MOTOROLA

Portable Hand-Held Device SAR Test Report

Tests Requested By:	Motorola Mobility, Inc. 600 N. US Highway 45 Libertyville, IL 60048
Test Report #:	24387-1F Rev. D
Date of Report:	Apr-12-2011, Revised on Apr-20-2011
Date of Test:	Mar-15-2011 to Mar-29-2011, Apr-06-2011 to Apr-07-2011
FCC ID #:	IHDT56ME1
Generic Name:	MMUQ7-33334411A11
Test Laboratory:	Motorola Mobility, Inc. - ADR Test Services Laboratory 600 N. US Highway 45 Libertyville, IL 60048
Report Author:	Thomas Knipple Senior RF Engineer

Accreditation:

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

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

2404

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

Statement of Compliance:

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

Motorola's ISO 17025 accreditation scope does not currently include SAR testing in the 5 GHz band. Therefore, SAR testing performed in this band was performed outside of our ISO 17025 accreditation. The general procedures and guidelines provided within; FCC KDB 248227 D01, FCC KDB 648474 D01, FCC KDB 865664 D01 and IEC 62209-2 were utilized for testing.

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1. Introduction

The Motorola Mobility ADR Test Services Laboratory has performed measurements of the maximum potential exposure to the user of the portable Hand-Held Device covered by this test report. The Specific Absorption Rate (SAR) of this product was measured. The portable Hand-Held Device was tested in accordance with [1], [4] and [5]. The SAR values measured for the portable Hand-Held Device 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 device are 1.53 W/kg for body adjacent use. For ANSI / IEEE C95.1 (1 g), the final simultaneous-transmission SAR readings for this device are 1.54 W/kg for body adjacent use. These measurements were performed using a Dasy4™ v4.7 system manufactured by Schmid & Partner Engineering AG (SPEAG), of Zurich Switzerland.

Summary of Stand-Alone SAR Results	
Transmit Band	**Body SAR (1 g $^{W}/_{kg}$)**
GSM 850	**1.45**
WCDMA 850	**1.48**
GSM 1900	**1.53**
WCDMA 1900	**1.42**
Wi-Fi 2.45 GHz	**0.76**
Wi-Fi 5.2 GHz	**0.76**
Wi-Fi 5.8 GHz	**0.67**

2. Description of the Device Under Test

2.1 Antenna description

GSM/WCDMA Antenna

Type	Internal	
Location	Top-Right Rear of Device	
Dimensions	Width	17 mm
	Length	42 mm

Bluetooth/Wi-Fi 2 GHz / 5 GHz Antenna

Type	Internal	
Location	Top-Center Rear of Device	
Dimensions	Width	3 mm
	Length	10 mm

2.2 Device Signaling[1]

Serial Number(s) (Functional Use)	LHBA230179 (GSM/WCDMA conducted power measurements, GSM/WCDMA SAR testing) LHBA230122 (Wi-Fi conducted power measurements, GSM;WCDMA;Wi-Fi 5210/5785 MHz SAR testing) 355483040050071 (Wi-Fi 2450 MHz SAR testing) 99000052000852 (Bluetooth conducted power measurements)
Production Unit or Identical Prototype (47 CFR §2..908)	Identical Prototype
Device Category	Portable / Mobile Station
RF Exposure Limits	General Population / Uncontrolled

Mode(s) of Operation	GSM 850	GSM 900	GSM 1800	GSM 1900	WCDMA 850	WCDMA 900	WCDMA 1900	WCDMA 2100	Wi-Fi 802.11b/g/n	Wi-Fi 802.11a/n	Bluetooth
Modulation Mode(s)	GMSK	GMSK	GMSK	GMSK	QPSK	QPSK	QPSK	QPSK	BPSK	BPSK	GFSK
Maximum Output Power Setting	33.5 dBm	33.5 dBm	30.5 dBm	30.5 dBm	24.0 dBm	24.0 dBm	24.0 dBm	24.0 dBm	20.0 dBm[2]	10.0 dBm[2]	10.0 dBm[2]
Duty Cycle	1:8	1:8	1:8	1:8	1:1	1:1	1:1	1:1	1:1	1:1	1:1
Transmitting Frequency Range(s)	824.2 - 848.8 MHz	880.2 - 914.8 MHz	1710.2 - 1784.8 MHz	1850.2 - 1909.8 MHz	826.4 - 846.6 MHz	882.4 - 912.6 MHz	1852.4 - 1907.6 MHz	1922.4 - 1977.6 MHz	2412.0 - 2462.5 MHz	5180 - 5240, 5745 - 5805, MHz	2402.0 - 2483.5 MHz

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

Mode(s) of Operation	GPRS 850				GPRS 900				GPRS 1800				GPRS 1900			
Modulation	GMSK				GMSK				GMSK				GMSK			
Maximum Output Power Setting (dBm)	33.5	**32.0**	29.5	28.5	33.5	**32.0**	29.5	28.5	30.5	**30.5**	28.0	26.0	30.5	**30.5**	28.0	26.0
Duty Cycle	1:8	**2:8**	3:8	4:8	1:8	**2:8**	3:8	4:8	1:8	**2:8**	3:8	4:8	1:8	**2:8**	3:8	4:8
Transmitting Frequency Range(s)	824.2 - 848.8 MHz				880.2 - 914.8 MHz				1710.2 - 1784.8 MHz				1850.2 - 1909.8 MHz			

Mode(s) of Operation	EDGE 850				EDGE 900				EDGE 1800				EDGE 1900			
Modulation	8PSK				8PSK				8PSK				8PSK			
Maximum Output Power Setting (dBm)	27.5	**27.0**	25.0	23.0	27.5	**27.0**	25.0	23.0	26.5	**26.0**	24.0	22.0	26.5	**26.0**	24.0	22.0
Duty Cycle	1:8	**2:8**	3:8	4:8	1:8	**2:8**	3:8	4:8	1:8	**2:8**	3:8	4:8	1:8	**2:8**	3:8	4:8
Transmitting Frequency Range(s)	824.2 - 848.8 MHz				880.2 - 914.8 MHz				1710.2 - 1784.8 MHz				1850.2 - 1909.8 MHz			

[1] **Bolded** entries indicate data mode configurations of highest time-average power output per band and data mode type, and thus were utilized for SAR testing in this report.
[2] Output power from WiFi/BT Chipset is theoretical maximum and does not account for any path loss or insertion loss to measurement port. Measured conducted power may be lower than these limits.

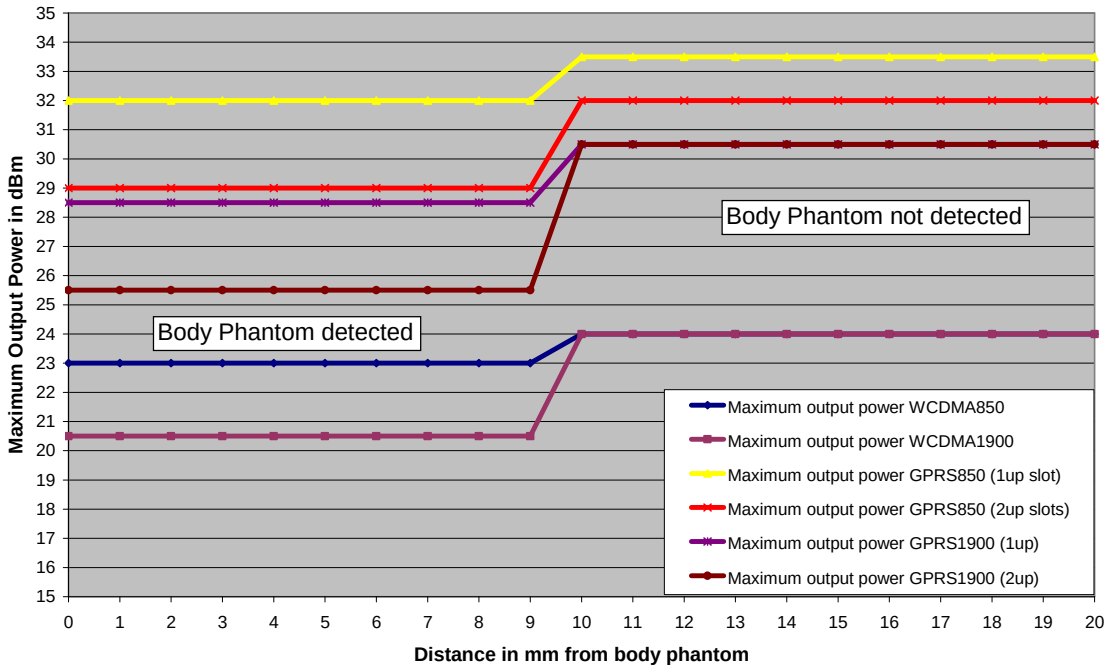
The DUT utilizes a set of reduced limits for the maximum transmit power for specified device configurations and orientations, as described by the tables and plot below. A complete description of this functionality is provided in the "Operational Description" contained within Exhibit 12A. The implementation to trigger the reduction in power requires the device to be radiating, which prevents a conducted power measurement without modification to the unit.

Mode(s) of Operation	GPRS 850				WCDMA 850	GPRS 1900				WCDMA 1900
Duty Cycle	1:8	**2:8**	3:8	4:8	1:1	1:8	**2:8**	3:8	4:8	1:1
Maximum Output Power Setting (dBm)	33.5	32	29.5	28.5	24.0	30.5	30.5	28.0	26.0	24.0
Time Avg Output Power Setting (dBm)	24.5	26.0	25.2	25.49	24.0	21.5	24.5	23.7	23.0	24.0
Reduced Maximum Output Power Setting (dBm)	32.0	29.0	27.2	26.0	23.0	28.5	25.5	23.7	22.5	20.5
Time Avg Output Power Setting (dBm)	23.0	23.0	22.9	23.0	23.0	19.5	19.5	19.5	19.5	20.5

Orientation\Mode Power Limit Activation	GSM 850	GSM 1900	WCDMA 850	WCDMA 1900
Landscape-1 (Bottom Edge toward body)	†	†	†	†
Landscape-2 (Top Edge toward body)	‡	‡	‡	‡
Portrait-1 (Right Edge toward body)	†	‡	†	‡
Portrait-2 (Left Edge toward body)	†	†	†	†

† Reduced maximum limit applied only by activation of proximity sensor.
‡ Reduced maximum limit applied by default.

Proximity Sensor Activation
Maximum Output Power vs. distance from the body phantom



2.3 Device Conducted Power Measurements

2.3.1 GSM modes

Band	Channel	Conducted power (dBm) for GSM modes[3]		
		GSM *CS Voice* (1 Slot)	GPRS *PS Data* (2 Slots)	EDGE *PS Data* (2 Slots)
GSM 850	128	33.66	32.11	27.27
	190	33.41	32.02	27.08
	251	33.43	31.89	26.89
GSM 1900	512	30.47	30.36	25.95
	661	30.61	30.43	25.92
	810	30.33	30.10	25.81

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

2.3.2 WCDMA modes

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

Band	Channel	Conducted power (dBm) for WCDMA modes		Conducted Power (dBm) for WCDMA – HSDPA (Rel 5) Modes				Conducted Power (dBm) for WCDMA – HSPA (HSUPA/HSDPA-Rel 6) Modes				
		RMC	AMR	Subtest 1	Subtest 2	Subtest 3	Subtest 4	Subtest 1	Subtest 2	Subtest 3	Subtest 4	Subtest 5
WCDMA 850	4132	23.95		24.01	24.04	24.06	24.07	24.04	24.05	24.09	24.00	24.11
	4180	23.98		24.03	23.96	24.00	23.99	24.05	23.99	23.99	24.01	24.03
	4233	23.89		23.91	23.90	23.88	23.90	23.91	23.95	23.88	23.92	23.91
WCDMA 1900	9262	23.83		23.99	23.96	24.00	23.99	24.00	23.99	23.98	23.97	23.99
	9400	24.00		24.06	24.04	24.11	24.06	24.06	24.05	24.11	24.06	24.10
	9538	23.83		23.90	23.93	23.96	23.91	23.91	23.94	23.97	23.93	23.92

Maximum Power Reduction (MPR)

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

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

UE transmit channel configuration	CM (dB)	MPR (dB)
For all combinations of; DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH	$0 \leq CM \leq 3.5$	MAX (CM-1, 0)
Note 1: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.		

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

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

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

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

2.3.3 Wi-Fi 802.11 modes

Per "SAR Measurement Procedures for 802.11 a/b/g Transmitters" (FCC KDB 248227), power measurements were performed for 802.11 operational modes. The conducted power measurements for each mode are shown in the tables below. SAR testing for 802.11 was performed within each transmit band (2.5 GHz, 5.2 GHz, 5.8 GHz) with the transmitter set to the lowest data rate on the default test channels **highlighted in bold** in the tables below. The body positions that resulted in the highest SAR values were further tested on the additional channels and higher data rates **highlighted in blue** in the tables below. Due to the relatively large number of data rates with measured conducted power exceeding the lowest data rate conducted power by more than 0.25 dB, there will be a large number of tests performed on the configuration that results in the highest measured SAR for the lowest data rate.

Band	Channel	Conducted Power (dBm) for 802.11b Mode Data Rates			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
Wi-Fi 2450 MHz	1	**13.53**	13.77	13.62	13.77
	6	**13.32**	13.55	13.46	**13.60**
	11	**14.31**	14.50	14.27	**14.57**

Band	Channel	Conducted Power (dBm) for 802.11g Mode Data Rates							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
Wi-Fi 2450 MHz	1	8.68	8.69	8.64	8.54	8.61	8.40	8.30	8.29
	6	**13.69**	**13.59**	13.39	13.32	12.10	11.96	11.96	11.85
	11	10.92	11.09	10.90	10.78	10.95	10.59	10.74	10.75

Band	Channel	Conducted Power (dBm) for 802.11n Mode Data Rates (20 MHz Channel, 400 ns Guard Interval)							
		7.2 Mbps	14.4 Mbps	21.6 Mbps	28.8 Mbps	43.3 Mbps	57.7 Mbps	65 Mbps	72.2 Mbps
Wi-Fi 2450 MHz	1	9.58	9.51	9.45	9.69	9.45	9.30	9.34	8.31
	6	12.77	12.64	12.57	11.41	11.26	11.15	11.18	9.19
	11	11.26	10.85	10.84	10.77	10.63	10.99	10.64	10.02

Band	Channel	Conducted Power (dBm) for 802.11n Mode Data Rates (20 MHz Channel, 800 ns Guard Interval)							
		6.5 Mbps	13 Mbps	19.5 Mbps	26 Mbps	39 Mbps	52 Mbps	58.5 Mbps	65 Mbps
Wi-Fi 2450 MHz	1	9.61	9.66	9.43	9.43	9.41	9.33	9.31	8.37
	6	12.74	12.05	12.57	11.22	11.31	11.16	11.10	8.41
	11	10.83	10.86	10.69	11.15	10.75	10.64	10.98	9.51

Band	Channel	Conducted Power (dBm) for 802.11a Mode Data Rates							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
Wi-Fi 5210 MHz	36	**5.33**	5.33	5.35	5.29	5.54	3.85	3.85	3.75
	40	**4.22**	4.28	3.70	3.63	4.19	4.14	3.42	3.44
	44	**3.69**	3.86	3.81	3.79	3.66	3.78	3.51	3.46
	48	**4.02**	3.94	3.91	3.89	3.61	3.57	3.61	3.57
Wi-Fi 5775 MHz	149	**6.50**	6.45	6.50	6.65	5.92	5.87	5.93	6.13
	153	**6.15**	6.32	6.15	6.16	6.24	6.24	6.15	6.07
	157	**6.30**	6.34	6.41	5.45	5.58	5.54	5.25	6.13
	161	**6.56**	6.54	6.40	6.50	6.42	6.34	6.10	5.98

Band	Channel	Conducted Power (dBm) for 802.11n Mode Data Rates (20 MHz Channel, 400 ns Guard Interval)							
		7.2 Mbps	14.4 Mbps	21.6 Mbps	28.8 Mbps	43.3 Mbps	57.7 Mbps	65 Mbps	72.2 Mbps
Wi-Fi 5210 MHz	36	4.56	4.26	4.29	4.29	4.30	4.25	4.25	4.09
	40	4.31	4.27	4.19	4.22	4.25	4.19	4.32	4.32
	44	**4.40**	**4.36**	**4.33**	**4.38**	**4.32**	**4.25**	**4.29**	**4.24**
	48	**4.84**	**4.29**	**4.29**	**4.34**	4.23	4.24	4.21	4.11
Wi-Fi 5775 MHz	149	6.06	6.04	6.01	6.04	6.25	5.97	5.95	5.93
	153	6.18	6.13	6.09	5.82	6.11	6.06	5.96	5.67
	157	6.01	5.98	5.95	6.02	5.92	5.89	5.91	5.83
	161	6.12	6.13	6.11	6.04	5.99	5.98	5.94	5.87

Band	Channel	Conducted Power (dBm) for 802.11n Mode Data Rates (20 MHz Channel, 800 ns Guard Interval)							
		6.5 Mbps	13 Mbps	19.5 Mbps	26 Mbps	39 Mbps	52 Mbps	58.5 Mbps	65 Mbps
Wi-Fi 5210 MHz	36	4.39	4.34	4.34	4.43	4.36	4.28	4.18	4.30
	40	4.25	4.29	4.21	4.28	4.26	4.17	4.14	4.16
	44	**4.42**	**4.43**	**4.40**	**4.46**	**4.52**	**4.30**	**4.29**	**4.31**
	48	**4.35**	4.25	4.21	**4.28**	4.20	4.18	4.09	4.10
Wi-Fi 5775 MHz	149	6.13	6.01	6.00	6.06	6.11	6.01	6.06	5.96
	153	6.09	6.13	6.06	5.96	6.14	5.76	5.75	6.08
	157	6.03	6.22	6.18	6.25	5.99	6.14	5.77	6.17
	161	6.12	6.08	6.05	6.13	6.05	6.00	5.98	5.96

2.4 Evaluation of Simultaneous Transmitters

The necessity of stand-alone and simultaneous SAR testing was evaluated for the licensed and unlicensed transmitters of the device per FCC KDB 447498 D01, which refers to "SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas" (FCC KDB 648474).

By device design the GSM/WCDMA transmitter may operate simultaneously with either the Wi-Fi 802.11 transmitter or the Bluetooth transmitter. The separation distance between the Wi-Fi 802.11/Bluetooth antenna and the GSM/WCDMA antenna is 4.2 cm. Pictorial representation of the antenna locations and separation distances are given in Exhibit 7d.

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

1. The highest output conducted power measured for Bluetooth on the device under test is 11.7 mW [≤ 12 mW]
2. The separation distance between the Bluetooth antenna and the main antenna is 4.2 cm [≥ 2.5 cm]

For the transmitters requiring stand-alone SAR testing (GSM/WCDMA and Wi-Fi 802.11), the KDB guidelines direct that if the sum of the 1 g SAR measured for the simultaneously transmitting antennas is less than the SAR limit, SAR measurements for simultaneous transmission is not required. Further, if the SAR-to-peak-location separation ratio for two simultaneously transmitting antennas is less than 0.3 then SAR measurement for simultaneous transmission is likewise not required. Per device specific FCC consultation KDB 879768, evaluations of the worst-case body simultaneous SAR summations and separation ratios are presented in the table below. Plots of peak SAR separations are provided in Appendix 3.

Evaluations for Simultaneous SAR

Cellular Transmitter Mode	Wi-Fi Transmitter Mode	Configuration	Cellular Transmitter 1 g SAR Value (W/kg)	Wi-Fi Transmitter 1 g SAR Value (W/kg)	Summation 1 g SAR Value (W/kg)	SAR-to-peak-location Separation Ratio	*Plot Page*	*Simultaneous Measurements Required?*
GPRS 850, Class 10	Wi-Fi 2450 802.11g, 9 Mbps	Top Edge of DUT 0 mm from Phantom	1.11	0.76	>1.60	0.30		**Yes**
GPRS 850, Class 10	Wi-Fi 5210 802.11n, 21.7 Mbps (20 Mhz BW, 400 ns GI)	Top Edge of DUT 0 mm from Phantom	1.11	0.76	>1.60	0.47		**Yes**
GPRS 1900, Class 10	Wi-Fi 2450 802.11g, 9 Mbps	Top Edge of DUT 0 mm from Phantom	1.25	0.76	>1.60	0.24	**A58**	No
GPRS 1900, Class 10	Wi-Fi 5210 802.11n, 21.7 Mbps (20 Mhz BW, 400 ns GI)	Top Edge of DUT 0 mm from Phantom	1.25	0.76	>1.60	0.31		**Yes**
WCDMA 850, 12.2 kbps RMC	Wi-Fi 2450 802.11g, 9 Mbps	Top Edge of DUT 0 mm from Phantom	1.48	0.76	>1.60	0.54		**Yes**
WCDMA 850, 12.2 kbps RMC	Wi-Fi 5210 802.11n, 21.7 Mbps (20 Mhz BW, 400 ns GI)	Top Edge of DUT 0 mm from Phantom	1.48	0.76	>1.60	0.54		**Yes**
WCDMA 1900, 12.2 kbps RMC	Wi-Fi 5210 802.11n, 21.7 Mbps (20 Mhz BW, 400 ns GI)	Top Edge of DUT 0 mm from Phantom	1.26	0.76	>1.60	0.31		**Yes**

For the configurations noted, combined SAR measurements were required to determine the aggregate 1 g SAR. The results of these measurements are given in the table below, with additional SAR plots of the combined measurements provided in Appendix 3.

Measurements for Simultaneous SAR							
Cellular Transmitter Mode	**Wi-Fi Transmitter Mode**	**Configuration**	**Cellular Transmitter 1 g SAR Value (W/kg)**	**Wi-Fi Transmitter 1 g SAR Value (W/kg)**	**Simultaneous 1 g SAR Value (W/kg)**	***Test Plots***	
						Grid	**Plot Page**
GPRS 850, Class 10	Wi-Fi 2450 802.11g, 9 Mbps	Top Edge of DUT 0 mm from Phantom	1.17	0.752	1.26	**15x7x6**	**A59-A61**
GPRS 850, Class 10	Wi-Fi 5210 802.11n, 21.7 Mbps (20 Mhz BW, 400 ns GI)	Top Edge of DUT 0 mm from Phantom	1.05	0.765	1.17	**28x15x6**	**A62-A65**
GPRS 1900, Class 10	Wi-Fi 5210 802.11n, 21.7 Mbps (20 Mhz BW, 400 ns GI)	Top Edge of DUT 0 mm from Phantom	1.33	0.765	1.34	**28x15x6**	**A66-A69**
WCDMA 850, 12.2 kbps RMC	Wi-Fi 2450 802.11g, 9 Mbps	Top Edge of DUT 0 mm from Phantom	1.47	0.752	1.54	**15x7x6**	**A70-A72**
WCDMA 850, 12.2 kbps RMC	Wi-Fi 5210 802.11n, 21.7 Mbps (20 Mhz BW, 400 ns GI)	Top Edge of DUT 0 mm from Phantom	1.37	0.765	1.38	**28x15x6**	**A73-A75**
WCDMA 1900, 12.2 kbps RMC	Wi-Fi 5210 802.11n, 21.7 Mbps (20 Mhz BW, 400 ns GI)	Top Edge of DUT 0 mm from Phantom	1.11	0.765	1.11	**28x15x6**	**A76-A78**

Additional SAR measurements for simultaneous transmission evaluation were performed for each of the single transmitters using an extended zoom scan. This extended zoom scan was created to encompass the zoom scan volumes that were found previously in each of the stand-alone transmit SAR tests. For the tests for the combination of GSM 850 and Wi-Fi 2450, the outer dimensions of the extended zoom scan were X = 112 mm, Y = 56 mm, Z = 30 mm with a step size of X = 8 mm, Y = 8 mm, and Z = 5 mm. For the tests for the combination of WCDMA 850 or WCDMA 1900 and Wi-Fi 2450, the outer dimensions of the extended zoom scan were X = 108 mm, Y = 56 mm, Z = 22 mm with a step size of X = 4 mm, Y = 4 mm, and Z using a graded step size with a ratio of 1.5 resulting in the following step increments: 2 mm, 2.7 mm, 4.0 mm, 5.9 mm, 7.4 mm. The step sizes and arrangement of measurement points were chosen to comply with the guidance provided in FCC KDB 865664.

The location of these extended zoom scans was established by using X, Y grid offsets from the "Grid Reference Point" in DASY4.7. The results were then combined via the DASY4.7 Multi-Band Combiner feature. A comparison can be performed between the stand-alone measurements for each noted transmitter and the measurements provided for simultaneous transmission. The measurements were not performed sequentially and thus may show slightly different results due to a number of reasons including, but not limited to, measurement system performance, slight differences in DUT positioning, or variations in simulated tissue parameters.

3. Test Equipment Used

3.1 Dosimetric System

The Motorola Mobility ADR Test Services Laboratory utilizes a Dosimetric Assessment System (Dasy4™ v4.7) manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All the SAR measurements are taken within a shielded enclosure. The overall 10 g RSS uncertainty of the measurement system is ±10.8% (K=1) with an expanded uncertainty of ±21.6% (K=2). The overall 1 g RSS uncertainty of the measurement system is ±11.1% (K=1) with an expanded uncertainty of ±22.2% (K=2). The measurement uncertainty budget is given in Appendix 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.

Description	Serial Number	Cal Date	Cal Due Date
DASY4™ DAE V1	434	Jan-13-2011	Jan-13-2012
E-Field Probe ES3DV3	3124	Aug-11-2010	Aug-11-2011
DASY4™ DAE V1	702	May-18-2010	May-18-2011
DASY4™ DAE V1	661	Jan-13-2011	Jan-13-2012
E-Field Probe ES3DV3	3183	Jul-14-2010	Jul-14-2011
DASY4™ DAE V1	440	Nov-11-2010	Nov-11-2011
E-Field Probe EX3DV4	3730	Jul-16-2010	Jul-16-2011
S.A.M. Phantom used for 800/900 MHz	TP-1139		
S.A.M. Phantom used for 800/900 MHz	TP-1131		
S.A.M. Phantom used for 800/900 MHz	TP-1156		
S.A.M. Phantom used for 1800/1900/2450 MHz	TP-1250		
S.A.M. Phantom used for 5210/5775 MHz	TP-1106		
S.A.M. Phantom used for 5210/5775 MHz	TP-1153		
Dipole Validation Kit, DV835V2	424TR	Oct-14-2010	Oct-14-2011
Dipole Validation Kit, DV835V2	425TR	Oct-14-2010	Oct-14-2011
Dipole Validation Kit, DV1800V2	279TR	Oct-13-2010	Oct-13-2011
Dipole Validation Kit, DV1800V2	281TR	Jan-13-2011	Jan-13-2012
Dipole Validation Kit, DV2450V2	766	Oct-13-2010	Oct-13-2011
Dipole Validation Kit, D5GHzV2	1088	Jul-14-2010	Jul-14-2011

3.2 Additional Equipment

Description	Serial Number	Cal Date	Cal Due Date
Signal Generator HP8648C	3847A04982	Nov-18-2009	Nov-18-2011
Power Meter E4419B	GB39511082	Apr-24-2009	Apr-24-2011
Power Sensor #1 - E9301A	US39210918	Oct-25-2010	Oct-25-2011
Power Sensor #2 - E9301A	US39210917	Oct-25-2010	Oct-25-2011
Signal Generator HP8648C	3847A04810	Oct-30-2009	Oct-30-2011
Power Meter E4419B	GB39511087	Dec-22-2009	Dec-22-2011
Power Sensor #1 - E9301A	US39211006	Oct-25-2010	Oct-25-2011
Power Sensor #2 - E9301A	US39210934	Oct-25-2010	Oct-25-2011
Signal Generator HP8648C	3429A00286	Nov-23-2009	Nov-23-2011
Power Meter E4419B	US39250622	Dec-22-2009	Dec-22-2011
Power Sensor #1 - E9301A	US39210931	Oct-25-2010	Oct-25-2011
Power Sensor #2 - E9301A	US39210932	Oct-25-2010	Oct-25-2011
Network Analyzer HP8753ES	US39172529	Jun-04-2010	Jun-04-2011
Dielectric Probe Kit HP85070C	US99360070		

4. Electrical parameters of the tissue simulating liquid

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

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

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			ε_r	σ (S/m)	Temp (°C)
835	**Body**	**Measured,** Mar-15-2011	53.4	1.01	20.0
		Measured, Mar-22-2011	53.5	1.01	20.5
		Measured, Apr-07-2011	55.9	0.99	20.2
		Recommended Limits	55.2 ±5%	0.97 ±5%	18-25
900	**Body**	**Measured,** Mar-17-2011	52.7	1.07	19.7
		Measured, Mar-18-2011	52.4	1.08	20.7
		Measured, Mar-24-2011	52.3	1.07	19.6
		Recommended Limits	55.0 ±5%	1.05 ±5%	18-25
1750	**Body**	**Measured,** Mar-17-2011	51.6	1.44	19.9
		Recommended Limits	53.5 ±5%	1.48 ±5%	18-25
1880	**Body**	**Measured,** Mar-15-2011	51.2	1.59	19.6
		Measured, Mar-16-2011	51.6	1.59	19.6
		Measured, Mar-17-2011	51.0	1.59	19.6
		Measured, Mar-22-2011	52.6	1.59	19.2
		Recommended Limits	53.3 ±5%	1.52 ±5%	18-25
1950	**Body**	**Measured,** Mar-19-2011	51.8	1.57	19.6
		Measured, Mar-25-2011	50.8	1.53	19.5
		Recommended Limits	53.3 ±5%	1.52 ±5%	18-25
2450	**Body**	**Measured,** Apr-07-2011	47.5	2.04	20.5
		Recommended Limits	52.7 ±10%	1.95 ±5%	18-25
5210	**Body**	**Measured,** Mar-25-2011	45.7	5.87	19.7
		Measured, Mar-29-2011	46.2	5.97	19.7
		Recommended Limits	49.0 ±10%	5.31 ±5%	18-25
5785	**Body**	**Measured,** Mar-28-2011	44.9	6.79	20.5
		Recommended Limits	48.2 ±10%	5.98 ±5%	18-25

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

Ingredient	835 MHz / 900 MHz Head	835 MHz / 900 MHz Body	1800 MHz / 1900 MHz Head	1800 MHz / 1900 MHz Body	2450 MHz Head	2450 MHz Body
Sugar	57	44.9	--	--	--	--
DGBE	--	--	47	30.8	--	30
Diacetin	--	--	--	--	51	--
Water	40.45	53.06	52.62	68.8	48.75	70
Salt	1.45	0.94	0.38	0.4	0.15	--
HEC	1	1	--	--	--	--
Bact.	0.1	0.1	--	--	0.1	--

All 5.2 GHz and 5.8 GHz SAR testing was performed using MSL 3500/5800 tissue simulating liquids from Schmid & Partner Engineering AG. Prior to conducting SAR measurements, the relative permittivity, ε_r, and the conductivity, σ, of the liquids were measured. The conductivity of the purchased liquids was determined to be at the high end of the window from the target parameter. This resulted in the 5.2 GHz and 5.8 GHz System Accuracy Verifications measuring slightly above the 19.9% (k=2) window from the dipole validation target. When conductivity is normalized to the target value, the system accuracy verification is within the 19.9% (k=2) window. Because the system accuracy verifications were measured on the conservative side of the target window, all subsequent 5.2 GHz and 5.8 GHz SAR tests were also on the conservative side of their uncertainty window.

5. System Accuracy Verification

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

A SAR measurement was performed to verify the measured SAR was within ±10% from the target SAR indicated in Appendix 6. These frequencies are within ±10% of the compliance test mid-band frequency as required in [1] and [5]. The test was conducted on the same days as the measurement of the DUT. Recommended limits for permittivity and conductivity, specified in [5], are shown in the table below. The obtained results from the system accuracy verification are also displayed in the table below. SAR values are normalized to 1 W forward power delivered to the dipole. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values. The distributions of SAR compare well with those of the reference measurements (see Appendix 1). For frequencies below 3 GHz, the simulated tissue depth was verified to be 15.0 cm ± 0.5 cm. For frequencies above 3 GHz, the simulated tissue depth was verified to be 10 cm ± 0.5 cm. Z-axis scans showing the SAR penetration are also included in Appendix 1.

f (MHz)	Description	SAR (W/kg), 1 gram	Dielectric Parameters		Ambient Temp (°C)	Tissue Temp (°C)
			ε_r	σ (S/m)		
835	**Measured,** Mar-15-2011	9.60	41.8	0.92	20.3	20.2
	Measured, Mar-17-2011	9.55	41.7	0.91	20.3	20.6
	Measured, Mar-18-2011	9.50	41.8	0.92	20.8	20.7
	Measured, Mar-22-2011	9.40	41.6	0.91	20.7	19.7
	Measured, Mar-24-2011	9.40	41.6	0.91	20.8	19.8
	Recommended Limits	9.49	41.5 ±5%	0.90 ±5%	18-25	18-25
	Measured, Mar-21-2011	9.80	41.5	0.91	20.6	20.6
	Measured, Apr-07-2011	9.75	41.4	0.91	20.6	20.7
	Recommended Limits	9.57	41.5 ±5%	0.90 ±5%	18-25	18-25
1800	**Measured,** Mar-19-2011	39.35	39.6	1.37	20.6	19.6
	Recommended Limits	37.8	40.0 ±5%	1.40 ±5%	18-25	18-25
	Measured, Mar-15-2011	37.50	40.2	1.37	20.2	19.8
	Measured, Mar-16-2011	37.45	40.0	1.36	20.7	20.0
	Measured, Mar-17-2011	37.90	40.2	1.37	20.3	19.9
	Measured, Mar-19-2011	37.80	39.6	1.37	20.1	19.6
	Measured, Mar-22-2011	37.65	40.0	1.38	20.5	19.3
	Measured, Mar-25-2011	37.85	39.7	1.37	20.6	19.3
	Recommended Limits	38.9	40.0 ±5%	1.40 ±5%	18-25	18-25
2450	**Measured,** Apr-06-2011	55.5	35.8	1.85	20.4	20.2
	Recommended Limits	52.2	39.2 ±10%	1.80 ±5%	18-25	18-25
5200	**Measured,** Mar-25-2011	90.1	33.8	4.84	20.3	19.5
	Measured, Mar-29-2011	87.6	34.3	4.82	20.7	19.8
	Recommended Limits	82.4	36.0 ±10%	4.65 ±5%	18-25	18-25
5800	**Measured,** Mar-28-2011	91.6	33.2	5.55	20.8	20.5
	Recommended Limits	82.1	35.4 ±10%	5.27 ±5%	18-25	18-25

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

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3124	835	5.89	5 of 11
		1810	4.89	5 of 11
		2450	4.35	5 of 11
E-Field Probe ES3DV3	3183	835	6.11	5 of 11
		1810	5.05	5 of 11
		2450	4.49	5 of 11
E-Field Probe EX3DV4	3730	5200	4.67	5 of 11
		5800	4.06	5 of 11

6. Test Results

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

The DUT was tested in the configurations stipulated in [1], [4] and [5], and per the guidance provided in FCC KDB 447498 D01. The DUT was positioned into these configurations using the device holder supplied with the DASY4™ SAR measurement system. The default settings for the "coarse" and "cube" scans were chosen and used for measurements. The grid spacing of the coarse scan was set to 15 mm or less as shown in the SAR plots included in Appendices 2 through 5. Please refer to the DASY4™ manual for additional information on SAR scanning procedures and algorithms used.

The portable hand-held device model covered by this report has an internal battery that is not replaceable by the end user. This battery was used to do all of the SAR testing. The battery was charged prior to each test.

6.1 Body Test Results

The SAR results shown in tables 1 through 4 are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to [6]. Also shown is the temperature of the simulated tissue after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is Extrapolated SAR = Measured SAR * $10^{(-drift/10)}$. The SAR reported at the end of the measurement process by the DASY4™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test.

The requisite test positions for the DUT were chosen per the guidance provided in FCC KDB 447498 D01. The DUT was tested with the back surface of the device facing the phantom with no separation for all transmitters requiring test. Additionally, the DUT was tested with the back surface of the device at 9 mm separation from the phantom, to capture compliance at the worst-case proximity sensor trigger point (i.e. the closest the DUT might come to a user without utilizing a set of reduced maximum power limits). The DUT was also tested along the edges of the device in which an antenna is located within 5 cm of that edge. Per the guidance, two of the DUT edges were excluded from testing as no antenna exists within 5 cm of those edges. Pictorial representation of the antenna locations and separation distances are given in Exhibit 7d. Additionally, the software within the DUT was set to invert the orientation results from the DUT's sensor. E.g., the DUT "top edge" facing up (away from the body) was operating instead at the "top edge" facing down (toward the body) performance levels. This inversion of the orientation ensures proper exposure conditions were measured for SAR testing of an edge using the standard DASY4 measurement setup.

The test conditions that produced the highest SAR values in each band are indicated as bold numbers in the following tables and are included in Appendix 2. All other test conditions measured lower SAR values than those included in Appendix 2.

The SAR measurements were performed using the SAM phantoms listed in section 3.1. Since the same phantoms and simulated tissue were used for the system accuracy verification and the device SAR measurements, the Z-axis scans included in Appendix 1 are applicable for verification of simulated tissue depth. The simulated tissue depth was verified to be 15.0 cm ± 0.5 cm for frequencies less than 3 GHz, or 10.0 cm ± 0.5 cm for frequencies greater than 3 GHz. The same device holder described in section 6 was used for positioning the DUT.

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

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3124	835	5.86	6 of 11
		1810	4.76	6 of 11
		2450	4.19	6 of 11
E-Field Probe ES3DV3	3183	835	6.15	6 of 11
		1810	4.84	6 of 11
		2450	4.36	6 of 11
E-Field Probe EX3DV4	3730	5200	4.07	6 of 11
		5800	3.53	6 of 11

Body, Top Edge of DUT 0 mm from Phantom											
Mid-Band f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	*10 g SAR value*		*1 g SAR value*		*Test Plot*	
						Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	GPRS 850, 2 Upslots	Internal	128	18.9	0.188	0.537	0.54	1.09	1.09		
			190	18.9	0.094	0.535	0.54	1.09	1.09		
			251	**18.9**	**0.083**	**0.539**	**0.54**	**1.11**	**1.11**	**5x5x7**	**A39**
	WCDMA 850, 12.2 kbps RMC	Internal	4132	18.0	0.063	0.665	0.67	1.33	1.33		
			4180	**18.0**	**0.081**	**0.727**	**0.73**	**1.48**	**1.48**	**5x5x7**	**A40**
			4233	18.2	0.065	0.652	0.65	1.32	1.32		
1880	GPRS 1900, 2 Upslots	Internal	512	19.4	-0.022	0.387	0.39	0.807	0.81		
			661	19.4	0.091	0.492	0.49	1.10	1.10		
			810	**19.4**	**-0.030**	**0.543**	**0.55**	**1.24**	**1.25**	**5x5x7**	**A41**
	WCDMA 1900, 12.2 kbps RMC	Internal	9262	18.9	-0.040	0.500	0.50	1.06	1.07		
			9400	**18.7**	**-0.084**	**0.571**	**0.58**	**1.24**	**1.26**	**5x5x7**	**A42**
			9538	18.7	-0.038	0.519	0.52	1.16	1.17		
2450	802.11b, 1 Mbps	Internal	1	19.6	0.304	0.240	0.24	0.684	0.68		
			6	19.5	0.421	0.250	0.25	0.700	0.70		
			11	19.2	0.413	0.268	0.27	0.731	0.73		
	802.11b, 11 Mbps	Internal	6	19.5	0.166	0.251	0.25	0.709	0.71		
			11	20.2	-0.010	0.262	0.26	0.728	0.73		
	802.11g, 6 Mbps	Internal	6	20.2	-0.094	0.261	0.27	0.731	0.75		
	802.11g, 9 Mbps	Internal	6	**20.2**	**-0.034**	**0.267**	**0.27**	**0.753**	**0.76**	**5x5x7**	**A43**
5210	802.11a, 6 Mbps	Internal	36	19.2	0.309	0.154	0.15	0.568	0.57		
			40	18.8	0.037	0.182	0.18	0.741	0.74		
			44	18.6	0.418	0.171	0.17	0.631	0.63		
			48	19.4	-0.111	0.173	0.18	0.621	0.64		
	802.11n, 7.2 Mbps (20 MHz BW, 400 ns GI)	Internal	44	19.2	0.062	0.193	0.19	0.742	0.74		
			48	19.1	0.306	0.177	0.18	0.640	0.64		
	802.11n, 14.4 Mbps (20 MHz BW, 400 ns GI)	Internal	44	18.5	-0.052	0.185	0.19	0.700	0.71		
			48	18.5	0.203	0.155	0.16	0.602	0.60		
	802.11n, 21.7 Mbps (20 MHz BW, 400 ns GI)	Internal	44	18.6	0.451	0.130	0.13	0.506	0.51		
			48	**19.4**	**-0.009**	**0.185**	**0.19**	**0.762**	**0.76**	**7x7x6**	**A44**
	802.11n, 28.9 Mbps (20 MHz BW, 400 ns GI)	Internal	44	18.1	0.209	0.132	0.13	0.483	0.48		
			48	18.2	-0.165	0.141	0.15	0.486	0.50		
	802.11n, 43.3 Mbps (20 MHz BW, 400 ns GI)	Internal	44	17.8	0.189	0.139	0.14	0.487	0.49		
	802.11n, 57.8 Mbps (20 MHz BW, 400 ns GI)	Internal	44	18.0	-0.077	0.119	0.12	0.441	0.45		
	802.11n, 65 Mbps (20 MHz BW, 400 ns GI)	Internal	44	19.3	-0.400	0.146	0.16	0.529	0.58		
	802.11n, 72.2 Mbps (20 MHz BW, 400 ns GI)	Internal	44	19.3	0.073	0.121	0.12	0.431	0.43		
	802.11n, 6.5 Mbps (20 MHz BW, 800 ns GI)	Internal	44	18.6	0.137	0.141	0.14	0.508	0.51		
			48	18.5	0.149	0.142	0.14	0.560	0.56		
	802.11n, 13 Mbps (20 MHz BW, 800 ns GI)	Internal	44	18.3	0.168	0.132	0.13	0.488	0.49		
	802.11n, 19.5 Mbps (20 MHz BW, 800 ns GI)	Internal	44	18.3	-0.054	0.133	0.13	0.484	0.49		
	802.11n, 26 Mbps (20 MHz BW, 800 ns GI)	Internal	44	18.0	0.007	0.154	0.15	0.596	0.60		
			48	18.0	0.012	0.152	0.15	0.562	0.56		
	802.11n, 39 Mbps (20 MHz BW, 800 ns GI)	Internal	44	18.6	0.163	0.149	0.15	0.589	0.59		
	802.11n, 52 Mbps (20 MHz BW, 800 ns GI)	Internal	44	17.8	0.368	0.187	0.19	0.724	0.72		
	802.11n, 58.5 Mbps (20 MHz BW, 800 ns GI)	Internal	44	17.7	-0.109	0.141	0.14	0.529	0.54		
	802.11n, 65 Mbps (20 MHz BW, 800 ns GI)	Internal	44	17.7	0.343	0.142	0.14	0.543	0.54		
5785	802.11a, 6 Mbps	Internal	149	19.6	-0.072	0.075	0.08	0.355	0.36		
			153	19.4	-0.425	0.106	0.12	0.507	0.56		
			157	19.2	0.250	0.138	0.14	0.638	0.64		
			161	**19.8**	**-0.174**	**0.140**	**0.15**	**0.645**	**0.67**	**7x7x6**	**A45**

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

Body, Right Edge of DUT 0 mm from Phantom											
Mid-Band f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	*10 g SAR value*		*1 g SAR value*		*Test Plot*	
						Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	GPRS 850, 2 Upslots	Internal	128								
			190	**19.0**	**0.244**	**0.110**	**0.11**	**0.160**	**0.16**	**5x5x7**	**A46**
			251								
	WCDMA 850, 12.2 kbps RMC	Internal	4132								
			4180	**18.0**	**0.003**	**0.176**	**0.18**	**0.313**	**0.31**	**5x5x7**	**A47**
			4233								
1880	GPRS 1900, 2 Upslots	Internal	512	19.1	0.050	0.490	0.49	1.00	1.00		
			661	19.2	0.312	0.633	0.63	1.33	1.33		
			810	**19.0**	**0.042**	**0.728**	**0.73**	**1.53**	**1.53**	**5x5x7**	**A48**
	WCDMA 1900, 12.2 kbps RMC	Internal	9262	**19.2**	**-0.001**	**0.561**	**0.56**	**1.11**	**1.11**	**5x5x7**	**A49**
			9400	18.8	0.106	0.468	0.47	0.950	0.95		
			9538	18.8	0.025	0.392	0.39	0.802	0.80		

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

Body, Back Surface of DUT 0 mm from Phantom											
Mid-Band f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	*10 g SAR value*		*1 g SAR value*		*Test Plot*	
						Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	GPRS 850, 2 Upslots	Internal	128	**19.0**	**0.040**	**0.827**	**0.83**	**1.45**	**1.45**	**5x5x7**	**A50**
			190	19.0	-0.157	0.700	0.73	1.25	1.30		
			251	18.9	-0.053	0.580	0.59	1.03	1.04		
	WCDMA 850, 12.2 kbps RMC	Internal	4132	18.0	0.029	0.782	0.78	1.37	1.37		
			4180	18.0	0.041	0.739	0.74	1.29	1.29		
			4233	**18.0**	**0.038**	**0.843**	**0.84**	**1.48**	**1.48**	**5x5x7**	**A51**
1880	GPRS 1900, 2 Upslots	Internal	512	18.7	-0.148	0.427	0.44	0.839	0.87		
			661	**19.4**	**-0.008**	**0.735**	**0.74**	**1.53**	**1.53**	**5x5x7**	**A52**
			810	19.2	-0.066	0.686	0.70	1.37	1.39		
	WCDMA 1900, 12.2 kbps RMC	Internal	9262	18.8	0.105	0.638	0.64	1.26	1.26		
			9400	**19.0**	**0.198**	**0.718**	**0.72**	**1.42**	**1.42**	**5x5x7**	**A53**
			9538	18.8	0.068	0.576	0.58	1.15	1.15		
2450	802.11b, 1 Mbps	Internal	1								
			6								
			11	**19.6**	**-0.265**	**0.138**	**0.15**	**0.346**	**0.37**	**5x5x7**	**A54**
5210	802.11a, 6 Mbps	Internal	36	19.3	0.274	0.062	0.06	0.196	0.20		
			40								
			44								
			48	**19.3**	**0.256**	**0.063**	**0.06**	**0.214**	**0.21**	**7x7x6**	**A55**
5785	802.11a, 6 Mbps	Internal	149	20.0	0.084	0.068	0.07	0.316	0.32		
			153								
			157								
			161	**20.0**	**-0.205**	**0.098**	**0.10**	**0.396**	**0.42**	**7x7x6**	**A56**

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

Body, Back Surface of DUT 9 mm from Phantom											
Mid-Band f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	*10 g SAR value*		*1 g SAR value*		*Test Plot*	
						Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	GPRS 850, 2 Upslots	Internal	128								
			190	19.5	-0.055	0.461	0.47	0.731	0.74		
			251								
	WCDMA 850, 12.2 kbps RMC	Internal	4132								
			4180	19.5	-0.0192	0.312	0.31	0.497	0.50		
			4233								
1880	GPRS 1900, 2 Upslots	Internal	512								
			661	19.0	-0.216	0.582	0.61	1.04	1.09		
			810								
	WCDMA 1900, 12.2 kbps RMC	Internal	9262								
			9400	19.5	0.078	0.468	0.47	0.817	0.82		
			9538								

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

References

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

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

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

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

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

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

Appendix 1

SAR distribution comparison for the system accuracy verification

Appendix 2

SAR distribution plots for Body Worn Configuration

Appendix 3

SAR distribution plots for Simultaneous Transmission

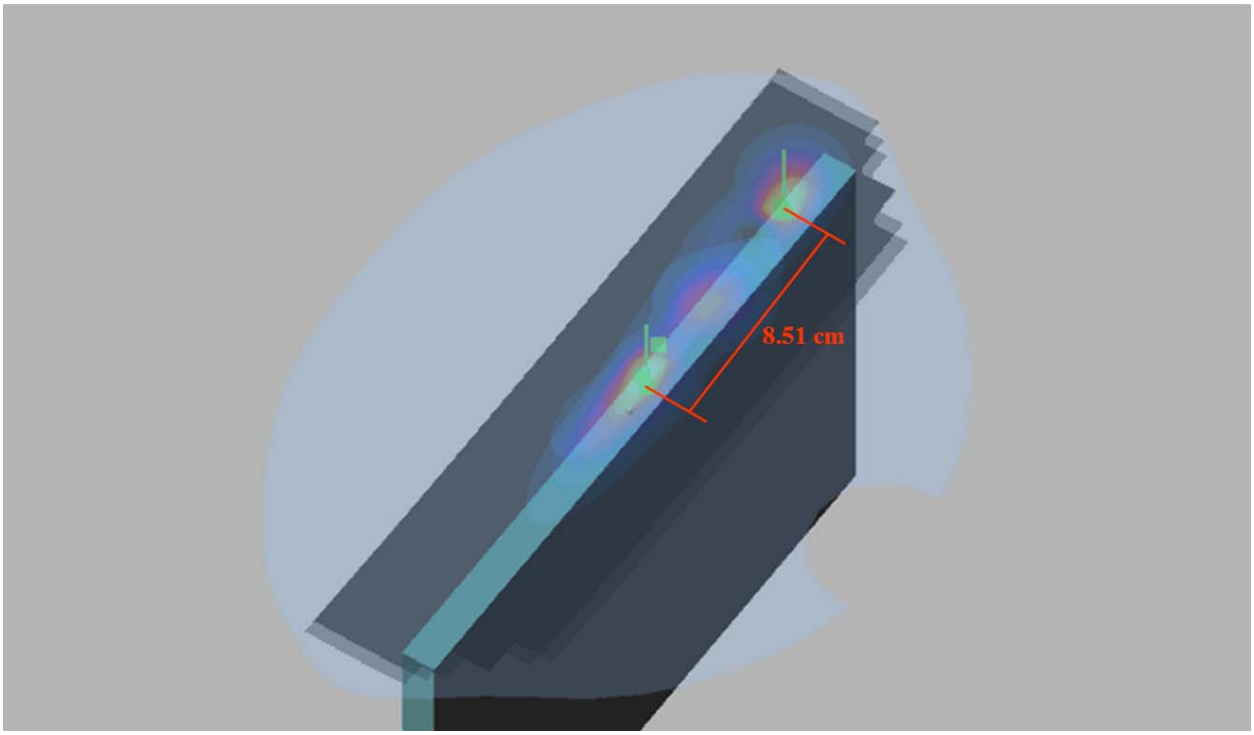


Figure A3.1: GSM 1900 Top Edge of DUT SAR overlaid with Wi-Fi 2450 Top Edge of DUT SAR

Appendix 4

Probe Calibration Certificate

Appendix 5

Measurement Uncertainty Budget

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	**IEEE 1528 section**	**Tol. (± %)**	**Prob Dist**	**Div.**	**c_i (1 g)**	**c_i (10 g)**	**1 g u_i (±%)**	**10 g u_i (±%)**	**v_i**
Measurement System									
Probe Calibration	E.2.1	5.9	N	1.00	1	1	5.9	5.9	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8	1.1	R	1.73	1	1	0.6	0.6	∞
RF Ambient Conditions - Noise	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	0.0	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mech. Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t Phantom	E.6.3	1.4	R	1.73	1	1	0.8	0.8	∞
Max. SAR Evaluation (ext., int., avg.)	E.5	3.4	R	1.73	1	1	2.0	2.0	∞
Test sample Related									
Test Sample Positioning	E.4.2	3.2	N	1.00	1	1	3.2	3.2	29
Device Holder Uncertainty	E.4.1	4.0	N	1.00	1	1	4.0	4.0	8
SAR drift	6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3	3.3	N	1.00	0.64	0.43	2.1	1.4	∞
Liquid Permittivity (target)	E.3.2	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	E.3.3	1.9	N	1.00	0.6	0.49	1.1	0.9	∞
Combined Standard Uncertainty			RSS				11.1	10.8	411
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				22.2	21.6	

Appendix 6

Dipole Characterization Certificate

END OF REPORT