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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 #: 25616-1F
Date of Report: Jan-03-2014
Date of Test: Dec-18-2013 to Jan-16-2014
FCC ID #: IHDT56PG1
IC ID #: N/A
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Test Laboratory: Motorola Mobility, LLC - ADR Test Service Laboratory
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A handwritten signature in black ink that reads 'Ketan Patel'.

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

Tests:
Electromagnetic Specific Absorption Rate

Procedures:
IEC 62209-1
IEC 62209-2
RSS-102
IEEE 1528 - 2003
Australian Communications Authority Radio
Communications (Electromagnetic Radiation –
Human Exposure) Standard 2003
CENELEC EN 50360
CENELEC EN 50566:2013
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 1: SAR Distribution Plots for Test System Verification

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

Appendix 5: Measurement Uncertainty Budget

Appendix 6: Probe Calibration Certificates

Appendix 7: Dipole Characterization Certificates

Revision History

Revision Version	Date	Notes
Rev. 0	Jan-03-2014	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. For ANSI / IEEE C95.1 (1 g), the final simultaneous-transmission SAR readings for this phone are 1.28 W/kg for head-adjacent use and 1.58 W/kg for body-worn use. 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)
LTE Band 17	0.51	0.47	0.59
LTE Band 5	0.41	0.49	0.47
LTE Band 4	1.18	1.05	1.08
LTE Band 2	0.34	1.36	1.33
GSM 850	0.48	1.02	1.19
GSM 1900	0.26	0.58	1.53
WCDMA 850	0.41	0.77	0.58
WCDMA 1700	1.28	0.98	1.15
WCDMA 1900	0.53	1.58	1.3
Wi-Fi 2.45 GHz	0.34	0.05	0.16
Bluetooth	N/A	0.00	N/A
Simultaneous SAR	1.58		

2 Details of the Device Under Test

2.1 Sample Information

Serial Number(s) (Functional Use)	LDGB2D0002 (GSM conducted power measurements and SAR testing) LDGB2D0007 (WCDMA conducted power measurements and SAR testing) LDGB2D0009 (LTE B2/4 conducted power measurements and SAR testing) LDGB2D0013 ((LTE B5/17 conducted power measurements and SAR testing) LDGB2D0026 (Wi-Fi SAR testing) LDGB2D0005 (Wi-Fi/Bluetooth power measurements)
Production Unit or Identical Prototype (47 CFR §2.908)	Identical Prototype
Device Category	Portable (Mobile Station Class B)
RF Exposure Limits	General Population / Uncontrolled

2.2 Antenna Description

Main (850/1700/1900 MHz) Antenna

Type	Internal	
Location	Bottom-Left Edge of Transceiver	
Dimensions	Width	11.09 mm
	Length	38.5 mm

LTE (710 MHz) Antenna

Type	Internal	
Location	Bottom-Right Edge of Transceiver	
Dimensions	Width	17.78 mm
	Length	19.04 mm

Bluetooth/Wi-Fi 2 GHz Antenna

Type	Internal	
Location	Left-Side Top of Transceiver	
Dimensions	Width	8.83 mm
	Length	9.68 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)
LTE Band 17	QPSK, 16QAM	23.0 dBm	24.0 dBm	1:1	704.0 - 716.0 MHz
LTE Band 2	QPSK, 16QAM	23.0 dBm	24.0 dBm	1:1	1850.0 - 1910.0 MHz
LTE Band 4	QPSK, 16QAM	23.0 dBm	24.0 dBm	1:1	1710.0 - 1755.0 MHz
LTE Band 5	QPSK, 16QAM	23.0 dBm	24.0 dBm	1:1	824.0 - 849.0 MHz
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	26.5 dBm	28.0 dBm	1:8.3, 2:8.3, 3:8.3, 4:8.3	824.2 - 848.8 MHz
GSM 900	GMSK	32.5 dBm	33.5 dBm	1:8.3	880.2 - 914.8 MHz
GPRS/EDGE 900	GMSK	32.5 dBm	33.5 dBm	1:8.3, 2:8.3, 3:8.3, 4:8.3	880.2 - 914.8 MHz
EDGE 900	8PSK	26.5 dBm	28.0 dBm	1:8.3, 2:8.3, 3:8.3, 4:8.3	880.2 - 914.8 MHz
GSM 1800	GMSK	29.5 dBm	30.5 dBm	1:8.3	1710.2 - 1784.8 MHz
GPRS/EDGE 1800	GMSK	29.5 dBm	30.5 dBm	1:8.3, 2:8.3, 3:8.3, 4:8.3	1710.2 - 1784.8 MHz
EDGE 1800	8PSK	25.5 dBm	27.0 dBm	1:8.3, 2:8.3, 3:8.3, 4:8.3	1710.2 - 1784.8 MHz
GSM 1900	GMSK	29.5 dBm	30.5 dBm	1:8.3	1850.2 - 1909.8 MHz
GPRS/EDGE 1900	GMSK	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	25.5 dBm	27.0 dBm	1:8.3, 2:8.3, 3:8.3, 4:8.3	1850.2 - 1909.8 MHz
WCDMA 850	QPSK	23.0 dBm	24.0 dBm	1:1	826.4 - 846.6 MHz
WCDMA 900	QPSK	23.0 dBm	24.0 dBm	1:1	882.4 - 912.6 MHz
WCDMA 1700	QPSK	23.0 dBm	24.0 dBm	1:1	1712.0 - 1752.0 MHz
WCDMA 1900	QPSK	23.0 dBm	24.0 dBm	1:1	1852.4 - 1907.6 MHz
WCDMA 2100	QPSK	23.0 dBm	24.0 dBm	1:1	1922.4 - 1977.6 MHz
Wi-Fi 802.11b/g/n	BPSK	18.26 dBm		1:1	2412.0 - 2462.0 MHz
Bluetooth	GFSK	10.6 dBm		1:1	2402.0 - 2480.0 MHz

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

2.4.1 LTE

Technical Description

LTE Summary Information

FCC ID			IHDT56PG1
Form Factor			Portable Handset
Frequency Range(s)			See Section 2.3
Channel Bandwidth(s)			Band 2: 20, 15, 10, 5, 3, 1.4 MHz Band 4: 20, 15, 10, 5, 3, 1.4 MHz Band 5: 10, 5, 3.5, 1.4 MHz Band 17: 10, 5 MHz
Low, Middle, High Channel Numbers and Frequencies			
Low	Mid	High	Band: Channel Bandwidth
18700 (1860.0 MHz)	18900 (1880.0 MHz)	19100 (1900.0 MHz)	Band 2: 20 MHz
18675 (1857.5 MHz)	18900 (1880.0 MHz)	19125 (1902.5 MHz)	Band 2: 15 MHz
18650 (1855.0 MHz)	18900 (1880.0 MHz)	19150 (1905.0 MHz)	Band 2: 10 MHz
18625 (1852.5 MHz)	18900 (1880.0 MHz)	19175 (1907.5 MHz)	Band 2: 5 MHz
18615 (1851.5 MHz)	18900 (1880.0 MHz)	19185 (1908.5 MHz)	Band 2: 3 MHz
18606 (1850.6 MHz)	18900 (1880.0 MHz)	19194 (1909.4 MHz)	Band 2: 1.4 MHz
--	20175 (1732.5 MHz)	--	Band 4: 20 MHz
20025 (1717.5 MHz)	20175 (1732.5 MHz)	20325 (1747.5 MHz)	Band 4: 15 MHz
20000 (1715.0 MHz)	20175 (1732.5 MHz)	20350 (1750.0 MHz)	Band 4: 10 MHz
19975 (1712.5 MHz)	20175 (1732.5 MHz)	20375 (1752.5 MHz)	Band 4: 5 MHz
19965 (1711.5 MHz)	20175 (1732.5 MHz)	20385 (1753.5 MHz)	Band 4: 3 MHz
19956 (1710.6 MHz)	20175 (1732.5 MHz)	20394 (1754.4 MHz)	Band 4: 1.4 MHz
--	20525 (836.5 MHz)	--	Band 5: 10 MHz
20425 (826.5 MHz)	20525 (836.5 MHz)	20625 (846.5 MHz)	Band 5: 5 MHz
20415 (825.5 MHz)	20525 (836.5 MHz)	20635 (847.5 MHz)	Band 5: 3 MHz
20406 (824.6 MHz)	20525 (836.5 MHz)	20644 (848.4 MHz)	Band 5: 1.4 MHz
--	23790 (710.0 MHz)	--	Band 17: 10 MHz
--	23790 (710.0 MHz)	--	Band 17: 5 MHz
UE Category			3
Modulations Supported			QPSK, 16QAM
Description of LTE Tx and Antenna Implementation			Band 2: 1 TX/RX Antenna, 1 RX Antenna Band 4: 1 TX/RX Antenna, 1 RX Antenna Band 5: 1 TX/RX Antenna, 1 RX Antenna Band 17: 1 TX/RX Antenna, 1 RX Antenna
LTE Voice Available?			Yes (3 rd Party VOIP clients Only)
Hotspot with LTE + Wi-Fi?			Yes
Hotspot with LTE + Wi-Fi active with Voice sessions?			No (SVLTE not supported)
LTE MPR Permanently Implemented per 3GPP TS 36.101?			Yes
A-MPR disabled for SAR Testing?			Yes
Conducted power table providing measurements across 1 RB, 50% RB and 100% RB allocations?			Yes
Table provided specifying other US wireless operating modes?			Yes

Table provided specifying maximum average conducted power for these other wireless modes?	Yes
Table provided identifying simultaneous transmission conditions?	Yes
Power Reduction used for SAR compliance?	Yes
Power Reduction used for GSM/WCDMA?	Yes
Power Reduction used for LTE?	Yes
Power Reduction used for SVLTE?	N/A
Test Equipment used	CMW500 SW version 2.1.28.9

LTE Maximum Power Reduction (MPR) conditions are defined in 3GPP 36-521, section 6.2.3.3:

6.2.3.3 Minimum conformance requirements

For UE Power Class 3, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2.3-1 due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3.3-1.

Table 6.2.3.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

For the UE maximum output power modified by MPR, the power limits specified in subclause 6.2.5.3 apply. The normative reference for this requirement is TS 36.101 clause 6.2.3.

For the device's architecture, MPR is permanently implemented. Per the chart above, the following MPR is used:

Modulation	1.4 MHz		3 MHz		5 MHz		10 MHz		15 MHz		20 MHz	
	# of RBs	MPR (dB)	# of RBs	MPR (dB)	# of RBs	MPR (dB)	# of RBs	MPR (dB)	# of RBs	MPR (dB)	# of RBs	MPR (dB)
QPSK	> 5	1	> 4	1	> 8	1	> 12	1	> 16	1	> 18	1
16 QAM	≤ 5	1	≤ 4	1	≤ 8	1	≤ 12	1	≤ 16	1	≤ 18	1
16 QAM	> 5	2	> 4	2	> 8	2	> 12	2	> 16	2	> 18	2

The table applies for any RB start value. RBs are assigned contiguously. Thus, given the maximum power limits stated in 2.2 and the MPR described above, the maximum power for the SAR test cases in channel bandwidths greater than 1.4 MHz is as follows:

Test Case	Band 2	Band 4	Band 5	Band 17
	Max Power (dBm)	Max Power (dBm)	Max Power (dBm)	Max Power (dBm)
QPSK, 1 RB Allocation	24.0	24.0	24.0	24.0
QPSK, 50% RB Allocation	23.0	23.0	23.0	23.0
QPSK, 100% RB Allocation	23.0	23.0	23.0	23.0
16QAM, 1 RB Allocation	23.0	23.0	23.0	23.0
16QAM, 50% RB Allocation	22.0	22.0	22.0	22.0
16QAM, 100% RB Allocation	22.0	22.0	22.0	22.0

Exposure Conditions and Test Exclusions

Mode	Type	Head-Adjacent	Body-Worn Accessory	Mobile Hotspot
All Modes, QPSK modulation	Data	Tested (1)	Tested (1)	Tested
All Modes, 16QAM modulation	Data	Excluded (2)	Excluded (2)	Excluded (2)

Notes:

- (1) QPSK modulation, 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) 16QAM modulation was excluded from testing per FCC KDB 941225 D05, as the maximum output power in this mode is not more than ½ dB higher than each comparable mode in QPSK and the reported SAR results for QPSK mode testing were less than 1.45 ^W/kg.

Device Test Setup

For LTE modes, the test sample was operated using transmission to a base station simulator. The base station simulator was configured per the guidance provided in FCC KDB 941225 D05, with closed-loop power control enforced to ensure the phone transmits at maximum output power.

Conducted Power Measurements

LTE Band 17 (10 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation			QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	
Start RB			0	50	99	0	25	50	0	0	50	99	0	25	50	0
RB Allocation			1	1	1	50	50	50	100	1	1	1	50	50	50	100
Max Limit (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
MPR Target (dB)			0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2
Max Limit with MPR (dBm)			24.0	24.0	24.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.0	22.0	22.0	22.0
Channel BW	Frequency (MHz)	Channel														
10 MHz	710.0	23790	22.93	22.64	22.96	21.64	21.60	21.72	21.79	21.71	21.41	21.73	20.56	20.59	20.65	20.69

LTE Band 17 (5 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation			QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Start RB			0	37	74	0	19	39	0	0	37	74	0	19	39	0
RB Allocation			1	1	1	36	36	36	75	1	1	1	36	36	36	75
Max Limit (dBm)			24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
MPR Target (dB)			0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2
Max Limit with MPR (dBm)			24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00
Channel BW	Frequency (MHz)	Channel														
5 MHz	706.5	23755	23.12	22.71	22.68	21.91	21.83	21.76	21.95	21.79	21.52	21.54	20.94	20.86	20.70	20.98
5 MHz	710.0	23790	22.79	22.56	22.65	21.55	21.50	21.67	21.62	21.78	21.61	21.62	20.61	20.58	20.66	20.56
5 MHz	713.5	23825	22.43	22.77	22.50	21.71	21.81	21.75	21.70	21.84	22.19	21.91	20.71	20.77	20.75	20.65

LTE Band 5 (10 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation			QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	
Start RB			0	50	99	0	25	50	0	0	50	99	0	25	50	0
RB Allocation			1	1	1	50	50	50	100	1	1	1	50	50	50	100
Max Limit (dBm)			24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
MPR Target (dB)			0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2
Max Limit with MPR (dBm)			24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00
Channel BW	Frequency (MHz)	Channel														
10 MHz	829	20450	22.84	22.70	22.77	21.74	21.79	21.78	21.86	21.93	21.84	21.94	20.85	20.81	20.75	20.87
10 MHz	836.5	20525	22.65	22.81	22.89	21.74	21.77	21.85	21.95	21.54	21.64	21.74	20.82	20.89	20.94	20.91
10 MHz	844	20600	22.88	22.81	22.76	21.89	21.82	21.80	21.85	21.62	21.58	21.49	20.86	20.79	20.78	20.88

LTE Band 5 (5 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation			QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	
Start RB			0	37	74	0	19	39	0	0	37	74	0	19	39	0
RB Allocation			1	1	1	36	36	36	75	1	1	1	36	36	36	75
Max Limit (dBm)			24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
MPR Target (dB)			0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2
Max Limit with MPR (dBm)			24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00
Channel BW	Frequency (MHz)	Channel														
5 MHz	826.5	20425	22.78	22.81	22.73	21.81	21.84	21.79	21.88	21.59	21.61	21.55	20.91	20.92	20.84	20.99
5 MHz	836.5	20525	22.74	22.80	22.88	21.77	21.71	21.89	21.79	21.76	21.83	21.85	20.81	20.77	20.86	20.75
5 MHz	846.5	20625	22.70	22.63	22.61	21.75	21.74	21.65	21.69	22.10	22.09	22.01	20.77	20.77	20.68	20.79

LTE Band 5 (3 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	
Start RB		0	25	49	0	12	25	0	0	25	49	0	12	25	0	
RB Allocation		1	1	1	25	25	25	50	1	1	1	25	25	25	50	
Max Limit (dBm)		24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	
MPR Target (dB)		0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	
Max Limit with MPR (dBm)		24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00	
Channel BW	Frequency (MHz)	Channel														
3 MHz	825.5	20415	22.83	22.82	22.85	21.77	21.74	21.75	21.77	21.62	21.60	21.64	20.86	20.81	20.84	20.83
3 MHz	836.5	20525	22.82	22.84	22.87	21.76	21.80	21.69	21.79	21.62	21.59	21.64	20.77	20.80	20.72	20.78
3 MHz	847.5	20635	22.79	22.63	22.71	21.68	21.60	21.60	21.66	21.96	21.53	21.46	20.79	20.68	20.67	20.72

LTE Band 5 (1.4 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	
Start RB		0	25	49	0	12	25	0	0	25	49	0	12	25	0	
RB Allocation		1	1	1	25	25	25	50	1	1	1	25	25	25	50	
Max Limit (dBm)		24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	
MPR Target (dB)		0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	
Max Limit with MPR (dBm)		24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00	
Channel BW	Frequency (MHz)	Channel														
1.4 MHz	824.7	20407	22.75	22.67	22.85	22.70	22.69	22.88	21.78	22.00	21.60	22.00	21.70	21.65	21.80	20.90
1.4 MHz	836.5	20525	22.85	22.77	22.75	22.73	22.68	22.67	21.84	21.67	21.57	21.55	21.94	21.85	21.84	20.93
1.4 MHz	848.3	20643	22.85	22.65	22.75	22.63	22.63	22.67	21.63	21.85	21.75	21.80	21.55	21.60	21.50	20.80

LTE Band 4 (20 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation			QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	
Start RB			0	50	99	0	25	50	0	0	50	99	0	25	50	0
RB Allocation			1	1	1	50	50	50	100	1	1	1	50	50	50	100
Max Limit (dBm)			24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
MPR Target (dB)			0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2
Max Limit with MPR (dBm)			24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00
Channel BW	Frequency (MHz)	Channel														
20 MHz	1720	20050	23.01	22.98	23.00	21.98	22.02	22.10	22.00	22.08	22.03	22.14	20.97	21.00	21.04	20.99
20 MHz	1732.5	20175	22.71	22.84	23.06	22.01	22.12	22.19	22.13	22.06	22.15	22.31	20.96	20.96	21.12	21.09
20 MHz	1745	20300	22.99	23.15	23.22	22.21	22.17	22.30	22.17	22.18	22.27	22.44	21.23	21.24	21.37	21.21

LTE Band 4 (15 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	
Start RB		0	37	74	0	19	39	0	0	37	74	0	19	39	0	
RB Allocation		1	1	1	36	36	36	75	1	1	1	36	36	36	75	
Max Limit (dBm)		24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	
MPR Target (dB)		0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	
Max Limit with MPR (dBm)		24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00	
Channel BW	Frequency (MHz)	Channel														
15 MHz	1717.5	20025	23.08	22.97	22.99	22.12	22.07	22.12	22.16	21.89	21.87	21.78	20.95	20.94	20.99	21.08
15 MHz	1732.5	20175	22.84	22.97	23.18	22.01	22.05	22.18	22.18	21.96	22.21	22.38	21.05	21.07	21.18	21.07
15 MHz	1747.5	20325	23.13	23.29	23.28	22.21	22.21	22.26	22.29	22.46	22.56	22.56	21.12	21.15	21.24	21.34

LTE Band 4 (10 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	
Start RB		0	25	49	0	12	25	0	0	25	49	0	12	25	0	
RB Allocation		1	1	1	25	25	25	50	1	1	1	25	25	25	50	
Max Limit (dBm)		24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	
MPR Target (dB)		0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	
Max Limit with MPR (dBm)		24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00	
Channel BW	Frequency (MHz)	Channel														
10 MHz	1715	20000	23.23	23.02	23.08	22.02	21.96	21.99	22.05	21.95	21.78	21.82	20.95	20.88	20.95	20.94
10 MHz	1732.5	20175	22.92	22.97	23.14	21.97	21.97	22.19	22.08	22.05	22.13	22.27	20.96	20.98	21.17	21.05
10 MHz	1750	20350	23.15	23.19	23.23	22.23	22.18	22.26	22.26	21.93	21.96	22.05	21.34	21.29	21.46	21.31

LTE Band 4 (5 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation			QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Start RB			0	37	74	0	19	39	0	0	37	74	0	19	39	0
RB Allocation			1	1	1	36	36	36	75	1	1	1	36	36	36	75
Max Limit (dBm)			24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
MPR Target (dB)			0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2
Max Limit with MPR (dBm)			24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00
Channel BW	Frequency (MHz)	Channel														
5 MHz	1712.5	19975	22.10	23.03	22.97	22.09	21.99	22.08	22.01	21.91	21.77	21.78	21.04	21.00	21.02	21.04
5 MHz	1732.5	20175	22.99	22.97	23.12	21.99	21.99	22.10	22.00	21.97	22.01	22.06	20.97	20.99	21.09	21.00
5 MHz	1752.5	20375	23.21	23.29	23.21	22.34	22.29	22.18	22.37	22.51	22.58	22.58	21.33	21.37	21.25	21.33

LTE Band 4 (3 MHz Channel Bandwidth) - Measured Conducted Power (dBm)															
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Start RB		0	25	49	0	12	25	0	0	25	49	0	12	25	0
RB Allocation		1	1	1	25	25	25	50	1	1	1	25	25	25	50
Max Limit (dBm)		24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
MPR Target (dB)		0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2
Max Limit with MPR (dBm)		24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00
Channel BW	Frequency (MHz)	Channel													
3 MHz	1711.5	19965	23.28	23.14	23.09	22.09	22.10	22.10	21.97	21.89	21.79	21.03	21.03	21.07	21.05
3 MHz	1732.5	20175	22.96	22.97	23.12	22.03	22.01	21.96	22.09	22.15	21.74	21.89	20.99	20.99	20.95
3 MHz	1753.5	20385	23.35	23.27	23.26	22.31	22.29	22.25	22.25	22.47	22.03	22.11	21.35	21.36	21.29

LTE Band 4 (1.4 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	
Start RB		0	25	49	0	12	25	0	0	25	49	0	12	25	0	
RB Allocation		1	1	1	25	25	25	50	1	1	1	25	25	25	50	
Max Limit (dBm)		24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	
MPR Target (dB)		0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	
Max Limit with MPR (dBm)		24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00	
Channel BW	Frequency (MHz)	Channel														
1.4 MHz	1710.7	19957	23.14	22.96	23.08	23.00	23.05	23.00	22.14	22.16	22.04	22.10	22.03	22.04	22.00	21.16
1.4 MHz	1732.5	20175	23.19	23.08	23.16	23.01	22.93	22.95	22.06	21.88	21.68	21.80	22.10	22.05	22.06	21.07
1.4 MHz	1754.3	20393	23.26	23.15	23.23	23.18	23.20	22.21	22.12	22.23	22.18	22.18	22.10	22.07	22.11	21.26

LTE Band 2 (20 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation			QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Start RB			0	50	99	0	25	50	0	0	50	99	0	25	50	0
RB Allocation			1	1	1	50	50	50	100	1	1	1	50	50	50	100
Max Limit (dBm)			24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
MPR Target (dB)			0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2
Max Limit with MPR (dBm)			24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00
Channel BW	Frequency (MHz)	Channel														
20 MHz	1860	18700	22.85	22.87	23.02	22.13	22.11	22.08	22.09	22.07	22.13	22.21	21.14	21.15	21.12	21.11
20 MHz	1880	18900	22.96	23.12	23.16	22.14	22.24	22.27	22.21	21.99	22.24	22.25	21.15	21.24	21.25	21.22
20 MHz	1900	19100	22.96	22.82	22.65	22.16	22.02	22.07	22.12	22.19	22.06	21.90	21.10	20.96	21.09	21.08

LTE Band 2 (15 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	
Start RB		0	37	74	0	19	39	0	0	37	74	0	19	39	0	
RB Allocation		1	1	1	36	36	36	75	1	1	1	36	36	36	75	
Max Limit (dBm)		24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	
MPR Target (dB)		0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	
Max Limit with MPR (dBm)		24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00	
Channel BW	Frequency (MHz)	Channel														
15 MHz	1857.5	18675	23.03	23.04	23.06	22.12	22.13	22.04	22.24	21.84	21.96	21.92	20.97	21.04	20.99	21.21
15 MHz	1880	18900	23.14	23.15	23.18	22.06	22.25	22.29	22.27	22.32	22.29	22.33	21.08	21.17	21.26	21.27
15 MHz	1902.5	19125	22.98	22.94	22.67	22.12	22.02	22.09	22.13	22.43	22.37	22.16	21.06	20.96	20.99	21.17

LTE Band 2 (10 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation			QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Start RB			0	25	49	0	12	25	0	0	25	49	0	12	25	0
RB Allocation			1	1	1	25	25	25	50	1	1	1	25	25	25	50
Max Limit (dBm)			24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
MPR Target (dB)			0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2
Max Limit with MPR (dBm)			24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00
Channel BW	Frequency (MHz)	Channel														
10 MHz	1855	18650	23.02	23.01	23.13	22.09	22.11	22.13	22.18	21.83	21.83	21.92	21.04	20.96	21.07	21.05
10 MHz	1880	18900	23.03	23.13	23.25	22.03	22.19	22.17	22.27	22.22	22.27	22.45	21.04	21.19	21.13	21.19
10 MHz	1905	19150	22.95	23.04	22.68	22.04	22.02	22.01	22.09	21.85	21.91	21.53	21.10	21.08	21.07	21.10

LTE Band 2 (5 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	
Start RB		0	37	74	0	19	39	0	0	37	74	0	19	39	0	
RB Allocation		1	1	1	36	36	36	75	1	1	1	36	36	36	75	
Max Limit (dBm)		24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	
MPR Target (dB)		0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	
Max Limit with MPR (dBm)		24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00	
Channel BW	Frequency (MHz)	Channel														
5 MHz	1852.5	18625	22.99	22.96	22.97	22.00	22.00	21.94	22.01	21.74	21.75	21.78	20.99	20.97	20.98	21.08
5 MHz	1880	18900	22.96	23.13	23.26	22.14	22.18	22.16	22.16	22.01	22.18	22.24	21.13	21.17	21.15	21.15
5 MHz	1907.5	19175	22.95	22.89	22.60	22.06	22.02	21.84	22.05	22.37	22.31	22.02	21.03	21.03	20.86	20.98

LTE Band 2 (3 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	
Start RB		0	25	49	0	12	25	0	0	25	49	0	12	25	0	
RB Allocation		1	1	1	25	25	25	50	1	1	1	25	25	25	50	
Max Limit (dBm)		24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	
MPR Target (dB)		0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	
Max Limit with MPR (dBm)		24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00	
Channel BW	Frequency (MHz)	Channel														
3 MHz	1851.5	18615	23.06	23.00	23.09	22.00	22.02	21.98	22.04	21.91	21.77	21.76	20.98	20.97	20.97	20.97
3 MHz	1880	18900	23.07	23.13	23.22	22.23	22.14	22.13	22.18	21.96	22.02	21.99	21.18	21.15	21.13	21.14
3 MHz	1908.5	19185	23.05	22.83	22.61	21.99	21.85	21.76	21.89	22.63	21.63	21.50	20.99	20.88	20.80	20.89

LTE Band 2 (1.4 MHz Channel Bandwidth) - Measured Conducted Power (dBm)																
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	
Start RB		0	25	49	0	12	25	0	0	25	49	0	12	25	0	
RB Allocation		1	1	1	25	25	25	50	1	1	1	25	25	25	50	
Max Limit (dBm)		24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	
MPR Target (dB)		0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	
Max Limit with MPR (dBm)		24.00	24.00	24.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	22.00	22.00	22.00	22.00	
Channel BW	Frequency (MHz)	Channel														
1.4 MHz	1850.7	18607	23.00	22.90	22.95	22.97	22.95	22.95	21.93	22.03	22.00	21.90	21.85	21.70	21.77	21.02
1.4 MHz	1880	18900	23.19	23.08	23.06	23.14	23.10	23.09	22.17	22.00	21.95	21.93	22.29	22.26	22.24	21.26
1.4 MHz	1909.3	19193	22.70	22.57	22.55	22.70	22.65	22.70	21.77	21.86	21.70	21.73	21.69	21.60	21.52	20.80

2.4.2 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)	33.5	31.5	29.5	27.5	30.5	28.5	26.5	24.5
Maximum Time Average Output Power Setting (dBm)	24.31	25.32	25.08	24.33	21.31	22.32	22.08	21.33
Duty Cycle	1:8	2:8	3:8	4:8	1:8	2:8	3:8	4:8
Transmitting Frequency Range(s)	824.2 - 848.8 MHz				1850.2 - 1909.8 MHz			
Mode(s) of Operation	EDGE 850				EDGE 1900			
Modulation	8PSK				8PSK			
Maximum TX Burst Output Power Setting (dBm)	28.0	26.0	24.0	22.0	27.0	25.0	23.0	21.0
Maximum Time Average Output Power Setting (dBm)	18.81	19.82	19.58	18.83	17.81	18.82	18.58	17.83
Duty Cycle	1:8	2:8	3:8	4:8	1:8	2:8	3:8	4:8
Transmitting Frequency Range(s)	824.2 - 848.8 MHz				1850.2 - 1909.8 MHz			

Device Test Setup

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

Conducted Power Measurements

Band	Channel	Conducted power (dBm) for GSM modes (Burst Average Power)								
		GSM CS Voice (1 Slot)	GPRS PS Data (1 Slot)	GPRS PS Data (2 Slots)	GPRS PS Data (3 Slots)	GPRS PS Data (4 Slots)	EDGE PS Data (1 Slot)	EDGE PS Data (2 Slots)	EDGE PS Data (3 Slots)	EDGE PS Data (4 Slots)
GSM 850	128	33.37	33.05	30.60	28.29	26.51	26.67	24.60	22.75	21.77
	190	33.28	32.97	30.52	28.29	26.76	26.72	24.62	22.46	22.31
	251	33.07	32.78	30.51	28.13	26.53	26.60	24.47	22.28	21.48
GSM 1900	512	30.14	30.11	28.00	25.81	23.65	26.08	23.91	21.81	20.69
	661	30.33	30.29	28.02	25.80	23.65	26.05	24.04	21.83	20.91
	810	29.80	29.86	27.62	25.43	23.28	25.65	23.61	21.50	20.61

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	24.18	23.86	24.42	23.87	23.34	17.48	18.42	18.33	18.60
	190	24.09	23.78	24.34	23.87	23.59	17.53	18.44	18.04	19.14
	251	23.88	23.59	24.33	23.71	23.36	17.41	18.29	17.86	18.31
GSM 1900	512	20.95	20.92	21.82	21.39	20.48	16.89	17.73	17.39	17.52
	661	21.14	21.10	21.84	21.38	20.48	16.86	17.86	17.41	17.74
	810	20.61	20.67	21.44	21.01	20.11	16.46	17.43	17.08	17.44

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.

2.4.3 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	23.24	23.23	22.13	21.73	21.81	21.8	21.72	21.75	22.19	22.19	22.21
	4180	22.97	22.94	22.01	21.52	21.6	21.51	21.55	21.49	22.11	22.02	22.08
	4233	22.87	22.85	21.87	21.46	21.48	21.55	21.5	21.49	21.95	21.94	21.95
WCDMA 1700	1312	22.97	22.98	21.94	22.4	21.55	21.57	21.64	21.43	22.07	21.99	22.1
	1413	22.86	22.87	21.87	22.35	21.44	21.44	21.61	21.35	21.96	21.88	22.02
	1513	22.91	22.93	21.88	22.29	21.53	21.5	21.8	21.46	21.96	21.95	21.98
WCDMA 1900	9262	22.97	22.98	21.94	22.4	21.55	21.57	21.64	21.43	22.07	21.99	22.1
	9400	22.86	22.87	21.87	22.35	21.44	21.44	21.61	21.35	21.96	21.88	22.02
	9538	22.91	22.93	21.88	22.29	21.53	21.5	21.8	21.46	21.96	21.95	21.98
WCDMA 2100	9612	22.78	22.81	21.83	21.28	21.42	21.36	21.41	21.31	21.87	21.79	21.85
	9750	22.7	22.7	21.74	21.18	21.32	21.29	21.33	21.32	21.87	21.73	21.83
	9888	22.65	22.64	21.63	21.2	21.25	21.29	21.23	21.21	21.8	21.65	21.76

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 $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.		

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

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

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

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

2.4.4 Wi-Fi 802.11

Technical Description

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

Exposure Conditions and Test Exclusions

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

Notes:

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

Device Test Setup

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

Conducted Power Measurements

Band	Channel	Average Conducted Power (dBm) for 802.11b Mode Data Rates			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
2450 MHz	1	18.2	18.22	18.24	18.26
	6	17.75	17.8	17.79	17.87
	11	18.01	18.04	18.02	18.1

Band	Channel	Average Conducted Power (dBm) for 802.11g Mode Data Rates							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
2450 MHz	1	15.7	15.76	15.7	14.88	14.82	14.81	13.91	13.92
	6	16.06	16.1	16.12	15.23	15.3	15.3	14.32	14.33
	11	12.55	12.58	12.6	11.55	11.52	11.6	10.57	10.6

Band	Channel	Average Conducted Power (dBm) for 802.11n Mode Data Rates (20 MHz Channel, 800 ns Guard Interval)							
		6.5 Mbps	13 Mbps	19.5 Mbps	26 Mbps	39 Mbps	52 Mbps	58.5 Mbps	65 Mbps
2450 MHz	1	14.8	14.88	14	13.96	12.92	12.95	12	12.01
	6	15.28	15.27	14.4	14.38	13.38	13.36	12.36	12.38
	11	12.6	12.6	11.55	11.62	10.6	10.65	9.52	9.56

Band	Channel	Average Conducted Power (dBm) for 802.11n Mode Data Rates (20 MHz Channel, 400 ns Guard Interval)							
		7.2 Mbps	14.4 Mbps	21.6 Mbps	28.8 Mbps	43.3 Mbps	57.7 Mbps	65 Mbps	72.2 Mbps
2450 MHz	1	14.7	14.75	13.76	13.5	12.8	12.83	11.81	11.84
	6	15.14	15.15	14.25	14.2	13.25	13.25	12.27	12.22
	11	12.5	12.55	11.5	11.48	10.5	10.51	9.4	9.41

2.4.5 Bluetooth

Technical Description

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

Exposure Conditions and Test Exclusions

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

Notes:

(1) Per FCC KDB 447498 D01, standalone SAR measurements of the Bluetooth transmitter in this phone were not required based on the maximum conducted power and the Bluetooth antenna-to-user separation distance; however, some SAR measurements, as necessary, to support simultaneous SAR evaluation are included. 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.

$$\frac{[11.489]_{(mW)}}{[10]_{(mm)}} \times \sqrt{2.44_{(GHz)}} = \mathbf{1.8} \leq 3.0$$

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

Conducted Power Measurements

Frequency [MHz]	Data Rate [Mbps]	Channel Number	Peak Conducted Power [mW]
2402	1.0	0	9.465
2441	1.0	39	9.215
2480	1.0	78	10.912
2402	2.0	0	9.663
2441	2.0	39	9.399
2480	2.0	78	11.092
2402	3.0	0	9.986
2441	3.0	39	9.701
2480	3.0	78	11.489

Frequency [MHz]	Mode	Channel Number	Peak Conducted Power [mW]
2402	LE	0	0.920
2441	LE	39	0.814
2480	LE	78	0.981

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 in body-adjacent exposure configurations during a mobile hotspot session, reduced power limits are enforced on the LTE transmitter in Band 2 and Band 4. A table of the reduced limits used for testing is given below.

Mode(s) of Operation	LTE Band 4					
Test Channel	Applicable to all channels/channel bandwidths					
Modulation	QPSK			16QAM		
RB Allocation	1 RB	50%	100%	1 RB	50%	100%
Maximum Output Power (dBm)	24.0	24.0	24.0	24.0	24.0	24.0
Output Power with MPR (dBm)	24.0	23.0	23.0	23.0	22.0	22.0
Reduced Maximum Output Power (dBm)	20.0	20.0	20.0	20.0	20.0	20.0

Mode(s) of Operation	LTE Band 2					
Test Channel	Applicable to all channels/channel bandwidths					
Modulation	QPSK			16QAM		
RB Allocation	1 RB	50%	100%	1 RB	50%	100%
Maximum Output Power Setting (dBm)	24.0	24.0	24.0	24.0	24.0	24.0
Output Power with MPR (dBm)	24.0	23.0	23.0	23.0	22.0	22.0
Reduced Maximum Output Power Setting (dBm)	19.0	19.0	19.0	19.0	19.0	19.0

While operating in body-adjacent exposure configurations during a mobile hotspot session, a reduced maximum power limit is enforced on the GSM 1900 or WCDMA 1700/1900 transmitters. Tables of the reduced limits used for testing are given below.

Mode(s) of Operation	WCDMA 1700	WCDMA 1900
Channel Ranges	1312-1513	9262-9538
Maximum Output Power Setting (dBm)	24	24
Reduced Maximum Output Power Setting (dBm)	20	19

Mode(s) of Operation	GPRS 1900				EDGE 1900			
Channel Range	512-810				512-810			
Modulation	GMSK				8PSK			
Duty Cycle	1:8	2:8	3:8	4:8	1:8	2:8	3:8	4:8
Maximum Output Power Setting (dBm)	30.5	28.5	26.5	24.5	27.0	25.0	23.0	21.0
Time Average Output Power Setting (dBm)	21.31	22.32	22.08	21.33	17.81	18.82	18.58	17.83
Reduced Maximum Output Power Setting (dBm)	29.5	27.5	25.5	23.5	26	24	22	20
Reduced Time Average Output Power Setting (dBm)	20.31	21.32	21.08	20.33	16.81	17.82	17.58	16.83

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

2.6 Accessories for the Device Under Test

2.6.1 Batteries

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

Model SNN5932A - 2000 mAh battery

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.

2.6.2 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 used 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	661	May-21-2013	May-21-2014	Measurement System 1
E-Field Probe ES3DV3	3283	Oct-20-2013	Oct-20-2014	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	378	28-May-2013	28-May-2014	Measurement System 2
E-Field Probe ES3DV3	3184	30-May-2013	30-May-2014	Measurement System 2
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	784	6-Mar-2013	6-Mar-2014	Measurement System 3
E-Field Probe EX3DV4	3728	30-May-2013	30-May-2014	Measurement System 3
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
Dipole Validation Kit, D750V2	1040	10-Aug-2011	10-Aug-2012	Calibration extension, see note.
Dipole Validation Kit, D835V2	422tr	18-Mar-2011	18-Mar-2012	Calibration extension, see note.
Dipole Validation Kit, D835V2	436tr	18-Mar-2011	18-Mar-2012	Calibration extension, see note.
Dipole Validation Kit, D1800V2	281tr	9-Feb-2012	7-Feb-2013	Calibration extension, see note.
Dipole Validation Kit, D1800V2	2d190	5-Jan-2012	5-Jan-2013	Calibration extension, see note.
Dipole Validation Kit, D2450V2	740	7-Feb-2012	7-Feb-2013	Calibration extension, see note.

Note: Per FCC KDB 865664 D01 v01r03, 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
Signal Generator HP8648C	3847A04843	8-Apr-2013	8-Apr-2015	
Power Meter E4419B	GB39511087	28-Aug-2012	28-Aug-2014	
Power Sensor #1 - E9301A	US39210918	18-Dec-2013	18-Dec -2014	
Power Sensor #2 - E9301A	US39210931	3-Jul-2013	3-Jul-2014	
Signal Generator HP8648C	3847A04844	19-Jul-2013	19-Jul-2015	
Power Meter E4419B	GB39511082	26-Jul-2013	26-Jul-2015	
Power Sensor #1 - E9301A	US39211009	7-Oct-2013	7-Oct-2014	
Power Sensor #2 - E9301A	US39210930	23-Jul-2013	23-Jul-2014	
Signal Generator N5181A	MY50143026	27-Oct-2011	27-Oct-2014	
Power Meter E4416A	GB41293258	4-Sep-2013	4-Sep-2015	
Power Meter E4419B	US39250622	27-Jun-2013	27-Jun-2015	
Power Sensor #1 - E9301A	US39211007	21-Dec-2013	21-Dec -2014	
Power Sensor #2 - E9301A	US39211013	21-Dec-2013	21-Dec -2014	
Power Sensor #3 - E9323A	MY44420341	23-Jul-2013	23-Jul-2014	
Network Analyzer E5071C	US39171846	24-Jul-2013	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
3283	Head	750	8/28/2013	0.841	41.95	pass				
3283	Head	835	8/28/2013	0.921	40.866	pass	9/5/2013	GMSK	0.915	40.164
3283	Head	1800	8/28/2013	1.341	37.55	pass	9/5/2013	GMSK	1.326	37.03
3283	Head	1900	8/29/2013	1.453	36.99	pass				
3283	Head	2450	8/29/2013	1.774	37.16	pass	11/7/2013	OFDM	1.84	37.07
3283	Head	2600	8/29/2013	1.922	36.67	pass				
3283	Body	750	8/28/2013	0.9113	55.33	pass				
3283	Body	835	8/28/2013	0.995	54.499	pass	9/5/2013	GMSK	0.996	54.017
3283	Body	1800	8/28/2013	1.458	52.92	pass	9/5/2013	GMSK	1.447	52.27
3283	Body	1900	8/29/2013	1.586	51.8	pass				
3283	Body	2450	9/3/2013	1.945	49.49	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	
				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
3728	Head	5300	6/12/2013	4.7	33.515	PASS	10/9/2013	OFDM	4.735	35.782
3728	Head	5600	6/12/2013	5.037	32.803	PASS	10/9/2013	OFDM	5.084	35.093
3728	Head	5800	6/12/2013	5.267	32.363	PASS	10/9/2013	OFDM	5.326	34.651
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
3728	Body	5300	6/13/2013	5.377	46.33	PASS	10/9/2013	OFDM	5.437	47.724
3728	Body	5600	6/13/2013	5.82	45.592	PASS	10/9/2013	OFDM	5.888	46.982
3728	Body	5800	6/13/2013	6.132	45.068	PASS	10/9/2013	OFDM	6.207	46.491

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 6. 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 $15.0 \text{ cm} \pm 0.5 \text{ cm}$. 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, Jan-04-2014	3283	422tr	1.94	9.7	0.9237	2.3%	40.57	-2.3%	22.0	20.0
	Measured, Jan-06-2014	3283	422tr	1.92	9.6	0.9087	1.2%	39.84	-4.0%	22.0	21.1
	Recommended Limits	3283	422tr		9.33	0.90	$\pm 10\%$	41.5	$\pm 10\%$	18-25	18-25
1800	Measured, Jan-07-2014	3283	281tr	7.5	37.5	1.352	-3.6%	37.03	-7.5%	21.8	20.4
	Measured, Jan-14-2014	3283	281tr	7.49	37.45	1.349	-3.6%	37.98	-5.1%	22.1	20.6
	Recommended Limits	3283	281tr		37.6	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		
750	Measured, Dec-18-2013	3184	1040	1.61	8.05	0.8821	-1.5%	41.55	-1.0%	21.1	20.4
	Recommended Limits	3184	1040		8.4	0.89	$\pm 10\%$	41.9	$\pm 10\%$	18-25	18-25
835	Measured, Jan-09-2014	3184	436tr	2.01	10.05	0.9472	5.6%	42.17	1.7%	22.1	20.3
	Recommended Limits	3184	436tr		9.73	0.90	$\pm 10\%$	41.5	$\pm 10\%$	18-25	18-25
1800	Measured, Dec-19-2013	3184	2D190	7.6	38	1.351	-3.6%	37.21	-7.0%	21.0	20.4
	Measured, Dec-30-2013	3184	2D190	7.68	38.4	1.406	0.8%	37.65	-5.9%	22.1	20.4
	Recommended Limits	3184	2D190		39.3	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, Jan-15-2014	3728	740	5.27	52.7	1.765	-2.3%	36.61	-6.7%	21.0	20.0
	Recommended Limits	3728	740		52.3	1.80	$\pm 10\%$	39.2	$\pm 10\%$	18-25	18-25

DASY52™ Measurement System 1											
System Verification Measurements for Body SAR Measurements											
<i>f</i> (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		
750	Measured, Dec-26-2013	3283	1040	1.79	8.95	0.9236	-4.6%	55.35	-0.4%	21.4	19.7
	Recommended Limits	3283	1040		8.8	0.96	±10%	55.5	±10%	18-25	18-25
835	Measured, Dec-23-2013	3283	422tr	2.05	10.25	0.9998	3.1%	54.23	-1.8%	21.6	19.7
	Measured, Jan-03-2014	3283	422tr	2.01	10.05	1.002	3.1%	54.26	-1.8%	22.1	20.8
	Measured, Jan-07-2014	3283	422tr	2	10	1.004	3.1%	53.60	-2.9%	21.8	20.3
	Measured, Jan-10-2014	3283	422tr	2.02	10.1	1.003	3.1%	53.57	-3.0%	21.7	21.0
	Recommended Limits	3283	422tr		9.77	0.97	±10%	55.2	±10%	18-25	18-25

DASY52™ Measurement System 2											
System Verification Measurements for Body SAR Measurements											
<i>f</i> (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		
750	Measured, Dec-18-2013	3184	1040	1.7	8.5	0.9772	1.8%	52.36	-5.8%	21.1	20.4
	Recommended Limits	3184	1040		8.8	0.96	±10%	55.5	±10%	18-25	18-25
1800	Measured, Dec-23-2013	3184	2D190	7.79	38.95	1.485	-2.0%	49.8	-6.6%	21.7	20.6
	Measured, Dec-27-2013	3184	2D190	7.62	38.1	1.529	0.7%	49.52	-7.1%	22.0	20.0
	Measured, Dec-28-2013	3184	2D190	7.55	37.75	1.532	0.7%	49.34	-7.5%	21.7	20.0
	Measured, Dec-29-2013	3184	2D190	7.64	38.2	1.531	0.7%	49.40	-7.4%	22.1	20.0
	Measured, Dec-30-2013	3184	2D190	7.62	38.1	1.534	0.7%	49.37	-7.4%	22.1	20.3
	Measured, Jan-04-2014	3184	2D190	7.58	37.9	1.471	-3.3%	49.55	-7.1%	22.0	20.0
	Measured, Jan-06-2014	3184	2D190	7.7	38.5	1.469	-3.3%	49.34	-7.5%	21.8	20.5
	Measured, Jan-07-2014	3184	2D190	7.61	38.05	1.505	-0.7%	49.57	-7.0%	21.8	20.3
	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											
<i>f</i> (MHz)	Description	Probe	Dipole	Measured SAR (W/kg), 1 gram	Normalized SAR (W/kg), 1 gram	Dielectric Parameters				Ambient Temp (°C)	Tissue Temp (°C)
						Measured σ (S/m)	Deviation σ (S/m)	Measured ϵ_r	Deviation ϵ_r		
2450	Measured, Jan-15-2014	3728	740	4.98	49.8	1.977	1.6%	48.89	-7.3%	21.0	20.1
	Recommended Limits	3728	740		49.5	1.95	±10%	52.7	±10%	18-25	18-25

3.5 Simulated Tissue Dielectric Properties

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

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

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

For SAR measurements, the dielectric measurements from the DAK-3.5 are imported into the DASY software which performs interpolation to determine the dielectric parameters at the specific frequencies used for device testing. The DASY software also implements SAR error compensation algorithms to automatically correct the measured SAR results for deviations between the measured and target dielectric parameters. This error compensation has been verified by the lab to meet the requirements in FCC KDB 865664 D01. Therefore, where frequencies of test fall within ± 50 MHz of a calibration point of the probe used for test, the acceptable range of tissue variation is $\pm 10\%$ 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)
710	Dec-18-2013	699.6	0.89 $\pm$ 10%	42.20 $\pm$ 10%	0.85	-4.5%	42.0	-0.7%	20.4
		710.0	0.89 $\pm$ 10%	42.15 $\pm$ 10%	0.85	-4.6%	41.9	-0.8%	
		716.0	0.89 $\pm$ 10%	42.12 $\pm$ 10%	0.86	-3.5%	41.8	-0.8%	
835	Jan-04-2014	820.0	0.90 $\pm$ 10%	41.58 $\pm$ 10%	0.91	1.3%	40.8	-1.9%	20.0
		835.0	0.90 $\pm$ 10%	41.50 $\pm$ 10%	0.92	2.3%	40.6	-2.3%	
		849.0	0.92 $\pm$ 10%	41.50 $\pm$ 10%	0.94	2.8%	40.4	-2.7%	
835	Jan-06-2014	820.0	0.90 $\pm$ 10%	41.58 $\pm$ 10%	0.90	0.2%	40.0	-3.8%	21.1
		835.0	0.90 $\pm$ 10%	41.50 $\pm$ 10%	0.91	1.2%	39.8	-4.0%	
		849.0	0.92 $\pm$ 10%	41.50 $\pm$ 10%	0.92	0.6%	39.7	-4.5%	
835	Jan-09-2014	820.0	0.90 $\pm$ 10%	41.58 $\pm$ 10%	0.93	3.5%	42.3	1.9%	20.7
		835.0	0.90 $\pm$ 10%	41.50 $\pm$ 10%	0.95	5.6%	42.2	1.7%	
		849.0	0.92 $\pm$ 10%	41.50 $\pm$ 10%	0.96	5.0%	42.0	1.2%	
1730	Dec-30-2013	1709.0	1.35 -5%/+10%	40.13 -10%/+5%	1.31	-2.9%	38.1	-5.1%	20.4
		1730.0	1.36 -5%/+10%	40.10 -10%/+5%	1.33	-2.3%	38.0	-5.3%	
		1755.0	1.37 -5%/+10%	40.06 -10%/+5%	1.36	-1.1%	37.9	-5.5%	
1730	Jan-14-2014	1709.0	1.35 -5%/+10%	40.13 -10%/+5%	1.30	-3.6%	37.1	-7.6%	20.5
		1730.0	1.36 -5%/+10%	40.10 -10%/+5%	1.32	-3.0%	37.1	-7.7%	
		1755.0	1.37 -5%/+10%	40.06 -10%/+5%	1.35	-1.8%	36.9	-7.9%	
1880	Dec-19-2013	1850.0	1.40 $\pm$ 10%	40.00 $\pm$ 10%	1.40	0.0%	37.0	-7.6%	20.2
		1880.0	1.40 -5%/+10%	40.00 -10%/+5%	1.43	2.2%	36.9	-7.9%	
		1915.0	1.40 -5%/+10%	40.00 -10%/+5%	1.47	5.0%	36.7	-8.3%	
1880	Dec-30-2013	1850.0	1.40 $\pm$ 10%	40.00 $\pm$ 10%	1.46	4.3%	37.4	-6.6%	20.4
		1880.0	1.40 -5%/+10%	40.00 -10%/+5%	1.49	6.5%	37.2	-6.9%	
		1915.0	1.40 -5%/+10%	40.00 -10%/+5%	1.52	8.6%	37.1	-7.4%	
1880	Jan-07-2014	1850.0	1.40 $\pm$ 10%	40.00 $\pm$ 10%	1.40	0.0%	36.8	-8.1%	20.4
		1880.0	1.40 -5%/+10%	40.00 -10%/+5%	1.44	2.9%	36.6	-8.5%	
		1915.0	1.40 -5%/+10%	40.00 -10%/+5%	1.47	5.0%	36.5	-8.9%	
2450	Jan-15-2014	2412.0	1.77 $\pm$ 10%	39.27 $\pm$ 10%	1.73	-2.1%	36.7	-6.5%	20.2
		2450.0	1.80 $\pm$ 10%	39.20 $\pm$ 10%	1.76	-2.3%	36.6	-6.7%	
		2462.0	1.81 $\pm$ 10%	39.18 $\pm$ 10%	1.78	-1.9%	36.6	-6.7%	

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)
710	Dec-18-2013	699.6	0.96 $\pm$ 10%	55.73 $\pm$ 10%	0.94	-2.1%	52.6	-5.6%	20.5
		710.0	0.96 $\pm$ 10%	55.69 $\pm$ 10%	0.95	-1.1%	52.6	-5.7%	
		716.0	0.96 $\pm$ 10%	55.66 $\pm$ 10%	0.95	-1.2%	52.6	-5.6%	
710	Dec-26-2013	699.6	0.96 $\pm$ 10%	55.73 $\pm$ 10%	0.87	-9.4%	55.9	0.3%	20.2
		710.0	0.96 $\pm$ 10%	55.69 $\pm$ 10%	0.88	-8.4%	55.8	0.2%	
		716.0	0.96 $\pm$ 10%	55.66 $\pm$ 10%	0.89	-7.4%	55.7	0.1%	
835	Dec-23-2013	820.0	0.97 $\pm$ 10%	55.26 $\pm$ 10%	0.98	1.2%	54.4	-1.6%	20.1
		835.0	0.97 $\pm$ 10%	55.20 $\pm$ 10%	1.00	3.1%	54.2	-1.8%	
		849.0	0.99 $\pm$ 10%	55.16 $\pm$ 10%	1.01	2.4%	54.1	-2.0%	
835	Jan-03-2014	820.0	0.97 $\pm$ 10%	55.26 $\pm$ 10%	0.98	1.2%	54.4	-1.5%	20.1
		835.0	0.97 $\pm$ 10%	55.20 $\pm$ 10%	1.00	3.1%	54.3	-1.8%	
		849.0	0.99 $\pm$ 10%	55.16 $\pm$ 10%	1.02	3.4%	54.1	-1.9%	
835	Jan-07-2014	820.0	0.97 $\pm$ 10%	55.26 $\pm$ 10%	0.99	2.2%	53.8	-2.8%	20.3
		835.0	0.97 $\pm$ 10%	55.20 $\pm$ 10%	1.00	3.1%	53.6	-2.9%	
		849.0	0.99 $\pm$ 10%	55.16 $\pm$ 10%	1.02	3.4%	53.4	-3.2%	
835	Jan-10-2014	820.0	0.97 $\pm$ 10%	55.26 $\pm$ 10%	0.99	2.2%	53.7	-2.8%	21.0
		835.0	0.97 $\pm$ 10%	55.20 $\pm$ 10%	1.00	3.1%	53.6	-3.0%	
		849.0	0.99 $\pm$ 10%	55.16 $\pm$ 10%	1.02	3.4%	53.4	-3.2%	
1730	Dec-28-2013	1709.0	1.47 -5%/+10%	53.55 -10%/+5%	1.43	-2.5%	49.7	-7.2%	20.0
		1730.0	1.48 -5%/+10%	53.50 -10%/+5%	1.46	-1.4%	49.6	-7.3%	
		1755.0	1.49 -5%/+10%	53.39 -10%/+5%	1.48	-0.9%	49.5	-7.3%	
1730	Dec-29-2013	1709.0	1.47 -5%/+10%	53.55 -10%/+5%	1.43	-2.5%	49.8	-7.1%	20.0
		1730.0	1.48 -5%/+10%	53.50 -10%/+5%	1.45	-2.1%	49.7	-7.1%	
		1755.0	1.49 -5%/+10%	53.39 -10%/+5%	1.48	-0.9%	49.6	-7.1%	
1730	Dec-30-2013	1709.0	1.47 -5%/+10%	53.55 -10%/+5%	1.43	-2.5%	49.8	-7.1%	20.3
		1730.0	1.48 -5%/+10%	53.50 -10%/+5%	1.46	-1.4%	49.7	-7.2%	
		1755.0	1.49 -5%/+10%	53.39 -10%/+5%	1.48	-0.9%	49.6	-7.2%	
1730	Jan-06-2014	1709.0	1.47 -5%/+10%	53.55 -10%/+5%	1.43	-2.5%	49.5	-7.6%	20.8
		1730.0	1.48 -5%/+10%	53.50 -10%/+5%	1.45	-2.1%	49.4	-7.7%	
		1755.0	1.49 -5%/+10%	53.39 -10%/+5%	1.48	-0.9%	49.3	-7.7%	
1880	Dec-23-2013	1850.0	1.52 $\pm$ 10%	53.30 $\pm$ 10%	1.54	1.4%	49.7	-6.9%	20.6
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.57	3.3%	49.5	-7.1%	
		1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.61	6.0%	49.4	-7.3%	
1880	Dec-27-2013	1850.0	1.52 $\pm$ 10%	53.30 $\pm$ 10%	1.59	4.7%	49.3	-7.6%	20.0
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.62	6.6%	49.2	-7.8%	
		1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.66	9.3%	49.0	-8.1%	
1880	Dec-28-2013	1850.0	1.52 $\pm$ 10%	53.30 $\pm$ 10%	1.59	4.7%	49.1	-7.9%	20.0
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.63	7.3%	49.0	-8.1%	
		1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.66	9.3%	48.8	-8.4%	
1880	Jan-04-2014	1850.0	1.52 $\pm$ 10%	53.30 $\pm$ 10%	1.53	0.7%	49.3	-7.5%	20.0
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.57	3.3%	49.2	-7.8%	
		1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.61	6.0%	49.0	-8.1%	
1880	Jan-07-2014	1850.0	1.52 $\pm$ 10%	53.30 $\pm$ 10%	1.57	3.3%	49.4	-7.4%	20.3
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.61	6.0%	49.2	-7.7%	
		1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.65	8.6%	49.1	-7.9%	
2450	Jan-15-2014	2412.0	1.91 $\pm$ 10%	52.75 $\pm$ 10%	1.93	0.9%	49.0	-7.2%	20.2
		2450.0	1.95 $\pm$ 10%	52.70 $\pm$ 10%	1.98	1.6%	48.9	-7.3%	
		2462.0	1.97 $\pm$ 10%	52.68 $\pm$ 10%	1.99	1.2%	48.9	-7.3%	

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)	
LTE B17, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	23790	710	24	22.96	19.9	0.110	0.236	0.30	0.307	0.39	
LTE B17, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	23790	710	23	21.72	19.9	0.030	0.107	0.14	0.139	0.19	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	20525	836.5	24	22.89	20.2	-0.040	0.233	0.30	0.312	0.41	A30
LTE B5, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	20525	836.5	23	21.85	21.3	0.030	0.171	0.22	0.231	0.30	
LTE B4, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	20175	1732.5	24	23.06	20.1	0.04	0.596	0.74	0.95	1.18	A31
LTE B4, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	20175	1732.5	24	23.06	20.6	0.010	0.596	0.74	0.944	1.17	
LTE B4, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	20175	1732.5	23	22.19	20.6	0.080	0.396	0.48	0.628	0.76	
LTE B4, 20 MHz BW QPSK (100% RB)	SNN5932A	20175	1732.5	23	22.13	20.6	0.050	0.404	0.49	0.639	0.78	
LTE B2, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	18900	1880	24	23.16	19.5	-0.090	0.170	0.21	0.275	0.34	A32
LTE B2, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	18900	1880	23	22.27	19.5	0.060	0.147	0.17	0.241	0.29	
GSM 850, CS Voice	SNN5932A	128	824.2	33.5	33.37	21	-0.02	0.322	0.33	0.427	0.44	
GPRS 850, Class 10 (2 Uplink Timeslots)	SNN5932A	128	824.2	31.5	30.60	21	-0.06	0.297	0.37	0.381	0.48	A33
GSM 1900, CS Voice	SNN5932A	661	1880	30.5	30.33	20.1	-0.03	0.0918	0.10	0.151	0.16	
GPRS 1900, Class 10 (2 Uplink Timeslots)	SNN5932A	661	1880	28.5	28.02	20.1	0.06	0.14	0.16	0.231	0.26	A34
WCDMA 850, RMC	SNN5932A	4132	826.4	24.0	23.24	20.3	-0.01	0.257	0.31	0.345	0.41	A35
WCDMA 1700, RMC	SNN5932A	1312	1712	24.0	22.97	20.4	-0.08	0.631	0.81	0.989	1.28	A36
WCDMA 1700, RMC	SNN5932A	1413	1732	24.0	22.86	20.4	0.03	0.566	0.74	0.896	1.16	
WCDMA 1700, RMC	SNN5932A	1513	1752	24.0	22.91	20.4	0.10	0.515	0.66	0.819	1.05	
WCDMA 1900, RMC	SNN5932A	9262	1852.4	24.0	22.78	20.4	-0.02	0.247	0.33	0.399	0.53	A37
802.11b, 1 Mbps	SNN5932A	1	2412		18.20	19.5	-0.05	0.0935	0.09	0.189	0.19	

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)	
LTE B17, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	23790	710	24	22.96	19.9	0.000	0.311	0.40	0.404	0.51	A29
LTE B17, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	23790	710	23	21.72	19.9	-0.010	0.144	0.19	0.188	0.25	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	20525	836.5	24	22.89	20.1	-0.500	0.184	0.27	0.246	0.36	
LTE B5, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	20525	836.5	23	21.85	20.1	-0.060	0.147	0.19	0.199	0.26	
LTE B4, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	20175	1732.5	24	23.06	20.6	0.030	0.334	0.42	0.515	0.64	
LTE B4, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	20175	1732.5	23	22.19	20.6	0.010	0.226	0.27	0.349	0.42	
LTE B2, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	18900	1880	24	23.16	19.4	-0.030	0.140	0.17	0.223	0.27	
LTE B2, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	18900	1880	23	22.27	19.4	0.120	0.116	0.14	0.186	0.22	
GSM 850, CS Voice	SNN5932A	128	824.2	33.5	33.37	21	-0.03	0.254	0.26	0.335	0.35	
GSM 1900, CS Voice	SNN5932A	661	1880	30.5	30.33	20	0.03	0.0612	0.06	0.0995	0.10	
WCDMA 850, RMC	SNN5932A	4132	826.4	24.0	23.24	20.3	0.12	0.217	0.26	0.286	0.34	
WCDMA 1700, RMC	SNN5932A	1312	1712	24.0	22.97	20.6	0.00	0.382	0.48	0.579	0.73	
WCDMA 1900, RMC	SNN5932A	9262	1852.4	24.0	22.78	20.6	-0.03	0.147	0.20	0.235	0.31	
802.11b, 1 Mbps	SNN5932A	1	2412		18.20	19.2	0.13	0.142	0.14	0.282	0.28	

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)	
LTE B17, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	23790	710	24	22.96	19.5	0.000	0.158	0.20	0.201	0.26	
LTE B17, 10 MHz BW QPSK (50% RB @ Low)	SNN5932A	23790	710	23	21.72	19.9	0.000	0.064	0.09	0.081	0.11	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	20525	836.5	24	22.89	21.3	-0.010	0.111	0.14	0.146	0.19	
LTE B5, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	20525	836.5	23	21.85	21.3	0.000	0.104	0.14	0.137	0.18	
LTE B4, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	20175	1732.5	24	23.06	20.6	0.030	0.271	0.34	0.411	0.51	
LTE B4, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	20175	1732.5	23	22.19	20.6	0.010	0.179	0.22	0.271	0.33	
LTE B2, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	18900	1880	24	23.16	19.5	0.060	0.111	0.13	0.183	0.22	
LTE B2, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	18900	1880	23	22.27	19.5	0.100	0.085	0.10	0.140	0.17	
GSM 850, CS Voice	SNN5932A	128	824.2	33.5	33.37	21	-0.09	0.216	0.23	0.281	0.30	
GSM 1900, CS Voice	SNN5932A	661	1880	30.5	30.33	20.1	0.09	0.0492	0.05	0.0796	0.08	
WCDMA 850, RMC	SNN5932A	4132	826.4	24.0	23.24	20.3	0.06	0.173	0.21	0.226	0.27	
WCDMA 1700, RMC	SNN5932A	1312	1712	24.0	22.97	20.4	0.08	0.301	0.38	0.446	0.57	
WCDMA 1900, RMC	SNN5932A	9262	1852.4	24.0	22.78	20.4	0.11	0.122	0.16	0.198	0.26	
802.11b, 1 Mbps	SNN5932A	1	2412		18.20	19.1	0.00	0.119	0.12	0.248	0.25	

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)	
LTE B17, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	23790	710	24	22.96	19.9	0.000	0.187	0.24	0.238	0.30	
LTE B17, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	23790	710	23	21.72	19.9	0.000	0.090	0.12	0.114	0.15	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	20525	836.5	24	22.89	19.5	0.000	0.125	0.16	0.165	0.21	
LTE B5, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	20525	836.5	23	21.85	20	0.010	0.105	0.14	0.138	0.18	
LTE B4, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	20175	1732.5	24	23.06	20.6	0.050	0.247	0.31	0.382	0.47	
LTE B4, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	20175	1732.5	23	22.19	20.6	0.010	0.166	0.20	0.257	0.31	
LTE B2, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	18900	1880	24	23.16	19.4	-0.150	0.082	0.10	0.138	0.17	
LTE B2, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	18900	1880	23	22.27	19.4	0.100	0.096	0.11	0.161	0.19	
GSM 850, CS Voice	SNN5932A	128	824.2	33.5	33.37	21	-0.02	0.224	0.23	0.294	0.30	
GSM 1900, CS Voice	SNN5932A	661	1880	30.5	30.33	20.1	-0.07	0.0488	0.05	0.0821	0.09	
WCDMA 850, RMC	SNN5932A	4132	826.4	24.0	23.24	20.3	0.04	0.163	0.19	0.214	0.25	
WCDMA 1700, RMC	SNN5932A	1312	1712	24.0	22.97	20	0.07	0.299	0.38	0.457	0.58	
WCDMA 1900, RMC	SNN5932A	9262	1852.4	24.0	22.78	20.6	0.18	0.125	0.17	0.202	0.27	
802.11b, 1 Mbps	SNN5932A	1	2412		18.20	19.3	0.06	0.152	0.15	0.336	0.34	A38

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)	
LTE B17, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	23790	710	24	22.96	19.8	-0.240	0.260	0.35	0.348	0.47	A40
LTE B17, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	23790	710	23	21.72	20.1	-0.050	0.112	0.15	0.151	0.21	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	20525	836.5	24	22.89	20	-0.430	0.242	0.35	0.318	0.45	
LTE B5, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	20525	836.5	23	21.85	20.1	0.070	0.199	0.26	0.261	0.34	
LTE B4, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	20175	1732.5	24	23.06	20	-0.020	0.439	0.55	0.716	0.89	
LTE B4, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	20175	1732.5	23	22.19	20	-0.050	0.288	0.35	0.467	0.57	
LTE B4, 20 MHz BW QPSK (100% RB)	SNN5932A	20175	1732.5	23	22.13	20	0.010	0.288	0.35	0.469	0.57	
LTE B2, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	18700	1860	24	23.02	20.4	-0.020	0.275	0.35	0.482	0.61	
LTE B2, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	18900	1880	24	23.16	19.6	-0.090	0.395	0.49	0.715	0.89	
LTE B2, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	18900	1880	23	22.27	19.6	-0.070	0.324	0.39	0.587	0.71	
LTE B2, 20 MHz BW QPSK (100% RB)	SNN5932A	18900	1880	23	22.21	19.6	0.000	0.322	0.39	0.583	0.70	
LTE B2, 20 MHz BW QPSK (1 RB @ Low)	SNN5932A	19000	1900	24	22.96	20.4	-0.030	0.261	0.33	0.460	0.59	
GSM 850, CS Voice	SNN5932A	128	824.2	33.5	33.37	19.8	-0.04	0.362	0.38	0.474	0.49	
GSM 1900, CS Voice	SNN5932A	661	1880	30.5	30.33	20	-0.02	0.152	0.16	0.265	0.28	
WCDMA 850, RMC	SNN5932A	4132	826.4	24.0	23.24	20.3	-0.41	0.326	0.43	0.428	0.56	
WCDMA 1700, RMC	SNN5932A	1312	1712	24.0	22.97	20	-0.03	0.454	0.58	0.738	0.94	
WCDMA 1700, RMC	SNN5932A	1413	1732	24.0	22.86	20	0.02	0.398	0.52	0.643	0.84	
WCDMA 1700, RMC	SNN5932A	1513	1752	24.0	22.91	20	0.03	0.358	0.46	0.581	0.75	
WCDMA 1900, RMC	SNN5932A	9262	1852.4	24.0	22.78	21	-0.03	0.388	0.52	0.697	0.93	
WCDMA 1900, RMC	SNN5932A	9400	1880	24.0	22.70	21	-0.03	0.415	0.56	0.752	1.02	
WCDMA 1900, RMC	SNN5932A	9538	1907.6	24.0	22.65	21	0.04	0.406	0.55	0.738	1.01	
802.11b, 1 Mbps	SNN5932A	1	2412		18.20	20	-0.06	0.0201	0.02	0.0367	0.04	

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)	
LTE B17, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	23790	710	24	22.96	20.1	-0.030	0.256	0.33	0.342	0.44	
LTE B17, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	23790	710	23	21.72	20.1	-0.020	0.135	0.18	0.181	0.24	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	20525	836.5	24	22.89	19.3	-0.090	0.279	0.37	0.371	0.49	A41
LTE B5, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	20525	836.5	23	21.85	19.8	0.050	0.221	0.29	0.295	0.38	
LTE B4, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	20175	1732.5	24	23.06	20	-0.140	0.480	0.62	0.816	1.05	A42
LTE B4, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	20175	1732.5	23	22.19	20	-0.050	0.305	0.37	0.516	0.63	
LTE B4, 20 MHz BW QPSK (100% RB)	SNN5932A	20175	1732.5	23	22.13	20	0.010	0.305	0.37	0.513	0.63	
LTE B2, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	18700	1860	24	23.02	20.6	-0.080	0.535	0.68	0.965	1.23	
LTE B2, 20 MHz BW QPSK (50% RB @ Low)	SNN5932A	18700	1860	23	22.13	20.6	-0.020	0.396	0.49	0.714	0.88	
LTE B2, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	18900	1880	24	23.16	20.6	-0.160	0.596	0.75	1.080	1.36	A43
LTE B2, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	18900	1880	23	22.27	20.6	-0.060	0.464	0.56	0.844	1.01	
LTE B2, 20 MHz BW QPSK (100% RB)	SNN5932A	18900	1880	23	22.21	20.6	-0.100	0.458	0.56	0.833	1.02	
LTE B2, 20 MHz BW QPSK (1 RB @ Low)	SNN5932A	19000	1900	24	22.96	20.6	-0.020	0.560	0.72	1.020	1.30	
LTE B2, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	19000	1900	23	22.16	20.6	-0.020	0.404	0.49	0.736	0.90	
GSM 850, CS Voice	SNN5932A	128	824.2	33.5	33.37	20.5	-0.03	0.411	0.43	0.55	0.57	
GPRS 850, Class 10 (2 Uplink Timeslots)	SNN5932A	128	824.2	31.5	30.60	20	-0.16	0.481	0.61	0.641	0.82	
GPRS 850, Class 10 (2 Uplink Timeslots)	SNN5932A	190	836.6	31.5	30.52	20	-0.03	0.544	0.69	0.727	0.92	
GPRS 850, Class 10 (2 Uplink Timeslots)	SNN5932A	251	848.8	31.5	30.51	20	0.01	0.604	0.76	0.811	1.02	A44
GSM 1900, CS Voice	SNN5932A	661	1880	30.5	30.33	20	-0.06	0.232	0.24	0.41	0.43	
GPRS 1900, Class 10 (2 Uplink Timeslots)	SNN5932A	661	1880	28.5	28.02	20	-0.09	0.279	0.32	0.506	0.58	A45
WCDMA 850, RMC	SNN5932A	4132	826.4	24.0	23.24	20.2	-0.03	0.482	0.58	0.641	0.77	A46
WCDMA 1700, RMC	SNN5932A	1312	1712	24.0	22.97	20	0.02	0.47	0.60	0.775	0.98	A47
WCDMA 1700, RMC	SNN5932A	1413	1732	24.0	22.86	20	0.06	0.432	0.56	0.729	0.95	
WCDMA 1700, RMC	SNN5932A	1513	1752	24.0	22.91	20	0.03	0.439	0.56	0.753	0.97	
WCDMA 1900, RMC	SNN5932A	9262	1852.4	24.0	22.78	21	-0.08	0.575	0.78	1.05	1.42	
WCDMA 1900, RMC	SNN5932A	9400	1880	24.0	22.70	20	-0.08	0.628	0.86	1.15	1.58	A48
WCDMA 1900, RMC	SNN5932A	9400	1880	24.0	22.70	20.7	-0.14	0.586	0.82	1.05	1.46	
WCDMA 1900, RMC	SNN5932A	9538	1907.6	24.0	22.65	20	0.04	0.615	0.84	1.13	1.54	
802.11b, 1 Mbps	SNN5932A	1	2412		18.20	20	0.06	0.0289	0.03	0.0513	0.05	A49
Bluetooth, 6 Mbps	SNN5932A	78	2480		10.60	19.1	-4.52	0	0.00	0	0.00	A50

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
LTE Bands 17	Yes	Yes	No	Yes	No	Yes
LTE Bands 2/4/5	Yes	Yes	Yes	Yes	No	Yes
GSM	Yes	Yes	Yes	Yes	No	Yes
WCDMA	Yes	Yes	Yes	Yes	No	Yes
Wi-Fi	Yes	Yes	Yes	No	Yes	No

Mobile Hotspot Position, Front of Phone 10 mm from Phantom												
Mode	Battery/ Accessory	Channel	f (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
				Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
LTE B17, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	23790	710	24	22.96	19.8	-0.460	0.245	0.35	0.414	0.59	A52
LTE B17, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	23790	710	23	21.72	19.3	0.020	0.137	0.18	0.232	0.31	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	20525	836.5	24	22.89	19.7	0.000	0.200	0.26	0.263	0.34	
LTE B5, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	20525	836.5	23	21.85	19.7	0.010	0.179	0.23	0.236	0.31	
LTE B4, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	20175	1732.5	24	23.06	20.3	-0.010	0.271	0.34	0.480	0.60	
LTE B4, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	20175	1732.5	23	22.19	20.3	-0.010	0.268	0.32	0.475	0.57	
LTE B2, 20 MHz BW QPSK (50% RB @ Low)	SNN5932A	18700	1860	23	22.13	20.6	-0.140	0.296	0.37	0.587	0.74	
LTE B2, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	18900	1880	24	23.16	20.6	-0.120	0.313	0.39	0.625	0.78	
LTE B2, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	18900	1880	23	22.27	20.6	-0.120	0.340	0.41	0.676	0.82	
LTE B2, 20 MHz BW QPSK (100% RB)	SNN5932A	18900	1880	23	22.21	20.6	-0.060	0.343	0.42	0.683	0.83	
LTE B2, 20 MHz BW QPSK (50% RB @ Low)	SNN5932A	19000	1900	23	22.16	20.6	-0.040	0.287	0.35	0.574	0.70	
GPRS 850, Class 10 (2 Uplink Timeslots)	SNN5932A	128	824.2	31.5	30.60	21	-0.27	0.463	0.61	0.599	0.78	
GPRS 1900, Class 10 (2 Uplink Timeslots)	SNN5932A	661	1880	28.5	28.02	20	-0.05	0.258	0.29	0.488	0.55	
WCDMA 850, RMC	SNN5932A	4132	826.4	24.0	23.24	20	-0.27	0.226	0.29	0.297	0.38	
WCDMA 1700, RMC	SNN5932A	1312	1712	24.0	22.97	20	0.02	0.327	0.41	0.588	0.75	
WCDMA 1900, RMC	SNN5932A	9262	1852.4	24.0	22.78	20	0.05	0.252	0.33	0.491	0.65	
802.11b, 1 Mbps	SNN5932A	1	2412		18.20	20	-0.17	0.0417	0.04	0.0791	0.08	

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)	
LTE B17, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	23790	710	24	22.96	19.6	-0.170	0.275	0.36	0.416	0.55	
LTE B17, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	23790	710	23	21.72	19.6	-0.190	0.144	0.20	0.211	0.30	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	20525	836.5	24	22.89	19.7	-0.030	0.270	0.35	0.360	0.47	A53
LTE B5, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	20525	836.5	23	21.85	19.7	-0.010	0.217	0.28	0.290	0.38	
LTE B4, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	20175	1732.5	24	23.06	20.2	-0.030	0.298	0.37	0.537	0.67	
LTE B4, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	20175	1732.5	23	22.19	20.3	-0.040	0.298	0.36	0.538	0.65	
LTE B2, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	18700	1860	24	23.02	21	-0.050	0.325	0.41	0.632	0.80	
LTE B2, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	18900	1880	24	23.16	21	-0.200	0.364	0.46	0.712	0.90	
LTE B2, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	18900	1880	23	22.27	21	0.000	0.385	0.46	0.752	0.89	
LTE B2, 20 MHz BW QPSK (100% RB)	SNN5932A	18900	1880	23	22.21	21	-0.040	0.383	0.46	0.747	0.90	
LTE B2, 20 MHz BW QPSK (50% RB @ Low)	SNN5932A	19000	1900	23	22.16	21	-0.090	0.338	0.42	0.669	0.83	
GPRS 850, Class 10 (2 Uplink Timeslots)	SNN5932A	128	824.2	31.5	30.60	20.1	0.04	0.555	0.68	0.733	0.90	
GPRS 850, Class 10 (2 Uplink Timeslots)	SNN5932A	190	836.6	31.5	30.52	21	-0.04	0.669	0.85	0.893	1.13	
GPRS 850, Class 10 (2 Uplink Timeslots)	SNN5932A	251	848.8	31.5	30.51	21	-0.01	0.704	0.89	0.941	1.18	
GPRS 850, Class 10 (2 Uplink Timeslots)	SNN5932A	251	848.8	31.5	30.51	21	-0.04	0.702	0.89	0.94	1.19	A56
GPRS 1900, Class 10 (2 Uplink Timeslots)	SNN5932A	512	1850.2	28.5	28.00	20	-0.05	0.375	0.43	0.713	0.81	
GPRS 1900, Class 10 (2 Uplink Timeslots)	SNN5932A	661	1880	28.5	28.02	20	-0.13	0.394	0.45	0.749	0.86	
GPRS 1900, Class 10 (2 Uplink Timeslots)	SNN5932A	810	1909.8	28.5	27.62	20	-0.12	0.401	0.50	0.763	0.96	
WCDMA 850, RMC	SNN5932A	4132	826.4	24.0	23.24	20.7	-0.06	0.359	0.43	0.48	0.58	A58
WCDMA 1700, RMC	SNN5932A	1312	1712	24.0	22.97	20	-0.03	0.357	0.46	0.658	0.84	
WCDMA 1700, RMC	SNN5932A	1413	1732	24.0	22.86	20	-0.06	0.341	0.45	0.637	0.84	
WCDMA 1700, RMC	SNN5932A	1513	1752	24.0	22.91	20	-0.13	0.361	0.48	0.681	0.90	
WCDMA 1900, RMC	SNN5932A	9262	1852.4	24.0	22.78	20	0.08	0.345	0.46	0.68	0.90	
WCDMA 1900, RMC	SNN5932A	9400	1880	24.0	22.70	20	0.09	0.384	0.52	0.759	1.02	
WCDMA 1900, RMC	SNN5932A	9538	1907.6	24.0	22.65	20	0.11	0.365	0.50	0.726	0.99	
802.11b, 1 Mbps	SNN5932A	1	2412		18.20	20	0.01	0.0788	0.08	0.155	0.16	

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)	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	20525	836.5	24	22.89	19.7	-0.070	0.215	0.28	0.312	0.41	
LTE B5, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	20525	836.5	23	21.85	20	0.020	0.150	0.20	0.219	0.29	
LTE B4, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	20175	1732.5	24	23.06	20.3	0.000	0.132	0.16	0.223	0.28	
LTE B4, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	20175	1732.5	23	22.19	20.3	-0.020	0.131	0.16	0.220	0.27	
LTE B2, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	18900	1880	24	23.16	20	-0.020	0.065	0.08	0.109	0.13	
LTE B2, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	18900	1880	23	22.27	20	0.000	0.070	0.08	0.118	0.14	
GPRS 850, Class 10 (2 Uplink Timeslots)	SNN5932A	128	824.2	31.5	30.60	21	-0.03	0.507	0.63	0.737	0.91	
GPRS 850, Class 10 (2 Uplink Timeslots)	SNN5932A	190	836.6	31.5	30.52	21	0.05	0.582	0.73	0.847	1.06	
GPRS 850, Class 10 (2 Uplink Timeslots)	SNN5932A	251	848.8	31.5	30.51	21	0.08	0.624	0.78	0.911	1.14	
GPRS 1900, Class 10 (2 Uplink Timeslots)	SNN5932A	661	1880	28.5	28.02	20	0.00	0.0999	0.11	0.17	0.19	
WCDMA 850, RMC	SNN5932A	4132	826.4	24.0	23.24	20	0.03	0.276	0.33	0.399	0.48	
WCDMA 1700, RMC	SNN5932A	1312	1712	24.0	22.97	20	-0.07	0.139	0.18	0.234	0.30	
WCDMA 1900, RMC	SNN5932A	9262	1852.4	24.0	22.78	20	-0.04	0.0696	0.09	0.121	0.16	
802.11b, 1 Mbps	SNN5932A	1	2412		18.20	20	-0.06	0.0308	0.03	0.0542	0.05	

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)	
LTE B17, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	23790	710	24	22.96	19.6	-0.090	0.155	0.20	0.241	0.31	
LTE B17, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	23790	710	23	21.72	19.6	-0.030	0.084	0.11	0.130	0.18	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	20525	836.5	24	22.89	20	-0.810	0.100	0.16	0.145	0.23	
LTE B5, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	20525	836.5	23	21.85	20.1	0.050	0.090	0.12	0.132	0.17	
LTE B4, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	20175	1732.5	24	23.06	20	0.030	0.049	0.06	0.082	0.10	
LTE B4, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	20175	1732.5	23	22.19	20	0.000	0.048	0.06	0.080	0.10	
LTE B2, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	18900	1880	24	23.16	20	0.080	0.026	0.03	0.044	20	
LTE B2, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	18900	1880	23	22.27	20	-0.100	0.028	0.03	0.049	20	
GPRS 850, Class 10 (2 Uplink Timeslots)	SNN5932A	128	824.2	31.5	30.60	20	-0.04	0.138	0.17	0.2	0.25	
GPRS 1900, Class 10 (2 Uplink Timeslots)	SNN5932A	661	1880	28.5	28.02	20	-0.07	0.0283	0.03	0.0479	0.05	
WCDMA 850, RMC	SNN5932A	4132	826.4	24.0	23.24	20	-0.11	0.0799	0.10	0.116	0.14	
WCDMA 1700, RMC	SNN5932A	1312	1712	24.0	22.97	20	-0.01	0.0557	0.07	0.093	0.12	
WCDMA 1900, RMC	SNN5932A	9262	1852.4	24.0	22.78	20	-0.08	0.0265	0.04	0.0461	0.06	

Table 4-10: 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)	
LTE B17, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	23790	710	24	22.96	19.6	-0.150	0.103	0.14	0.187	0.25	
LTE B17, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	23790	710	23	21.72	19.6	-0.020	0.101	0.14	0.183	0.25	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	SNN5932A	20525	836.5	24	22.89	19.7	-0.140	0.066	0.09	0.108	0.14	
LTE B5, 10 MHz BW QPSK (50% RB @ High)	SNN5932A	20525	836.5	23	21.85	20	-0.070	0.055	0.07	0.091	0.12	
LTE B4, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	20175	1732.5	24	23.06	20	0.030	0.440	0.55	0.872	1.08	A54
LTE B4, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	20175	1732.5	23	22.19	20	0.020	0.422	0.51	0.837	1.01	
LTE B4, 20 MHz BW QPSK (100% RB)	SNN5932A	20175	1732.5	23	22.13	20	0.010	0.402	0.49	0.797	0.97	
LTE B2, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	18700	1860	24	23.02	20	-0.040	0.422	0.53	0.877	1.11	
LTE B2, 20 MHz BW QPSK (50% RB @ Low)	SNN5932A	18700	1860	23	22.13	20	0.020	0.456	0.56	0.940	1.15	
LTE B2, 20 MHz BW QPSK (1 RB @ High)	SNN5932A	18900	1880	24	23.16	20	0.030	0.505	0.61	1.050	1.27	
LTE B2, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	18900	1880	23	22.27	20	-0.010	0.540	0.64	1.120	1.33	A55
LTE B2, 20 MHz BW QPSK (50% RB @ High)	SNN5932A	18900	1880	23	22.27	20.1	0.01	0.476	0.56	0.961	1.14	
LTE B2, 20 MHz BW QPSK (100% RB)	SNN5932A	18900	1880	23	22.21	20	-0.020	0.520	0.63	1.070	1.29	
LTE B2, 20 MHz BW QPSK (1 RB @ Low)	SNN5932A	19000	1900	24	22.96	20	-0.030	0.484	0.62	0.996	1.28	
LTE B2, 20 MHz BW QPSK (50% RB @ Low)	SNN5932A	19000	1900	23	22.16	20	-0.040	0.453	0.55	0.934	1.14	
GPRS 850, Class 10 (2 Uplink Timeslots)	SNN5932A	128	824.2	31.5	30.60	20	0.03	0.0785	0.10	0.125	0.15	
GPRS 1900, Class 10 (2 Uplink Timeslots)	SNN5932A	512	1850.2	28.5	28.00	20	-0.03	0.55	0.62	1.11	1.25	
GPRS 1900, Class 10 (2 Uplink Timeslots)	SNN5932A	661	1880	28.5	28.02	20	-0.04	0.592	0.67	1.2	1.35	
GPRS 1900, Class 10 (2 Uplink Timeslots)	SNN5932A	810	1909.8	28.5	27.62	20	-0.04	0.613	0.76	1.24	1.53	A57
GPRS 1900, Class 10 (2 Uplink Timeslots)	SNN5932A	810	1909.8	28.5	27.62	20.7	-0.03	0.518	0.64	1.04	1.28	
WCDMA 850, RMC	SNN5932A	4132	826.4	24.0	23.24	20	0.04	0.0751	0.09	0.123	0.15	
WCDMA 1700, RMC	SNN5932A	1312	1712	24.0	22.97	20	0.05	0.369	0.47	0.728	0.92	
WCDMA 1700, RMC	SNN5932A	1413	1732	24.0	22.86	20	0.03	0.386	0.50	0.77	1.00	
WCDMA 1700, RMC	SNN5932A	1513	1752	24.0	22.91	20	-0.01	0.447	0.58	0.896	1.15	A59
WCDMA 1700, RMC	SNN5932A	1513	1752	24.0	22.91	20.7	-0.06	0.375	0.49	0.75	0.98	
WCDMA 1900, RMC	SNN5932A	9262	1852.4	24.0	22.78	20	0.00	0.433	0.57	0.888	1.18	
WCDMA 1900, RMC	SNN5932A	9400	1880	24.0	22.70	20	0.02	0.469	0.63	0.966	1.30	A60
WCDMA 1900, RMC	SNN5932A	9538	1907.6	24.0	22.65	20	-0.05	0.443	0.61	0.905	1.25	

Table 4-11: 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	SNN5932A	1	2412		18.20	20	0.04	0.0824	0.08	0.163	0.16	A61

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.

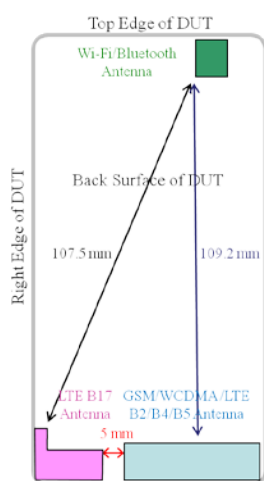
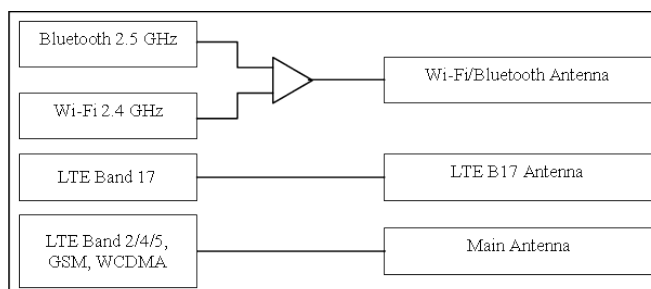
SAR Measurement Variability Results										
Mode	Exposure Condition	Channel	f (MHz)	Original Measured SAR (W/kg)	1st Repeated SAR (W/kg)	Ratio	2nd Repeated SAR (W/kg)	Ratio	3rd Repeated SAR (W/kg)	Ratio
LTE B4, 20 MHz BW QPSK (1 RB @ High)	LH Cheek	20175	1732.5	0.95	0.944	1.01	N/A	N/A	N/A	N/A
LTE B2, 20 MHz BW QPSK (50% RB @ High)	Mobile Hotspot Position, Bottom Edge of Phone 10 mm from Phantom	18900	1880.0	1.12	0.961	1.17	N/A	N/A	N/A	N/A
GPRS 850, Class 10 (2 Uplink Timeslots)	Mobile Hotspot Position, Back of Phone 10 mm from Phantom	251	848.8	0.941	0.94	1.0	N/A	N/A	N/A	N/A
GPRS 1900, Class 10 (2 Uplink Timeslots)	Mobile Hotspot Position, Bottom Edge of Phone 10 mm from Phantom	810	1909.8	1.24	1.04	1.19	N/A	N/A	N/A	N/A
WCDMA 1700, RMC	Mobile Hotspot Position, Bottom Edge of Phone 10 mm from Phantom	1513	1752	0.896	0.75	1.19	N/A	N/A	N/A	N/A
WCDMA 1900, RMC	Body Worn, Back of Phone 15 mm from Phantom	9400	1880	1.15	1.05	1.10	N/A	N/A	N/A	N/A

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:

$$\frac{[11.489]_{(mW)}}{[15]_{(mm)}} \times \frac{\sqrt{2.44_{(GHz)}}}{7.5} = 0.2 W/kg_{(estimated)}$$

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.
- *19, 20, and 29.5* 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, dispatch/push-to-talk, body-worn accessory, and mobile hotspot exposure conditions with the worst-case SAR transmitter configurations are presented in the following tables.

Head Exposure Conditions; Simultaneous Transmit Configurations, including Power Conditions or Reduced Limits					
Case	Transmitter #1		Transmitter #2		Notes
	Transmitter Configuration	PWR	Transmitter Configuration	PWR	
H1	GSM 850 CS Voice	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
H2	GSM 1900 CS Voice	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
H3	WCDMA 850	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
H4	WCDMA 1700	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
H5	WCDMA 1900	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
H6	LTE Band 17	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
H7	LTE Band 5	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
H8	LTE Band 4	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
H9	LTE Band 2	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data

		Transmitter Stand-Alone 1 g SAR Values (W/kg)			1 g SAR Summations (W/kg)	
					Case H1	Case H2
Band		GSM 850	GSM 1900	Wi-Fi 2.4 GHz	GSM 850 + Wi-Fi 2.4 GHz	GSM 1900 + Wi-Fi 2.4 GHz
Power Condition or Reduced Limit		N/A	N/A	N/A		
Position	Left Head Cheek	0.44	0.16	0.19	0.63	0.35
	Left Head 15° Tilt	0.3	0.08	0.25	0.55	0.33
	Right Head Cheek	0.35	0.1	0.28	0.63	0.38
	Right Head 15° Tilt	0.3	0.09	0.34	0.64	0.43

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 H5
Band		WCDMA 850	WCDMA 1700	WCDMA 1900	Wi-Fi 2.4 GHz	WCDMA 850 + Wi-Fi 2.4 GHz	WCDMA 1900 + Wi-Fi 2.4 GHz	WCDMA 850 + Wi-Fi 2.4 GHz
Power Condition or Reduced Limit		N/A	N/A	N/A	N/A			
Position	Left Head Cheek	0.41	1.28	0.53	0.19	0.6	1.47	0.72
	Left Head 15° Tilt	0.27	0.57	0.26	0.25	0.52	0.82	0.51
	Right Head Cheek	0.34	0.73	0.31	0.28	0.62	1.01	0.59
	Right Head 15° Tilt	0.25	0.58	0.27	0.34	0.59	0.92	0.61

Table 4-15: SAR summations for simultaneous evaluation – WCDMA in Head Positions

		Transmitter Stand-Alone 1 g SAR Values (W/kg)					1 g SAR Summations (W/kg)			
							Case H6	Case H7	Case H8	Case H9
Band		LTE B17	LTE B5	LTE B4	LTE B2	Wi-Fi 2.4 GHz	LTE B17 + Wi-Fi 2.4 GHz	LTE B5 + Wi-Fi 2.4 GHz	LTE B4 + Wi-Fi 2.4 GHz	LTE B2 + Wi-Fi 2.4 GHz
Power Condition or Reduced Limit		N/A	N/A	N/A		N/A				
Position	Left Head Cheek	0.39	0.41	1.18	0.34	0.19	0.58	0.6	1.37	0.53
	Left Head 15° Tilt	0.26	0.19	0.51	0.22	0.25	0.51	0.44	0.76	0.47
	Right Head Cheek	0.51	0.36	0.64	0.27	0.28	0.79	0.64	0.92	0.55
	Right Head 15° Tilt	0.3	0.21	0.47	0.19	0.34	0.64	0.55	0.81	0.53

Table 4-16: SAR summations for simultaneous evaluation – LTE 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	N/A	Voice + Background Data
B2	GSM 1900 CS Voice	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
B3	WCDMA 850	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
B4	WCDMA 1700	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
B5	WCDMA 1900	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
B6	LTE Band 17	N/A	Wi-Fi 2.4 GHz	N/A	VoIP + Mobile Hotspot session
B7	LTE Band 5	N/A	Wi-Fi 2.4 GHz	N/A	VoIP + Mobile Hotspot session
B8	LTE Band 4	N/A	Wi-Fi 2.4 GHz	N/A	VoIP + Mobile Hotspot session
B9	LTE Band 2	N/A	Wi-Fi 2.4 GHz	N/A	VoIP + Mobile Hotspot session
B10	GSM 850 CS Voice	N/A	Bluetooth 2 GHz	N/A	Voice + BT (Estimated/measured)
B11	GSM 1900 CS Voice	N/A	Bluetooth 2 GHz	N/A	Voice + BT (Estimated/measured)
B12	WCDMA 850	N/A	Bluetooth 2 GHz	N/A	Voice + BT (Estimated/measured)
B13	WCDMA 1700	N/A	Bluetooth 2 GHz	N/A	Voice + BT (Estimated/measured)
B14	WCDMA 1900	N/A	Bluetooth 2 GHz	N/A	Voice + BT (Estimated/measured)
B15	LTE Band 17	N/A	Bluetooth 2 GHz	N/A	Voice + BT (Estimated/measured)
B16	LTE Band 5	N/A	Bluetooth 2 GHz	N/A	Voice + BT (Estimated/measured)
B17	LTE Band 4	N/A	Bluetooth 2 GHz	N/A	Voice + BT (Estimated/measured)
B18	LTE Band 2	N/A	Bluetooth 2 GHz	N/A	Voice + BT (Estimated/measured)

		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	Bluetooth	Case B1	Case B2	Case B10	Case B11
Power Condition or Reduced Limit		N/A	N/A	N/A	N/A	GSM 850 + Wi-Fi 2.4 GHz	GSM 1900 + Wi-Fi 2.4 GHz	GSM 850 + Bluetooth	GSM 1900 + Bluetooth
Position	Body Worn, Front of Phone 15 mm from Phantom	0.49	0.28	0.04	0.2	0.53	0.32	0.69	0.48
	Body Worn, Back of Phone 15 mm from Phantom	1.02	0.58	0.05	0	1.07	0.63	1.02	0.58

Table 4-17: 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 1700	WCDMA 1900	Wi-Fi/BT 2.4 GHz	Bluetooth	Case B3	Case B4	Case B5	Case B12	Case B13	Case B14
Power Condition or Reduced Limit		N/A	N/A	N/A	17	N/A	WCDMA 850 + Wi-Fi/BT 2.4 GHz	WCDMA 1700 + Wi-Fi/BT 2.4 GHz	WCDMA 1900 + Wi-Fi/BT 2.4 GHz	WCDMA 850 + Bluetooth	WCDMA 1700 + Bluetooth	WCDMA 1900 + Bluetooth
Position	Body Worn, Front of Phone 15 mm from Phantom	0.56	0.94	1.02	0.04	0.2	0.6	0.98	1.06	0.76	1.14	1.22
	Body Worn, Back of Phone 15 mm from Phantom	0.77	0.98	1.58	0.05	0	0.82	1.03	>1.6	0.77	0.98	1.58

Table 4-18: 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		LTE B17	LTE B5	Wi-Fi 2.4 GHz	Bluetooth	Case B6	Case B7	Case B15	Case B16
Power Condition or Reduced Limit		N/A	N/A	N/A	N/A	LTE B17 + Wi-Fi 2.4 GHz	LTE B17 + Wi-Fi 2.4 GHz	LTE B5 + Bluetooth	LTE B5 + Bluetooth
Position	Body Worn, Front of Phone 15 mm from Phantom	0.47	0.45	0.04	0.2	0.51	0.49	0.67	0.65
	Body Worn, Back of Phone 15 mm from Phantom	0.44	0.49	0.05	0	0.49	0.54	0.44	0.49

Table 4-19: SAR summations for simultaneous evaluation – LTE in Body-Worn Accessory Positions

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)			
Band		LTE B4	LTE B2	Wi-Fi 2.4 GHz	Bluetooth	Case B8	Case B9	Case B17	Case B18
Power Condition or Reduced Limit		N/A	N/A	N/A	N/A	LTE B4 + Wi-Fi 2.4 GHz	LTE B2 + Wi-Fi 2.4 GHz	LTE B4 + Bluetooth	LTE B2 + Bluetooth
Position	Body Worn, Front of Phone 15 mm from Phantom	0.89	0.89	0.04	0.2	0.93	0.93	1.09	1.09
	Body Worn, Back of Phone 15 mm from Phantom	1.05	1.36	0.05	0	1.1	1.41	1.05	1.36

Table 4-20: SAR summations for simultaneous evaluation – LTE in Body-Worn Accessory Positions

Mobile Hotspot Exposure Conditions; Simultaneous Transmit Configurations, including Power Conditions or Reduced Limits					
Case	Transmitter #1		Transmitter #2		Notes
	Transmitter Configuration	PWR	Transmitter Configuration	PWR	
M1	GPRS 850	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
M2	GPRS 1900	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
M3	WCDMA 850	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
M4	WCDMA 1900	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
M5	WCDMA 1700	N/A	Wi-Fi 2.4 GHz	N/A	Voice + Background Data
M6	LTE Band 17	N/A	Wi-Fi 2.4 GHz	N/A	VoIP + Mobile Hotspot session
M7	LTE Band 5	N/A	Wi-Fi 2.4 GHz	N/A	VoIP + Mobile Hotspot session
M8	LTE Band 4	N/A	Wi-Fi 2.4 GHz	N/A	VoIP + Mobile Hotspot session
M9	LTE Band 2	N/A	Wi-Fi 2.4 GHz	N/A	VoIP + Mobile Hotspot session

		Transmitter Stand-Alone 1 g SAR Values (W/kg)			1 g SAR Summations (W/kg)	
Band		GPRS 850	GPRS 1900	Wi-Fi 2.4 GHz	Case M1	Case M2
Power Condition or Reduced Limit		N/A	29.5	N/A	GPRS 850 + Wi-Fi 2.4 GHz	GPRS 1900 + Wi-Fi 2.4 GHz
Position	Front of Phone 10 mm from Phantom	0.78	0.55	0.08	0.86	0.63
	Back of Phone 10 mm from Phantom	1.19	0.96	0.16	1.35	1.12
	Left Edge of Phone 10 mm from Phantom	1.14	0.19	0.05	1.19	0.24
	Right Edge of Phone 10 mm from Phantom	0.25	0.05	0	0.25	0.05
	Top Edge of Phone 10 mm from Phantom	0	0	0.16	0.16	0.16
	Bottom Edge of Phone 10 mm from Phantom	0.15	1.53	0	0.15	1.53

Table 4-21: 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)		
Band		WCDMA 850	WCDMA 1900	WCDMA 1700	Wi-Fi 2.4 GHz	Case M3	Case M4	Case M5
Power Condition or Reduced Limit		N/A	20	19	N/A	WCDMA 850 + Wi-Fi 2.4 GHz	WCDMA 1900 + Wi-Fi 2.4 GHz	WCDMA 1700 + Wi-Fi 2.4 GHz
Position	Front of Phone 10 mm from Phantom	0.38	0.75	0.65	0.08	0.46	0.83	0.73
	Back of Phone 10 mm from Phantom	0.58	0.9	1.02	0.16	0.74	1.06	1.18
	Left Edge of Phone 10 mm from Phantom	0.48	0.3	0.16	0.05	0.53	0.35	0.21
	Right Edge of Phone 10 mm from Phantom	0.14	0.12	0.06	0	0.14	0.12	0.06
	Top Edge of Phone 10 mm from Phantom	0	0	0	0.16	0.16	0.16	0.16
	Bottom Edge of Phone 10 mm from Phantom	0.15	1.15	1.3	0	0.15	1.15	1.3

Table 4-22: 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)			
Band		LTE Band 17	LTE Band 5	LTE Band 4	LTE Band 2	Wi-Fi 2.4 GHz	Case M6	Case M7	Case M8	Case M9
Power Condition or Reduced Limit		N/A	N/A	20	19	N/A	LTE B17 + Wi-Fi 2.4 GHz	LTE B5 + Wi-Fi 2.4 GHz	LTE B4 + Wi-Fi 2.4 GHz	LTE B2 + Wi-Fi 2.4 GHz
Position	Front of Phone 10 mm from Phantom	0.59	0.34	0.6	0.83	0.08	0.67	0.42	0.68	0.91
	Back of Phone 10 mm from Phantom	0.55	0.47	0.67	0.9	0.16	0.71	0.63	0.83	1.06
	Left Edge of Phone 10 mm from Phantom	0	0.41	0.28	0.14	0.05	0.05	0.46	0.33	0.19
	Right Edge of Phone 10 mm from Phantom	0.31	0.23	0.1	0.06	0	0.31	0.23	0.1	0.06
	Top Edge of Phone 10 mm from Phantom	0	0	0	0	0.16	0.16	0.16	0.16	0.16
	Bottom Edge of Phone 10 mm from Phantom	0.25	0.14	1.08	1.33	0	0.25	0.14	1.08	1.33

Table 4-23: SAR summations for simultaneous evaluation – Positions during a Mobile Hotspot session

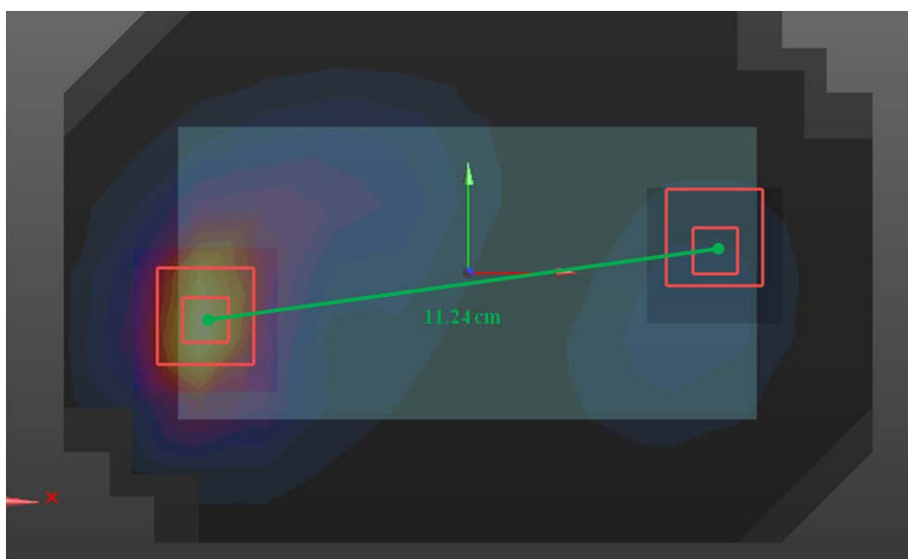
Simultaneous Evaluation Conclusion

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

B5. Back of Phone 15 mm from Phantom, WCDMA 1900 + Wi-Fi 2450

The guidelines provided in FCC KDB 447498 D01 were utilized for evaluation of the need for simultaneous transmission SAR measurements. These guidelines direct that if the SAR-to-peak location separation ratio (SPLSR) for a pair of antennas is ≤ 0.04 then SAR measurement for simultaneous transmission is not required. Overlaid SAR plots, separation distances between RF peaks, and demonstration of these calculations are provided below for each noted case. Calculations of peak separation distances were evaluated per SPEAG Technical Note “Calculation of the Distance between Two Hotspot”, *TN_110209_DASY_Calculate_HotSpot_Distance.pdf*.

Case A: Back of Phone 15 mm from Phantom, WCDMA 1900 + Wi-Fi 2450



WCDMA 1900 Back of Phone SAR overlaid with Wi-Fi 2450 Back of Phone SAR

Transmitter	1-g SAR
WCDMA 1900	1.58
Wi-Fi 2450	0.05
<u>Sum^{1.5}</u>	<u>2.081</u>
Peak separation distance	112.4 mm
<i>SPLSR</i>	<i>0.02</i>

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

5 References to Test Standards and Guidance

- [1] CENELEC, EN 62209-1:2006 “Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)”
- [2] CENELEC, EN 50360:2001 “Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)”.
- [3] ANSI / IEEE, C95.1 1992 Edition “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”
- [4] 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 v01r02 “SAR Evaluation Considerations for Wireless Handsets”
- [13] FCC KDB Publication 865664 D01 v01r02 “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 v02 “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 v02r03 “SAR Evaluation Considerations for LTE Devices”
- [18] FCC KDB Publication 941225 D06 v01r01 “SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities”