related to the Burst Average Power by a fixed factor dependent on the number of time slots active in the frame, was calculated as follows (in dB), where *x* is the number of time slots active:

$$P_{Source} = P_{Burst} - 10 * \log\left(\frac{x}{8.3}\right)$$

CS Voice denotes circuit-switched transmission for voice call operation, and PS Data denotes packet-switched transmission for data sessions.

2.4.2 WCDMA

Technical Description

The phone under test contains a WCDMA transmitter designed per 3GPP TS 25.101, that supports both voice and data capabilities.

Exposure Conditions and Test Exclusions

Mode	Type	Head-Adjacent	Body-Worn Accessory	Mobile Hotspot
RMC	Voice/ Data	Tested	Tested	Tested
AMR	Voice/ Data	Excluded (1)	Excluded (1)	Excluded (1)
HSDPA (Rel 5) Modes	Data	Excluded (1)	Excluded (1)	Excluded (1)
HSPA (Rel 6) Modes	Data	Excluded (1)	Excluded (1)	Excluded (1)

Notes:

(1) AMR, HSDPA (Rel. 5), and HSPA (Rel. 6) were excluded from testing per FCC KDB 941225 D01, as the measured output power in these modes is not more than ¼ dB higher than that measured in RMC and the maximum SAR for the RMC mode is < 75% of the SAR limit.

Device Test Setup

For WCDMA modes, the test sample was operated using transmission to a base station simulator. The base station simulator was set up for the proper channel and transmit mode of operation on the phone's uplink. The transmitter power level and transmit power control were set to "All 1's" for RMC and AMR modes in WCDMA or HSDPA, or inner loop power control procedures were applied to maintain maximum output power while HSUPA was active.

Conducted Power Measurements

Power measurements were executed per FCC KDB 941225 D01:

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	23.25	23.3	23.08	23.05	23.02	23.06	23.06	23.02	23.05	23.01	23.04
	4180	23.36	23.38	23.24	23.17	23.14	23.18	23.15	23.16	23.14	23.2	23.17
	4233	23.21	23.22	23	22.95	22.97	22.94	22.93	22.98	22.91	23.01	22.87
WCDMA 1900	9262	22.34	22.37	22.15	22.03	22.06	22.02	22.06	22.08	22.03	22.12	22.03
	9400	22.25	22.28	22	21.92	21.92	21.91	21.91	21.98	21.89	21.99	21.91
	9538	22.14	22.16	21.85	21.78	21.79	21.76	21.77	21.83	21.76	21.84	21.85

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 device's output power is identical to the case where there is no MPR in the device.

2.4.3 Wi-Fi 802.11

Technical Description

The phone under test contains a Wi-Fi 802.11b/g/n transmitter capable of data transmission in the 2.45 GHz ISM band.

Exposure Conditions and Test Exclusions

Mode	Type	Head-Adjacent	Body-Worn Accessory	Mobile Hotspot
802.11b / 802.11a	Data	Tested (1)	Tested (1)	Tested (1)
802.11g / 802.11n	Data	Excluded (1)	Excluded (1)	Excluded (1)

Notes:

(1) Per FCC KDB 248227 D01 and the April 2010 FCC/TCB Meeting Notes, the highest average output power channel for the lowest data rate for 802.11b was selected for SAR evaluation. Other 802.11 modes (including 802.11g and 802.11n) were not investigated when the average output powers over all channels and data rates were not more than ¼ dB higher than the tested channel in the lowest data rate of the 802.11b mode. The **bolded** data rates and channels in the following conducted power tables were used for SAR testing. For cases where alternate channels, higher data rates, or 802.11 modes resulted in output power more than ¼ dB higher than the tested configuration, additional SAR tests were conducted. Alternate configurations selected for additional testing are marked in **highlighted bold**, and were tested in all applicable exposure conditions.

Device Test Setup

For Wi-Fi 802.11 modes, the test sample was operated using manufacturer test mode software per guidance provided in FCC KDB 248227. The test software was set up for the proper channel, transmitter power level and transmit modes of operation on the phone's uplink.

Conducted Power Measurements

Band	Channel	Average Conducted Power (dBm) for 802.11b Mode Data Rates			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
2450 MHz	1	14.85	14.82	14.85	14.87
	6	**15.34**	15.12	15.14	15.21
	11	15.16	14.92	14.93	14.98

Band	Channel	Average Conducted Power (dBm) for 802.11g Mode Data Rates							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
2450 MHz	1	13.45	13.52	13.57	13.45	13.57	13.51	13.16	13.25
	6	13.68	13.5	13.48	13.55	13.53	13.47	13.55	13.6
	11	13.26	13.23	13.24	13.32	13.54	13.5	13.6	13.34

Band	Channel	Average Conducted Power (dBm) for 802.11n Mode Data Rates (20 MHz Channel, 800 ns Guard Interval)							
		6.5 Mbps	13 Mbps	19.5 Mbps	26 Mbps	39 Mbps	52 Mbps	58.5 Mbps	65 Mbps
2450 MHz	1	10.7	10.59	10.87	10.79	9.84	9.62	9.69	10.16
	6	13.54	13.53	13.31	13.58	13.55	12.69	13.48	13.56
	11	13.35	13.37	12.87	13.33	13.28	13.5	13.51	13.36

Band	Channel	Average Conducted Power (dBm) for 802.11n Mode Data Rates (20 MHz Channel, 400 ns Guard Interval)							
		7.2 Mbps	14.4 Mbps	21.6 Mbps	28.8 Mbps	43.3 Mbps	57.7 Mbps	65 Mbps	72.2 Mbps
2450 MHz	1	10.12	10.62	10.85	10.24	10.51	9.97	10.33	9.8
	6	11	12.22	13.53	13.46	13.57	9.05	12.73	13.24
	11	13.3	13.27	13.34	13.26	12.49	13.13	13.08	11.72

Band	Channel	Average Conducted Power (dBm) for 802.11n Mode Data Rates (40 MHz Channel, 800 ns Guard Interval)							
		6.5 Mbps	13 Mbps	19.5 Mbps	26 Mbps	39 Mbps	52 Mbps	58.5 Mbps	65 Mbps
2450 MHz	3	10.83	10.39	10.24	10.78	10.05	10.7	9.31	9.42
	6	11.59	11.43	10.86	11.06	11.74	11.61	9.72	9.96
	9	10.09	9.88	9.93	9.91	9.82	10.01	9.62	8.43

Band	Channel	Average Conducted Power (dBm) for 802.11n Mode Data Rates (40 MHz Channel, 400 ns Guard Interval)							
		7.2 Mbps	14.4 Mbps	21.6 Mbps	28.8 Mbps	43.3 Mbps	57.7 Mbps	65 Mbps	72.2 Mbps
2450 MHz	3	11.07	10.4	10.81	9.8	9.98	9.41	8.59	8.7
	6	11.63	11.69	11.72	8.82	11.44	10.03	10.25	8.72
	9	10.18	9.43	10.3	8.74	10.11	8.1	8.88	8.92

2.4.4 Bluetooth

Technical Description

The phone under test contains a Bluetooth transmitter capable of data transmission in the 2.45 GHz ISM band.

Exposure Conditions and Test Exclusions

Mode	Type	Head-Adjacent	Dispatch/Push-to-Talk	Body-Worn Accessory	Mobile Hotspot
All Modes	Data	Excluded (1)	Excluded (1)	Excluded (1)	Excluded (1)

Notes:

(1) Per FCC KDB 447498 D01, standalone SAR measurements of the Bluetooth transmitter in this phone were not required based on the maximum conducted power and the Bluetooth antenna-to-user separation distance. As detailed by the KDB publication, the SAR exclusion threshold for distances < 50 mm is defined by the following equation:

$$\frac{[maximum\ power\ of\ channel, including\ tune-up\ tolerance]_{(mW)}}{[minimum\ test\ separation\ distance]_{(mm)}} \times \sqrt{f_{(GHz)}} \leq 3.0$$

Based on the maximum conducted power of Bluetooth and the most conservative antenna-to-user separation distance used in testing, standalone SAR measurements for Bluetooth were not required.

$$\frac{[7.4]_{(mW)}}{[10]_{(mm)}} \times \sqrt{2.44_{(GHz)}} = \mathbf{1.2} \leq 3.0$$

Note that simultaneous SAR evaluations include estimations for Bluetooth SAR, as detailed in section 4.5 below.

Conducted Power Measurements

Frequency [MHz]	Data Rate [Mbps]	Channel Number	Average Conducted Power [mW]
2402	1.0	0	5.109
2441	1.0	39	6.665
2480	1.0	78	5.789
2402	2.0	0	4.812
2441	2.0	39	6.262
2480	2.0	78	5.396
2402	3.0	0	5.753
2441	3.0	39	7.437
2480	3.0	78	6.630

Frequency [MHz]	Mode	Channel Number	Average Conducted Power [mW]
2402	LE	0	0.624
2441	LE	39	0.710
2480	LE	78	0.661

2.4.5 Near-Field Communications

Technical Description

This device contains an integrated Near Field Communications (NFC) module.

Test Exclusion Evaluation

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.

2.5 Accessories for the Device Under Test

2.5.1 Batteries

The phone tested in this report has the following battery options:
Model SNN5916A - 2000 mAH battery

The Model SNN5916A 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.

3 Test Equipment Used

3.1 Dosimetric Measurement System

The Motorola Mobility ADR Test Services Laboratory utilizes a DASY52™ Dosimetric Assessment System manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All SAR measurements are taken within a shielded enclosure. The overall 10 g RSS uncertainty of the measurement system is ±11% (K=1) with an expanded uncertainty of ±22% (K=2). The overall 1 g RSS uncertainty of the measurement system is ±11% (K=1) with an expanded uncertainty of ±22% (K=2). The measurement uncertainty budget is given in Appendix 4. 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. All equipment was brought into service and used only during its noted calibration period, except where indicated. Equipment without a calibration period was in service for the entirety of the test period.

Description	Serial Number	Cal Date	Cal Due Date	Service Notes
DASY™ DAE V1	378	Apr-11-2012	Apr-11-2013	Measurement System 1
E-Field Probe ES3DV3	3184	Apr-25-2012	Apr-25-2013	Measurement System 1
Twin SAM Phantom V4.0	TP-1156			Measurement System 1
Twin SAM Phantom V4.0	TP-1319			Measurement System 1
MFP V5.1 C Triple Modular Flat Phantom	1101			Measurement System 1
DASY™ DAE V1	1312	Sep-04-2012	Sep-04-2013	Measurement System 4
DASY™ DAE V1	703	Sep-11-2012	Sep-11-2013	Measurement System 4
E-Field Probe ES3DV3	3037	Sep-13-2012	Sep-13-2013	Measurement System 4
Twin SAM Phantom V4.0	TP-1162			Measurement System 4
MFP V5.1 C Triple Modular Flat Phantom	1104			Measurement System 4
Dipole Validation Kit, DV835V2	422TR	Mar-18-2011	Mar-18-2014	
Dipole Validation Kit, DV1800V2	259TR	Oct-20-2011	Oct-20-2013	Calibration extension, see note.
Dipole Validation Kit, DV2450V2	877	Jan 10, 2012	Jan-10-2014	Calibration extension, see note.

Note: Per FCC KDB 450824 D02, evaluation for the extension of the dipole calibration was carried out. Results are provided in Appendix 6 in addition to the original calibration certificate.

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	Sep-06-2012	Sep-06-2014
Power Sensor #1 - E9301A	US39211009	Aug-28-2012	Aug-28-2013
Power Sensor #2 - E9301A	US39211013	Nov-02-2012	Nov-02-2013
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
Power Sensor #1 - E9301A	US39210915	Jan-14-2013	Jan-14-2014
Power Sensor #2 - E9301A	US39210916	Jan-14-2013	Jan-14-2014
Power Meter E4419B	GB39511086	Nov-04-2011	Nov-04-2013
Signal Generator HP8648C	3847A04632	Aug-13-2011	Aug-13-2013
Power Sensor #1 - E9301A	US39211007	Aug-28-2012	Aug-28-2013
Power Sensor #2 - E9301A	US39211008	Aug-28-2012	Aug-28-2013
Network Analyzer E5071C	MY46212851	May-10-2012	May-10-2013
Dielectric Assessment Kit DAK-3.5	1072		

3.3 Test System Validations

Per [5] and FCC KDB 865664 D01, each SAR system (including probes, system components, and software) used for device testing was validated against its performance specifications prior to deployment. These validation measurements are taken to ensure the accuracy of device test results. Validation measurements utilize reference dipoles and the required tissue-equivalent media, and include assessments of system sensitivity, probe linearity, and probe isotropy. Per FCC KDB 865664 D02, a tabulated summary of the validation results for each SAR system used in testing is given below.

DASY52™ Measurement System 1
System Validation Measurements

Probe	Tissue Type	*f* (MHz)	CW Validations				Modulated Validations				
			Date	Dielectric Parameters		Result	Date	Mod. Type	Dielectric Parameters		Result
				Measured σ (S/m)	Measured ε_r				Measured σ (S/m)	Measured ε_r	
3184	Head	750	1/14/2013	0.876	42.76	PASS					
3184	Head	835	1/10/2013	0.919	40.99	PASS	1/11/2013	GMSK	0.915	40.926	PASS
3184	Head	1800	1/10/2013	1.336	38.94	PASS	1/11/2013	GMSK	1.342	39.026	PASS
3184	Head	1900	1/10/2013	1.443	38.49	PASS					
3184	Head	2450	1/11/2013	1.818	37.98	PASS					
3184	Body	750	1/14/2013	0.980	54.73	PASS					
3184	Body	835	1/14/2013	0.978	53.83	PASS	1/11/2013	GMSK	0.98	53.925	PASS
3184	Body	1800	1/14/2013	1.450	52.38	PASS	1/11/2013	GMSK	1.579	51.544	PASS
3184	Body	1900	1/14/2013	1.568	52.00	PASS					
3184	Body	2450	1/14/2013	1.980	51.87	PASS					

DASY52™ Measurement System 4
System Validation Measurements

Probe	Tissue Type	*f* (MHz)	CW Validations				Modulated Validations				
			Date	Dielectric Parameters		Result	Date	Mod. Type	Dielectric Parameters		Result
				Measured σ (S/m)	Measured ε_r				Measured σ (S/m)	Measured ε_r	
3037	Head	750	1/8/2013	0.861	43.20	PASS					
3037	Head	835	1/7/2013	0.936	42.10	PASS	1/10/2013	GMSK	0.936	41.632	PASS
3037	Head	1800	1/7/2013	1.352	38.58	PASS	1/8/2013	GMSK	1.345	38.568	PASS
3037	Head	1900	1/7/2013	1.459	38.05	PASS					
3037	Head	2450	1/8/2013	1.822	37.87	PASS					
3037	Head	2600	1/8/2013	1.974	37.32	PASS					
3037	Body	750	1/8/2013	0.911	54.83	PASS					
3037	Body	835	1/7/2013	0.997	53.94	PASS	1/8/2013	GMSK	1.00	54.83	PASS
3037	Body	1800	1/7/2013	1.443	52.70	PASS	1/8/2013	GMSK	1.43	52.459	PASS
3037	Body	1900	1/7/2013	1.567	52.25	PASS					
3037	Body	2450	1/8/2013	1.999	51.31	PASS					
3037	Body	2600	1/8/2013	2.177	50.77	PASS					

3.4 Test System Verifications (System Performance Checks)

System accuracy verifications of the DASY52™ were performed using the measurement equipment listed in Section 3.1. The daily system performance check 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 6. These frequencies are within ±10% of the compliance test mid-band frequency as required in [1] and [5]. The test was conducted within 24 hours prior to the measurement of the phone. 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. Z-axis scans showing the SAR penetration are also included in Appendix 1.

DASY52™ Measurement System 1
System Verification Measurements for Head SAR Measurements

f (MHz)	Description	Probe	Dipole	Measured SAR (W/kg), 1 gram	Normalized SAR (W/kg), 1 gram	Dielectric Parameters				Ambient Temp (°C)	Tissue Temp (°C)
						Measured σ (S/m)	Deviation σ (S/m)	Measured ε_r	Deviation ε_r		
835	**Measured,** Mar-22-2013	3184	422	1.99	9.95	0.9334	3.4	40.27	-3.0	21.8	19.3
	Measured, Mar-23-2013	3184	422	1.96	9.80	0.9172	2.3	39.56	-4.7	21.2	19.3
	Recommended Limits	3184	422		9.33	0.90	±10%	41.5	±10%	18-25	18-25
1800	**Measured,** Mar-22-2013	3184	259	7.20	36.0	1.382	-1.5	37.91	-5.3	21.8	19.7
	Recommended Limits	3184	259		38.1	1.40	±10%	40.0	±10%	18-25	18-25

DASY52™ Measurement System 1
System Verification Measurements for Body SAR Measurements

f (MHz)	Description	Probe	Dipole	Measured SAR (W/kg), 1 gram	Normalized SAR (W/kg), 1 gram	Dielectric Parameters				Ambient Temp (°C)	Tissue Temp (°C)
						Measured σ (S/m)	Deviation σ (S/m)	Measured ε_r	Deviation ε_r		
835	**Measured,** Mar-23-2013	3184	422	1.95	9.75	0.9941	2.1	52.38	-5.2	21.3	19.7
	Recommended Limits	3184	422		9.77	0.97	±10%	55.2	±10%	18-25	18-25
1800	**Measured,** Mar-23-2013	3184	259	7.85	39.25	1.441	-5.3	50.09	-6.1	21.6	18.7
	Measured, Mar-26-2013	3184	259	7.87	39.35	1.449	-4.7	49.68	-6.8	21.5	19.0
	Recommended Limits	3184	259		39.1	1.52	±10%	53.3	±10%	18-25	18-25

DASY52™ Measurement System 4
System Verification Measurements for Head SAR Measurements

f (MHz)	Description	Probe	Dipole	Measured SAR (W/kg), 1 gram	Normalized SAR (W/kg), 1 gram	Dielectric Parameters				Ambient Temp (°C)	Tissue Temp (°C)
						Measured σ (S/m)	Deviation σ (S/m)	Measured ε_r	Deviation ε_r		
2450	**Measured,** Jan-18-2013	3037	877	11.3	56.5	1.861	3.4%	39.03	-0.5%	20.5	18.9
	Recommended Limits	3037	877		52.1	1.80	±10%	39.2	±10%	18-25	18-25

DASY52™ Measurement System 4
System Verification Measurements for Body SAR Measurements

f (MHz)	Description	Probe	Dipole	Measured SAR (W/kg), 1 gram	Normalized SAR (W/kg), 1 gram	Dielectric Parameters				Ambient Temp (°C)	Tissue Temp (°C)
						Measured σ (S/m)	Deviation σ (S/m)	Measured ε_r	Deviation ε_r		
2450	**Measured,** Jan-17-2013	3037	877	10.2	51.0	2.007	3.0%	50.92	-3.4%	20.5	19.3
	Recommended Limits	3037	877		52.3	1.95	±10%	52.7	±10%	18-25	18-25

3.5 Simulated Tissue Dielectric Properties

Validation, System Performance Check, and device SAR measurements are performed using the DASY52™ system along with liquids specified to simulate head and body tissues subjected to electromagnetic exposure. The list of ingredients and the percent composition of the tissue-simulating liquids used for testing are indicated in the following table.

Ingredient	782 / 835 / 900 MHz Head	782 / 835 / 900 MHz Body	1800 MHz / 1900 MHz Head	1800 MHz / 1900 MHz Body	2450 MHz Head	2450 MHz Body	5 GHz Head	5 GHz Body
Sugar	57.0	44.9	--	--	--	--	--	--
DGBE	--	--	47.0	30.8	6.89	8.0	--	--
Water	40.45	53.06	52.62	68.8	57.95	71.8	65.52	78.66
Salt	1.45	0.94	0.38	0.4	0.15	0.2	--	--
HEC	1.0	1.0	--	--	--	--	--	--
Bact.	0.1	0.1	--	--	--	--	--	--
Triton X-100	--	--	--	--	35.02	20.0	17.24	10.67
Di(ethylene glycol) Hexyl Ether	--	--	--	--	--	--	17.24	10.67

Prior to conducting SAR measurements, the relative permittivity, ε_r, and conductivity, σ, of the tissue-simulating liquids were measured with a SPEAG™ DAK-3.5 Dielectric Assessment Kit across the frequency ranges of interest. These values, along with recommended targets, percent deviation from the targets, and the temperature of the simulated tissue are shown in the tables below.

For SAR measurements, the dielectric measurements from the DAK-3.5 are imported into the DASY software which performs interpolation to determine the dielectric parameters at the specific frequencies used for device testing. The DASY software also implements SAR error compensation algorithms to automatically correct the measured SAR results for deviations between the measured and target dielectric parameters. This error compensation has been verified by the lab to meet the requirements in FCC KDB 865664 D01. Therefore, where frequencies of test fall within ±50 MHz of a calibration point of the probe used for test, the acceptable range of tissue variation is ±10% per FCC KDB 865664 D01 section 2.4. For test frequencies outside of ±50 MHz of a probe calibration point, the range of tissue variation is reduced per section 2.6 part 2 of the same KDB, to ensure that tissues used in testing are within the required specification regardless of device performance. A mass density of $\rho = 1\ ^{g}/_{cm^3}$ was entered into the system for all cases. It can be seen that the measured parameters are within tolerance of the recommended targets specified in [1] and [5].

Head Simulated-Tissue Dielectric Parameters									
Index	**Date Measured**	***f* (MHz)**	**Target σ (S/m)**	**Target ε_r**	**Measured σ (S/m)**	**Deviation σ (%)**	**Measured ε_r**	**Deviation ε_r (%)**	**Temp (°C)**
835	Mar-22-2013	820.0	0.90 ±10%	41.58 ±10%	0.92	2.4%	40.5	-2.7%	19.3
		835.0	0.90 ±10%	41.50 ±10%	0.93	3.4%	40.3	-3.0%	
		849.0	0.92 ±10%	41.50 ±10%	0.95	3.9%	40.1	-3.5%	
835	Mar-23-2013	820.0	0.90 ±10%	41.58 ±10%	0.90	0.2%	39.8	-4.4%	19.3
		835.0	0.90 ±10%	41.50 ±10%	0.92	2.3%	39.6	-4.7%	
		849.0	0.92 ±10%	41.50 ±10%	0.93	1.7%	39.4	-5.2%	
1880	Mar-22-2013	1850.0	1.40 ±10%	40.00 ±10%	1.43	2.2%	37.7	-5.9%	19.7
		1880.0	1.40 -5%/+10%	40.00 -10%/+5%	1.47	5.0%	37.5	-6.4%	
		1915.0	1.40 -5%/+10%	40.00 -10%/+5%	1.51	7.9%	37.3	-6.8%	
2450	Jan-18-2013	2412.0	1.77 ±10%	39.27 ±10%	1.82	3.1%	39.2	-0.3%	19.1
		2450.0	1.80 ±10%	39.20 ±10%	1.86	3.4%	39.0	-0.5%	
		2462.0	1.81 ±10%	39.18 ±10%	1.87	3.2%	39.0	-0.5%	

Body Simulated-Tissue Dielectric Parameters									
Index	**Date Measured**	***f* (MHz)**	**Target σ (S/m)**	**Target ε_r**	**Measured σ (S/m)**	**Deviation σ (%)**	**Measured ε_r**	**Deviation ε_r (%)**	**Temp (°C)**
835	Mar-23-2013	820.0	0.97 ±10%	55.26 ±10%	0.97	0.2%	52.5	-5.0%	19.7
		835.0	0.97 ±10%	55.20 ±10%	0.99	2.1%	52.4	-5.2%	
		849.0	0.99 ±10%	55.16 ±10%	1.01	2.4%	52.2	-5.4%	
1880	Mar-23-2013	1850.0	1.52 ±10%	53.30 ±10%	1.50	-1.4%	49.9	-6.4%	19.5
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.54	1.4%	49.8	-6.6%	
		1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.59	4.7%	49.7	-6.9%	
1880	Mar-26-2013	1850.0	1.52 ±10%	53.30 ±10%	1.51	-0.7%	49.5	-7.2%	19.5
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.55	2.0%	49.3	-7.5%	
		1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.60	5.3%	49.1	-7.9%	
2450	Jan-17-2013	2412.0	1.91 ±10%	52.75 ±10%	1.96	2.4%	51.0	-3.3%	20.1
		2450.0	1.95 ±10%	52.70 ±10%	2.01	3.1%	50.9	-3.4%	
		2462.0	1.97 ±10%	52.68 ±10%	2.02	2.8%	50.9	-3.5%	

4 Test Setup Information, SAR Measurement Results, and Analysis

4.1 Overview of Test Setup and Results

The phone was tested in the exposure configurations stipulated in [1], [4], [5], and per FCC KDB 941225 D06 for mobile hotspot operation. The phone was positioned into these configurations using the device holder supplied with the DASY52™ SAR measurement system. The default settings for the SAR scans are set in accordance with FCC KDB 865664 D01 for all area scan resolutions, zoom scan resolutions and volumes, and probe positioning. Please refer to the DASY52™ manual for additional information on SAR scanning procedures and algorithms used.

The SAR measurements were performed using the SAM and Flat phantoms listed in section 3.1. The same phantoms and simulated tissues were used for the system performance checks and the device SAR measurements. Consequently the Z-axis scans included in Appendix 1 are applicable for verification of the required simulated tissue depths of 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 SAR results shown in following tables 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 maximum device power, measured device power, temperature of the simulated tissue after the test, the measured drift and the scaled SAR. The exact method of scaling is:

$$Scaled\ SAR = (Measured\ SAR) * 10^{\left(\frac{(Maximum\ Power)-(Measured\ Power)}{10}\right)} * 10^{\left(\frac{-Drift}{10}\right)}$$

The SAR reported at the end of the measurement process by the DASY52™ 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. Note that measured SAR is scaled only in the manner which results in a more conservative scaled value, i.e. to a higher SAR value as a consequence of measured power being below the maximum allowed power, or for negative drift values.

Per FCC KDB 447498 D01, area-scan based 1 g SAR estimation was used for initial testing in all combinations of device modes and exposure conditions. The highest SAR measurements for each combination of device mode and exposure condition, and all conditions where the area scan estimation reported values greater than 1.2 $^{W}/_{kg}$, were further evaluated with a zoom scan. When operating conditions for the SAR system verifications did not demonstrate that the verification area scan 1 g SAR estimation resulted in values within 3% of zoom scan 1 g SAR, zoom scans were executed for all SAR tests.

The test conditions that produced the highest SAR values for each combination of DUT mode and exposure condition are indicated as **bold** numbers in the following tables. Plots of these tests are included in Appendices 2 through 3.

4.2 Head-Adjacent Exposure Results

Left Cheek-Touch Position												
Mode	Battery/ Accessory	Channel	*f* (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
				Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
GSM 850, CS Voice	SNN5916A	190	836.6	32.8	32.83	19	0.01	0.401	0.40	0.582	0.58	
GSM 1900, CS Voice	SNN5916A	661	1880	29.8	29.72	19.3	0.03	0.181	0.18	0.28	0.29	
WCDMA 850, RMC	SNN5916A	4180	836	23.5	23.36	19.3	0.03	0.383	0.40	0.51	0.53	
WCDMA 1900, RMC	SNN5916A	9400	1880	22.4	22.25	19.2	-0.12	0.289	0.31	0.473	0.50	
802.11b, 1 Mbps	SNN5916A	6	2437		15.34	20.0	0.03	0.256	0.26	0.457	0.46	

Table 4-1: SAR measurement results in a head-adjacent position against the ICNIRP and ANSI SAR Limit.

Right Cheek-Touch Position												
Mode	Battery/ Accessory	Channel	*f* (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
				Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
GSM 850, CS Voice	SNN5916A	128	824.2	32.8	32.80	18.4	0.02	0.614	0.61	0.829	0.83	
GSM 850, CS Voice	SNN5916A	190	836.6	32.8	32.83	18.6	0.01	0.598	0.60	0.809	0.81	
GSM 850, CS Voice	SNN5916A	251	848.8	32.8	32.76	19	-0.17	0.45	0.47	0.666	0.70	
GSM 850, PS Data (4 Upslots)	SNN5916A	128	**824.2**	**27.6**	**27.12**	**19.1**	**-0.12**	**0.646**	**0.73**	**0.873**	**0.99**	**A13**
GSM 850, PS Data (4 Upslots)	SNN5916A	190	836.6	27.6	27.18	19	-0.03	0.559	0.61	0.826	0.91	
GSM 850, PS Data (4 Upslots)	SNN5916A	251	848.8	27.6	27.13	19	0.00	0.503	0.55	0.747	0.82	
GSM 1900	SNN5916A	661	1880	29.8	29.72	19.3	-0.08	0.21	0.22	0.355	0.37	
GSM 1900, PS Data (4 Upslots)	SNN5916A	661	**1880**	**24.6**	**23.98**	**19.2**	**0.02**	**0.216**	**0.25**	**0.364**	**0.42**	**A14**
WCDMA 850	SNN5916A	4180	**836**	**23.5**	**23.36**	**18.9**	**-0.03**	**0.452**	**0.47**	**0.611**	**0.64**	**A15**
WCDMA 1900	SNN5916A	9400	**1880**	**22.4**	**22.25**	**19.2**	**0.02**	**0.388**	**0.40**	**0.652**	**0.67**	**A16**
802.11b, 1 Mbps	SNN5916A	6	2437		15.34	18.9	-0.06	0.545	0.55	1.07	1.08	
802.11b, 1 Mbps	SNN5916A	6	2437		15.34	20.0	0.26	0.344	0.34	0.683	0.68	
802.11b, 1 Mbps	SNN5916A	**6**	**2437**		**15.34**	**18.9**	**-0.09**	**0.544**	**0.56**	**1.07**	**1.09**	**A17**
802.11b, 1 Mbps	SNN5916A	1	2437		15.34	18.9	-0.24	0.349	0.37	0.689	0.73	
802.11b, 1 Mbps	SNN5916A	11	2437		15.34	18.9	-0.18	0.473	0.49	0.928	0.97	

Table 4-2: SAR measurement results in a head-adjacent position against the ICNIRP and ANSI SAR Limit.

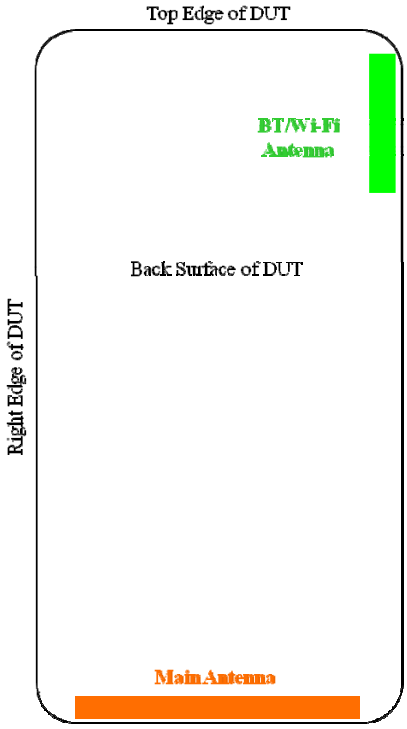
Left 15° Tilt Position												
Mode	Battery/ Accessory	Channel	*f* (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
				Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
GSM 850, CS Voice	SNN5916A	190	836.6	32.8	32.83	19	0.02	0.268	0.27	0.386	0.39	
GSM 1900, CS Voice	SNN5916A	661	1880	29.8	29.72	19.3	-0.10	0.105	0.11	0.184	0.19	
WCDMA 850, RMC	SNN5916A	4180	836	23.5	23.36	19.1	0.02	0.267	0.28	0.384	0.40	
WCDMA 1900, RMC	SNN5916A	9400	1880	22.4	22.25	19.1	-0.06	0.193	0.20	0.337	0.35	
802.11b, 1 Mbps	SNN5916A	6	2437		15.34	20.0	-0.03	0.202	0.20	0.38	0.38	

Table 4-3: SAR measurement results in a head-adjacent position against the ICNIRP and ANSI SAR Limit.

Right 15° Tilt Position												
Mode	Battery/ Accessory	Channel	*f* (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
				Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
GSM 850, CS Voice	SNN5916A	190	836.6	32.8	32.83	19	0.03	0.297	0.30	0.426	0.43	
GSM 1900, CS Voice	SNN5916A	661	1880	29.8	29.72	19.3	0.02	0.0756	0.08	0.127	0.13	
WCDMA 850, RMC	SNN5916A	4180	836	23.5	23.36	18.8	0.01	0.28	0.29	0.401	0.41	
WCDMA 1900, RMC	SNN5916A	9400	1880	22.4	22.25	19.2	-0.04	0.134	0.14	0.226	0.24	
802.11b, 1 Mbps	SNN5916A	6	2437		15.34	19.9	-0.21	0.212	0.22	0.431	0.45	

Table 4-4: SAR measurement results in a head-adjacent position against the ICNIRP and ANSI SAR Limit.

4.3 Body-Worn Accessory and Mobile Hotspot Exposure Results



Mobile Hotspot Surfaces/Edges 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

Mobile Hotspot Position, Front of Phone 10 mm from Phantom												
Mode	Battery/ Accessory	Channel	*f* (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
				Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
GSM 850, PS Data (4 Upslots)	SNN5916A	128	824.2	27.6	27.12	19.6	0.01	0.591	0.65	0.843	0.93	
GSM 850, PS Data (4 Upslots)	SNN5916A	190	836.6	27.6	27.18	19.6	-0.09	0.569	0.63	0.813	0.90	
GSM 850, PS Data (4 Upslots)	SNN5916A	251	848.8	27.6	27.13	19.6	0.00	0.57	0.63	0.814	0.90	
GSM 1900, PS Data (4 Upslots)	SNN5916A	661	1880	24.6	23.98	18.8	0.02	0.245	0.28	0.409	0.47	
WCDMA 850, RMC	SNN5916A	4180	836	23.5	23.36	19.5	0.00	0.479	0.49	0.685	0.71	
WCDMA 1900, RMC	SNN5916A	9400	1880	22.4	22.25	18.6	0.01	0.409	0.42	0.691	0.72	
802.11b, 1 Mbps	SNN5916A	6	2437		15.34	20.0	-0.11	0.154	0.16	0.262	0.27	

Table 4-5: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot Position, Back of Phone 10 mm from Phantom												
Mode	Battery/ Accessory	Channel	*f* (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
				Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
GSM 850, PS Data (4 Upslots)	SNN5916A	128	824.2	27.6	27.12	19.6	-0.04	0.823	0.92	1.11	1.24	
GSM 850, PS Data (4 Upslots)	**SNN5916A**	**128**	**824.2**	**27.6**	**27.12**	**19.5**	**-0.05**	**0.834**	**0.93**	**1.13**	**1.26**	**A19**
GSM 850, PS Data (4 Upslots)	SNN5916A	190	836.6	27.6	27.18	19.6	0.01	0.813	0.89	1.1	1.20	
GSM 850, PS Data (4 Upslots)	SNN5916A	251	848.8	27.6	27.13	19.6	-0.01	0.716	0.79	1.03	1.14	
GSM 1900, PS Data (4 Upslots)	SNN5916A	512	1850.2	24.6	24.21	19.5	0.00	0.419	0.45	0.724	0.78	
GSM 1900, PS Data (4 Upslots)	SNN5916A	661	1880	24.6	23.98	18.8	-0.02	0.431	0.49	0.738	0.85	
GSM 1900, PS Data (4 Upslots)	**SNN5916A**	**810**	**1909.8**	**24.6**	**23.90**	**19.5**	**0.02**	**0.459**	**0.53**	**0.795**	**0.92**	**A20**
WCDMA 850, RMC	**SNN5916A**	**4132**	**826.4**	**23.5**	**23.25**	**19.6**	**-0.01**	**0.861**	**0.91**	**1.17**	**1.24**	**A21**
WCDMA 850, RMC	SNN5916A	4132	826.4	23.5	23.25	19.6	0.01	0.829	0.88	1.12	1.19	
WCDMA 850, RMC	SNN5916A	4180	836	23.5	23.36	19.5	0.00	0.682	0.70	0.986	1.02	
WCDMA 1900, RMC	SNN5916A	4233	846.6	23.5	23.21	19.6	0.00	0.683	0.73	0.986	1.05	
WCDMA 1900, RMC	SNN5916A	9262	1852.4	22.4	22.34	18.6	0.00	0.627	0.64	1.07	1.08	
WCDMA 1900, RMC	SNN5916A	9400	1880	22.4	22.25	18.6	-0.04	0.63	0.66	1.08	1.13	
WCDMA 1900, RMC	SNN5916A	9538	1907.6	22.4	22.14	19	-0.07	0.641	0.69	1.1	1.19	
802.11b, 1 Mbps	SNN5916A	6	2437		15.34	20.0	0	0.173	0.17	0.355	0.36	

Table 4-6: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot Position, Left Edge of Phone 10 mm from Phantom												
Mode	Battery/ Accessory	Channel	*f* (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
				Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
GSM 850, PS Data (4 Upslots)	SNN5916A	190	836.6	27.6	27.18	19.6	0.00	0.49	0.53	0.728	0.79	
GSM 1900, PS Data (4 Upslots)	SNN5916A	661	1880	24.6	23.98	18.7	-0.11	0.0989	0.12	0.173	0.20	
WCDMA 850, RMC	SNN5916A	4180	836	23.5	23.36	19.5	0.03	0.377	0.39	0.561	0.58	
WCDMA 1900, RMC	SNN5916A	9400	1880	22.4	22.25	18.7	-0.03	0.163	0.17	0.283	0.29	
802.11b, 1 Mbps	**SNN5916A**	**6**	**2437**		**15.34**	**20.0**	**-0.09**	**0.195**	**0.20**	**0.385**	**0.39**	**A23**

Table 4-7: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot Position, Right Edge of Phone 10 mm from Phantom												
Mode	Battery/ Accessory	Channel	*f* (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
				Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
GSM 850, PS Data (4 Upslots)	SNN5916A	128	824.2	27.6	27.12	19.6	0.02	0.478	0.53	0.701	0.77	
GSM 850, PS Data (4 Upslots)	SNN5916A	190	836.6	27.6	27.18	19.6	0.03	0.536	0.58	0.789	0.86	
GSM 850, PS Data (4 Upslots)	SNN5916A	251	848.8	27.6	27.13	19.6	-0.01	0.543	0.60	0.804	0.89	
GSM 1900, PS Data (4 Upslots)	SNN5916A	661	1880	24.6	23.98	18.7	-0.15	0.0717	0.08	0.124	0.15	
WCDMA 850	SNN5916A	4180	836	23.5	23.36	19.5	-0.01	0.471	0.49	0.695	0.72	
WCDMA 1900	SNN5916A	9400	1880	22.4	22.25	18.7	-0.05	0.116	0.12	0.2	0.21	

Table 4-8: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot Position, Top Edge of Phone 10 mm from Phantom												
Mode	Battery/ Accessory	Channel	*f* (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
				Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
802.11b, 1 Mbps	SNN5916A	6	2437		15.34	20.0	-0.07	0.123	0.12	0.224	0.23	

Table 4-9: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot Position, Bottom Edge of Phone 10 mm from Phantom												
Mode	Battery/ Accessory	Channel	*f* (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
				Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
GSM 850, PS Data (4 Upslots)	SNN5916A	190	836.6	27.6	27.18	19.5	0.03	0.126	0.14	0.202	0.22	
GSM 1900, PS Data (4 Upslots)	SNN5916A	661	1880	24.6	23.98	18.7	-0.04	0.343	0.39	0.646	0.74	
WCDMA 850, RMC	SNN5916A	4180	836	23.5	23.36	19.5	-0.04	0.0922	0.10	0.147	0.15	
WCDMA 1900, RMC	SNN5916A	9262	1852.4	22.4	22.34	18.6	-0.08	0.519	0.54	0.967	1.00	
WCDMA 1900, RMC	SNN5916A	9400	1880	22.4	22.25	18.6	-0.08	0.538	0.57	1.01	1.06	
WCDMA 1900, RMC	**SNN5916A**	**9538**	**1907.6**	**22.4**	**22.14**	**18.6**	**-0.06**	**0.588**	**0.63**	**1.13**	**1.22**	**A22**
WCDMA 1900, RMC	SNN5916A	9538	1907.6	22.4	22.14	19	0.06	0.511	0.54	0.98	1.04	

Table 4-10: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

Note:
GSM SAR measurements for Body-Worn Accessory exposure were excluded from testing, as GPRS was tested at an identical device separation distance and exhibits higher time-averaged output power.

4.4 Measurement Variability Analysis

Per FCC KDB 865664 D01, SAR measurement variability was assessed for each frequency band as determined by the SAR probe calibration points and tissue-equivalent mediums used for the device measurements. These additional measurements are executed after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The phone was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for these measurements, to minimize any unexpected variations in the repeated results.

SAR measurement variability was assessed using the following procedures for each frequency band:

1. If the original highest measured SAR is < 0.8 $^{W}/_{kg}$, the following steps do not apply and no repeat measurements were executed.
2. If the original highest measured SAR is ≥ 0.8 $^{W}/_{kg}$, that measurement was repeated once.
3. If the ratio of the largest to smallest SAR for the original and first repeated measurement was > 1.2, or if the original or first repeated measurement was ≥ 1.45 $^{W}/_{kg}$, the measurement was repeated a second time.
4. If the ratio of the largest to smallest SAR for the original, first repeated, or second repeated measurement was > 1.2, and one of those measurements was ≥ 1.5 $^{W}/_{kg}$, the measurement was repeated a third time.

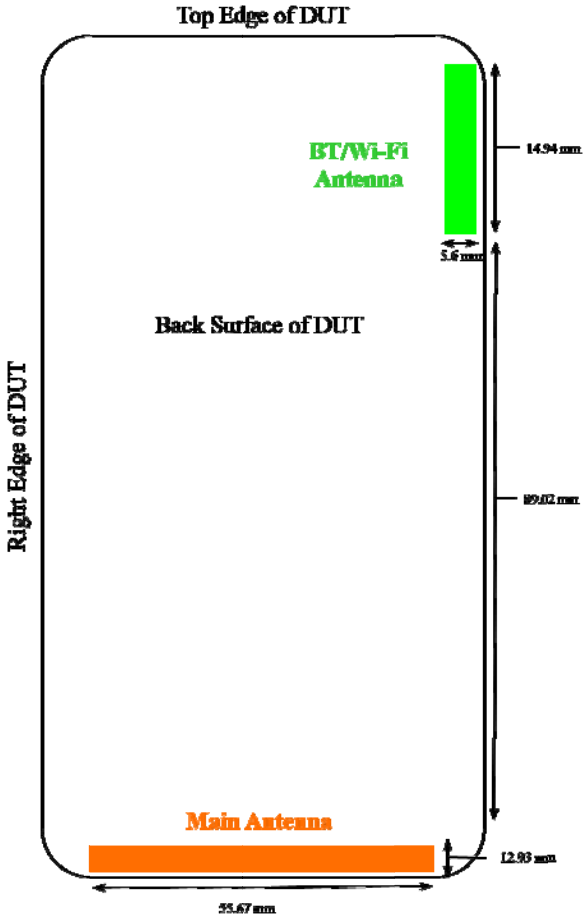
SAR Measurement Variability Results										
Mode	**Exposure Condition**	**Channel**	***f* (MHz)**	**Original Measured SAR (W/kg)**	**1st Repeated SAR (W/kg)**	**Ratio**	**2nd Repeated SAR (W/kg)**	**Ratio**	**3rd Repeated SAR (W/kg)**	**Ratio**
GSM 850, PS Data (4 Upslots)	Body-Adjacent, Back of Phone 10 mm from Phantom	128	824.2	1.11	1.13	1.02	N/A	N/A	N/A	N/A
WCDMA 850, RMC	Body-Adjacent, Back of Phone 10 mm from Phantom	4132	826.4	1.17	1.12	1.05	N/A	N/A	N/A	N/A
WCDMA 1900, RMC	Body-Adjacent, Bottom Edge of Phone 10 mm from Phantom	9538	1907.6	1.13	0.98	1.15	N/A	N/A	N/A	N/A
802.11b, 1 Mbps	Right Head Cheek	6	2437	1.07	0.683	1.57	1.07	1.57	N/A	N/A

Table 4-13: SAR measurement results for Variability Analysis

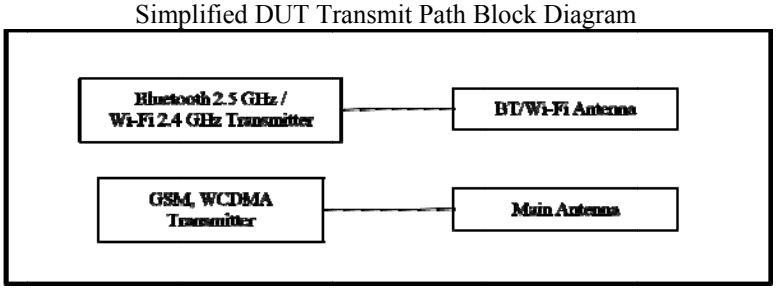
4.5 Description and Evaluation of Simultaneous Transmitters

Per FCC KDB 447498 D01, the necessity of simultaneous SAR testing was evaluated for the licensed and unlicensed transmitters of the phone under test.

By device design the GSM/WCDMA transmitter 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. 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



When standalone SAR test exclusion applies to a mode and antenna that transmits simultaneously with other modes and antennas, the KDB directs that the standalone SAR of that mode must be estimated for evaluation in the SAR summations.

For simultaneous SAR evaluation, Bluetooth SAR was estimated and included in all applicable SAR summations. For Body-Worn Accessory simultaneous SAR evaluation (at 10mm), the value used for inclusion in these summations was found to be:

$$\frac{[10]_{(mW)}}{[10]_{(mm)}} \times \frac{\sqrt{2.44_{(GHz)}}}{7.5} = 0.2\,{}^{W}/_{kg\,(estimated)}$$

Note that Head-Adjacent exposure configurations are not applicable to Bluetooth operation, and therefore were not considered for simultaneous evaluation. Further, Bluetooth and Wi-Fi share the same transmit path, and cannot transmit simultaneously.

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*, *20.5*, and *24.5* indicate an enforced power limit, at the value stated in dBm, on the noted transmitter for this simultaneous transmit case.

Per FCC KDB 447498 D01 section 4.3.2, when the sum of the 1 g SAR values of all simultaneously transmitting antennas and device modes in an exposure condition is within the SAR limit, that simultaneous transmission configuration may be excluded from SAR measurements. Simultaneous SAR summations for the head-adjacent, body-worn accessory, and mobile hotspot exposure conditions with the worst-case SAR transmitter configurations are presented in the following tables.

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

		Transmitter Stand-Alone 1 g SAR Values (W/kg)					1 g SAR Summations (W/kg)			
							Case H1	Case H2	Case H3	Case H4
Band		GSM 850	GSM 1900	WCDMA 850	WCDMA 1900	Wi-Fi 2.4 GHz	GSM 850 + Wi-Fi 2.4 GHz	GSM 1900 + Wi-Fi 2.4 GHz	WCDMA 850 + Wi-Fi 2.4 GHz	WCDMA 1900 + Wi-Fi 2.4 GHz
Power Condition or Reduced Limit		*N/A*	*N/A*	*N/A*	*N/A*	*N/A*				
Position	Left Head Cheek	0.58	0.29	0.53	0.50	0.46	1.04	0.75	0.99	0.96
	Left Head 15° Tilt	0.39	0.19	0.4	0.35	0.38	0.77	0.57	0.78	0.73
	Right Head Cheek	0.99	0.42	0.64	0.67	1.09	**>1.60**	1.51	**>1.60**	**>1.60**
	Right Head 15° Tilt	0.43	0.13	0.41	0.24	0.45	0.88	0.58	0.86	0.69

Table 13: SAR summations for simultaneous evaluation in Head Positions

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	GPRS 850	*N/A*	Bluetooth	*N/A*	Voice + Background Data
B2	GPRS 1900	*N/A*	Bluetooth	*N/A*	Voice + Background Data
B3	WCDMA 850	*N/A*	Bluetooth	*N/A*	Voice + Background Data
B4	WCDMA 1900	*N/A*	Bluetooth	*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 H3	Case H4
Band		GPRS 850	GPRS 1900	WCDMA 850	WCDMA 1900	Bluetooth	GPRS 850 + Bluetooth	GPRS 1900 + Bluetooth	WCDMA 850 + Bluetooth	WCDMA 1900 + Bluetooth
Power Condition or Reduced Limit		*N/A*	*N/A*	*N/A*	*N/A*	*N/A*				
Position	Body Worn, Front of Phone 10 mm from Phantom	0.93	0.47	0.71	0.72	0.2	1.09	1.13	0.67	0.91
	Body Worn, Back of Phone 10 mm from Phantom	1.26	0.92	1.24	1.19	0.2	1.32	1.46	1.12	1.44

Table 14: SAR summations for simultaneous evaluation in Body-Worn Accessory Positions

Note:
GSM SAR measurements for Body-Worn Accessory exposure were excluded from testing, as GPRS was tested at an identical device separation distance and exhibits higher time-averaged output power.

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	*N/A*	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	*N/A*	Wi-Fi 2.4 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 M3	Case M4
Band		GPRS 850	GPRS 1900	WCDMA 850	WCDMA 1900	Wi-Fi 2.4 GHz	GPRS 850 + Wi-Fi 2.4 GHz	GPRS 1900 + Wi-Fi 2.4 GHz	WCDMA 850 + Wi-Fi 2.4 GHz	WCDMA 1900 + Wi-Fi 2.4 GHz
Power Condition or Reduced Limit		*N/A*	*N/A*	*N/A*	*N/A*	*N/A*				
Position	Front of Phone 10 mm from Phantom	0.93	0.47	0.71	0.72	0.27	1.2	0.74	0.98	0.99
	Back of Phone 10 mm from Phantom	1.26	0.92	1.24	1.19	0.36	**>1.60**	1.28	1.6	1.55
	Left Edge of Phone 10 mm from Phantom	0.79	0.2	0.58	0.29	0.39	1.18	0.59	0.97	0.68
	Right Edge of Phone 10 mm from Phantom	0.89	0.15	0.72	0.21	0.00	0.89	0.15	0.72	0.21
	Top Edge of Phone 10 mm from Phantom	0	0	0	0	0.23	0.23	0.23	0.23	0.23
	Bottom Edge of Phone 10 mm from Phantom	0.22	0.74	0.15	1.22	0.00	0.22	0.74	0.15	1.22

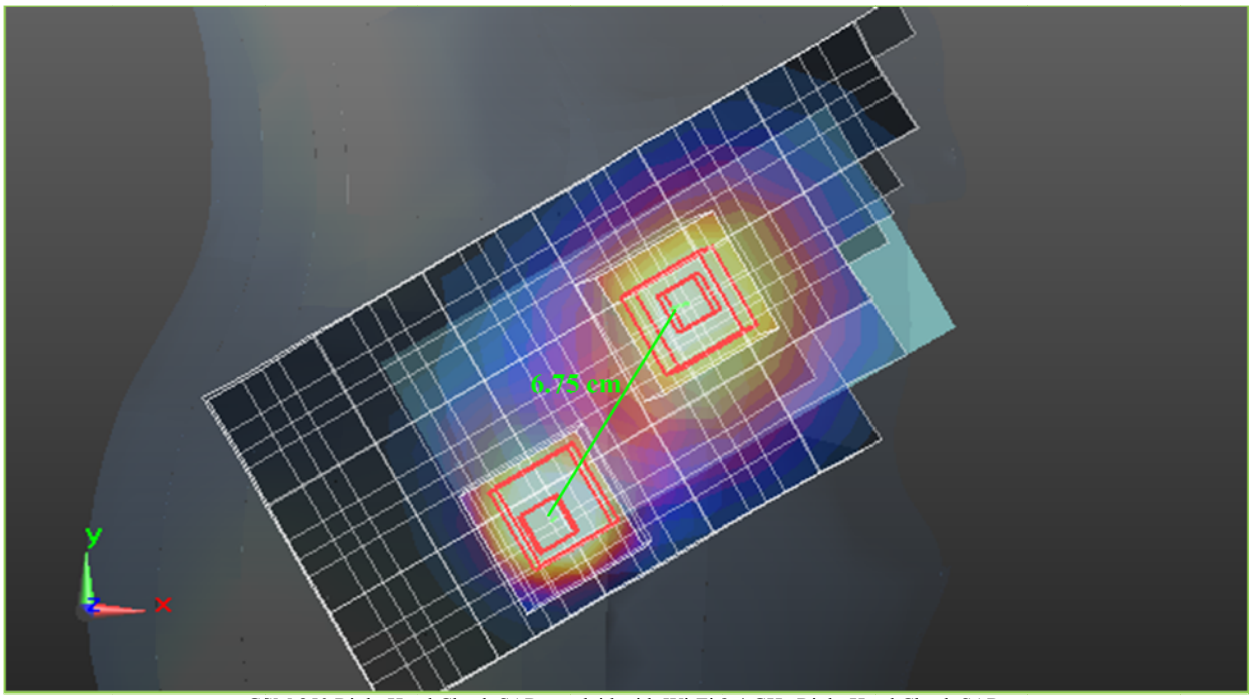
Table 15: SAR summations for simultaneous evaluation in a body-adjacent position

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

H1. Right Cheek, GSM 850 + Wi-Fi 2.4 GHz
H3. Right Cheek, WCDMA 850 + Wi-Fi 2.4 GHz
H3. Right Cheek, WCDMA 1900 + Wi-Fi 2.4 GHz
M1. Back of Phone 10mm from Phantom, GPRS 850 + Wi-Fi 2.4 GHz

The guidelines provided in FCC KDB 447498 D01 were utilized for evaluation of the need for simultaneous transmission SAR measurements. These guidelines direct that if the SAR-to-peak location separation ratio (SPLSR) for a pair of antennas is ≤ 0.04 then SAR measurement for simultaneous transmission is not required. Overlaid SAR plots, separation distances between RF peaks, and demonstration of these calculations are provided below for each noted case. 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 H1, Right Cheek, GSM 850 + Wi-Fi 2.4 GHz

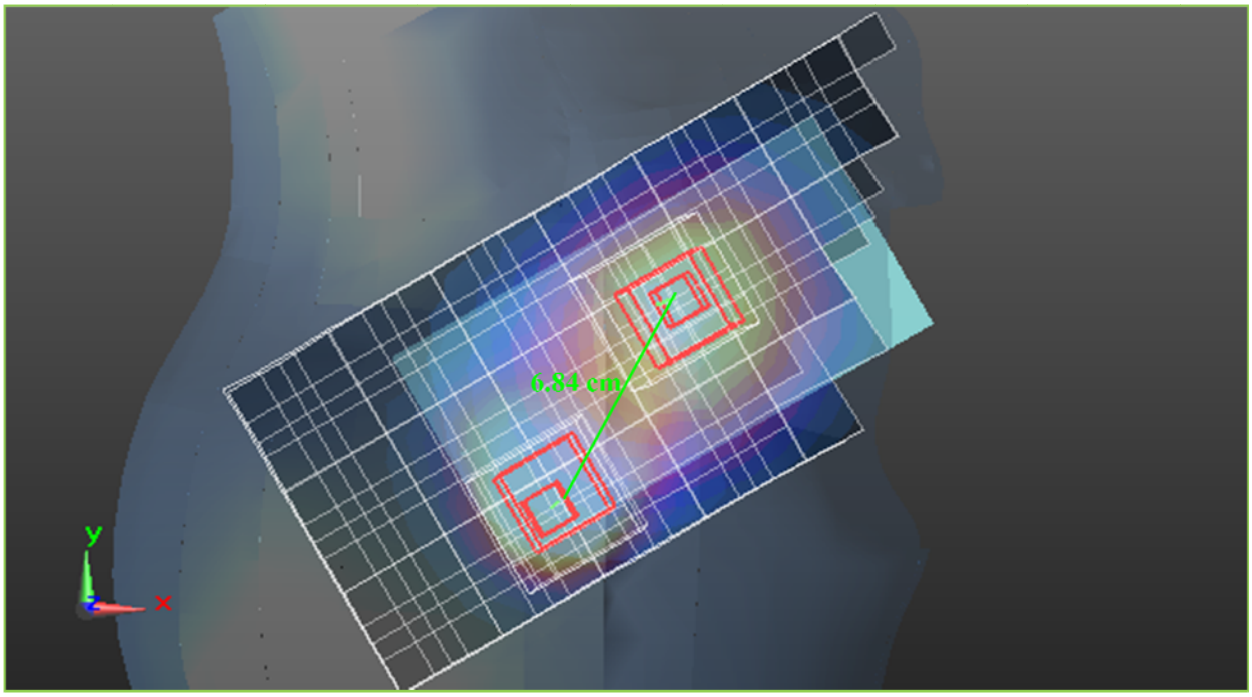


GSM 850 Right Head Cheek SAR overlaid with Wi-Fi 2.4 GHz Right Head Cheek SAR

Transmitter	1-g SAR
GSM 850	0.99
Wi-Fi 2.4 GHz	1.09
$(Sum)^{1.5}$	3.00
Peak separation distance	67.5 mm
SPLSR	*0.04*

As the SPLSR is equal to 0.04, 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

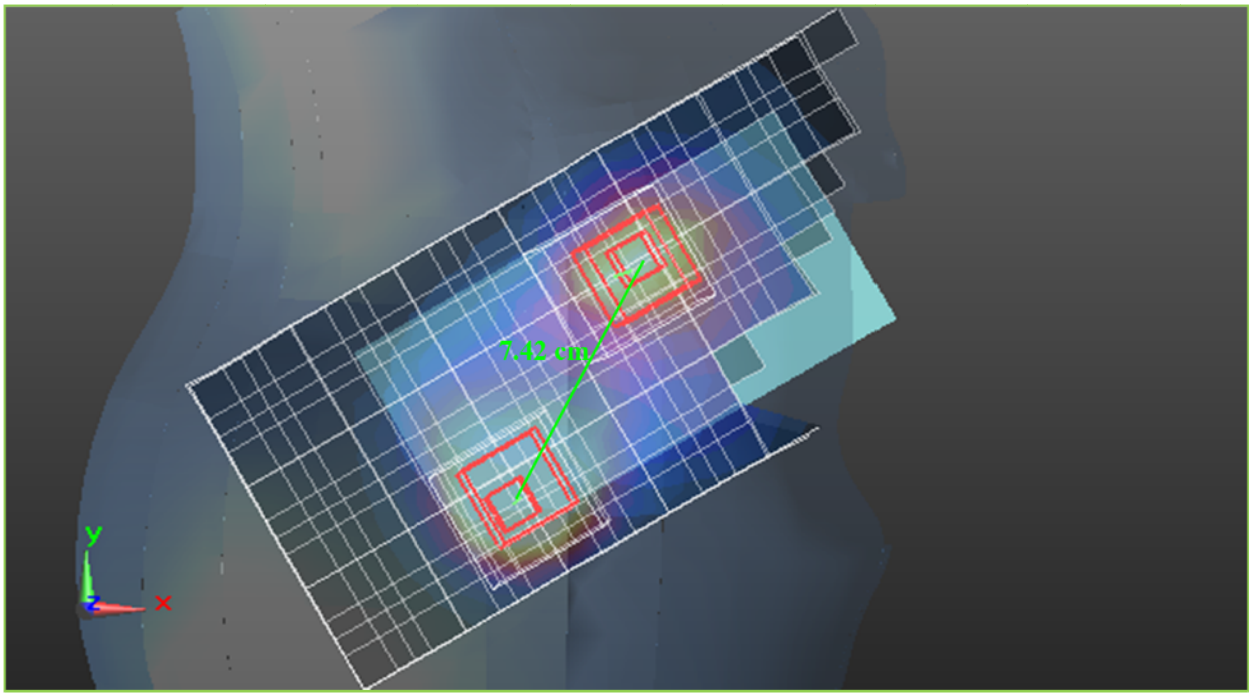


WCDMA 850 Right Head Cheek SAR overlaid with Wi-Fi 2.4 GHz Right Head Cheek SAR

Transmitter	1-g SAR
WCDMA 850	0.64
Wi-Fi 2.4 GHz	1.09
$(Sum)^{1.5}$	2.28
Peak separation distance	68.4 mm
SPLSR	*0.03*

As the SPLSR is below 0.04, 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

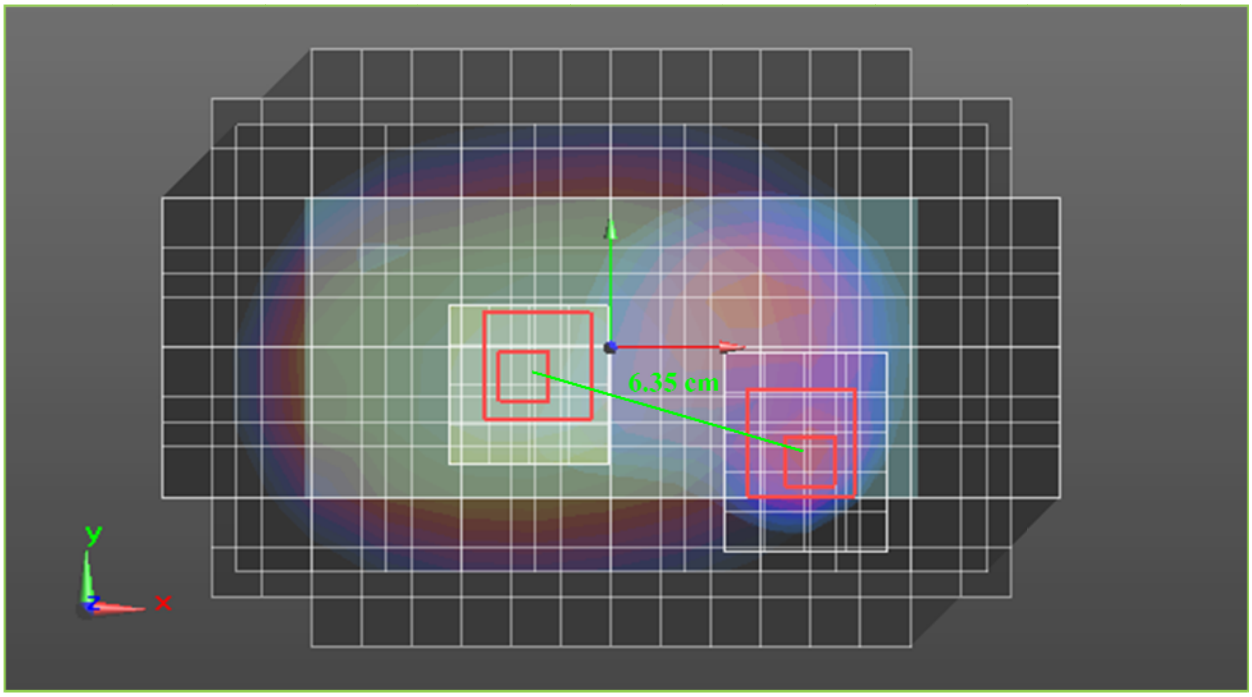


WCDMA 1900 Right Head Cheek SAR overlaid with Wi-Fi 2.4 GHz Right Head Cheek SAR

Transmitter	1-g SAR
WCDMA 1900	0.67
Wi-Fi 2.4 GHz	1.09
$(Sum)^{1.5}$	2.34
Peak separation distance	74.2 mm
SPLSR	*0.03*

As the SPLSR is below 0.04, no measurements to determine the aggregate 1-g SAR were required for this case.

Case M1, Back of Phone 10mm from Phantom, GPRS 850 + Wi-Fi 2.4 GHz



GPRS 850 Back of Phone 10mm from Phantom SAR overlaid with Wi-Fi 2.4 GHz Back of Phone 10mm from Phantom SAR

Transmitter	1-g SAR
GPRS 850	1.26
Wi-Fi 2.4 GHz	0.36
$(Sum)^{1.5}$	2.06
Peak separation distance	63.5 mm
SPLSR	*0.03*

As the SPLSR is below 0.04, no measurements to determine the aggregate 1-g SAR were required for this case.

5 References to Test Standards and Guidance

[1] CENELEC, EN 62209-1:2006 “Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)”

[2] CENELEC, EN 50360:2001 “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)”

[7] IC RSS-102 “Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

[8] IC Notice 2012-DRS1203 “RE: Applicability of Latest FCC RF Exposure KDB Procedures (Publication Date: October 24, 2012) and Other Procedures”

[9] CENELEC, EN 62209-2:2010 “Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)”

[10] FCC KDB Publication 248227 D01 v01r02 “SAR Measurement Procedures for 802.11 a/b/g Transmitters”

[11] FCC KDB Publication 447498 D01 v05 “Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies”

[12] FCC KDB Publication 648474 D04 v01 “SAR Evaluation Considerations for Wireless Handsets”

[13] FCC KDB Publication 865664 D01 v01 “SAR Measurement Requirements for 100 MHz to 6 GHz”

[14] FCC KDB Publication 865664 D02 v01 “RF Exposure Compliance Reporting and Documentation Considerations”

[15] FCC KDB Publication 941225 D01 v02 “SAR Measurement Procedures for 3G Devices”

[16] FCC KDB Publication 941225 D03 v01 “Recommended SAR Test Reduction Procedures for GMS/GPRS/EDGE”

[17] FCC KDB Publication 941225 D05 v02r01 “SAR Evaluation Considerations for LTE Devices”

[18] FCC KDB Publication 941225 D06 v01 “SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities”