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Portable Cellular Phone SAR Test Report

Tests Requested By: Motorola Mobility, LLC
600 N. US Highway 45
Libertyville, IL 60048

Test Report #: 25415-1F
Date of Report: 16-Oct-2013
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Test Laboratory: Motorola Mobility, LLC - ADR Test Service Laboratory
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A handwritten signature in black ink, appearing to read 'Thomas Knipple'.

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

Tests:
Electromagnetic Specific Absorption Rate

Procedures:
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)

Accreditation:



3465.01

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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This test report shall not be reproduced except in full, without written approval of the laboratory. The results and statements contained herein relate only to the items tested. The names of individuals involved may be mentioned only in connection with the statements or results from this report. Motorola encourages all feedback, both positive and negative, on this test report.

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Appendix 2: SAR Distribution Plots for Head-Adjacent Test Results

Appendix 3: SAR Distribution Plots for Body-Worn Accessory Test Results

Appendix 4: SAR Distribution Plots for Mobile Hotspot Test Results

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Appendix 7: Dipole Characterization Certificates

Revision History

Revision Version	Date	Notes
Rev. 0	16-Oct-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], [5], [9], 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	0.20	0.15	0.13
GSM 1900	0.16	0.48	0.90
WCDMA 850	0.13	0.15	0.22
WCDMA 1900	0.72	1.32	0.77
Wi-Fi 2.45 GHz	0.98	0.16	0.46
Wi-Fi 5.2 GHz	0.50	0.26	N/A
Wi-Fi 5.8 GHz	0.43	0.20	0.26
Bluetooth	N/A		
Simultaneous SAR	1.44		

2 Details of the Device Under Test

2.1 Sample Information

Serial Number(s) (Functional Use)	LXRR1G0009 (GSM conducted power measurements, GSM SAR testing) LXRR1G0016 (WCDMA conducted power measurements, WCDMA SAR testing) LXAA1W0032 (Wi-Fi SAR testing) LXAA1W0004 (Wi-Fi conducted power measurements) LXAA1W0021 (Bluetooth 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

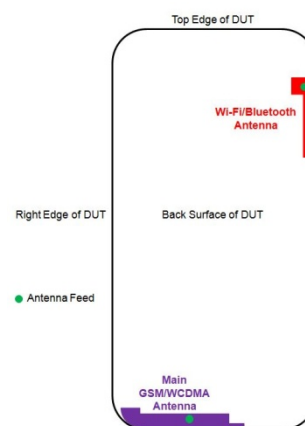
2.2 Antenna Description

Main (835/1880 MHz) Antenna

Type	Internal	
Location	Bottom Edge of Transceiver	
Dimensions	Width	7.2 mm
	Length	42 mm

Wi-Fi/Bluetooth Antenna

Type	Internal	
Location	Left Edge of Transceiver	
Dimensions	Width	25.2 mm
	Length	6 mm



2.3 Transmission Band Summary

Mode(s) of Operation	Modulation Mode(s)	Target Output Power Setting	Maximum Output Power Setting	Duty Cycle	Transmitting Frequency Range(s)
GSM 850	GMSK	32.5 dBm	33.5 dBm	1:8.3	824.2 - 848.8 MHz
GPRS/EDGE 850	GMSK	32.5 dBm	33.5 dBm	1:8.3, 2:8.3, 3:8.3, 4:8.3	824.2 - 848.8 MHz
EDGE 850	8PSK	26.0 dBm	28.0 dBm	1:8.3, 2:8.3, 3:8.3, 4:8.3	824.2 - 848.8 MHz
GSM 1900	GMSK	29.5 dBm	30.5 dBm	1:8.3	1850.2 - 1909.8 MHz
GPRS/EDGE 1900	GSMK	29.5 dBm	30.5 dBm	1:8.3, 2:8.3, 3:8.3, 4:8.3	1850.2 - 1909.8 MHz
EDGE 1900	8PSK	25.0 dBm	27.0 dBm	1:8.3, 2:8.3, 3:8.3, 4:8.3	1850.2 - 1909.8 MHz
WCDMA 850	QPSK	22.9 dBm	24.0 dBm	1:1	826.4 - 846.6 MHz
WCDMA 1900	QPSK	22.9 dBm	24.0 dBm	1:1	1852.4 - 1907.6 MHz
Wi-Fi 802.11b/g/n	BPSK	19.35 dBm		1:1	2412.0 - 2462.0 MHz
Wi-Fi 802.11a/n/ac	BPSK	15.60 dBm		1:1	5180.0 - 5240.0 MHz
Wi-Fi 802.11a/n/ac	BPSK	20.13 dBm		1:1	5745.0 - 5825.0 MHz
Bluetooth	GFSK	10.59 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)	33.50	31.00	28.75	28.00	30.50	28.00	25.75	25.00
Maximum Time Average Output Power Setting (dBm)	24.31	24.82	24.33	24.83	21.31	21.82	21.33	21.83
Duty Cycle	1:8.3	2:8.3	3:8.3	4:8.3	1:8.3	2:8.3	3:8.3	4:8.3
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)	28.00	25.50	24.00	22.50	27.00	24.50	22.75	21.50
Maximum Time Average Output Power Setting (dBm)	18.81	19.32	19.58	19.33	17.81	18.32	18.38	18.33
Duty Cycle	1:8.3	2:8.3	3:8.3	4:8.3	1:8.3	2:8.3	3:8.3	4:8.3
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	33.06	32.95	29.41	27.78	26.62	27.04	24.43	22.22	21.19
	190	32.97	32.87	29.41	27.77	26.54	27.01	24.42	22.16	21.35
	251	33.10	33.06	29.37	28.01	26.39	26.87	24.19	22.11	21.21
GSM 1900	512	30.19	30.25	26.76	25.05	23.65	26.63	23.86	21.51	20.35
	661	30.05	30.11	26.81	25.02	23.56	26.63	23.90	21.61	20.79
	810	30.05	30.01	26.63	24.97	23.48	26.43	23.72	21.30	20.27

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	23.87	23.76	23.23	23.36	23.45	17.85	18.25	17.80	18.02
	190	23.78	23.68	23.23	23.35	23.37	17.82	18.24	17.74	18.18
	251	23.91	23.87	23.19	23.59	23.22	17.68	18.01	17.69	18.04
GSM 1900	512	21.00	21.06	20.58	20.63	20.48	17.44	17.68	17.09	17.18
	661	20.86	20.92	20.63	20.60	20.39	17.44	17.72	17.19	17.62
	810	20.86	20.82	20.45	20.55	20.31	17.24	17.54	16.88	17.10

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.

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	22.80	22.80	21.48	20.90	20.94	20.95	20.80	20.82	21.31	21.10	20.88
	4180	22.88	22.83	21.57	21.08	21.02	21.01	20.92	20.88	21.42	21.11	21.12
	4233	22.71	22.67	21.41	20.79	20.83	20.77	20.73	20.66	21.23	21.00	21.00
WCDMA 1900	9262	22.41	22.61	21.37	20.68	20.73	20.72	20.87	20.81	21.01	21.11	21.14
	9400	22.62	22.67	21.32	20.82	20.86	20.85	20.94	20.93	21.15	21.20	21.22
	9538	22.32	22.34	21.10	20.66	20.63	20.61	20.77	20.70	20.99	20.94	20.99

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, and contains a Wi-Fi 802.11a/n/ac transmitter capable of data transmission in the 5 GHz U-NII bands.

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) (2)
802.11g / 802.11n / 802.11ac	Data	Excluded (1)	Excluded (1)	Excluded (1) (2)

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 or 802.11a was selected for SAR evaluation. Other 802.11 modes (including 802.11g, 802.11n, and 802.11ac) 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 or 802.11a 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.
- (2) Transmission in the U-NII-1 Band (5.180 to 5.240 GHz) is disabled for Mobile Hotspot operation.

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

Mode	Freq [MHz]	Channel	Detector	802.11b Conducted Power [dBm]			
				Data Rate [Mbps]			
				1	2	5.5	11
802.11b	2412	1	AVG	18.13	17.98	18.49	18.37
			PEAK	20.57	20.44	20.58	20.62
802.11b	2437	6	AVG	19.14	19.19	19.35	19.29
			PEAK	21.77	21.78	21.74	21.80
802.11b	2457	10	AVG	17.20	17.16	17.36	17.31
			PEAK	19.85	19.85	19.87	19.94
802.11b	2462	11	AVG	17.24	17.21	17.39	17.35
			PEAK	19.89	19.89	19.95	19.90

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	10.84	10.80	10.77	10.79	10.81	10.78	10.79	10.76
			PEAK	19.45	19.48	19.49	19.49	19.54	19.53	19.51	19.56
802.11g	2417	2	AVG	12.67	12.67	12.65	12.64	12.68	12.66	12.64	12.64
			PEAK	20.65	20.67	20.72	20.74	20.69	20.77	20.78	20.85
802.11g	2422	3	AVG	14.73	14.79	14.81	14.82	14.76	14.81	14.79	14.82
			PEAK	22.23	22.31	22.32	22.34	22.29	22.27	22.30	22.28
802.11g	2427	4	AVG	16.00	16.01	15.96	15.98	15.97	15.99	15.97	15.96
			PEAK	22.97	23.01	23.04	22.99	23.01	23.05	23.08	23.06
802.11g	2437	6	AVG	17.03	16.99	16.98	16.95	16.99	16.97	17.02	16.95
			PEAK	23.56	23.57	23.59	23.58	23.65	23.59	23.54	23.55
802.11g	2447	8	AVG	16.10	16.14	16.11	16.13	16.12	16.15	16.10	16.08
			PEAK	23.29	23.19	23.25	23.28	23.20	23.25	23.30	23.23
802.11g	2452	9	AVG	14.04	14.10	14.09	14.07	14.08	14.06	14.10	14.05
			PEAK	22.06	22.20	22.25	22.21	22.20	22.27	22.28	22.28
802.11g	2457	10	AVG	12.66	12.68	12.65	12.64	12.68	12.68	12.67	12.69
			PEAK	21.09	21.19	21.11	21.14	21.18	21.08	21.14	21.15
802.11g	2462	11	AVG	11.88	11.90	11.92	11.91	11.89	11.90	11.92	11.91
			PEAK	20.49	20.53	20.47	20.51	20.52	20.54	20.50	21.51

Mode	Freq	Channel	Detector	20MHz 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	8.48	8.52	8.51	8.47	8.48	8.45	8.44	8.44
			PEAK	17.88	17.84	17.79	17.89	17.85	17.78	17.84	17.82
802.11n	2417	2	AVG	11.68	11.70	11.72	11.69	11.73	11.71	11.73	11.67
			PEAK	20.12	20.12	20.02	20.07	20.06	20.02	20.10	20.06
802.11n	2422	3	AVG	13.78	13.75	13.83	13.76	13.74	13.70	13.77	13.72
			PEAK	21.68	21.60	21.63	21.71	21.66	21.71	21.61	21.67
802.11n	2427	4	AVG	14.93	14.95	14.93	14.89	14.97	14.87	14.94	14.93
			PEAK	22.62	22.64	22.67	22.68	22.64	22.59	22.61	22.59
802.11n	2432	5	AVG	15.95	15.88	15.91	16.00	15.94	15.95	15.93	15.99
			PEAK	23.13	23.08	23.22	23.16	23.21	23.10	23.07	23.04
802.11n	2437	6	AVG	17.07	17.04	17.01	17.02	17.11	17.08	17.04	17.05
			PEAK	23.55	23.48	23.61	23.50	23.57	23.47	23.59	23.53
802.11n	2447	8	AVG	15.13	15.05	15.14	15.10	15.16	15.07	15.16	15.08
			PEAK	22.81	22.80	22.88	22.90	22.78	22.84	22.82	22.73
802.11n	2452	9	AVG	12.86	12.90	12.87	12.90	12.86	12.85	12.82	12.82
			PEAK	21.31	21.24	21.37	21.34	21.23	21.33	21.33	21.33
802.11n	2457	10	AVG	11.71	11.68	11.68	11.76	11.64	11.66	11.64	11.73
			PEAK	20.43	20.42	20.37	20.52	20.40	20.44	20.48	20.50
802.11n	2462	11	AVG	10.94	10.99	10.90	10.93	10.91	10.94	10.87	10.89
			PEAK	19.82	19.84	19.89	19.90	19.81	19.72	19.86	19.83

Mode	Freq	Channel	Detector	20MHz 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	8.46	8.41	8.45	8.44	8.49	8.40	8.38	8.50
			PEAK	17.66	17.61	17.59	17.68	17.58	17.56	17.65	17.58
802.11n	2417	2	AVG	11.66	11.64	11.63	11.60	11.61	11.66	11.71	11.68
			PEAK	20.10	20.05	20.10	20.14	20.01	20.07	20.15	20.06
802.11n	2422	3	AVG	13.71	13.76	13.74	13.64	13.73	13.76	13.69	13.64
			PEAK	21.61	21.53	21.66	21.57	21.51	21.67	21.64	21.67
802.11n	2427	4	AVG	14.92	14.84	14.90	14.96	14.86	14.85	14.85	14.96
			PEAK	22.57	22.59	22.50	22.54	22.50	22.48	22.54	22.61
802.11n	2432	5	AVG	15.96	15.90	15.92	15.93	15.96	15.91	15.95	15.97
			PEAK	23.07	23.05	23.01	23.07	23.01	23.00	22.99	22.99
802.11n	2437	6	AVG	16.94	16.90	16.91	16.90	16.89	16.92	16.87	16.93
			PEAK	23.50	23.52	23.41	23.50	23.54	23.57	23.54	23.48
802.11n	2447	8	AVG	15.09	15.06	15.06	15.12	15.02	15.12	15.10	15.09
			PEAK	22.76	22.82	22.80	22.77	22.67	22.70	22.79	22.79
802.11n	2452	9	AVG	12.73	12.78	12.74	12.69	12.74	12.75	12.65	12.65
			PEAK	21.19	21.27	21.24	21.17	21.14	21.17	21.11	21.27
802.11n	2457	10	AVG	11.86	11.79	11.89	11.83	11.82	11.89	11.85	11.87
			PEAK	20.45	20.52	20.51	20.42	20.51	20.36	20.38	20.52
802.11n	2462	11	AVG	10.91	10.95	10.93	10.95	10.95	10.83	10.87	10.96
			PEAK	19.73	19.65	19.66	19.78	19.74	19.82	19.82	19.77

Mode	Freq	Channel	Detector	802.11a Conducted Power [dBm]							
				Data Rate [Mbps]							
				6	9	12	18	24	36	48	54
802.11a	5180	36	AVG	15.56	15.55	15.54	15.52	15.50	15.51	15.49	15.47
802.11a	5200	40	AVG	15.35	15.33	15.34	15.31	15.31	15.32	15.30	15.31
802.11a	5220	44	AVG	15.48	15.47	15.45	15.49	15.46	15.45	15.43	15.47
802.11a	5240	48	AVG	15.52	15.48	15.47	15.50	15.49	15.45	15.41	15.43

Mode	Freq	Channel	Detector	20MHz BW 802.11n (5GHz - 400ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
				7.2	14.4	21.7	28.9	43.3	57.8	65.0	72.2
802.11n	5180	36	AVG	15.59	15.56	15.55	15.60	15.59	15.58	15.55	15.57
802.11n	5200	40	AVG	15.31	15.28	15.35	15.35	15.30	15.30	15.31	15.26
802.11n	5220	44	AVG	15.43	15.44	15.40	15.49	15.44	15.48	15.44	15.47
802.11n	5240	48	AVG	15.49	15.50	15.47	15.46	15.53	15.43	15.41	15.40

Mode	Freq	Channel	Detector	20MHz BW 802.11n (5GHz - 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	5180	36	AVG	15.57	15.52	15.51	15.52	15.53	15.56	15.46	15.52
802.11n	5200	40	AVG	15.32	15.29	15.37	15.32	15.27	15.32	15.31	15.28
802.11n	5220	44	AVG	15.52	15.44	15.49	15.47	15.50	15.44	15.42	15.48
802.11n	5240	48	AVG	15.55	15.46	15.45	15.46	15.48	15.46	15.43	15.38

Mode	Freq	Channel	Detector	20MHz BW 802.11ac (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	MCS8
802.11ac	5180	36	AVG	15.41	15.43	15.40	15.42	15.46	15.45	15.41	15.42	15.40
802.11ac	5200	40	AVG	15.46	15.40	15.48	15.49	15.50	15.52	15.44	15.42	15.43
802.11ac	5220	44	AVG	15.48	15.44	15.48	15.48	15.55	15.50	15.41	15.49	15.46
802.11ac	5240	48	AVG	15.41	15.41	15.37	15.42	15.53	15.46	15.45	15.46	15.46

Mode	Freq	Channel	Detector	20MHz BW 802.11ac (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	MCS8
802.11ac	5180	36	AVG	15.59	15.58	15.69	15.65	15.61	15.74	15.44	15.59	14.58
802.11ac	5200	40	AVG	15.29	15.41	15.48	15.46	15.42	15.48	15.32	15.32	14.26
802.11ac	5220	44	AVG	15.37	15.43	15.54	15.55	15.52	15.63	15.38	15.49	14.51
802.11ac	5240	48	AVG	15.54	15.57	15.65	15.59	15.57	15.72	15.42	15.47	14.49

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	5190	38	AVG	14.18	14.16	14.14	14.15	14.16	14.16	14.15	14.17
802.11n	5230	46	AVG	14.17	14.14	14.15	14.17	14.15	14.18	14.13	14.16

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	5190	38	AVG	14.15	14.20	14.16	14.19	14.19	14.16	14.15	14.16
802.11n	5230	46	AVG	14.20	14.14	14.14	14.13	14.19	14.16	14.17	14.12

Mode	Freq	Channel	Detector	40MHz BW 802.11ac (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	MCS8	MCS9
802.11ac	5190	38	AVG	14.01	13.94	13.91	13.92	13.82	13.85	13.90	13.89	13.02	12.01
802.11ac	5230	46	AVG	13.99	13.97	13.94	13.93	13.90	13.89	13.89	13.87	13.05	11.99

Mode	Freq	Channel	Detector	40MHz BW 802.11ac (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	MCS8	MCS9
802.11ac	5190	38	AVG	14.11	14.17	14.06	14.03	13.93	14.05	13.91	13.99	13.19	12.17
802.11ac	5230	46	AVG	13.99	14.08	14.03	14.01	13.98	14.04	13.97	13.95	13.23	12.21

Mode	Freq	Channel	Detector	80MHz BW 802.11ac (5GHz - 400ns GI) Conducted Power [dBm]									
				Data Rate [Mbps]									
	[MHz]			32.5	65	97.5	130	195	260	292.5	325	390	433.3
802.11ac	5210	42	AVG	14.25	14.28	14.27	14.31	14.30	14.26	14.28	14.29	14.25	12.28

Mode	Freq	Channel	Detector	80MHz BW 802.11ac (5GHz - 800ns GI) Conducted Power [dBm]									
				Data Rate [Mbps]									
	[MHz]			29.3	58.5	87.8	117	175.5	234	263.3	292.5	351	390
802.11ac	5210	42	AVG	14.33	14.29	14.32	14.30	14.28	14.31	14.30	14.28	14.29	12.47

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	20.07	20.03	19.24	19.17	19.15	18.19	17.11	16.29
			PEAK	24.12	24.10	23.81	23.80	23.84	23.49	23.02	22.63
802.11a	5765	153	AVG	20.07	20.13	19.07	19.14	19.09	18.07	17.07	16.25
			PEAK	24.05	24.05	23.72	23.82	23.78	23.41	23.01	22.56
802.11a	5785	157	AVG	20.09	20.13	19.11	19.13	19.06	18.01	16.98	16.11
			PEAK	24.02	24.02	23.72	23.71	23.72	23.43	22.92	22.45
802.11a	5805	161	AVG	20.07	20.10	19.06	19.09	19.08	18.13	17.11	16.12
			PEAK	24.01	24.04	23.71	23.74	23.73	23.42	22.96	22.51
802.11a	5825	165	AVG	20.02	20.01	19.05	19.08	19.09	18.03	17.01	16.05
			PEAK	24.01	24.02	23.73	23.75	23.72	23.37	22.95	22.47

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	19.23	19.34	19.32	19.16	18.26	17.14	16.20	15.23
			PEAK	24.44	24.49	24.49	24.47	24.13	23.64	23.03	22.35
802.11n	5765	153	AVG	19.28	19.26	19.23	19.20	18.19	17.05	16.15	15.18
			PEAK	24.42	24.48	24.49	24.38	24.07	23.51	22.97	22.24
802.11n	5785	157	AVG	19.17	19.18	19.24	19.22	18.08	16.96	16.15	15.11
			PEAK	24.35	24.36	24.40	24.40	23.98	23.41	22.93	22.25
802.11n	5805	161	AVG	19.23	19.22	19.23	19.21	18.26	17.05	16.25	15.28
			PEAK	24.30	24.34	24.32	24.30	24.01	23.43	22.97	22.31
802.11n	5825	165	AVG	19.25	19.26	19.23	19.22	18.21	17.01	16.26	15.26
			PEAK	24.32	24.35	24.32	24.31	23.98	23.40	22.99	22.27

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	19.00	19.13	19.14	19.04	18.06	17.04	16.18	15.13
			PEAK	24.20	24.24	24.26	24.18	23.92	23.46	22.92	22.22
802.11n	5765	153	AVG	19.08	19.04	19.02	19.02	18.09	17.00	16.11	15.12
			PEAK	24.04	24.06	24.08	24.07	23.78	23.31	22.87	22.29
802.11n	5785	157	AVG	19.14	19.07	18.99	19.08	18.09	16.84	16.05	15.08
			PEAK	24.16	24.16	24.15	24.21	23.88	23.32	22.86	22.11
802.11n	5805	161	AVG	19.15	19.13	19.14	19.07	18.19	16.95	16.14	15.06
			PEAK	24.37	24.35	24.41	24.39	24.08	23.46	22.90	22.15
802.11n	5825	165	AVG	19.14	19.06	19.17	19.15	18.15	16.95	16.03	15.08
			PEAK	24.32	24.27	24.27	24.28	23.90	23.39	22.75	22.12

Mode	Freq	Channel	Detector	20MHz BW 802.11ac (5GHz - 400ns GI) Conducted Power [dBm]								
				Data Rate [Mbps]								
	[MHz]			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
802.11ac	5745	149	AVG	18.90	18.98	18.94	18.98	18.02	17.01	15.98	14.92	13.93
			PEAK	23.75	23.72	23.69	23.82	23.52	23.19	22.64	21.97	21.28
802.11ac	5765	153	AVG	18.88	18.94	18.95	19.02	17.99	17.02	15.98	14.88	13.94
			PEAK	23.79	23.74	23.72	23.83	23.52	23.25	22.67	21.94	21.30
802.11ac	5785	157	AVG	18.94	18.94	18.99	18.99	18.00	16.98	16.02	14.90	13.93
			PEAK	23.77	23.67	23.65	23.87	23.48	23.14	22.69	21.92	21.31
802.11ac	5805	161	AVG	18.87	18.99	18.93	18.96	18.03	17.00	15.98	14.93	13.97
			PEAK	23.78	23.67	23.68	23.86	23.58	23.14	22.68	22.03	21.29
802.11ac	5825	165	AVG	18.87	19.00	18.93	18.94	18.06	17.06	15.94	14.89	13.92
			PEAK	23.80	23.73	23.67	23.81	23.58	23.14	22.58	21.93	21.25

Mode	Freq	Channel	Detector	20MHz BW 802.11ac (5GHz - 800ns GI) Conducted Power [dBm]								
				Data Rate [Mbps]								
	[MHz]			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
802.11ac	5745	149	AVG	18.94	18.97	18.90	18.99	18.00	17.06	15.97	14.91	13.95
			PEAK	23.80	23.79	23.76	23.75	23.51	23.26	22.59	21.96	21.33
802.11ac	5765	153	AVG	18.95	19.02	18.91	19.03	18.04	17.02	15.97	14.90	13.91
			PEAK	23.69	23.78	23.62	23.76	23.47	23.22	22.69	21.99	21.24
802.11ac	5785	157	AVG	18.92	18.95	18.96	18.99	18.00	16.97	16.00	14.97	13.89
			PEAK	23.78	23.75	23.64	23.80	23.58	23.15	22.63	21.97	21.29
802.11ac	5805	161	AVG	18.87	18.99	18.96	18.97	17.98	17.02	15.94	14.89	13.93
			PEAK	23.81	23.72	23.68	23.78	23.59	23.13	22.68	22.00	21.28
802.11ac	5825	165	AVG	18.90	18.95	18.99	19.03	18.06	17.05	15.95	14.97	13.96
			PEAK	23.73	23.69	23.65	23.76	23.56	23.23	22.64	21.96	21.27

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	18.72	18.69	18.56	18.63	17.63	16.72	15.53	14.47
			PEAK	23.78	23.73	23.70	23.70	23.32	22.87	22.12	21.43
802.11n	5775	155	AVG	18.72	18.67	18.72	18.69	17.60	16.67	15.65	14.32
			PEAK	23.74	23.71	23.76	23.74	23.22	22.74	22.23	21.29
802.11n	5795	159	AVG	18.69	18.67	18.71	18.57	17.67	16.71	15.51	14.43
			PEAK	23.73	23.74	23.74	23.67	23.30	22.85	22.14	21.40
802.11n	5815	163	AVG	18.57	18.73	18.72	18.70	17.64	16.69	15.67	14.38
			PEAK	23.66	23.77	23.76	23.76	23.29	22.84	22.19	21.40

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	18.55	18.54	18.54	18.55	17.65	16.63	15.48	14.52
			PEAK	23.69	23.67	23.73	23.73	23.30	22.76	22.06	21.47
802.11n	5775	155	AVG	18.58	18.59	18.55	18.58	17.64	16.72	15.56	14.37
			PEAK	23.70	23.70	23.69	23.71	23.33	22.84	22.07	21.36
802.11n	5795	159	AVG	18.71	18.73	18.74	18.52	17.63	16.68	15.62	14.38
			PEAK	23.76	23.73	23.74	23.68	23.30	22.77	22.13	21.37
802.11n	5815	163	AVG	18.66	18.69	18.67	18.64	17.70	16.62	15.64	14.31
			PEAK	23.69	23.73	23.72	23.74	23.34	22.79	22.21	21.25

Mode	Freq [MHz]	Channel	Detector	40MHz BW 802.11ac (5GHz - 400ns GI) Conducted Power [dBm]									
				Data Rate [Mbps]									
				15.0	30.0	45.0	60.0	90.0	120.0	135.0	150.0	MCS8	MCS9
802.11ac	5755	151	AVG	17.72	17.73	17.76	17.78	16.57	15.49	14.58	13.59	12.65	10.86
			PEAK	23.42	23.34	23.42	23.41	22.85	22.42	22.01	21.61	20.55	18.61
802.11ac	5775	155	AVG	17.73	17.73	17.80	17.79	16.58	15.55	14.55	13.59	12.68	10.85
			PEAK	23.36	23.38	23.37	23.38	22.82	22.42	22.02	21.65	20.48	18.72
802.11ac	5795	159	AVG	17.70	17.71	17.81	17.83	16.58	15.52	14.55	13.63	12.63	10.85
			PEAK	23.34	23.45	23.46	23.46	22.79	22.53	21.93	21.72	20.61	18.66
802.11ac	5815	163	AVG	17.77	17.75	17.73	17.75	16.56	15.54	14.62	13.65	12.70	10.85
			PEAK	23.48	23.29	23.39	23.42	22.92	22.51	21.94	21.62	20.49	18.57

Mode	Freq	Channel	Detector	40MHz BW 802.11ac (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	MCS8	MCS9
802.11ac	5755	151	AVG	17.87	17.95	17.87	17.85	16.78	15.69	14.78	13.72	12.76	11.96
			PEAK	24.09	24.25	24.11	24.04	23.60	23.14	23.15	22.06	21.70	21.02
802.11ac	5775	155	AVG	17.83	17.86	17.84	17.85	16.82	15.68	14.78	13.64	12.68	11.93
			PEAK	24.05	24.09	24.00	24.02	23.63	23.10	23.11	22.01	21.73	21.05
802.11ac	5795	159	AVG	17.88	17.93	17.90	17.84	16.70	15.69	14.76	13.76	12.81	11.98
			PEAK	24.05	23.98	24.04	24.07	23.59	23.04	23.19	22.09	21.64	21.07
802.11ac	5815	163	AVG	17.82	17.76	17.76	17.85	16.80	15.63	14.78	13.66	12.79	11.89
			PEAK	24.01	24.01	24.07	23.96	23.50	23.14	23.14	22.06	21.69	20.98

Mode	Freq	Channel	Detector	80MHz BW 802.11ac (5GHz - 400ns GI) Conducted Power [dBm]									
				Data Rate [Mbps]									
	[MHz]			32.5	65	97.5	130	195	260	292.5	325	MCS8	MCS9
802.11ac	5775	155	AVG	17.67	17.31	16.89	16.61	15.44	14.38	13.53	12.60	11.46	9.72
			PEAK	26.19	25.76	25.90	26.40	24.89	23.77	22.89	21.90	20.49	18.99
802.11ac	5795	159	AVG	17.59	17.19	17.01	16.63	15.32	14.27	13.69	12.56	11.50	9.59
			PEAK	26.07	25.98	26.02	26.36	25.08	23.69	22.91	21.97	20.63	18.89

Mode	Freq	Channel	Detector	80MHz BW 802.11ac (5GHz - 800ns GI) Conducted Power [dBm]									
				Data Rate [Mbps]									
	[MHz]			29.3	58.5	87.8	117	175.5	234	263.3	292.5	MCS8	MCS9
802.11ac	5775	155	AVG	17.55	17.20	16.87	16.53	15.36	14.31	13.56	12.46	11.47	9.61
			PEAK	26.12	25.81	25.92	26.23	24.92	23.72	22.88	21.82	20.49	18.89
802.11ac	5795	159	AVG	17.53	17.10	16.81	16.59	15.38	14.24	13.55	12.37	11.42	9.66
			PEAK	26.22	25.67	25.86	26.22	24.91	23.79	22.93	21.79	20.46	18.80

2.4.4 Bluetooth

Technical Description

The phone under test contains a Bluetooth transmitter capable of data transmission in the 2.44 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:

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

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.

$$\frac{[11.468]_{(mW)}}{[10]_{(mm)}} \times \sqrt{2.44_{(GHz)}} = 1.8 \leq 3.0$$

Note that simultaneous SAR evaluations include estimations for Bluetooth SAR, as detailed in section 4.6 below.

Conducted Power Measurements

Frequency [MHz]	Data Rate [Mbps]	Channel Number	Average Conducted Power [mW]
2402	1.0	0	6.285
2441	1.0	39	8.352
2480	1.0	78	7.091
2402	2.0	0	7.982
2441	2.0	39	10.551
2480	2.0	78	8.886
2402	3.0	0	8.650
2441	3.0	39	11.468
2480	3.0	78	9.685

Frequency [MHz]	Mode	Channel Number	Average Conducted Power [mW]
2402	LE	0	6.233
2441	LE	39	8.232
2480	LE	78	6.759

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 Transmitter power reduction conditions and modes

The phone 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 simultaneously with any other transmitters active, a reduced maximum power limit is enforced on the Wi-Fi transmitter. A table of the reduced limits used for testing is given below.

Mode(s) of Operation	Wi-Fi 2.4 GHz	Wi-Fi 5.8 GHz
Channel Ranges	1-11	149-165
Maximum Output Power (dBm)	19.35	20.13
Reduced Maximum Output Power Setting (dBm)	17	16

While operating in a mobile hotspot session, reduced power limits are enforced on the WCDMA 1900 transmitter. A table of the reduced limits used for testing is given below.

Mode(s) of Operation	WCDMA 1900
Channel Ranges	9262-9538
Maximum Output Power Setting (dBm)	24.0
Reduced Maximum Output Power Setting (dBm)	19.0

While operating in a mobile hotspot session, reduced power limits are enforced on the GSM 1900 transmitter. A table of the reduced limits used for testing is given below.

Mode(s) of Operation	GPRS 1900				EDGE 1900			
Channel Range	975-124				975-124			
Modulation	GMSK				8PSK			
Duty Cycle	1:8.3	2:8.3	3:8.3	4:8.3	1:8.3	2:8.3	3:8.3	4:8.3
Maximum Output Power Setting (dBm)	30.50	28.00	25.75	25.00	27.00	24.50	22.75	21.50
Time Average Output Power Setting (dBm)	21.31	21.82	21.33	21.83	17.81	18.32	18.38	18.33
Reduced Maximum Output Power Setting (dBm)	30.00	27.50	25.25	24.50	26.50	24.00	22.25	21.00
Reduced Time Average Output Power Setting (dBm)	20.81	21.32	20.83	21.33	17.31	17.82	17.83	17.83

See section 4.6 for tables detailing the complete interoperation of this power limit reduction schema.

2.6 Accessories for the Device Under Test

2.6.1 Alternative Housings

The front and rear housings and other associated components (bezel, button covers and graphics) will be available in multiple colors and several different types of materials. None of the permissible variations result in a new usage mode, adds operational features, or changes the shape or key physical dimensions of the wireless device. Colors and accents to be added to the portfolio available for custom configurations do not have any metallic content differences, pearl content, carbon loading or other significant dielectric loading impact and are evaluated against these requirements. Those that are fully conformant are deemed acceptable, and may be deployed with no further activity. Any areas of non-conformity are evaluated for potential impact upon SAR compliance, and such impact may entail additional testing, and possible Class II Permissive Change filings. Therefore, testing for this application will be performed on one representative sample and is reflective of the other options.

2.6.2 Batteries

The phone tested in this report has the following battery options:

Model SNN5923A - 2200 mAh battery

The model SNN5923A 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.

2.6.3 Body-Worn Carry Accessories

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 15 mm between the device and the flat phantom was used for testing body-worn accessory SAR. The chosen separation distance of 15 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 either side facing the user.

Other carry accessories may become available after the testing of this product. These accessories will maintain reported compliance if they either; only intended to protect the phone when it is in an idle mode (a protect case), or as use as a body worn accessory with a separation distance of 15 mm. All potential carry accessories shall not be allowed to have metal components between the phone and the user. Also, these accessories shall not contain any clips, snaps, belt loops, arm / body bands or lanyards that result in a use condition with less than 15 mm separation distance.

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 $\pm 11\%$ ($K=1$) with an expanded uncertainty of $\pm 22\%$ ($K=2$). The overall 1 g RSS uncertainty of the measurement system is $\pm 11\%$ ($K=1$) with an expanded uncertainty of $\pm 22\%$ ($K=2$). The measurement uncertainty budget is given in Appendix 5. 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	656	7-Feb-2013	7-Feb-2014	Measurement System 1
E-Field Probe ES3DV3	3180	11-Feb-2013	11-Feb-2014	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	376	3-Sep-2012	3-Sep-2013	Measurement System 2 Removed from service 14-Aug-2013
E-Field Probe ES3DV3	3124	20-Aug-2012	20-Aug-2013	Measurement System 2 Removed from service 14-Aug-2013
DASY™ DAE V1	378	28-May-2013	28-May-2014	Measurement System 2 Placed into service 14-Aug-2013
E-Field Probe ES3DV3	3184	30-May-2013	30-May-2014	Measurement System 2 Placed into service 14-Aug-2013
Twin SAM Phantom V4.0	TP-1235			Measurement System 2
Twin SAM Phantom V4.0	TP-1136			Measurement System 2
MFP V5.1 C Triple Modular Flat Phantom	1102			Measurement System 2
DASY™ DAE V1	699	12-Sep-2012	12-Sep-2013	Measurement System 3 Removed from service 28-Mar-2013
DASY™ DAE V1	784	6-Mar-2013	6-Mar-2014	Measurement System 3 Placed into service 28-Mar-2013
E-Field Probe EX3DV4	3730	24-Aug-2012	24-Aug-2013	Measurement System 3 Removed from service 14-Aug-2013
E-Field Probe EX3DV4	3728	30-May-2013	30-May-2014	Measurement System 3 Placed into service 14-Aug-2013
Twin SAM Phantom V4.0	TP-1106			Measurement System 3
Twin SAM Phantom V4.0	TP-1153			Measurement System 3
MFP V5.1 C Triple Modular Flat Phantom	1103			Measurement System 3
DASY™ DAE V1	440	24-Jul-2013	24-Jul-2014	Measurement System 4
E-Field Probe ES3DV3	3284	26-Jul-2013	26-Jul-2014	Measurement System 4
Twin SAM Phantom V4.0	TP-1132			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, D835V2	422tr	18-Mar-2011	18-Mar-2012	Calibration extension, see note.
Dipole Validation Kit, D835V2	423tr	12-Sep-2012	12-Sep-2013	Calibration extension, see note.
Dipole Validation Kit, D835V2	436tr	18-Mar-2011	18-Mar-2012	Calibration extension, see note.
Dipole Validation Kit, D1800V2	2d190	5-Jan-2012	5-Jan-2013	Calibration extension, see note.
Dipole Validation Kit, D1800V2	2d191	5-Jan-2012	5-Jan-2013	Calibration extension, see note.
Dipole Validation Kit, D1800V2	259tr	20-Oct-2011	20-Oct-2012	Calibration extension, see note.
Dipole Validation Kit, D2450V2	740	7-Feb-2012	7-Feb-2013	Calibration extension, see note.
Dipole Validation Kit, D2450V2	863	17-Mar-2011	17-Mar-2012	Calibration extension, see note.
Dipole Validation Kit, D5GHzV2	1088	20-May-2011	20-May-2012	Calibration extension, see note.
Dipole Validation Kit, D5GHzV2	1098	17-Jan-2012	17-Jan-2013	Calibration extension, see note.

Note: Per FCC KDB 865664 D01 v01r01, Section 3.2.2, evaluation for the extension of the dipole calibration was carried out. Results are provided in Appendix 7 in addition to the original calibration certificate.

3.2 Additional Equipment

Description	Serial Number	Cal Date	Cal Due Date	Service Notes
Power Meter 437B	3125U08032	28-Aug-2012	28-Aug-2013	
Power Sensor 8481A	US37296470	2-Nov-2012	2-Nov-2013	
10 dB Attenuator 8491A	62165	24-Sep-2011	27-Sep-2013	
Signal Generator HP8648C	3847A04810	26-Sep-2011	26-Sep-2013	
Power Meter E4419B	GB39511090	12-Aug-2011	12-Aug-2013	
Power Sensor #1 - E9301A	US39211009	28-Aug-2012	28-Aug-2013	
Power Sensor #2 - E9301A	US39211013	2-Nov-2012	2-Nov-2013	
3 dB Attenuator 8491A	50577	15-Aug-2011	15-Aug-2013	
Power Meter 437B	3125U11503	18-Jul-2013	18-Jul-2015	
Power Sensor 8481A	2702A59572	21-Mar-2013	21-Mar-2014	
10 dB Attenuator 8491A	50772	19-Jul-13	19-Jul-2015	
Signal Generator HP8648C	3847M01245	18-Jul-2013	18-Jul-2015	
Power Meter E4419B	GB39511090	6-Sep-2012	6-Sep-2014	
Power Sensor #1 - E9301A	US39210934	28-Jun-2013	28-Jun-2014	
Power Sensor #2 - E9301A	US39211006	28-Jun-2014	28-Jun-2014	
3 dB Attenuator 8491A	MY39262292	19-Jul-2013	19-Jul-2015	
Dual Directional Coupler 778D	50790	2-Nov-2012	2-Nov-2014	
Amplifier ZHL-42-SMA	N120299-25			
Power Meter 437B	3125U08939	12-Aug-2011	12-Aug-2013	
Power Sensor 8481A	US37296475	2-Nov-2012	2-Nov-2013	
10 dB Attenuator 8491A	3929M50702	12-Sep-2011	12-Sep-2013	
Signal Generator HP8648C	3847M01245	23-Aug-2011	23-Aug-2013	
Power Meter E4419B	GB39511084	28-Mar-2011	28-Mar-2013	
Power Meter E4419B	GB39511087	28-Aug-2012	28-Aug-2014	
Power Sensor #1 - E9301A	US39210915	14-Jan-2013	14-Jan-2014	
Power Sensor #2 - E9301A	US39210916	14-Jan-2013	14-Jan-2014	
3 dB Attenuator 8491A	MY39267604	13-Oct-2011	13-Oct-2013	
Power Meter 437B	3125U11497	18-Jul-2013	18-Jul-2015	
Power Sensor 8481A	US37296475	2-Nov-2012	2-Nov-2013	
10 dB Attenuator 8491A	3929M50701	19-Jul-13	19-Jul-2015	
Signal Generator HP8648C	3847A04843	8-Apr-2013	8-Apr-2015	
Power Meter E4419B	GB39511087	28-Aug-2012	28-Aug-2014	
Power Sensor #1 - E9301A	US39210915	14-Jan-2013	14-Jan-2014	
Power Sensor #2 - E9301A	US39210916	14-Jan-2013	14-Jan-2014	
3 dB Attenuator 8491A	36902	5-Sep-2013	5-Sep-2015	
Dual Directional Coupler 778D	18376	29-Aug-2012	29-Aug-2014	
Amplifier ZHL-42-SMA	N120299-23			
Signal Generator HP8648C	3847A04632	13-Aug-2011	13-Aug-2013	
Power Meter E4419B	GB39511086	4-Nov-2011	4-Nov-2013	
Power Sensor #1 - E9301A	US39211007	28-Aug-2012	28-Aug-2013	
Power Sensor #2 - E9301A	US39211008	28-Aug-2012	28-Aug-2013	
3 dB Attenuator 8491A	50555	13-Sep-2011	13-Sep-2013	
Dual Directional Coupler 778D	18621	18-Aug-2011	18-Aug-2013	
Signal Generator HP8648C	3847A04844	19-Jul-2013	19-Jul-2015	
Power Meter E4419B	GB39511086	4-Nov-2011	4-Nov-2013	
Power Sensor #1 - E9301A	US39210929	23-Jul-2013	23-Jul-2014	
Power Sensor #2 - E9301A	US39210930	23-Jul-2013	23-Jul-2014	
3 dB Attenuator 8491A	50579	19-Jul-2013	19-Jul-2015	
Dual Directional Coupler 778D	MY48220442	22-Jul-2013	22-Jul-2014	
Amplifier ZHL-42-SMA	N120299-26			
Power Meter E4416A	GB41293246	5-Nov-2011	5-Nov-2013	
Power Sensor #3 - E9323A	MY444420676	29-Aug-2012	29-Aug-2013	
Power Meter E4419B	GB39511088	11-Aug-2011	11-Aug-2013	
Power Sensor #1 - E9301A	US39210929	27-Jul-2012	27-Jul-2013	
Power Sensor #2 - E9301A	US39210930	27-Jun-2012	27-Jun-2013	
3 dB Attenuator 8491A	36902	13-Sep-2011	13-Sep-2013	
Power Meter E4416A	GB41293258	4-Sep-2013	4-Sep-2015	
Power Sensor #3 - E9323A	MY44420341	23-Jul-2013	23-Jul-2014	
10 dB Attenuator 8491A	MY39267982	31-Jul-2012	31-Jul-2014	
Signal Generator N5181A	MY50143026	27-Oct-2011	27-Oct-2014	
Power Meter E4419B	US39250622	27-Jun-2013	27-Jun-2015	
Power Sensor #1 - E9301A	US39210917	18-Jan-2013	18-Jan-2014	
Power Sensor #2 - E9301A	US39210932	20-Mar-2013	20-Mar-2014	
3 dB Attenuator 8491A	36904	19-Jul-2013	19-Jul-2015	
Dual Directional Coupler 772D	MY46151266	1-Aug-2012	1-Aug-2014	
Amplifier ZVA-183-S+	988901030 A			
Network Analyzer E5071C	MY46212851	10-May-2012	10-May-2013	
Network Analyzer E5071C	US39171846	24-Jul-2014	24-Jul-2014	
Dielectric Probe 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			Date	Mod. Type	Dielectric Parameters	
				Measured σ (S/m)	Measured ϵ_r	Result			Measured σ (S/m)	Measured ϵ_r
3180	Head	750	2/21/2013	0.8599	41.52	PASS				
3180	Head	835	2/21/2013	0.941	41.98	PASS	3/7/2013	GMSK	0.912	39.6
3180	Head	1800	2/21/2013	1.37	39.23	PASS	3/7/2013	GMSK	1.384	38.24
3180	Head	1900	2/21/2013	1.476	38.79	PASS				
3180	Head	2450	2/25/2013	1.75	36.59	PASS	3/14/2013	OFDM	1.807	37.8
3180	Body	750	2/21/2013	0.9525	54.36	PASS				
3180	Body	835	2/21/2013	1.00	55.04	PASS	3/7/2013	GMSK	0.996	54.068
3180	Body	1800	2/21/2013	1.445	49.43	PASS	3/7/2013	GMSK	1.582	49.18
3180	Body	1900	2/21/2013	1.561	49.05	PASS				
3180	Body	2450	2/25/2013	1.926	49.22	PASS	3/12/2013	OFDM	1.999	50.5

DASY52™ Measurement System 2										
System Validation Measurements										
Probe	Tissue Type	f (MHz)	CW Validations				Modulated Validations			
			Date	Dielectric Parameters			Date	Mod. Type	Dielectric Parameters	
				Measured σ (S/m)	Measured ϵ_r	Result			Measured σ (S/m)	Measured ϵ_r
3124	Head	750	1/16/2013	0.876	42.29	PASS				
3124	Head	835	1/16/2013	0.895	39.11	PASS	1/14/2013	GMSK	0.914	40.63
3124	Head	1800	1/15/2013	1.365	38.34	PASS	1/14/2013	GMSK	1.373	39.61
3124	Head	1900	1/15/2013	1.457	38.20	PASS				
3124	Head	2450	1/16/2013	1.812	39.28	PASS				
3124	Body	750	1/16/2013	0.967	54.55	PASS				
3124	Body	835	1/15/2013	0.989	53.55	PASS	1/15/2013	GMSK	0.99	53.547
3124	Body	1800	1/15/2013	1.448	51.40	PASS	1/14/2013	GMSK	1.45	52.38
3124	Body	1900	1/15/2013	1.568	51.03	PASS				
3124	Body	2450	1/16/2013	1.992	50.89	PASS				

DASY52™ Measurement System 2										
System Validation Measurements										
Probe	Tissue Type	f (MHz)	CW Validations				Modulated Validations			
			Date	Dielectric Parameters			Date	Mod. Type	Dielectric Parameters	
				Measured σ (S/m)	Measured ϵ_r	Result			Measured σ (S/m)	Measured ϵ_r
3184	Head	750	6/14/2013	0.8102	40.58	PASS				
3184	Head	835	6/13/2013	0.897	38.741	PASS	6/20/2013	GMSK	0.919	40.058
3184	Head	1800	6/13/2013	1.342	38.07	PASS	6/19/2013	GMSK	1.353	37.87
3184	Head	1900	6/18/2013	1.45	37.92	PASS				
3184	Head	2450	6/14/2013	1.818	37.06	PASS				
3184	Body	750	6/13/2013	0.9026	56.06	PASS				
3184	Body	835	6/13/2013	1.01	54.153	PASS	6/18/2013	GMSK	1.007	53.962
3184	Body	1800	6/13/2013	1.43	49.05	PASS	6/20/2013	GMSK	1.44	48.91
3184	Body	1900	6/13/2013	1.534	48.69	PASS				
3184	Body	2450	6/13/2013	2.12	49.2	PASS				

DASY52™ Measurement System 3											
System Validation Measurements											
Probe	Tissue Type	f (MHz)	CW Validations				Modulated Validations				
			Date	Dielectric Parameters			Date	Mod. Type	Dielectric Parameters		Result
				Measured σ (S/m)	Measured ϵ_r	Result			Measured σ (S/m)	Measured ϵ_r	
3730	Head	2450	1/16/2013	1.812	39.28	PASS	3/12/2013	OFDM	1.795	37.65	PASS
3730	Head	5200	1/15/2013	4.547	35.00	PASS	3/18/2013	OFDM	4.562	35.362	PASS
3730	Head	5300	1/15/2013	4.663	34.79	PASS	3/18/2013	OFDM	4.679	35.123	PASS
3730	Head	5600	1/15/2013	4.981	34.10	PASS	3/18/2013	OFDM	5.014	34.448	PASS
3730	Head	5800	1/14/2013	5.204	33.67	PASS	3/19/2013	OFDM	5.243	34.016	PASS
3730	Body	2450	1/16/2013	1.992	50.89	PASS	3/12/2013	OFDM	1.999	50.5	PASS
3730	Body	5200	1/14/2013	5.204	46.23	PASS	3/18/2013	OFDM	5.233	47.237	PASS
3730	Body	5300	1/14/2013	5.353	46.00	PASS	3/18/2013	OFDM	5.386	46.995	PASS
3730	Body	5600	1/14/2013	5.766	45.24	PASS	3/18/2013	OFDM	5.815	46.248	PASS
3730	Body	5800	1/14/2013	6.061	44.77	PASS	3/19/2013	OFDM	6.114	45.753	PASS

DASY52™ Measurement System 3											
System Validation Measurements											
Probe	Tissue Type	f (MHz)	CW Validations				Modulated Validations				
			Date	Dielectric Parameters			Date	Mod. Type	Dielectric Parameters		Result
				Measured σ (S/m)	Measured ϵ_r	Result			Measured σ (S/m)	Measured ϵ_r	
3728	Head	2450	6/13/2013	1.77	35.85	PASS					
3728	Head	5200	6/12/2013	4.588	33.741	PASS	10/9/2013	OFDM	4.624	36.017	PASS
3728	Head	5300	6/12/2013	4.7	33.515	PASS	10/9/2013	OFDM	4.735	35.782	PASS
3728	Head	5600	6/12/2013	5.037	32.803	PASS	10/9/2013	OFDM	5.084	35.093	PASS
3728	Head	5800	6/12/2013	5.267	32.363	PASS	10/9/2013	OFDM	5.326	34.651	PASS
3728	Body	2450	6/13/2013	2.12	49.2	PASS					
3728	Body	5200	6/13/2013	5.226	46.625	PASS	10/9/2013	OFDM	5.296	47.969	PASS
3728	Body	5300	6/13/2013	5.377	46.33	PASS	10/9/2013	OFDM	5.437	47.724	PASS
3728	Body	5600	6/13/2013	5.82	45.592	PASS	10/9/2013	OFDM	5.888	46.982	PASS
3728	Body	5800	6/13/2013	6.132	45.068	PASS	10/9/2013	OFDM	6.207	46.491	PASS

DASY52™ Measurement System 4											
System Validation Measurements											
Probe	Tissue Type	f (MHz)	CW Validations				Modulated Validations				
			Date	Dielectric Parameters			Date	Mod. Type	Dielectric Parameters		Result
				Measured σ (S/m)	Measured ϵ_r	Result			Measured σ (S/m)	Measured ϵ_r	
3284	Head	750	8/13/2013	0.8238	40.65	PASS					
3284	Head	835	8/13/2013	0.903	39.583	PASS	9/4/2013	GMSK	0.913	39.675	PASS
3284	Head	1800	8/14/2013	1.322	38.19	PASS	9/4/2013	GMSK	1.323	37.02	PASS
3284	Head	1900	8/14/2013	1.425	37.71	PASS					
3284	Head	2450	8/14/2013	1.775	37.4	PASS					
3284	Body	750	8/13/2013	0.9067	54.48	PASS					
3284	Body	835	8/13/2013	0.993	53.658	PASS	9/4/2013	GMSK	1.006	53.822	PASS
3284	Body	1800	8/14/2013	1.432	52.33	PASS	9/4/2013	GMSK	1.452	51.87	PASS
3284	Body	1900	8/14/2013	1.553	51.96	PASS					
3284	Body	2450	8/14/2013	1.968	49.94	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 $\pm 10\%$ from the target SAR indicated in Appendix 7. These frequencies are within $\pm 10\%$ 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 $\pm$ 0.5 cm. For frequencies above 3 GHz, the simulated tissue depth was verified to be 10 cm $\pm$ 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, 26-Apr-2013	3180	422tr	1.85	9.25	0.9241	2.68%	41.25	-0.60%	22.3	21.1
	Recommended Limits	3180	422tr		9.33	0.90	$\pm 10\%$	41.5	$\pm 10\%$	18-25	18-25
1800	Measured, 26-Apr-2013	3180	259tr	7.65	38.25	1.371	-2.07%	38.30	-4.25%	22.1	20.0
	Recommended Limits	3180	259tr		38.10	1.40	$\pm 10\%$	40.0	$\pm 10\%$	18-25	18-25

DASY52™ Measurement System 2											
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, 26-Apr-2013	3124	436tr	1.96	9.80	0.9179	1.99%	41.19	-0.75%	22.5	20.6
	Recommended Limits	3124	436tr		9.73	0.90	$\pm 10\%$	41.5	$\pm 10\%$	18-25	18-25
1800	Measured, 26-Apr-2013	3124	2d190	7.61	38.05	1.371	-2.07%	38.3	-4.25%	22.2	20.2
	Recommended Limits	3124	2d190		39.30	1.40	$\pm 10\%$	40.0	$\pm 10\%$	18-25	18-25

DASY52™ Measurement System 3											
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, 21-Mar-2013	3730	863	5.64	56.4	1.813	0.72%	37.16	-5.20%	21.6	19.3
	Recommended Limits	3730	863		54.2	1.80	$\pm 10\%$	39.2	$\pm 10\%$	18-25	18-25
5200	Measured, 29-Mar-2013	3730	1088	7.85	78.5	4.707	1.23%	34.83	-3.25%	21.5	19.3
	Recommended Limits	3730	1088		80.2	4.65	-5%/+10%	36.0	-10%/+5%	18-25	18-25
5800	Measured, 27-Mar-2013	3730	1088	8.26	82.6	5.346	1.44%	33	-6.78%	21.2	19.1
	Recommended Limits	3730	1088		79.0	5.27	-5%/+10%	35.4	-10%/+5%	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, 27-Apr-2013	3180	422tr	1.90	9.50	0.9856	1.61%	52.82	-4.31%	21.8	20.5
	Recommended Limits	3180	422tr		9.77	0.97	±10%	55.2	±10%	18-25	18-25
1800	Measured, 27-Apr-2013	3180	259tr	7.70	38.5	1.386	-8.82%	51.28	-3.79%	22.3	20.6
	Recommended Limits	3180	259tr		39.1	1.52	±10%	53.3	±10%	18-25	18-25

DASY52™ Measurement System 2											
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, 25-Apr-2013	3124	436tr	1.98	9.9	1.01	4.12%	53.59	-2.92%	21.8	20.2
	Recommended Limits	3124	436tr		10.1	0.97	±10%	55.2	±10%	18-25	18-25
1800	Measured, 26-Apr-2013	3124	2d190	7.74	38.7	1.448	-4.74%	49.28	-7.54%	22.4	20.2
	Measured, 26-Sep-2013	3184	2d190	7.38	36.9	1.458	-4.08%	51.3	-3.75%	20.7	19.9
	Recommended Limits	3184	2d190		37.8	1.52	±10%	53.3	±10%	18-25	18-25

DASY52™ Measurement System 3											
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, 23-Mar-2013	3730	863	5.35	53.5	2.014	3.28%	50.24	-4.67%	21.3	19.5
	Recommended Limits	3730	863		52.8	1.95	±10%	52.7	±10%	18-25	18-25
	Measured, 18-Sep-2013	3728	740	5.09	50.9	1.937	-0.67%	49.77	-5.56%	21.1	20.2
	Recommended Limits	3728	740		49.5	1.95	±10%	52.7	±10%	18-25	18-25
5200	Measured, 9-Oct-2013	3728	1098	7.33	73.3	5.296	-0.08%	47.97	-2.10%	21.3	20.6
	Recommended Limits	3728	1098		73.7	5.30	-5%/+10%	49.0	-10%/+5%	18-25	18-25
5800	Measured, 30-Mar-2013	3730	1088	7.26	72.6	6.242	4.03%	44.6	-7.47%	21.7	20
	Recommended Limits	3730	1088		75.4	6.00	-5%/+10%	48.2	-10%/+5%	18-25	18-25
	Measured, 9-Oct-2013	3728	1098	6.90	69.0	6.207	3.45%	46.49	-3.55%	20.7	20.6
	Recommended Limits	3728	1098		71.1	6.00	-5%/+10%	48.2	-10%/+5%	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		
835	Measured, 16-Sep-2013	3284	423tr	1.92	9.60	1.007	3.81%	53.79	-2.55%	21.5	20.5
	Recommended Limits	3284	423tr		9.31	0.97	±10%	55.2	±10%	18-25	18-25
1800	Measured, 13-Sep-2013	3284	2d191	7.97	39.85	1.451	-4.54%	51.39	-3.58%	22.1	20.6
	Measured, 27-Sep-2013	3284	2d191	8.00	40.0	1.443	-5.07%	51.63	-3.13%	21.3	19.1
	Recommended Limits	3284	2d191		37.8	1.52	±10%	53.3	±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 $\pm 10\%$ 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 $\rho = 1 \text{ g/cm}^3$ 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	26-Apr-2013	820.0	0.90 ±10%	41.58 ±10%	0.91	1.3%	41.4	-0.4%	21.0
		835.0	0.90 ±10%	41.50 ±10%	0.92	2.3%	41.3	-0.7%	
		849.0	0.92 ±10%	41.50 ±10%	0.94	2.8%	41.1	-1.1%	
835	26-Apr-2013	820.0	0.90 ±10%	41.58 ±10%	0.90	0.2%	41.4	-0.5%	20.5
		835.0	0.90 ±10%	41.50 ±10%	0.92	2.3%	41.2	-0.8%	
		849.0	0.92 ±10%	41.50 ±10%	0.93	1.7%	41.0	-1.2%	
1880	26-Apr-2013	1850.0	1.40 ±10%	40.00 ±10%	1.42	1.5%	38.0	-5.0%	20.1
		1880.0	1.40 -5%/+10%	40.00 -10%/+5%	1.45	3.6%	37.9	-5.3%	
		1915.0	1.40 -5%/+10%	40.00 -10%/+5%	1.49	6.5%	37.7	-5.7%	
2450	21-Mar-2013	2412.0	1.77 ±10%	39.27 ±10%	1.77	0.3%	37.3	-5.1%	20.6
		2450.0	1.80 ±10%	39.20 ±10%	1.81	0.6%	37.2	-5.3%	
		2462.0	1.81 ±10%	39.18 ±10%	1.83	1.0%	37.1	-5.3%	
5500	27-Mar-2013	5180.0	4.63 -5%/+10%	36.02 -10%/+5%	4.63	-0.1%	34.5	-4.4%	19.7
		5500.0	4.96 -5%/+10%	35.65 -10%/+5%	5.00	0.9%	33.7	-5.5%	
		5825.0	5.30 -5%/+10%	35.36 -10%/+5%	5.38	1.6%	33.0	-6.9%	
5500	29-Mar-2013	5180.0	4.63 -5%/+10%	36.02 -10%/+5%	4.69	1.3%	34.9	-3.2%	19.2
		5500.0	4.96 -5%/+10%	35.65 -10%/+5%	5.05	1.9%	34.1	-4.4%	
		5825.0	5.30 -5%/+10%	35.36 -10%/+5%	5.43	2.6%	33.3	-5.8%	

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	25-Apr-2013	820.0	0.97 ±10%	55.26 ±10%	0.99	2.2%	53.8	-2.8%	20.6
		835.0	0.97 ±10%	55.20 ±10%	1.01	4.2%	53.6	-3.0%	
		849.0	0.99 ±10%	55.16 ±10%	1.03	4.4%	53.4	-3.2%	
835	27-Apr-2013	820.0	0.97 ±10%	55.26 ±10%	0.97	0.2%	53.0	-4.2%	20.5
		835.0	0.97 ±10%	55.20 ±10%	0.99	2.1%	52.8	-4.4%	
		849.0	0.99 ±10%	55.16 ±10%	1.00	1.3%	52.7	-4.6%	
835	16-Sep-2013	820.0	0.97 ±10%	55.26 ±10%	0.99	2.2%	54.0	-2.4%	20.2
		835.0	0.97 ±10%	55.20 ±10%	1.01	4.2%	53.8	-2.6%	
		849.0	0.99 ±10%	55.16 ±10%	1.02	3.4%	53.6	-2.8%	
1880	26-Apr-2013	1850.0	1.52 ±10%	53.30 ±10%	1.50	-1.4%	49.0	-8.0%	20.0
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.54	1.4%	48.9	-8.3%	
		1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.58	4.0%	48.8	-8.6%	
1880	27-Apr-2013	1850.0	1.52 ±10%	53.30 ±10%	1.44	-5.3%	51.1	-4.3%	20.7
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.48	-2.7%	50.9	-4.5%	
		1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.52	0.0%	50.8	-4.8%	
1880	13-Sep-2013	1850.0	1.52 ±10%	53.30 ±10%	1.51	-0.7%	51.2	-4.0%	21.0
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.55	2.0%	51.1	-4.2%	
		1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.59	4.7%	51.0	-4.4%	
1880	26-Sep-2013	1850.0	1.52 ±10%	53.30 ±10%	1.52	0.0%	51.0	-4.3%	20.5
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.56	2.7%	50.9	-4.6%	
		1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.60	5.3%	50.7	-4.9%	
1880	27-Sep-2013	1850.0	1.52 ±10%	53.30 ±10%	1.50	-1.4%	51.5	-3.5%	19.3
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.54	1.4%	51.4	-3.7%	
		1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.58	4.0%	51.2	-3.9%	
2450	23-Mar-2013	2412.0	1.91 ±10%	52.75 ±10%	1.97	2.9%	50.4	-4.6%	19.5
		2450.0	1.95 ±10%	52.70 ±10%	2.01	3.1%	50.2	-4.7%	
		2462.0	1.97 ±10%	52.68 ±10%	2.03	3.3%	50.2	-4.8%	
2450	19-Sep-2013	2412.0	1.91 ±10%	52.75 ±10%	1.89	-1.3%	48.6	-8.0%	20.7
		2450.0	1.95 ±10%	52.70 ±10%	1.94	-0.6%	48.5	-8.0%	
		2462.0	1.97 ±10%	52.68 ±10%	1.95	-0.9%	48.5	-8.0%	
5500	30-Mar-2013	5180.0	5.28 -5%/+10%	49.05 -10%/+5%	5.31	0.6%	46.1	-6.0%	20.0
		5500.0	5.65 -5%/+10%	48.61 -10%/+5%	5.79	2.5%	45.3	-6.8%	
		5825.0	6.03 -5%/+10%	48.17 -10%/+5%	6.28	4.2%	44.5	-7.6%	
5500	9-Oct-2013	5180.0	5.28 -5%/+10%	49.05 -10%/+5%	5.27	-0.2%	48.0	-2.2%	20.7
		5500.0	5.65 -5%/+10%	48.61 -10%/+5%	5.74	1.6%	47.2	-2.9%	
		5825.0	6.03 -5%/+10%	48.17 -10%/+5%	6.25	3.7%	46.5	-3.6%	

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], [5], [9], 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:

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

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 4.

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	SNN5923A	190	836.6	33.5	32.97	20.3	-0.13	0.070	0.08	0.092	0.11	
GPRS 850, Class 12 (4 Uplink Timeslots)	SNN5923A	190	836.6	28.0	26.54	19.6	-0.03	0.055	0.08	0.072	0.10	
GSM 1900, CS Voice	SNN5923A	661	1880.0	30.5	30.05	20.2	-0.15	0.075	0.09	0.122	0.14	
GPRS 1900, Class 12 (4 Uplink Timeslots)	SNN5923A	661	1880.0	25.0	23.56	20.0	-0.098	0.0694	0.10	0.115	0.16	A27
WCDMA 850, RMC	SNN5923A	4180	836.0	24.0	22.88	19.6	-0.07	0.055	0.07	0.073	0.10	
WCDMA 1900, RMC	SNN5923A	9400	1880.0	24.0	22.62	20.0	0.08	0.183	0.25	0.297	0.41	
802.11b, 1 Mbps	SNN5923A	6	2437.0		19.14	18.3	0.06	0.118	0.12	0.236	0.24	
802.11b, 1 Mbps	SNN5923A	6	2437.0	17		19.8	0.03	0.109	0.11	0.217	0.22	
802.11a, 6 Mbps	SNN5923A	36	5180.0		15.56	19.3	-0.01	0.0876	0.09	0.275	0.28	
802.11a, 6 Mbps	SNN5923A	157	5785.0		20.09	19.0	-0.09	0.101	0.10	0.275	0.28	
802.11a, 6 Mbps	SNN5923A	157	5785.0	16		19.1	-0.11	0.0565	0.06	0.155	0.16	

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	SNN5923A	190	836.6	33.5	32.97	20.3	-0.04	0.108	0.12	0.146	0.17	
GPRS 850, Class 12 (4 Uplink Timeslots)	SNN5923A	190	836.6	28.0	26.54	20.1	0.017	0.105	0.15	0.142	0.20	A25
GSM 1900, CS Voice	SNN5923A	661	1880.0	30.5	30.05	20.2	0.12	0.049	0.05	0.078	0.09	
GPRS 1900, Class 12 (4 Uplink Timeslots)	SNN5923A	661	1880.0	25.0	23.56	20.0	-0.18	0.058	0.08	0.094	0.14	
WCDMA 850, RMC	SNN5923A	4180	836.0	24.0	22.88	19.6	-0.242	0.0729	0.10	0.0975	0.13	A26
WCDMA 1900, RMC	SNN5923A	9400	1880.0	24.0	22.62	19.8	0.012	0.315	0.43	0.523	0.72	A28
802.11b, 1 Mbps	SNN5923A	1	2412.0		18.13	20.0	-0.25	0.311	0.33	0.710	0.75	
802.11b, 1 Mbps	SNN5923A	6	2437.0		19.14	19.3	-0.066	0.430	0.44	0.965	0.98	A29
802.11b, 1 Mbps	SNN5923A	6	2437.0		19.14	20.7	0.10	0.387	0.39	0.886	0.89	
802.11b, 1 Mbps	SNN5923A	11	2462.0		17.24	19.8	-0.11	0.249	0.26	0.569	0.58	
802.11b, 1 Mbps	SNN5923A	6	2437.0	17		19.8	-0.22	0.311	0.33	0.687	0.72	
802.11a, 6 Mbps	SNN5923A	36	5180.0		15.56	19.0	-0.314	0.143	0.15	0.470	0.50	A30
802.11a, 6 Mbps	SNN5923A	157	5785.0		20.09	18.8	-0.117	0.142	0.15	0.419	0.43	A31
802.11a, 6 Mbps	SNN5923A	157	5785.0	16		18.4	-0.16	0.0696	0.07	0.214	0.22	

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	SNN5923A	190	836.6	33.5	32.97	20.3	0.02	0.051	0.06	0.066	0.07	
GPRS 850, Class 12 (4 Uplink Timeslots)	SNN5923A	190	836.6	28.0	26.54	19.6	0.50	0.031	0.04	0.041	0.06	
GSM 1900, CS Voice	SNN5923A	661	1880.0	30.5	30.05	20.2	-0.06	0.051	0.06	0.083	0.09	
GPRS 1900, Class 12 (4 Uplink Timeslots)	SNN5923A	661	1880.0	25.0	23.56	20.0	-0.04	0.042	0.06	0.069	0.10	
WCDMA 850, RMC	SNN5923A	4180	836.0	24.0	22.88	19.6	0.02	0.045	0.06	0.058	0.08	
WCDMA 1900, RMC	SNN5923A	9400	1880.0	24.0	22.62	19.9	0.01	0.176	0.24	0.289	0.40	
802.11b, 1 Mbps	SNN5923A	6	2437.0		19.14	18.3	-0.04	0.0755	0.08	0.145	0.15	
802.11b, 1 Mbps	SNN5923A	6	2437.0	17		19.8	0.11	0.0664	0.07	0.13	0.13	
802.11a, 6 Mbps	SNN5923A	36	5180.0		15.56	19.1	0.00	0.101	0.10	0.318	0.32	
802.11a, 6 Mbps	SNN5923A	157	5785.0		20.09	19	-0.07	0.11	0.11	0.295	0.30	
802.11a, 6 Mbps	SNN5923A	157	5785.0	16		18.7	-0.16	0.0561	0.06	0.138	0.14	

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	SNN5923A	190	836.6	33.5	32.97	20.3	-0.05	0.058	0.07	0.075	0.09	
GPRS 850, Class 12 (4 Uplink Timeslots)	SNN5923A	190	836.6	28.0	26.54	20.1	0.01	0.047	0.07	0.062	0.09	
GSM 1900, CS Voice	SNN5923A	661	1880.0	30.5	30.05	20.2	-0.03	0.039	0.04	0.065	0.07	
GPRS 1900, Class 12 (4 Uplink Timeslots)	SNN5923A	661	1880.0	25.0	23.56	20.0	0.02	0.037	0.05	0.062	0.09	
WCDMA 850, RMC	SNN5923A	4180	836.0	24.0	22.88	19.6	0.06	0.048	0.06	0.064	0.08	
WCDMA 1900, RMC	SNN5923A	9400	1880.0	24.0	22.62	19.7	0.13	0.146	0.20	0.246	0.34	
802.11b, 1 Mbps	SNN5923A	6	2437.0		19.14	18.3	-0.16	0.149	0.15	0.319	0.33	
802.11b, 1 Mbps	SNN5923A	6	2437.0	17		19.8	-0.14	0.112	0.12	0.226	0.23	
802.11a, 6 Mbps	SNN5923A	36	5180.0		15.56	19.0	0.01	0.103	0.10	0.350	0.35	
802.11a, 6 Mbps	SNN5923A	157	5785.0		20.09	18.8	-0.01	0.0718	0.07	0.203	0.20	
802.11a, 6 Mbps	SNN5923A	157	5785.0	16		20	-0.12	0.0394	0.04	0.117	0.12	

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

4.3 Body-Worn Accessory Exposure Results

Body-Worn Accessory Position, Front of Phone 15 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, CS Voice	SNN5923A	190	836.6	33.5	32.97	20.5	-0.03	0.072	0.08	0.095	0.11	
GPRS 850, Class 12 (4 Uplink Timeslots)	SNN5923A	190	836.6	28.0	26.54	20.5	-0.03	0.069	0.10	0.091	0.13	
GSM 1900, CS Voice	SNN5923A	661	1880.0	30.5	30.05	20.6	-0.05	0.142	0.16	0.247	0.28	
GPRS 1900, Class 12 (4 Uplink Timeslots)	SNN5923A	661	1880.0	25.0	23.56	20.5	-0.03	0.115	0.16	0.200	0.28	
WCDMA 850, RMC	SNN5923A	4180	836.0	24.0	22.88	20.4	0.025	0.0891	0.12	0.117	0.15	A34
WCDMA 1900, RMC	SNN5923A	9262	1852.4	24.0	22.41	20.6	0.09	0.205	0.30	0.354	0.51	
WCDMA 1900, RMC	SNN5923A	9400	1880.0	24.0	22.62	20.5	-0.08	0.333	0.47	0.579	0.81	
WCDMA 1900, RMC	SNN5923A	9538	1907.6	24.0	22.32	20.6	-0.06	0.329	0.49	0.578	0.86	
802.11b, 1 Mbps	SNN5923A	6	2437.0		19.14	20.3	0.14	0.041	0.04	0.077	0.08	
802.11b, 1 Mbps	SNN5923A	6	2437.0	17		19.8	-0.01	0.030	0.03	0.056	0.06	
802.11a, 6 Mbps	SNN5923A	36	5180.0		15.56	20.6	-0.17	0.025	0.03	0.069	0.07	
802.11a, 6 Mbps	SNN5923A	157	5785.0		20.09	20.6	0.04	0.031	0.03	0.084	0.08	
802.11a, 6 Mbps	SNN5923A	157	5785.0	16		20.4	-0.38	0.021	0.02	0.060	0.07	

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

Body-Worn Accessory Position, Back of Phone 15 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, CS Voice	SNN5923A	190	836.6	33.5	32.97	20.5	-0.05	0.079	0.09	0.108	0.12	
GPRS 850, Class 12 (4 Uplink Timeslots)	SNN5923A	190	836.6	28.0	26.54	20.5	0.168	0.0767	0.11	0.106	0.15	A33
GSM 1900, CS Voice	SNN5923A	661	1880.0	30.5	30.05	20.5	-0.05	0.220	0.25	0.398	0.45	
GPRS 1900, Class 12 (4 Uplink Timeslots)	SNN5923A	661	1880.0	25.0	23.56	20.6	-0.100	0.187	0.27	0.337	0.48	A35
WCDMA 850, RMC	SNN5923A	4180	836.0	24.0	22.88	20.4	0.05	0.078	0.10	0.102	0.13	
WCDMA 1900, RMC	SNN5923A	9262	1852.4	24.0	22.41	20.5	-0.06	0.304	0.44	0.546	0.80	
WCDMA 1900, RMC	SNN5923A	9400	1880.0	24.0	22.62	20.6	-0.01	0.492	0.68	0.889	1.22	
WCDMA 1900, RMC	SNN5923A	9538	1907.6	24.0	22.32	20.5	-0.059	0.487	0.73	0.885	1.32	A36
802.11b, 1 Mbps	SNN5923A	6	2437.0		19.14	20.3	0.013	0.0821	0.08	0.160	0.16	A37
802.11b, 1 Mbps	SNN5923A	6	2437.0	17		19.5	0.02	0.061	0.06	0.119	0.12	
802.11a, 6 Mbps	SNN5923A	36	5180.0		15.56	20.6	-0.088	0.0992	0.10	0.256	0.26	A38
802.11a, 6 Mbps	SNN5923A	157	5785.0		20.09	20.6	0.00866	0.0726	0.07	0.201	0.20	A39
802.11a, 6 Mbps	SNN5923A	157	5785.0	16		20.4	-0.14	0.038	0.04	0.102	0.11	

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

4.4 Mobile Hotspot Exposure Results



Mobile Hotspot Surfaces/Edges for SAR testing						
Mode	Front	Back	Left	Right	Top	Bottom
GSM/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)	
GPRS 850, Class 12 (4 Uplink Timeslots)	SNN5923A	190	836.6	28.0	26.54	19.8	-0.01	0.059	0.08	0.078	0.11	
GPRS 1900, Class 12 (4 Uplink Timeslots)	SNN5923A	661	1880.0	24.5		19.8	-0.07	0.154	0.16	0.282	0.29	
WCDMA 850, RMC	SNN5923A	4180	836.0	24.0	22.88	19.8	-0.03	0.097	0.13	0.127	0.17	
WCDMA 1900, RMC	SNN5923A	9400	1880.0	19.0		19.9	-0.12	0.284	0.29	0.554	0.57	
802.11b, 1 Mbps	SNN5923A	6	2437.0	17		19.5	-0.22	0.052	0.05	0.101	0.11	
802.11a, 6 Mbps	SNN5923A	157	5785.0	16		20	-0.76	0.0107	0.01	0.0558	0.07	

Table 4-7: 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)	
GPRS 850, Class 12 (4 Uplink Timeslots)	SNN5923A	190	836.6	28.0	26.54	19.8	-0.095	0.0654	0.09	0.0924	0.13	A41
GPRS 1900, Class 12 (4 Uplink Timeslots)	SNN5923A	661	1880.0	24.5		19.8	-0.07	0.232	0.24	0.436	0.44	
WCDMA 850, RMC	SNN5923A	4180	836.0	24.0	22.88	19.8	-0.03	0.091	0.12	0.119	0.16	
WCDMA 1900, RMC	SNN5923A	9400	1880.0	19.0		19.9	-0.22	0.360	0.38	0.716	0.75	
802.11b, 1 Mbps	SNN5923A	6	2437.0	17		19.5	-0.06	0.116	0.12	0.242	0.25	
802.11a, 6 Mbps	SNN5923A	157	5785.0	16		19.1	-0.08	0.047	0.05	0.141	0.14	

Table 4-8: 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)	
GPRS 850, Class 12 (4 Uplink Timeslots)	SNN5923A	190	836.6	28.0	26.54	19.8	-0.01	0.0189	0.03	0.028	0.04	
GPRS 1900, Class 12 (4 Uplink Timeslots)	SNN5923A	661	1880.0	24.5		19.8	0.00	0.0213	0.02	0.036	0.04	
WCDMA 850, RMC	SNN5923A	4180	836.0	24.0	22.88	19.9	0.02	0.046	0.06	0.068	0.09	
WCDMA 1900, RMC	SNN5923A	9400	1880.0	19.0		19.9	-0.06	0.022	0.02	0.036	0.04	
802.11b, 1 Mbps	SNN5923A	6	2437.0	17		19.5	0.041	0.210	0.21	0.455	0.46	A45
802.11a, 6 Mbps	SNN5923A	157	5785.0	16		19	-0.047	0.0752	0.08	0.255	0.26	A46

Table 4-9: 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)	
GPRS 850, Class 12 (4 Uplink Timeslots)	SNN5923A	190	836.6	28.0	26.54	19.8	0.01	0.062	0.09	0.091	0.13	
GPRS 1900, Class 12 (4 Uplink Timeslots)	SNN5923A	661	1880.0	24.5		19.8	-0.04	0.065	0.07	0.111	0.11	
WCDMA 850, RMC	SNN5923A	4180	836.0	24.0	22.88	20.0	-0.142	0.115	0.15	0.167	0.22	A42
WCDMA 1900, RMC	SNN5923A	9400	1880.0	19.0		19.9	-0.04	0.060	0.06	0.102	0.10	

Table 4-10: 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	SNN5923A	6	2437.0	17		19.5	0.02	0.0208	0.02	0.0361	0.04	
802.11a, 6 Mbps	SNN5923A	157	5785.0	16		19	-0.03	0.0229	0.02	0.0665	0.07	

Table 4-11: 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)	
GPRS 850, Class 12 (4 Uplink Timeslots)	SNN5923A	190	836.6	28.0	26.54	19.8	-0.03	0.039	0.05	0.061	0.09	
GPRS 1900, Class 12 (4 Uplink Timeslots)	SNN5923A	512	1850.2	24.5		19.1	0.00	0.400	0.40	0.772	0.77	
GPRS 1900, Class 12 (4 Uplink Timeslots)	SNN5923A	661	1880.0	24.5		19.8	-0.06	0.385	0.39	0.774	0.78	
GPRS 1900, Class 12 (4 Uplink Timeslots)	SNN5923A	810	1909.8	24.5		19.2	0.021	0.450	0.45	0.904	0.90	A43
GPRS 1900, Class 12 (4 Uplink Timeslots)	SNN5923A	810	1909.8	24.5		20.6	0.00	0.399	0.40	0.804	0.80	
WCDMA 850, RMC	SNN5923A	4180	836.0	24.0	22.88	20.1	-0.03	0.048	0.06	0.077	0.10	
WCDMA 1900, RMC	SNN5923A	9400	1880.0	19.0		19.9	0.026	0.383	0.38	0.769	0.77	A44

Table 4-12: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

4.5 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 $< 0.8 \text{ W/kg}$, the following steps do not apply and no repeat measurements were executed.
2. If the original highest measured SAR is $\geq 0.8 \text{ W/kg}$, 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 $\geq 1.45 \text{ W/kg}$, 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 $\geq 1.5 \text{ W/kg}$, the measurement was repeated a third time.

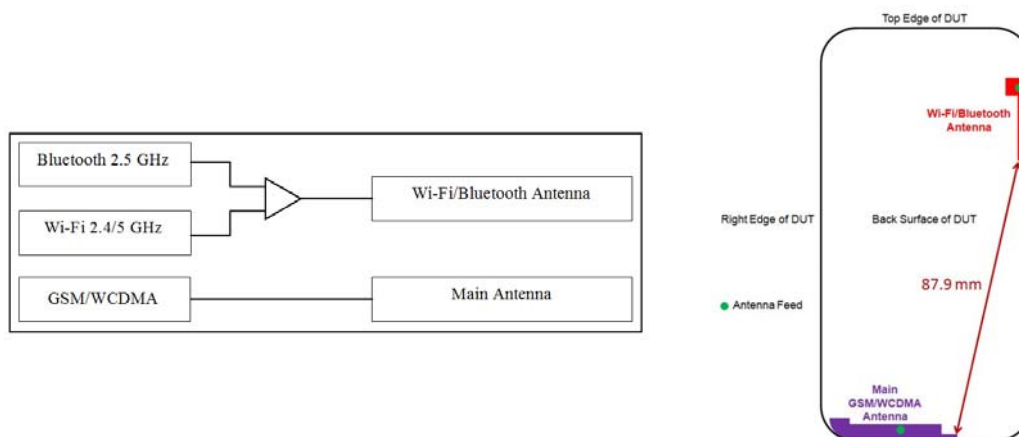
SAR Measurement Variability Results									
Mode	Exposure Condition	Channel	f (MHz)	Original Measured SAR (W/kg)	1st Repeated SAR (W/kg)	Ratio	2nd Repeated SAR (W/kg)	Ratio	3rd Repeated SAR (W/kg)
GPRS 1900, Class 12 (4 Uplink Timeslots)	Mobile Hotspot Position, Bottom Edge of Phone 10 mm from Phantom	810	1909.8	0.904	0.804	1.12			
802.11b, 1 Mbps	Right Cheek-Touch Position	6	2437.0	0.965	0.886	1.09			

Table 4-13: SAR measurement results for Variability Analysis

4.6 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 design some or all of the transmitters built into the phone may operate simultaneously, as described in the tables on the following pages. A simplified model of the transmit paths and a diagram of the separation distances between the transmitting antennas are provided below.



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, the value used for inclusion in these summations was found to be:

$$\frac{[11.468]_{(mW)}}{[15]_{(mm)}} \times \frac{\sqrt{2.44_{(GHz)}}}{7.5} = 0.2 W/kg_{(estimated)}$$

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.

A description of the power conditions or reduced limits for simultaneous transmit modes is provided in section 2.5 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.
- *16, 17, 19, 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. Further, if the SAR-to-peak-location separation ratio for two simultaneously transmitting antennas is less than 0.04 then SAR measurement for simultaneous transmission is likewise not required. Evaluations of the worst-case simultaneous SAR summations and separation ratios are presented in the tables below.

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	17	Voice + Background Data
H2	GSM 1900 CS Voice	N/A	Wi-Fi 2.4 GHz	17	Voice + Background Data
H3	WCDMA 850	N/A	Wi-Fi 2.4 GHz	17	Voice + Background Data
H4	WCDMA 1900	N/A	Wi-Fi 2.4 GHz	17	Voice + Background Data
H5	GSM 850 CS Voice	N/A	Wi-Fi 5 GHz	16	Voice + Background Data
H6	GSM 1900 CS Voice	N/A	Wi-Fi 5 GHz	16	Voice + Background Data
H7	WCDMA 850	N/A	Wi-Fi 5 GHz	16	Voice + Background Data
H8	WCDMA 1900	N/A	Wi-Fi 5 GHz	16	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	17	16				
Position	Left Head Cheek	0.11	0.14	0.22	0.28	0.33	0.36	0.39	0.42
	Left Head 15° Tilt	0.07	0.09	0.13	0.32	0.20	0.22	0.39	0.41
	Right Head Cheek	0.17	0.09	0.72	0.50	0.89	0.81	0.67	0.59
	Right Head 15° Tilt	0.09	0.07	0.23	0.35	0.32	0.30	0.44	0.42

Table 4-14: 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 5.78 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	17	16				
Position	Left Head Cheek	0.10	0.41	0.22	0.28	0.32	0.63	0.38	0.69
	Left Head 15° Tilt	0.08	0.40	0.13	0.32	0.21	0.53	0.40	0.72
	Right Head Cheek	0.13	0.72	0.72	0.50	0.85	1.44	0.63	1.22
	Right Head 15° Tilt	0.08	0.34	0.23	0.35	0.31	0.57	0.43	0.69

Table 4-15: SAR summations for simultaneous evaluation – WCDMA 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	GSM 850 CS Voice	N/A	Wi-Fi 2.4 GHz	17	Voice + Background Data
B2	GSM 1900 CS Voice	N/A	Wi-Fi 2.4 GHz	17	Voice + Background Data
B3	WCDMA 850	N/A	Wi-Fi 2.4 GHz	17	Voice + Background Data
B4	WCDMA 1900	N/A	Wi-Fi 2.4 GHz	17	Voice + Background Data
B5	GSM 850 CS Voice	N/A	Wi-Fi 5 GHz	16	Voice + Background Data
B6	GSM 1900 CS Voice	N/A	Wi-Fi 5 GHz	16	Voice + Background Data
B7	WCDMA 850	N/A	Wi-Fi 5 GHz	16	Voice + Background Data
B8	WCDMA 1900	N/A	Wi-Fi 5 GHz	16	Voice + Background Data
B9	GSM 850 CS Voice	N/A	Bluetooth 2 GHz	N/A	Voice + BT (Estimated)
B10	GSM 1900 CS Voice	N/A	Bluetooth 2 GHz	N/A	Voice + BT (Estimated)
B11	WCDMA 850	N/A	Bluetooth 2 GHz	N/A	Voice + BT (Estimated)
B12	WCDMA 1900	N/A	Bluetooth 2 GHz	N/A	Voice + BT (Estimated)

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)			
Band		GSM 850	GSM 1900	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	Case B1	Case B2	Case B5	Case B6
Power Condition or Reduced Limit		N/A	N/A	17	16	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
Position	Body Worn, Front of Phone 15 mm from Phantom	0.11	0.28	0.06	0.07	0.17	0.34	0.18	0.35
	Body Worn, Back of Phone 15 mm from Phantom	0.12	0.45	0.12	0.26	0.24	0.57	0.38	0.71

Table 4-16: 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)			
Band		WCDMA 850	WCDMA 1900	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	Case B3	Case B4	Case B7	Case B8
Power Condition or Reduced Limit		N/A	N/A	17	16	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
Position	Body Worn, Front of Phone 15 mm from Phantom	0.15	0.86	0.06	0.07	0.21	0.92	0.22	0.93
	Body Worn, Back of Phone 15 mm from Phantom	0.13	1.32	0.12	0.26	0.25	1.44	0.39	1.58

Table 4-17: SAR summations for simultaneous evaluation – WCDMA in Body-Worn Accessory Positions

		Transmitter Stand-Alone 1 g SAR Values (W/kg)					1 g SAR Summations (W/kg)			
Band		GSM 850	GSM 1900	WCDMA 850	WCDMA 1900	Bluetooth	Case B9	Case B10	Case B11	Case B12
Power Condition or Reduced Limit		N/A	N/A	N/A	N/A	N/A	GSM 850 + Bluetooth	GSM 1900 + Bluetooth	WCDMA 850 + Bluetooth	WCDMA 1900 + Bluetooth
Position	Body Worn, Front of Phone 15 mm from Phantom	0.11	0.28	0.15	0.86	0.2	0.31	0.48	0.35	1.06
	Body Worn, Back of Phone 15 mm from Phantom	0.12	0.45	0.13	1.32	0.2	0.32	0.65	0.33	1.52

Table 4-18: 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	17	Mobile Hotspot session
M2	GPRS 1900	24.5	Wi-Fi 2.4 GHz	17	Mobile Hotspot session
M3	WCDMA 850	N/A	Wi-Fi 2.4 GHz	17	Mobile Hotspot session
M4	WCDMA 1900	19	Wi-Fi 2.4 GHz	17	Mobile Hotspot session
M5	GPRS 850	N/A	Wi-Fi 5.785 GHz	16	Mobile Hotspot session
M6	GPRS 1900	24.5	Wi-Fi 5.785 GHz	16	Mobile Hotspot session
M7	WCDMA 850	N/A	Wi-Fi 5.785 GHz	16	Mobile Hotspot session
M8	WCDMA 1900	19	Wi-Fi 5.785 GHz	16	Mobile Hotspot session

		Transmitter Stand-Alone 1 g SAR Values (W/kg)					1 g SAR Summations (W/kg)			
		GPRS 850	GPRS 1900	WCDMA 850	WCDMA 1900	Wi-Fi 2.4 GHz	Case M1	Case M2	Case M5	Case M6
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	24.5	N/A	19	17				
Position	Front of Phone 10 mm from Phantom	0.11	0.29	0.17	0.57	0.11	0.22	0.40	0.28	0.68
	Back of Phone 10 mm from Phantom	0.13	0.44	0.16	0.75	0.25	0.38	0.69	0.41	1.00
	Left Edge of Phone 10 mm from Phantom	0.04	0.04	0.09	0.04	0.46	0.50	0.50	0.55	0.50
	Right Edge of Phone 10 mm from Phantom	0.13	0.11	0.22	0.10	0	0.13	0.11	0.22	0.10
	Top Edge of Phone 10 mm from Phantom	0	0	0	0	0.04	0.04	0.04	0.04	0.04
	Bottom Edge of Phone 10 mm from Phantom	0.09	0.90	0.10	0.77	0	0.09	0.90	0.10	0.77

Table 4-19: 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)			
		GPRS 850	GPRS 1900	WCDMA 850	WCDMA 1900	Wi-Fi 5.785 GHz	Case M3	Case M4	Case M7	Case M8
Band		GPRS 850	GPRS 1900	WCDMA 850	WCDMA 1900	Wi-Fi 5.785 GHz	GPRS 850 + Wi-Fi 5.785 GHz	GPRS 1900 + Wi-Fi 5.785 GHz	WCDMA 850 + Wi-Fi 5.785 GHz	WCDMA 1900 + Wi-Fi 5.785 GHz
Power Condition or Reduced Limit		N/A	24.5	N/A	19	16				
Position	Front of Phone 10 mm from Phantom	0.11	0.29	0.17	0.57	0.07	0.18	0.36	0.24	0.64
	Back of Phone 10 mm from Phantom	0.13	0.44	0.16	0.75	0.14	0.27	0.58	0.30	0.89
	Left Edge of Phone 10 mm from Phantom	0.04	0.04	0.09	0.04	0.26	0.30	0.30	0.35	0.30
	Right Edge of Phone 10 mm from Phantom	0.13	0.11	0.22	0.10	0	0.13	0.11	0.22	0.10
	Top Edge of Phone 10 mm from Phantom	0	0	0	0	0.07	0.07	0.07	0.07	0.07
	Bottom Edge of Phone 10 mm from Phantom	0.09	0.90	0.10	0.77	0	0.09	0.90	0.10	0.77

Table 4-20: SAR summations for simultaneous evaluation – Positions during a Mobile Hotspot session

Simultaneous Evaluation Conclusion

As no summation of transmitter SAR values results in a value greater than the compliance limit, no measurements for simultaneous SAR are required.

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] Removed
- [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 v05r01 “Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies”
- [12] FCC KDB Publication 648474 D04 v01r01 “SAR Evaluation Considerations for Wireless Handsets”
- [13] FCC KDB Publication 865664 D01 v01r01 “SAR Measurement Requirements for 100 MHz to 6 GHz”
- [14] FCC KDB Publication 865664 D02 v01r01 “RF Exposure Compliance Reporting and Documentation Considerations”
- [15] FCC KDB Publication 941225 D01 v02r02 “SAR Measurement Procedures for 3G Devices”
- [16] FCC KDB Publication 941225 D03 v01 “Recommended SAR Test Reduction Procedures for GSM/GPRS/EDGE”
- [17] FCC KDB Publication 941225 D05 v02r02 “SAR Evaluation Considerations for LTE Devices”
- [18] FCC KDB Publication 941225 D06 v01r01 “SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities”