MOTOROLA

Portable Cellular Phone SAR Test Report

Tests Requested By:	Motorola Mobility, Inc. 600 N. US Highway 45 Libertyville, IL 60048
Test Report #:	24606-1F Rev. D
Date of Report:	Oct-13-2011
Date of Test:	Aug-13-2011 to Sep-14-2011
FCC ID #:	IHDP56ME1
Generic Name:	M0C1D
Test Laboratory:	Motorola Mobility, Inc. - ADR Test Services Laboratory 600 N. US Highway 45 Libertyville, IL 60048
Report Author:	Thomas Knipple Senior RF Engineer

Accreditation:

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

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

2404

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

Statement of Compliance:

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

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

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Revision History

Revision Version	Date	Notes
Rev. 0	Sep-16-2011	Initial report release.
Rev. A	Sep-21-2011	Updated for Wi-Fi head tests per TCB inquiry
Rev. B	Oct-04-2011	Updated per FCC inquiry
Rev. C	Oct-06-2011	Updated power reduction limits on LTE for clarity per FCC inquiry
Rev. D	Oct-13-2011	Updated per FCC inquiry Oct-12

1. Introduction

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

For ANSI / IEEE C95.1 (1 g), the final stand-alone SAR readings for this phone are given in the table below. For ANSI / IEEE C95.1 (1 g), the final simultaneous SAR reading for this phone is 1.42 $^{W}/_{kg}$. These measurements were performed using a Dasy4™ v4.7 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 13	**0.79**	**0.28**	**0.93**
CDMA 800	**0.63**	**0.32**	**1.16**
CDMA 1900	**1.45**	**0.71**	**1.51**
Wi-Fi 2.45 GHz	**0.34**	**0.04**	**0.38**

2. Description of the Device Under Test

2.1 Antenna description

CDMA (800/1900 MHz) Antenna

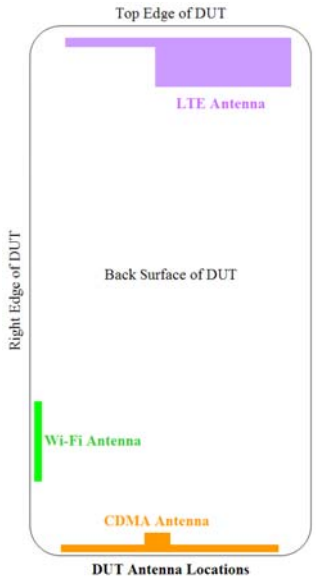
Type	Internal	
Location	Bottom Rear of Transceiver	
Dimensions	Width	4 mm
	Length	54 mm

LTE (782 MHz) Antenna

Type	Internal	
Location	Top Rear of Transceiver	
Dimensions	Width	12 mm
	Length	53 mm

Bluetooth/Wi-Fi 2 GHz Antenna

Type	Internal	
Location	Right-Edge Rear of Transceiver	
Dimensions	Width	2 mm
	Length	19 mm



2.2 Device Signaling

Serial Number(s) (Functional Use)	LS4V230044	(CDMA conducted power measuremenets, CDMA head/body/mobile hotspot SAR testing)
	LS4V230052	(LTE conducted power measurements, LTE head/body/mobile hotspot SAR testing)
	LS4V230049	(LTE mobile hotspot testing)
	LS4V230079	(LTE head/body/mobile hotspot testing)
	LS4V1X0041	(Wi-Fi/Bluetooth 2.4 GHz conducted power measurements)
	LS4V230096	(Wi-Fi head/body/mobile hotspot testing)
Production Unit or Identical Prototype (47 CFR §2..908)	Identical Prototype	
Device Category	Portable	
RF Exposure Limits	General Population / Uncontrolled	

Mode(s) of Operation	Modulation Mode(s)	Maximum Output Power Setting	Duty Cycle	Transmitting Frequency Range(s)
LTE Band 13	QPSK, 16QAM	25.0 dBm	1:1	777 - 787 MHz (1 Channel, 10 MHz wide)
CDMA 800	QPSK	24.5 dBm	1:1	824.70 - 848.31 MHz
CDMA 1900	QPSK	25.0 dBm	1:1	1851.20 - 1908.75 MHz
Wi-Fi 802.11b/g/n	BPSK	18.5 dBm	1:1	2412.0 - 2462.5 MHz
Bluetooth	GFSK	10 dBm	1:1	2402.0 - 2483.5 MHz

Note: This device supports voice call functionality over GSM and WCDMA on non-US cellular networks. The GSM/WCDMA network functions have been disabled by firmware and are SIM locked for all US operators. Further information regarding this functionality is contained within Exhibit 12.

2.2.1 LTE Device Description

LTE Summary Information per FCC KDB 941225

	FCC ID			IHDP56ME1
	Form Factor			Handset
1	**Frequency Range**			777 MHz - 787 MHz
2	**Channel Bandwidths**			10 MHz
3	**L,M,H Channel Numbers and Frequencies**			
	Low	**Mid**	**High**	
	N/A	23230 (782 MHz)	N/A	
4	**UE Category**			1
	Modulations Supported			QPSK, 16QAM
5	**Description of LTE Tx and Antenna Implementation**			1 TX/RX Antenna; 1 RX Antenna
6	**LTE Voice Available?**			Yes (VOIP Only)
	Hotspot with LTE + Wi-Fi?			Yes
	Hotspot with LTE + Wi-Fi active with 1x Voice sessions?			Yes
7 (a)	**LTE MPR Permanently Implemented per 3GPP TS 36.101?**			Yes
7 (b)	**A-MPR disabled (by setting NS=01 on the R&S CMW500)?**			Yes
8	**Conducted power table providing 1 RB (lower and upper edge), 50% RB (centered) and 100% RB**			Yes
9	**Table provided specifying other US wireless operating modes?**			Yes
10	**Table provided specifying maximum average conducted power for these other wireless modes**			Yes
11	**Table provided identifying simultaneous transmission conditions?**			Yes
12	**Power Reduction used for SAR compliance?**			Yes (see section 2.2.2)
	Power Reduction used for CDMA?			Yes
	Power Reduction used for LTE?			Yes
	Power Reduction used for svLTE?			Yes
13	**Test Equipment used**			CMW500 SW version 2.0.20.10

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 DUT architecture, MPR is permanently implemented. Per the chart above, for a 10 MHz bandwidth the following MPR is used:

Modulation	# of RBs	MPR (dB)
QPSK	>12	1
16 QAM	<= 12	1
16 QAM	> 12	2

The table applies for any RB start value. RBs are assigned contiguously.

Thus, given a maximum power of 25 dBm and the MPR described above, the power for the SAR test cases are as follows:

Test Case	Max Power (dBm)
QPSK, Start RB: 12, RB Alloc 50%	24
QPSK, Start RB: 0, RB Alloc 100%	24
QPSK, Start RB: 49, RB Alloc: 1 RB @ high channel edge	25
QPSK, Start RB: 0, RB Alloc: 1 RB @ low channel edge	25
16QAM, Start RB: 12, RB Alloc 50%	23
16QAM, Start RB: 0, RB Alloc 100%	23
16QAM, Start RB: 49, RB Alloc: 1 RB @ high channel edge	24
16QAM, Start RB: 0, RB Alloc: 1 RB @ low channel edge	24

2.2.2 Power limit reduction schemes

For specified modes of operation, the DUT utilizes reduced maximum power limits to maintain compliance to SAR exposure limits. Complete descriptions of the following functionalities are provided in the Operational Description contained within Exhibit 12. The implementations to trigger the reductions in power require the device to be radiating, which prevents conducted power measurements of these functionalities without modification of the DUT.

The DUT supports Simultaneous Voice and LTE (svLTE), allowing a CDMA voice call while simultaneously providing an LTE link for data transport on the cellular network. When operating during svLTE, a reduced maximum LTE transmit power limit is enforced to ensure SAR exposure compliance is maintained. This reduced limit is also enforced when operating as a mobile hotspot during svLTE. When these combinations of functionalities are not in use, the LTE transmitter operates at full maximum power. A table of the reduced limits used for testing are given below.

Mode(s) of Operation	LTE Band 13							
Test Channel	23230							
Modulation	QPSK				16QAM			
RB Allocation	50%	100%	1 RB @HIGH EDGE	1 RB @LOW EDGE	50%	100%	1 RB @HIGH EDGE	1 RB @LOW EDGE
Maximum Output Power Setting (dBm)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Output Power Setting with MPR (dBm)	24.0	24.0	25.0	25.0	23.0	23.0	24.0	24.0
svLTE Reduced Maximum Output Power Setting (dBm)	22.0	22.0	23.0	23.0	21.0	21.0	22.0	22.0
Reduction Target (dB)	-3	-3	-2	-2	-4	-4	-3	-3

The DUT utilizes a reduced limit for the maximum CDMA 1900 band transmit power when the Wi-Fi transmitter of the phone is active. A table of the reduced limits used for testing are given below.

Mode(s) of Operation	CDMA 1900
Channel Ranges	25 - 1175
Maximum Output Power Setting (dBm)	25.0
Reduced Maximum Output Power Setting (dBm)	23.5
Reduction Target (dB)	-1.5

Alternatively, the DUT utilizes reduced limits for the maximum CDMA 1900 band transmit power when the mobile hotspot functionality is enabled. These limits are utilized when in a data connection during a mobile hotspot session, and also when in a voice connection for svLTE during a mobile hotspot session. A table of the reduced limits used for testing are given below.

Mode(s) of Operation	CDMA 1900
Channel Ranges	25 - 1175
Maximum Output Power Setting (dBm)	25.0
Reduced Maximum Output Power Setting (dBm)	19.0
Reduction Target (dB)	-6.0

2.3 Device Conducted Power Measurements

2.3.1 LTE modes

Measured Conducted Power (dBm) for LTE modes								
Modulation	Channel Bandwidth	RB Allocation Size	RB Offset	Measured Power (dBm)	Power Limit with MPR (dBm)	MPR Target (dB)	Measured reduction from maximum limit	Notes
QPSK	10 MHz	1	0	24.70	25.00	0	0 dB	-
		1	49	24.85	25.00	0	0 dB	-
		50%	12	23.93	24.00	-1	-1.07 dB	MPR enabled
		100%	0	23.83	24.00	-1	-1.17 dB	MPR enabled
16QAM	10 MHz	1	0	24.05	24.00	-1	-0.95 dB	MPR enabled
		1	49	24.20	24.00	-1	-0.80 dB	MPR enabled
		50%	12	23.07	23.00	-2	-1.93 dB	MPR enabled
		100%	0	22.90	23.00	-2	-2.10 dB	MPR enabled

2.3.2 CDMA modes

Per the "SAR Measurement Procedures for 3G Devices" released in October, 2007, RC1, RC3 and RC3 (FCH + SCH) CDMA modes, EVDO Rev O, EVDO Rev A were considered. The conducted power measurements (per steps 3, 4 & 10 of section 4.4.5.2 of 3GPP2 C.5.011 / TIA -98-E) for each mode are shown in the table below.

Measured Conducted Power (dBm) for CDMA modes							
		Loopback		Data[1]		EVDO Rev. O[1]	EVDO Rev. A[1]
Band	Channel	RC3 SO55	RC1 SO55	TDSO SO32 + FCH-SCH	TDSO SO32 + SCH	RTAP 153.6k	Subtype 2 RETAP
CDMA 800	1013	24.52	24.47	24.47	22.85	24.20	23.87
	384	24.60	24.59	24.59	23.06	24.29	23.92
	777	24.36	24.31	24.31	22.99	24.01	23.64
CDMA 1900	25	25.20	25.24	25.24	25.24	24.28	23.99
	600	25.16	25.27	25.27	25.27	24.29	23.95
	1175	24.93	25.06	25.06	24.01	24.19	23.83

[1] The DUT system architecture does not support simultaneous voice and data during a single CDMA session to the cellular network. Operation in this mode is for data transmission only.

2.3.3 Wi-Fi 802.11 modes

Per "SAR Measurement Procedures for 802.11 a/b/g Transmitters" (FCC KDB 248227), power measurements were performed for 802.11 operational modes. The average conducted power measurements for each mode are shown in the tables below. SAR testing for 802.11 was performed with the transmitter set to the lowest data rate on the default test channels **highlighted in bold** in the tables below. The head and body positions that resulted in the highest SAR values were further tested on the additional channels and higher data rates **highlighted in pink** in the tables below.

Band	Channel	Measured Average Conducted Power (dBm) for 802.11b Mode Data Rates			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
Wi-Fi 2450 MHz	1	**17.52**	17.53	17.54	17.53
	6	**18.04**	17.89	17.79	17.76
	11	**18.51**	18.59	18.67	18.62

Band	Channel	Measured 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
Wi-Fi 2450 MHz	1	16.73	16.73	16.26	16.03	13.63	13.71	12.09	12.08
	6	17.19	17.21	16.93	16.65	14.27	14.13	12.41	12.6
	11	17.75	17.79	17.18	17.04	14.73	14.76	12.92	12.95

Band	Channel	Measured 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
Wi-Fi 2450 MHz	1	15.70	16.17	15.85	13.76	13.72	11.96	11.89	10.99
	6	16.23	16.54	16.27	14.37	14.26	12.66	12.44	11.52
	11	16.69	17.09	16.79	14.80	14.70	13.00	12.99	12.03

Band	Channel	Measured 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
Wi-Fi 2450 MHz	1	15.54	16.00	15.61	13.79	13.56	11.80	11.74	10.88
	6	16.11	16.70	16.21	14.28	14.12	12.42	12.39	11.55
	11	16.60	17.08	16.76	14.81	14.65	12.74	12.82	11.94

3. Test Equipment Used

3.1 Dosimetric System

The Motorola Mobility ADR Test Services Laboratory utilizes a Dosimetric Assessment System (Dasy4™ v4.7) manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All the SAR measurements are taken within a shielded enclosure. The overall 10 g RSS uncertainty of the measurement system is ±10.8% (K=1) with an expanded uncertainty of ±21.6% (K=2). The overall 1 g RSS uncertainty of the measurement system is ±11.1% (K=1) with an expanded uncertainty of ±22.2% (K=2). The measurement uncertainty budget is given in Appendix 6. Per IEEE 1528, this uncertainty budget is applicable to the SAR range of 0.4 W/kg to 10 W/kg.

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

Description	Serial Number	Cal Date	Cal Due Date
DASY4™ DAE V1	434	Jan-13-2011	Jan-13-2012
E-Field Probe ES3DV3	3115	Jan-12-2011	Jan-12-2012
DASY4™ DAE V1	699	Sep-20-2010	Sep-20-2011
DASY4™ DAE V1	702	Apr-14-2011	Apr-14-2012
E-Field Probe ES3DV3	3184	Mar-11-2011	Mar-11-2012
S.A.M. Phantom used for 782/800 MHz	TP-1136		
S.A.M. Phantom used for 782/800 MHz	TP-1235		
S.A.M. Phantom used for 782/1800/1900/2450 MHz	TP-1131		
Dipole Validation Kit, DV835V2	422TR	Mar-18-2011	Mar-18-2012
Dipole Validation Kit, DV835V2	436TR	Mar-18-2011	Mar-18-2012
Dipole Validation Kit, DV1800V2	250TR	Mar-17-2011	Mar-17-2012
Dipole Validation Kit, DV1800V2	259TR	Mar-17-2011	Mar-17-2012
Dipole Validation Kit, DV2450V2	863	Mar-17-2011	Mar-17-2012

3.2 Additional Equipment

Description	Serial Number	Cal Date	Cal Due Date
Rohde & Schwarz CMW500 SW version 2.0.20.10 Used for LTE testing	103402	Dec-01-2010	Dec-01-2012
Signal Generator HP8648C	3847A04982	Nov-18-2009	Nov-18-2011
Power Meter E4419B	GB39510900	Mar-28-2011	Mar-28-2013
Power Sensor #1 - E9301A	US39211007	Aug-16-2011	Aug-16-2012
Power Sensor #2 - E9301A	US39211008	Aug-16-2011	Aug-16-2012
Signal Generator HP8648C	3847A04632	Aug-13-2011	Aug-13-2013
Power Meter E4419B	GB39511087	Dec-22-2009	Dec-22-2011
Power Sensor #1 - E9301A	US39211006	Oct-25-2010	Oct-25-2011
Power Sensor #2 - E9301A	US39210934	Oct-25-2010	Oct-25-2011
Signal Generator HP8648C	3847A04843	Mar-28-2011	Mar-28-2013
Power Meter E4419B	GB39511084	Mar-28-2011	Mar-28-2013
Power Sensor #1 - E9301A	US39210929	Mar-31-2011	Mar-31-2012
Power Sensor #2 - E9301A	US39210930	Mar-31-2011	Mar-31-2012
Network Analyzer HP8753ES	US39172529	Jun-04-2010	Jun-04-2011
Dielectric Probe Kit HP85070C	US99360070		

4. Electrical parameters of the tissue simulating liquid

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

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

The probe calibration frequency and the system accuracy verifications were performed at 835 MHz. The center of the LTE Band 13 transmit band is 782 MHz. The difference exceeds the ± 50 MHz window specified in FCC KDB 450824 D01. Therefore calculations are given to perform a SAR correction for deviations of the complex permittivity and conductivity from simulated tissue targets if the deviation is in the direction that does not result in a "conservative" SAR result. The sensitivity coefficients for frequencies within "Attachment 1: Tissue Parameter Variations" of FCC KDB 450824 were used.

This attachment provides:

450 MHz tissue has sensitivity coefficients for ε_r of -0.46 and for σ of +0.43
800 MHz tissue has sensitivity coefficients for ε_r of -0.57 and for σ of +0.59

A linear approximation to get the values for 782 MHz (the frequency of the center of the transmit band) were performed. The sensitivity coefficients used for 782 MHz were: ε_r of -0.56434 and σ of +0.581771.

These coefficients were then applied to the delta between the measured conductivity and the target conductivity using the formula:

$$\Delta SAR = S_\varepsilon\, \Delta\varepsilon + S_\sigma\, \Delta\sigma$$

Here, $S_\varepsilon = \partial SAR/\partial\varepsilon$ and $S_\sigma = \partial SAR/\partial\sigma$ are sensitivity coefficients, representing the sensitivity of SAR to permittivity and conductivity, respectively.

The measured SAR is then corrected by the delta SAR to compensate for the change in conductivity using the formula:

$$SAR_{Corrected} = \frac{SAR_{Measured}}{(1 + \Delta SAR)}$$

This correction has been applied to the conditions resulting in the worst-case SAR values found in testing (to maintain conservativeness), and can be seen in the data tables provided in section 6 below.

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			ε_r	σ (S/m)	Temp (°C)
782	Head	**Measured,** Aug-17-2011	43.1	0.87	19.2
		Measured, Sep-10-2011	43.1	0.88	20.3
		Measured, Sep-14-2011	42.1	0.86	20.6
		Recommended Limits	41.78 ±5%	0.896 ±5%	18-25
	Body	**Measured,** Aug-21-2011	54.9	0.93	18.3
		Measured, Aug-28-2011	54.6	0.92	19.2
		Measured, Sep-08-2011	54.2	0.92	19.2
		Measured, Sep-10-2011	54.2	0.92	20.0
		Measured, Sep-14-2011	55.6	0.93	19.9
		Recommended Limits	55.4 ±5%	0.966 ±5%	18-25
835	Head	**Measured,** Aug-17-2011	42.3	0.92	19.2
		Recommended Limits	41.5 ±5%	0.90 ±5%	18-25
	Body	**Measured,** Aug-13-2011	54.7	0.99	19.0
		Measured, Sep-14-2011	55.1	0.98	19.9
		Recommended Limits	55.2 ±5%	0.97 ±5%	18-25
1880	Head	**Measured,** Aug-30-2011	38.2	1.45	19.0
		Measured, Sep-14-2011	38.1	1.41	19.8
		Recommended Limits	40.0 ±5%	1.40 ±5%	18-25
	Body	**Measured,** Aug-31-2011	50.9	1.57	19.2
		Measured, Sep-10-2011	50.9	1.56	20.6
		Measured, Sep-14-2011	50.9	1.55	20.0
		Recommended Limits	53.3 ±5%	1.52 ±5%	18-25
2450	Head	**Measured,** Sep-14-2011	37.3	1.85	20.7
		Measured, Sep-20-2011	38.8	1.86	20.2
		Recommended Limits	39.2 ±5%	1.80 ±5%	18-25
	Body	**Measured,** Aug-17-2011	52.4	1.94	19.9
		Measured, Sep-14-2011	52.0	1.93	20.2
		Recommended Limits	52.7 ±5%	1.95 ±5%	18-25

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

Ingredient	782 / 835 / 900 MHz Head	782 / 835 / 900 MHz Body	1800 MHz / 1900 MHz Head	1800 MHz / 1900 MHz Body	2450 MHz Head	2450 MHz Body
Sugar	57	44.9	--	--	--	--
DGBE	--	--	47	30.8	--	30
Diacetin	--	--	--	--	51	--
Water	40.45	53.06	52.62	68.8	48.75	70
Salt	1.45	0.94	0.38	0.4	0.15	--
HEC	1	1	--	--	--	--
Bact.	0.1	0.1	--	--	0.1	--

5. System Accuracy Verifications

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

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

System Accuracy Verification Measurements for Head SAR Measurements						
f (MHz)	Description	SAR (W/kg), 1 gram	Dielectric Parameters		Ambient Temp (°C)	Tissue Temp (°C)
			ε_r	σ (S/m)		
835	**Measured,** Aug-17-2011	10.2	42.3	0.92	21.1	19.2
	Measured, Sep-10-2011	10.25	42.5	0.93	21.2	20.3
	Recommended Limits	9.73	41.5 ±5%	0.90 ±5%	18-25	18-25
	Measured, Sep-14-2011	9.75	41.5	0.91	21.1	20.6
	Recommended Limits	9.33	41.5 ±5%	0.90 ±5%	18-25	18-25
1800	**Measured,** Aug-30-2011	35.0	38.5	1.36	21.2	19.9
	Measured, Sep-14-2011	37.5	38.5	1.33	21.2	20.5
	Recommended Limits	38.6	40.0 ±5%	1.40 ±5%	18-25	18-25
2450	**Measured,** Sep-14-2011	57.5	37.3	1.85	21.3	20.3
	Measured, Sep-20-2011	56.0	38.8	1.86	21.1	20.3
	Recommended Limits	54.2	39.2 ±5%	1.80 ±5%	18-25	18-25

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

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3115	835	5.87	5 of 11
		1810	5.02	5 of 11
		2450	4.39	5 of 11
E-Field Probe ES3DV3	3184	835	6.11	5 of 11

System Accuracy Verification Measurements for Body SAR Measurements						
f (MHz)	Description	SAR (W/kg), 1 gram	Dielectric Parameters		Ambient Temp (°C)	Tissue Temp (°C)
			ε_r	σ (S/m)		
835	**Measured,** Aug-13-2011	10.05	54.7	0.99	21.2	19.3
	Measured, Aug-21-2011	10.15	54.4	0.99	20.7	18.3
	Measured, Aug-28-2011	10.05	54.1	0.97	21.0	19.2
	Measured, Sep-08-2011	9.95	53.5	0.97	21.0	19.2
	Measured, Sep-10-2011	10.10	53.7	0.97	21.4	20.0
	Measured, Sep-14-2011	9.90	55.1	0.98	21.3	19.9
	Recommended Limits	10.1	55.2 ±5%	0.97 ±5%	18-25	18-25
1800	**Measured,** Sep-01-2011	38.35	51.6	1.48	21.2	19.3
	Recommended Limits	37.5	53.3 ±5%	1.52 ±5%	18-25	18-25
	Measured, Aug-31-2011	36.75	51.2	1.47	21.1	20.0
	Measured, Sep-09-2011	36.95	51.2	1.47	21.2	19.6
	Measured, Sep-14-2011	36.90	51.2	1.46	21.1	20.5
	Recommended Limits	37.2	53.3 ±5%	1.52 ±5%	18-25	18-25
2450	**Measured,** Aug-17-2011	57.0	52.4	1.94	20.1	20.0
	Measured, Sep-14-2011	57.5	52.0	1.93	21.0	20.2
	Recommended Limits	52.8	52.7 ±5%	1.95 ±5%	18-25	18-25

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

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3115	1810	4.61	6 of 11
		2450	4.12	6 of 11
E-Field Probe ES3DV3	3184	835	6.10	6 of 11
		1810	4.90	6 of 11

6. Test Results

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

The phone was tested in the configurations stipulated in [1], [4] and [5]. The phone was positioned into these configurations using the device holder supplied with the DASY4™ SAR measurement system The default settings for the "coarse" and "cube" scans were chosen and used for measurements. The grid spacing of the coarse scan was set to 15 mm or less as shown in the SAR plots included in Appendices 2 through 6. Please refer to the DASY4™ manual for additional information on SAR scanning procedures and algorithms used.

The DUT covered by this report has the following battery options:

Model SNN5899A - 1800 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.

6.1 Head Adjacent Test Results

The SAR results shown in tables 1 through 9 are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to [6]. Also shown are the temperature of the simulated tissue after the test, the measured drift, the measured conducted output power levels, target power reduction amount (when applicable), the measured SAR corrected for probe calibration (when applicable), and the extrapolated SAR. The exact method of extrapolation is:

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

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

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

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

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

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3115	1810	5.02	5 of 11
		2450	4.39	5 of 11
E-Field Probe ES3DV3	3184	835	6.11	5 of 11

Left Head Cheek Position															
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Measured (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	18.8	0.082	23.93	-1	0.374		0.37	0.519		0.52		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	18.0	-0.279	24.70	0	0.464		0.49	0.639		0.68		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	18.8	-0.393	24.85	0	0.278		0.30	0.385		0.42		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	18.0	-0.320	23.07	-2	0.297		0.32	0.413		0.44		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	18.0	-0.351	24.05	-1	0.378		0.41	0.525		0.57		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	18.0	0.142	24.20	-1	0.255		0.26	0.353		0.35		
835	CDMA 800, RC3 SO55	SNN5899A	1013												
			384	19.0	0.016	24.60		0.445		0.45	0.588		0.59		
			777												
1880	CDMA 1900, RC3 SO55	SNN5899A	25												
			600	19.7	-0.106	25.16		0.392		0.40	0.649		0.67		
			1175												
2450	802.11b, 1 Mbps	SNN5899A	1												
			6												
			11	19.5	0.150	18.51		0.102		0.10	0.183		0.18		

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

Right Head Cheek Position															
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Measured (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	18.8	-0.141	23.93	-1	0.400		0.41	0.625		0.65		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	**19.0**	**-0.126**	**24.70**	**0**	**0.473**	**0.484**	**0.50**	**0.742**	**0.768**	**0.79**	**5x5x7**	**A43**
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	18.8	-0.100	24.85	0	0.314		0.32	0.488		0.50		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	19.0	-0.313	23.07	-2	0.313		0.34	0.492		0.53		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	19.0	-0.333	24.05	-1	0.432		0.47	0.676		0.73		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	18.5	-0.522	24.20	-1	0.247		0.28	0.390		0.44		
835	CDMA 800, RC3 SO55	SNN5899A	1013												
			384	**19.0**	**0.029**	**24.60**		**0.471**		**0.47**	**0.626**		**0.63**	**5x5x7**	**A45**
			777												
1880	CDMA 1900, RC3 SO55	SNN5899A	25	19.7	0.014	25.20		0.765		0.77	1.30		1.30		
			600	19.7	0.053	25.16		0.761		0.76	1.30		1.30		
			1175	**19.7**	**-0.004**	**24.93**		**0.845**		**0.85**	**1.45**		**1.45**	**5x5x7**	**A46**
2450	802.11b, 1 Mbps	SNN5899A	1	20.2	-0.053	17.52		0.181		0.18	0.329		0.33		
			6	20.2	0.016	18.04		0.187		0.19	0.335		0.34		
			11	**20.2**	**0.043**	**18.51**		**0.190**		**0.19**	**0.344**		**0.34**	**5x5x7**	**A48**

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

Left Head 15° Tilt Position															
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Measured (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	18.8	-0.046	23.93	-1	0.296		0.30	0.435		0.44		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	18.0	-0.042	24.70	0	0.375		0.38	0.552		0.56		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	18.6	0.583	24.85	0	0.083		0.08	0.122		0.12		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	18.0	0.173	23.07	-2	0.247		0.25	0.361		0.36		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	18.0	0.090	24.05	-1	0.306		0.31	0.450		0.450		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	18.7	0.184	24.20	-1	0.191		0.19	0.280		0.28		
835	CDMA 800, RC3 SO55	SNN5899A	1013												
			384	**19.0**	**0.140**	**24.60**		**0.256**		**0.26**	**0.334**		**0.33**	**5x5x7**	**A51**
			777												
1880	CDMA 1900, RC3 SO55	SNN5899A	25												
			600	**19.7**	**-0.013**	**25.16**		**0.203**		**0.20**	**0.340**		**0.34**	**5x5x7**	**A52**
			1175												
2450	802.11b, 1 Mbps	SNN5899A	1												
			6												
			11	**20.0**	**-0.050**	**18.51**		**0.080**		**0.08**	**0.162**		**0.16**	**5x5x7**	**A53**

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

Right Head 15° Tilt Position															
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Measured (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	19.0	-0.059	23.93	-1	0.351		0.36	0.549		0.56		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	**19.0**	**-0.160**	**24.70**	0	**0.436**	**0.446**	**0.46**	**0.677**	**0.700**	**0.73**	**5x5x7**	**A49**
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	18.8	-0.072	24.85	0	0.281		0.29	0.436		0.44		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	19.0	-0.14	23.07	-2	0.287		0.30	0.448		0.46		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	19.0	-0.079	24.05	-1	0.391		0.40	0.606		0.62		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	18.8	-0.450	24.20	-1	0.244		0.27	0.378		0.42		
835	CDMA 800, RC3 SO55	SNN5899A	1013												
			384	19.0	0.087	24.60		0.255		0.26	0.333		0.33		
			777												
1880	CDMA 1900, RC3 SO55	SNN5899A	25												
			600	19.8	0.052	25.16		0.154		0.15	0.258		0.26		
			1175												
2450	802.11b, 1 Mbps	SNN5899A	1												
			6												
			11	19.4	-0.014	18.51		0.050		0.05	0.096		0.10		

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

The DUT utilizes a reduced limit for the maximum CDMA 1900 band transmit power when the Wi-Fi transmitter of the phone is active. The measurement data in the following table is provided to demonstrate SAR performance for CDMA 1900 when this functionality is enabled, for the purpose of evaluating simultaneous SAR cases. See section 6.5 for further information.

Right Head Cheek Position																
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Limit[2] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
1880	**CDMA 1900, RC3 SO55**	SNN5899A	25	20.0	-0.213	23.5	-1.5	0.496		0.52	0.843		0.89		
			600	20.2	-0.133	23.5	-1.5	0.524		0.54	0.897		0.92		
			1175	**20.2**	**-0.230**	**23.5**	**-1.5**	**0.537**		**0.57**	**0.929**		**0.98**	**5x5x7**	**A47**

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

The DUT supports Simultaneous Voice and LTE (svLTE), allowing a CDMA voice call while simultaneously providing an LTE link for data transport on the cellular network. When operating during svLTE, a reduced maximum LTE transmit power limit is enforced to ensure SAR exposure compliance is maintained. This reduced limit is also enforced when operating as a mobile hotspot during svLTE.

The measurement data in the following tables is provided to demonstrate SAR performance for LTE when this functionality is enabled, for the purpose of evaluating simultaneous SAR cases. See section 6.5 for further information.

Left Head Cheek Position															
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Limit[2] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	**LTE Band 13, QPSK (50% RB)**	SNN5899A	23230	19.2	-0.176	22.0	-3	0.242		0.25	0.340		0.35		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	19.2	-0.089	23.0	-2	0.287		0.29	0.401		0.41		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	19.2	0.051	23.0	-2	0.187		0.19	0.263		0.26		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	19.6	-0.022	21.0	-4	0.199		0.20	0.277		0.28		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	19.6	-0.258	22.0	-3	0.280		0.30	0.386		0.41		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	19.7	-0.092	22.0	-3	0.173		0.18	0.242		0.25		

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

[2] For tests with power limit reductions employed, measured conducted power is not available by device design. Per FCC direction, measured power is replaced with the reduced maximum power limit for the device mode under test.

Right Head Cheek Position															
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Limit[2] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	20.0	-0.084	22.0	-3	0.261		0.27	0.415		0.42		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	**20.0**	**-0.022**	**23.0**	**-2**	**0.311**	**0.317**	**0.32**	**0.493**	**0.507**	**0.51**	**5x5x7**	**A44**
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	20.0	0.047	23.0	-2	0.221		0.22	0.352		0.35		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	20.1	-0.174	21.0	-4	0.217		0.23	0.343		0.36		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	20.1	-0.040	22.0	-3	0.267		0.27	0.422		0.43		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	20.1	0.004	22.0	-3	0.191		0.19	0.302		0.30		

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

Left Head 15° Tilt Position															
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Limit[2] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	19.4	0.026	22.0	-3	0.203		0.20	0.298		0.30		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	19.4	-0.014	23.0	-2	0.236		0.24	0.348		0.35		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	19.4	-0.078	23.0	-2	0.229		0.23	0.338		0.34		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	19.4	-0.159	21.0	-4	0.170		0.18	0.251		0.26		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	19.7	-0.018	22.0	-3	0.217		0.22	0.318		0.32		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	19.6	-0.472	22.0	-3	0.143		0.16	0.21		0.23		

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

Right Head 15° Tilt Position															
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Limit[2] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	20.0	-0.056	22.0	-3	0.242		0.25	0.378		0.38		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	**20.0**	**-0.204**	**23.0**	**-2**	**0.294**	**0.300**	**0.31**	**0.456**	**0.469**	**0.49**	**5x5x7**	**A50**
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	20.0	0.119	23.0	-2	0.201		0.20	0.312		0.31		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	19.4	-0.097	21.0	-4	0.189		0.19	0.292		0.30		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	20.1	-0.170	22.0	-3	0.242		0.25	0.373		0.39		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	20.1	0.033	22.0	-3	0.176		0.18	0.270		0.27		

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

6.2 Body Worn Test Results

The SAR results shown in tables 10 through 13 are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to [6]. Also shown are the temperature of the simulated tissue after the test, the measured drift, the measured conducted output power levels, target power reduction amount (when applicable), the measured SAR corrected for probe calibration (when applicable), and the extrapolated SAR. The exact method of extrapolation is:

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

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

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

A SPEAG™ MFP V5.1 C Triple Modular Phantom was used for the body-worn tests. The triple modular phantom consists of three identical modules that can be installed and removed separately without emptying the liquid. Each module of the triple phantom is constructed of glass-fiber reinforced vinylester (VG-GF) with a thickness at the bottom of 2.0 mm. It measures 29.2 cm(long) by 17.8 cm(wide) by 17.8 cm(tall). Alternately, a "flat" phantom was used for the body-worn tests. This "flat" phantom is made out of 1" thick natural High Density Polyethylene with a thickness at the bottom of 2.0 mm. It measures 52.7 cm(long) by 26.7 cm(wide) by 21.2 cm(tall).

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

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

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

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3115	1810	4.61	6 of 11
		2450	4.12	6 of 11
E-Field Probe ES3DV3	3184	835	6.10	6 of 11

Body-Worn, Front of Phone 25 mm from Phantom																
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Measured (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	18.3	0.068	23.93	-1	0.012		0.01	0.016		0.02		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	18.3	-0.559	24.70	0	0.180		0.20	0.238		0.27		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	18.3	-0.124	24.85	0	0.131		0.13	0.173		0.18		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	18.6	-0.121	23.07	-2	0.137		0.14	0.179		0.18		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	18.4	-0.157	24.05	-1	0.141		0.15	0.184		0.19		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	18.6	-0.015	24.20	-1	0.113		0.11	0.149		0.15		
835	CDMA 800, RC3 SO55	SNN5899A	1013												
			384	**19.0**	**-0.021**	**24.60**		**0.237**		**0.24**	**0.315**		**0.32**	**5x5x7**	**A57**
			777												
1880	CDMA 1900, RC3 SO55	SNN5899A	25												
			600	19.6	-0.055	25.16		0.333		0.34	0.542		0.55		
			1175												
2450	802.11b, 1 Mbps	SNN5899A	1												
			6												
			11	19.9	-0.045	18.51		0.019		0.02	0.034		0.03		

Table 10: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

Body-Worn, Back of Phone 25 mm from Phantom																
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Measured (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	18.3	-0.081	23.93	-1	0.062		0.06	0.084		0.09		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	18.3	0.059	24.70	0	0.054		0.05	0.075		0.07		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	18.1	-0.349	24.85	0	0.161		0.17	0.213		0.23		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	18.2	-0.199	23.07	-2	0.158		0.17	0.208		0.22		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	**18.2**	**-0.124**	**24.05**	**-1**	**0.199**	**0.202**	**0.21**	**0.262**	**0.268**	**0.28**	**5x5x7**	**A55**
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	18.2	0.159	24.20	-1	0.147		0.15	0.196		0.20		
835	CDMA 800, RC3 SO55	SNN5899A	1013												
			384	19.0	-0.070	24.60		0.217		0.22	0.288		0.29		
			777												
1880	CDMA 1900, RC3 SO55	SNN5899A	25												
			600	**19.6**	**-0.042**	**25.16**		**0.431**		**0.44**	**0.701**		**0.71**	**5x5x7**	**A58**
			1175												
2450	802.11b, 1 Mbps	SNN5899A	1	20.0	0.023	17.52		0.019		0.02	0.031		0.03		
			6	20.0	-0.009	18.04		0.019		0.02	0.034		0.03		
			11	**19.9**	**-0.005**	**18.51**		**0.022**		**0.02**	**0.038**		**0.04**	**5x5x7**	**A59**

Table 11: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

The DUT supports Simultaneous Voice and LTE (svLTE), allowing a CDMA voice call while simultaneously providing an LTE link for data transport on the cellular network. When operating during svLTE, a reduced maximum LTE transmit power limit is enforced to ensure SAR exposure compliance is maintained. This reduced limit is also enforced when operating as a mobile hotspot during svLTE.

The measurement data in the following tables is provided to demonstrate SAR performance for LTE when this functionality is enabled, for the purpose of evaluating simultaneous SAR cases. See section 6.5 for further information.

Body-Worn, Front of Phone 25 mm from Phantom															
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Limit[3] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	19.3	-0.169	22.0	-3	0.091		0.09	0.118		0.12		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	19.3	-0.036	23.0	-2	0.099		0.10	0.129		0.13		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	19.3	0.054	23.0	-2	0.082		0.08	0.108		0.11		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	19.5	-0.287	21.0	-4	0.075		0.08	0.098		0.10		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	19.5	0.017	22.0	-3	0.086		0.09	0.112		0.11		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	19.5	0.036	22.0	-3	0.075		0.08	0.098		0.10		

Table 12: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

Body-Worn, Back of Phone 25 mm from Phantom															
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Limit[3] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	19.3	0.025	22.0	-3	0.109		0.11	0.144		0.14		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	**19.3**	**-0.004**	**23.0**	**-2**	**0.133**	**0.135**	**0.14**	**0.177**	**0.182**	**0.18**	**5x5x7**	**A56**
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	19.3	-0.092	23.0	-2	0.103		0.11	0.135		0.14		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	19.6	-0.124	21.0	-4	0.089		0.09	0.118		0.12		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	19.5	0.014	22.0	-3	0.120		0.12	0.160		0.16		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	19.5	-0.089	22.0	-3	0.098		0.10	0.129		0.13		

Table 13: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

[3] For tests with power limit reductions employed, measured conducted power is not available by device design. Per FCC direction, measured power is replaced with the reduced maximum power limit for the device mode under test.

6.3 Lapdock Accessory Test Results

The DUT supports the use of the Motorola Lapdock™. The body-worn SAR results above were utilized to determine the channel that results in the highest measured SAR value when in proximity of the user's body. SAR testing was performed with the DUT placed into the Lapdock™ and the Lapdock™ placed for testing per FCC KDB 616217. For LTE and CDMA modes, the test sample was operated using an actual transmission through a base station simulator. Wi-Fi testing was conducted using manufacturer test mode software, per guidance given in FCC KDB 248227. The base station simulator or test software was set up for the proper channels, transmitter power levels and transmit modes of operation.

The SAR results shown in table 14 are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to [6]. Also shown are the temperature of the simulated tissue after the test, the measured drift, the measured conducted output power levels, target power reduction amount (when applicable), the measured SAR corrected for probe calibration (when applicable), and the extrapolated SAR. The exact method of extrapolation is:

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

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

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

A SPEAG™ MFP V5.1 C Triple Modular Phantom was used for the Lapdock™ tests. The triple modular phantom consists of three identical modules that can be installed and removed separately without emptying the liquid. Each module of the triple phantom is constructed of glass-fiber reinforced vinylester (VG-GF) with a thickness at the bottom of 2.0 mm. It measures 29.2 cm(long) by 17.8 cm(wide) by 17.8 cm(tall). Alternately, a "flat" phantom was used for the Lapdock™ tests. This "flat" phantom is made out of 1" thick natural High Density Polyethylene with a thickness at the bottom of 2.0 mm. It measures 52.7 cm(long) by 26.7 cm(wide) by 21.2 cm(tall).

The simulated tissue depth was verified to be 15.0 cm ± 0.5 cm. The DUT and Lapdock™ were placed using a Laptop Extension Kit available from SPEAG™ that facilitates the testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.). The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin-SAM Phantoms.

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

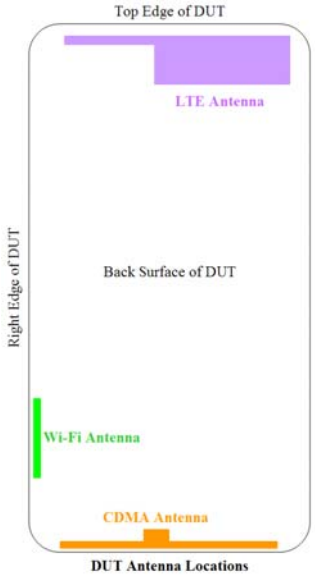
Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3115	1810	4.61	6 of 11
		2450	4.12	6 of 11
E-Field Probe ES3DV3	3184	835	6.10	6 of 11

Lapdock against Body, Bottom Surface of Lapdock 0 mm from Phantom, Screen opened 90 degrees															
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Measured (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	20.2	-0.386	24.05	-1	0.045	0.046	0.05	0.070	0.072	0.08	5x5x7	A61
835	CDMA 800, TD-SO32 (+FCH-SCH)	SNN5899A	1013												
			384	20.2	-0.061	24.59		0.296		0.30	0.433		0.44	5x5x7	A62
			777												
1880	CDMA 1900, TD-SO32 (+FCH-SCH)	SNN5899A	25												
			600	19.8	0.082	25.27		0.271		0.27	0.474		0.47	5x5x7	A63
			1175												
2450	802.11b, 1 Mbps	SNN5899A	1												
			6												
			11	20.0	-0.133	18.51		0.007		0.01	0.012		0.01	5x5x7	A64

Table 14: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

6.4 Mobile Hotspot Test Results

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



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

The SAR results shown in tables 15 through 25 are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to [6]. Also shown are the temperature of the simulated tissue after the test, the measured drift, the measured conducted output power levels, target power reduction amount (when applicable), the measured SAR corrected for probe calibration (when applicable), and the extrapolated SAR. The exact method of extrapolation is:

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

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

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

The test conditions that produced the highest SAR values in each band are indicated as bold numbers in the following tables and are included in Appendix 5. All other test conditions measured lower SAR values than those included in Appendix 5.

A SPEAG™ MFP V5.1 C Triple Modular Phantom was used for the mobile hotspot tests. The triple modular phantom consists of three identical modules that can be installed and removed separately without emptying the liquid. Each module of the triple phantom is constructed of glass-fiber reinforced vinylester (VG-GF) with a thickness at the bottom of 2.0 mm. It measures 29.2 cm(long) by 17.8 cm(wide) by 17.8 cm(tall). Alternately, a "flat" phantom was used for the mobile hotspot tests. This "flat" phantom is made out of 1" thick natural High Density Polyethylene with a thickness at the bottom of 2.0 mm. It measures 52.7 cm(long) by 26.7 cm(wide) by 21.2 cm(tall).

The simulated tissue depth was verified to be 15.0 cm ± 0.5 cm. The same device holder described in section 6 was used for positioning the phone.

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

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3115	1810	4.61	6 of 11
		2450	4.12	6 of 11
E-Field Probe ES3DV3	3184	835	6.10	6 of 11

Mobile Hotspot, Bottom Edge of Phone 10 mm from Phantom															
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Measured or Limit[4] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	CDMA 800, RC3 SO55	SNN5899A	1013												
			384	19.4	0.028	24.60		0.041		0.04	0.068		0.07		
			777												
1880	CDMA 1900, RC3 SO55	SNN5899A	25	20.3	-0.019	19.0	-6.0	0.752		0.76	1.46		1.47		
			600	20.8	-0.034	19.0	-6.0	0.702		0.71	1.34		1.35		
			1175	**20.2**	**-0.080**	**19.0**	**-6.0**	**0.741**		**0.75**	**1.48**		**1.51**	**5x5x7**	**A69**
	CDMA 1900, EVDO Rev. O[5]	SNN5899A	1175	20.6	0.039	19.0	-6.0	0.781		0.78	1.47		1.47		
2450	802.11b, 1 Mbps	SNN5899A	1												
			6												
			11	20.1	-0.026	18.51		0.019		0.02	0.036		0.04		

Table 14: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot, Top Edge of Phone 10 mm from Phantom															
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Measured or Limit[4] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	18.0	-0.013	23.93	-1	0.162		0.16	0.316		0.32		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	19.5	-0.072	24.70	0	0.205		0.21	0.396		0.40		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	19.2	-0.285	24.85	0	0.155		0.17	0.296		0.32		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	19.5	-0.072	23.07	-2	0.205		0.210	0.396		0.40		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	19.5	-0.207	24.05	-1	0.186		0.20	0.363		0.38		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	19.5	-0.074	24.20	-1	0.134		0.14	0.266		0.27		

Table 15: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

[4] For tests with power limit reductions employed, measured conducted power is not available by device design. Per FCC direction, measured power is replaced with the reduced maximum power limit for the device mode under test.

[5] CDMA testing for Mobile Hotspot was conducted using 1x mode. Per guidance from the FCC, additional testing was conducted using EVDO Rev. O mode and is presented here.

Mobile Hotspot, Left Edge of Phone 10 mm from Phantom																
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Measured or Limit[4] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	18.1	-0.063	23.93	-1	0.018		0.02	0.029		0.03		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	18.1	-0.570	24.70	0	0.126		0.14	0.197		0.22		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	19.2	-0.193	24.85	0	0.097		0.10	0.138		0.14		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	19.5	-0.069	23.07	-2	0.101		0.10	0.143		0.15		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	19.5	-0.104	24.05	-1	0.114		0.12	0.177		0.18		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	19.5	0.029	24.20	-1	0.079		0.08	0.114		0.11		
835	CDMA 800, RC3 SO55	SNN5899A	1013												
			384	19.4	-0.018	24.60		0.440		0.44	0.643		0.65		
			777												
1880	CDMA 1900, RC3 SO55	SNN5899A	25												
			600	20.7	-0.045	19.0	-6.0	0.015		0.02	0.023		0.02		
			1175												

Table 16: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot, Right Edge of Phone 10 mm from Phantom																
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Measured or Limit[4] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	19.5	0.032	23.93	-1	0.244		0.24	0.342		0.34		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	18.1	-0.446	24.70	0	0.290		0.32	0.409		0.45		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	18.5	-0.327	24.85	0	0.206		0.22	0.289		0.31		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	18.5	-0.476	23.07	-2	0.175		0.20	0.245		0.27		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	19.6	-0.154	24.05	-1	0.250		0.26	0.350		0.36		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	19.6	-0.055	24.20	-1	0.187		0.19	0.262		0.27		
835	CDMA 800, RC3 SO55	SNN5899A	1013												
			384	19.8	0.097	24.60		0.371		0.37	0.539		0.54		
			777												
1880	CDMA 1900, RC3 SO55	SNN5899A	25												
			600	20.7	-0.054	19.0	-6.0	0.118		0.12	0.195		0.20		
			1175												
2450	802.11b, 1 Mbps	SNN5899A	1	**19.9**	**0.216**	**17.52**		**0.178**		**0.18**	**0.381**		**0.38**	**5x5x7**	**A70**
			6	19.6	0.177	18.04		0.170		0.17	0.364		0.36		
			11	20.2	-0.057	18.51		0.168		0.17	0.362		0.37		

Table 17: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot, Front of Phone 10 mm from Phantom																
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Measured or Limit[4] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	18.0	-0.686	23.93	-1	0.223		0.26	0.299		0.35		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	18.1	-0.047	24.70	0	0.234		0.23	0.303		0.30		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	19.5	-0.038	24.85	0	0.195		0.20	0.262		0.26		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	19.5	-0.074	23.07	-2	0.209		0.21	0.285		0.29		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	19.0	-0.031	24.05	-1	0.213		0.21	0.282		0.28		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	19.0	-0.125	24.20	-1	-0.125		0.15	0.193		0.20		
835	CDMA 800, RC3 SO55	SNN5899A	1013	**19.0**	**-0.169**	**24.52**		**0.859**		**0.89**	**1.12**		**1.16**	**5x5x7**	**A68**
			384	18.2	-0.014	24.60		0.716		0.72	0.930		0.93		
			777	19.0	-0.104	24.36		0.745		0.76	0.972		1.00		
	CDMA 1900, EVDO Rev. O[6]	SNN5899A	1013	20.5	-0.298	24.20		0.781		0.84	0.997		1.07		
1880	CDMA 1900, RC3 SO55	SNN5899A	25	20.7	0.002	19.0	-6.0	0.567		0.57	1.08		1.08		
			600	20.7	-0.049	19.0	-6.0	0.537		0.54	1.03		1.04		
			1175	20.7	0.031	19.0	-6.0	0.500		0.50	0.974		0.97		
2450	802.11b, 1 Mbps	SNN5899A	1												
			6												
			11	20.0	-0.063	18.51		0.092		0.09	0.180		0.18		

Table 18: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot, Back of Phone 10 mm from Phantom																
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Measured or Limit[4] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	18.0	-0.410	23.93		0.395		0.43	0.714		0.78		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	19.5	-0.032	24.70		0.574		0.58	0.853		0.86		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	18.2	-0.422	24.85		0.385		0.42	0.698		0.77		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	18.5	-0.207	23.07		0.328		0.34	0.579		0.61		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	**18.2**	**0.283**	**24.05**		**0.497**	**0.505**	**0.51**	**0.906**	**0.931**	**0.93**	**5x5x7**	**A66**
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	18.2	0.006	24.20		0.320		0.32	0.583		0.58		
835	CDMA 800, RC3 SO55	SNN5899A	1013	19.0	-0.089	24.52		0.805		0.82	1.06		1.08		
			384	19.0	0.065	24.60		0.731		0.73	0.965		0.97		
			777	19.0	-0.025	24.36		0.690		0.69	0.919		0.92		
1880	CDMA 1900, RC3 SO55	SNN5899A	25	20.7	-0.025	19.0	-6.0	0.497		0.50	0.920		0.93		
			600	20.7	0.008	19.0	-6.0	0.489		0.49	0.912		0.91		
			1175	20.7	-0.011	19.0	-6.0	0.468		0.47	0.886		0.89		
2450	802.11b, 1 Mbps	SNN5899A	1												
			6												
			11	20.0	-0.009	18.51		0.090		0.09	0.174		0.17		

Table 19: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

[6] CDMA testing for Mobile Hotspot was conducted using 1x mode. Per guidance from the FCC, additional testing was conducted using EVDO Rev. O mode and is presented here.

The DUT supports Simultaneous Voice and LTE (svLTE), allowing a CDMA voice call while simultaneously providing an LTE link for data transport on the cellular network. When operating during svLTE, a reduced maximum LTE transmit power limit is enforced to ensure SAR exposure compliance is maintained. This reduced limit is also enforced when operating as a mobile hotspot during svLTE.

The measurement data in the following tables is provided to demonstrate SAR performance for LTE when this functionality is enabled, for the purpose of evaluating simultaneous SAR cases. See section 6.5 for further information.

Mobile Hotspot, Top Edge of Phone 10 mm from Phantom															
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Limit[4] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	19.7	-0.079	22.0	-3	0.117	X	0.12	0.230	X	0.23		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	19.8	0.016	23.0	-2	0.143	X	0.14	0.281	X	0.28		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	19.7	-0.004	23.0	-2	0.107	X	0.11	0.211	X	0.21		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	19.8	-0.312	21.0	-4	0.103	X	0.11	0.204	X	0.22		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	19.8	-0.184	22.0	-3	0.127	X	0.13	0.247	X	0.26		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	20.0	-0.100	22.0	-3	0.009	X	0.10	0.195	X	0.20		

Table 20: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot, Left Edge of Phone 10 mm from Phantom															
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Limit[4] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	19.9	0.029	22.0	-3	0.089	X	0.09	0.152	X	0.15		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	19.9	-0.375	23.0	-2	0.110	X	0.12	0.189	X	0.21		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	19.7	-0.024	23.0	-2	0.055	X	0.06	0.086	X	0.09		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	20.0	-0.177	21.0	-4	0.064	X	0.07	0.092	X	0.10		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	19.9	-0.112	22.0	-3	0.074	X	0.08	0.116	X	0.12		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	19.7	-0.349	22.0	-3	0.055	X	0.06	0.089	X	0.10		

Table 21: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot, Right Edge of Phone 10 mm from Phantom															
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Limit[4] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	19.9	-0.043	22.0	-3	0.148	X	0.15	0.208	X	0.21		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	19.9	-0.083	23.0	-2	0.178	X	0.18	0.250	X	0.25		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	19.7	0.011	23.0	-2	0.141	X	0.14	0.197	X	0.20		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	19.7	0.027	21.0	-4	0.121	X	0.12	0.170	X	0.17		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	19.7	-0.051	22.0	-3	0.146	X	0.15	0.204	X	0.21		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	19.7	-0.050	22.0	-3	0.126	X	0.13	0.177	X	0.18		

Table 22: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot, Front of Phone 10 mm from Phantom																
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Limit[4] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	19.7	-0.122	22.0	-3	0.145		0.15	0.189		0.19		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	19.7	-0.069	23.0	-2	0.164		0.17	0.216		0.22		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	19.7	-0.601	23.0	-2	0.140		0.16	0.187		0.21		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	19.7	-0.023	21.0	-4	0.138		0.14	0.187		0.19		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	19.7	-0.103	22.0	-3	0.153		0.16	0.210		0.22		
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	19.7	-0.410	22.0	-3	0.131		0.14	0.171		0.19		

Table 23: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot, Back of Phone 10 mm from Phantom																
f (MHz)	Mode	Battery/ Accessory	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value			1 g SAR value			Test Plot	
						Limit[4] (dBm)	Reduction Target (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	LTE Band 13, QPSK (50% RB)	SNN5899A	23230	19.7	-0.186	22.0	-3	0.261		0.27	0.459		0.48		
	LTE Band 13, QPSK (100% RB)	SNN5899A	23230												
	LTE Band 13, QPSK (1 RB @ Low)	SNN5899A	23230	19.7	-0.082	23.0	-2	0.342		0.35	0.601		0.61		
	LTE Band 13, QPSK (1 RB @ High)	SNN5899A	23230	19.7	-0.128	23.0	-2	0.232		0.24	0.405		0.42		
	LTE Band 13, 16QAM (50% RB)	SNN5899A	23230	19.7	-0.175	21.0	-4	0.313		0.33	0.579		0.60		
	LTE Band 13, 16QAM (100% RB)	SNN5899A	23230												
	LTE Band 13, 16QAM (1 RB @ Low)	SNN5899A	23230	**19.7**	**-0.071**	**22.0**	**-3**	**0.367**	**0.373**	**0.38**	**0.673**	**0.692**	**0.70**	**5x5x7**	**A67**
	LTE Band 13, 16QAM (1 RB @ High)	SNN5899A	23230	19.7	-0.022	22.0	-3	0.237		0.24	0.434		0.44		

Table 24: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

6.5 Description and Evaluation of Simultaneous Transmitters

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

By device design the CDMA and LTE transmitters may operate simultaneously with either the Wi-Fi 802.11 transmitter or the Bluetooth transmitter. The separation distance between the Wi-Fi 802.11/Bluetooth antenna and the CDMA antenna is 1.67 cm, and the separation between the Wi-Fi 802.11/Bluetooth antenna and the LTE antenna is 9.1 cm. Pictorial representation of the antenna locations and separation distances are given in Exhibit 7d.

The Bluetooth transmitter of the device under test can be excluded from stand-alone and simultaneous SAR evaluation, per the highlighted requirements from FCC KDB 648474, as follows. Note that Bluetooth mode is not intended for use in configurations against the head or during mobile hotspot operation, and this evaluation considers only the body-worn configuration.

1. The highest output conducted power measured for Bluetooth on the device under test is 8.77 mW [≤ 14 mW]
2. The separation distance between the Bluetooth antenna and the CDMA antenna is 1.67 cm [< 2.5 cm]
3. The highest 1-g Body-Worn SAR values for the other transmitters are:
   CDMA 800 (0.28 $^{W}/_{kg}$); CDMA 1900 (0.71 $^{W}/_{kg}$); LTE Band 13 (0.28 $^{W}/_{kg}$) [< 1.2 $^{W}/_{kg}$]

The Wi-Fi and the Bluetooth cannot transmit simultaneously, so there is no co-location test requirement for Wi-Fi and Bluetooth. CDMA supports both voice and data transmission, though not simultaneously. LTE and Wi-Fi support data transmission only.

Description of Simultaneous Transmit Capabilities				
Transmitter Combinations		Scenario Supported?	Supported for Mobile Hotspot?	Notes
#1	CDMA (1x Voice) + CDMA (1x Data)	No	No	DUT system architecture does not support simultaneous voice and data during a CDMA session on the cellular network
#2	CDMA (1x Voice) + CDMA (EVDO)	No	No	
#3	CDMA (1x Data) + CDMA (EVDO)	No	No	DUT system architecture supports only one data link per CDMA session
#4	CDMA (1x Voice) + LTE	Yes	No	*svLTE* – LTE operates at reduced power, see section 2.2.2
#5	CDMA (1x Data) + LTE	No	No	DUT system architecture supports only one data link per cellular session
	CDMA (EVDO) + LTE	No	No	DUT system architecture supports only one data link per cellular session
#6	CDMA (1x Voice) + Wi-Fi	Yes	No	Supported for voice plus background data; CDMA operates at reduced power, see section 2.2.2
#7	CDMA (1x Data) + Wi-Fi	Yes	Yes	CDMA operates at reduced power during mobile hotspot operation, See section 2.2.2
	CDMA (EVDO) + Wi-Fi	Yes	Yes	
#8	LTE + Wi-Fi	Yes	Yes	Supported for mobile hotspot operation only.
#9	CDMA (1x Voice) + LTE + Wi-Fi	Yes	Yes	CDMA operates at reduced power during mobile hotspot operation; *svLTE during Mobile Hotspot* – LTE operates at reduced power See section 2.2.2

For the transmitters requiring stand-alone SAR testing (CDMA, LTE, and Wi-Fi 802.11), the KDB guidelines direct that if the sum of the 1 g SAR measured for the simultaneously transmitting antennas is less than the SAR limit, SAR measurement for simultaneous transmission is not required. Further, if the SAR-to-peak-location separation ratio for two simultaneously transmitting antennas is less than 0.3 then SAR measurement for simultaneous transmission is likewise not required. Evaluations of the head, body, and mobile hotspot simultaneous SAR summations for the worst-case SAR transmitter configurations are presented in the tables below.

The following Head position SAR summations for simultaneous evaluation are provided to demonstrate a CDMA voice link with a simultaneous data link on LTE or Wi-Fi.

Evaluations for Simultaneous SAR, Head positions								
	Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)			
Transmitter Combination					#4	#4	#6	#6
Band / Position	CDMA 800	CDMA 1900	*LTE Band 13* (svLTE)	Wi-Fi 2450	CDMA 800 + *LTE Band 13*	CDMA 1900 + *LTE Band 13*	CDMA 800 + Wi-Fi 2450	CDMA 1900 + Wi-Fi 2450
Left Head Cheek	0.59	0.67	*0.41*	0.18	1.00	1.08	0.77	0.84
Left Head 15° Tilt	0.33	0.34	*0.35*	0.16	0.68	0.69	0.49	0.83
Right Head Cheek	0.63	1.45 (full power) *0.98* (with Wi-Fi on)	*0.51*	0.34	1.14	**>1.60**	1.06	*1.32*
Right Head 15° Tilt	0.33	0.26	*0.49*	0.10	0.82	0.75	0.43	0.36

The following Head position SAR summations for simultaneous evaluation are provided to demonstrate a CDMA voice link with simultaneous data links for LTE (to the cellular network) and Wi-Fi (to client devices), which can occur while the mobile hotspot functionality is enabled.[7]

Evaluations for Simultaneous SAR, Head positions Mobile Hotspot functionality enabled						
	Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)	
Transmitter Combination					#9	#9
Band / Position	CDMA 800	CDMA 1900	*LTE Band 13* (svLTE)	Wi-Fi 2450	CDMA 800 + *LTE Band 13* + Wi-Fi 2450	CDMA 1900 + *LTE Band 13* + Wi-Fi 2450
Left Head Cheek	0.59	0.67	*0.41*	0.18	1.18	1.36
Left Head 15° Tilt	0.33	0.34	*0.35*	0.16	0.84	0.85
Right Head Cheek	0.63	*0.98*	*0.51*	0.34	1.48	**>1.60**
Right Head 15° Tilt	0.33	0.26	*0.49*	0.10	0.92	0.85

[7] Note that during typical operation, the CDMA transmitter power is reduced for mobile hotspot operation and the LTE transmitter power is reduced as well for svLTE during mobile hotspot operation. The summations given are shown without CDMA power reduction enabled. As the SAR summations show results below the compliance limit using SAR values from higher-power configurations than used during typical operation, compliance with those reductions employed is implied.

The following Body-Worn position SAR summations for simultaneous evaluation are provided to demonstrate a CDMA voice link with a simultaneous data link on LTE or Wi-Fi.

Evaluations for Simultaneous SAR, Body-Worn positions								
	Transmitter Stand-Alone 1 g SAR Values (W/kg)				**1 g SAR Summations (W/kg)**			
Transmitter Combination					**#4**	**#4**	**#6**	**#6**
Band / Position	**CDMA 800**	**CDMA 1900**	***LTE Band 13* (svLTE)**	**Wi-Fi 2450**	**CDMA 800 + *LTE Band 13***	**CDMA 1900 + *LTE Band 13***	**CDMA 800 + Wi-Fi 2450**	**CDMA 1900 + Wi-Fi 2450**
Body Worn, Front of Phone 25 from Phantom	0.32	0.55	*0.13*	0.03	0.45	0.68	0.35	0.58
Body Worn, Back of Phone 25 from Phantom	0.29	0.71	*0.18*	0.04	0.47	0.89	0.33	0.75

The following Body-Worn position SAR summations for simultaneous evaluation are provided to demonstrate a CDMA voice link with simultaneous data links for LTE (to the cellular network) and Wi-Fi (to client devices), which can occur while the mobile hotspot functionality is enabled.[8]

Evaluations for Simultaneous SAR, Body-Worn positions Mobile Hotspot functionality enabled						
	Transmitter Stand-Alone 1 g SAR Values (W/kg)				**1 g SAR Summations (W/kg)**	
Transmitter Combination					**#9**	**#9**
Band / Position	**CDMA 800**	**CDMA 1900**	***LTE Band 13* (svLTE)**	**Wi-Fi 2450**	**CDMA 800 + *LTE Band 13* + Wi-Fi 2450**	**CDMA 1900 + *LTE Band 13* + Wi-Fi 2450**
Body Worn, Front of Phone 25 from Phantom	0.32	0.55	*0.13*	0.03	0.48	0.71
Body Worn, Back of Phone 25 from Phantom	0.29	0.71	*0.18*	0.04	0.51	0.93

[8] Note that during typical operation, the CDMA transmitter power is reduced for mobile hotspot operation and the LTE transmitter power is reduced as well for svLTE during mobile hotspot operation. The summations given are shown without CDMA power reduction enabled. As the SAR summations show results below the compliance limit using SAR values from higher-power configurations than used during typical operation, compliance with those reductions employed is implied.

The following Mobile Hotspot (10 mm separation) position SAR summations for simultaneous evaluation are provided to demonstrate a data link (over CDMA or LTE) with a simultaneous data link on Wi-Fi (to client devices).

Evaluations for Simultaneous SAR, Mobile Hotspot (10 mm separation) positions Mobile Hotspot functionality enabled							
	Transmitter Stand-Alone 1 g SAR Values (W/kg)				**1 g SAR Summations (W/kg)**		
Transmitter Combination					**#7**	**#7**	**#8**
Band / Position	**CDMA 800**	***CDMA 1900* (Reduced Power)**	**LTE Band 13**	**Wi-Fi 2450**	***CDMA 800* + Wi-Fi 2450**	***CDMA 1900* + Wi-Fi 2450**	**LTE Band 13 + Wi-Fi 2450**
Bottom Edge of DUT 10 mm from Phantom	0.07	*1.51*	0	0.04	0.11	1.55	0.04
Top Edge of DUT 10 mm from Phantom	0	*0*	0.40	0	0.40	0.40	0.40
Left Edge of DUT 10 mm from Phantom	0.65	*0.02*	0.22	0	0.65	0.02	0.22
Right Edge of DUT 10 mm from Phantom	0.54	*0.20*	0.45	0.38	0.92	0.58	0.83
Front Surface of DUT 10 mm from Phantom	1.16	*1.08*	0.35	0.18	1.34	1.26	0.53
Back Surface of DUT 10 mm from Phantom	1.08	*0.93*	0.93	0.17	1.25	1.10	1.10

The following Mobile Hotspot (10 mm separation) position SAR summations for simultaneous evaluation are provided to demonstrate a CDMA voice link with simultaneous data links for LTE (to the cellular network) and Wi-Fi (to client devices), which can occur while the mobile hotspot functionality is enabled.

Evaluations for Simultaneous SAR, Mobile Hotspot (10 mm) position Mobile Hotspot functionality enabled						
	Transmitter Stand-Alone 1 g SAR Values (W/kg)				**1 g SAR Summations (W/kg)**	
Transmitter Combination					**#9**	**#9**
Band / Position	**CDMA 800**	***CDMA 1900* (Reduced Power)**	***LTE Band 13* (svLTE)**	**Wi-Fi 2450**	**CDMA 800 + *LTE Band 13* + Wi-Fi 2450**	**CDMA 1900 + *LTE Band 13* + Wi-Fi 2450**
Bottom Edge of DUT 10 mm from Phantom	0.07	*1.51*	*0*	0.04	0.11	1.55
Top Edge of DUT 10 mm from Phantom	0	*0*	*0.28*	0	0.28	0.28
Left Edge of DUT 10 mm from Phantom	0.65	*0.02*	*0.21*	0	0.86	0.23
Right Edge of DUT 10 mm from Phantom	0.54	*0.20*	*0.25*	0.38	1.37	0.83
Front Surface of DUT 10 mm from Phantom	1.16	*1.08*	*0.22*	0.18	1.56	1.48
Back Surface of DUT 10 mm from Phantom	1.08	*0.93*	*0.70*	0.17	**>1.60**	**>1.60**

The following body-adjacent position SAR summations with Lapdock™ for simultaneous evaluation are provided to demonstrate a CDMA voice link with Wi-Fi, a cellular link with Wi-Fi for mobile hotspot operation, and CDMA voice link with simultaneous data links for LTE (to the cellular network) and Wi-Fi (to client devices) for svLTE during a mobile hotspot session.[9]

Evaluations for Simultaneous SAR, Lapdock against Body Mobile Hotspot functionality enabled where applicable									
	Transmitter Stand-Alone 1 g SAR Values (W/kg)				**1 g SAR Summations (W/kg)**				
Transmitter Combination					**#6 or #7**	**#6 or #7**	**#8**	**#9**	**#9**
Band / Position	**CDMA 800**	**CDMA 1900**	**LTE Band 13**	**Wi-Fi 2450**	**CDMA 800 + Wi-Fi 2450**	**CDMA 1900 + Wi-Fi 2450**	**LTE Band 13 + Wi-Fi 2450**	**CDMA 800 + LTE Band 13 + Wi-Fi 2450**	**CDMA 1900 + LTE Band 13 + Wi-Fi 2450**
Bottom Surface of Lapdock 0 mm from Phantom	0.44	0.47	0.08	0.01	0.45	0.48	0.09	0.53	0.56

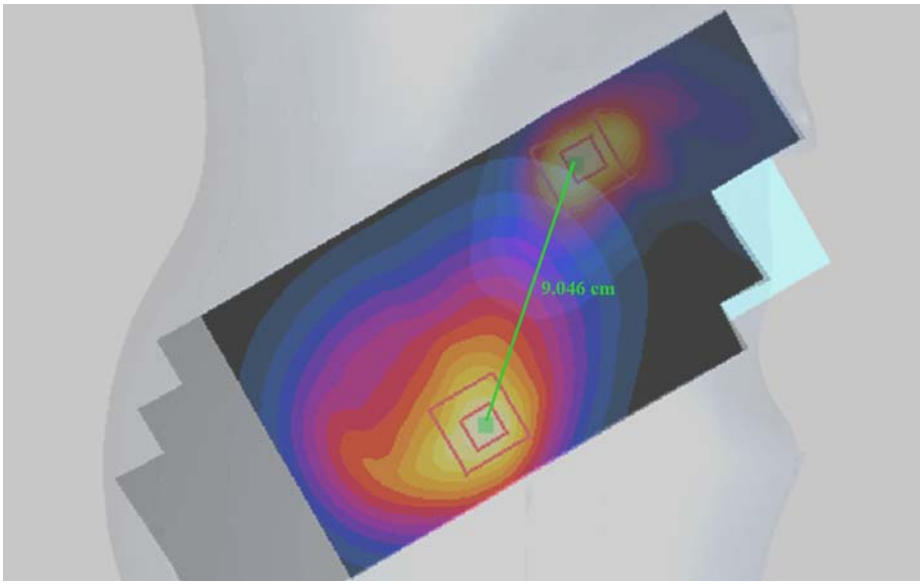
[9] Note that during typical operation, the CDMA transmitter power is reduced for mobile hotspot operation and the LTE transmitter power is reduced as well for svLTE during mobile hotspot operation. The summations given are shown without CDMA or LTE power reduction enabled. As the SAR summations show results below the compliance limit using SAR values from higher-power configurations than used during typical operation, compliance with those reductions employed is implied.

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

A. Right Cheek, CDMA 1900 + LTE Band 13 (svLTE)
B. Right Cheek, CDMA 1900 + LTE Band 13 + Wi-Fi 2450 (svLTE during mobile hotspot session)
C. Back of DUT 10 mm from Phantom, CDMA 800 + LTE Band 13 + Wi-Fi 2450 (svLTE during mobile hotspot session)
D. Back of DUT 10 mm from Phantom, CDMA 1900 + LTE Band 13 + Wi-Fi 2450 (svLTE during mobile hotspot session)

The guidelines provided in "SAR for Handsets with Multiple Transmitters" (KDB publication 648474 - D01 v01r03) were utilized for evaluation of the need for simultaneous transmission SAR testing. These guidelines direct that if the SAR-to-peak location separation ratio (SPLSR) for a pair of antennas is < 0.3 then SAR evaluation for simultaneous transmission is not required. Overlaid SAR plots, separation distances between RF peaks[10], and demonstration of these calculations are provided below for each noted case.

Case A: Right Cheek, CDMA 1900 + LTE Band 13 (svLTE)



CDMA 1900 Right Head Cheek SAR overlaid with LTE Band 13 Right Head Cheek SAR

Transmitter	1-g SAR
CDMA 1900	1.45
LTE Band 13 (svLTE)	0.51
Sum	1.95
Peak separation distance	9.046 cm
SPLSR	*0.22*

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

[10] 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 B: Right Cheek, CDMA 1900 + LTE Band 13 + Wi-Fi 2450 (svLTE during mobile hotspot operation)

Investigation of this case revealed that the relative positions of the RF peaks resulted in SPLSR values to be much greater than 0.30, and thus aggregate 1-g SAR measurements were required.

SAR measurements for simultaneous transmission evaluation were performed for each of the single transmitters using an extended zoom scan. This extended zoom scan was created to encompass the zoom scan volumes that were found previously in each of the single transmit SAR tests. For this case, the outer dimensions of the extended zoom scan were X = 136 mm, Y = 56 mm, Z = 30 mm with a step size of X = 8 mm, Y = 8 mm, Z = 5 mm.

The location of this extended zoom scan was established by using X, Y grid offsets from the "Grid Reference Point" in DASY4.7. The results were then combined via the SEMCAD X Combined Multi Band Averaged SAR tool. Use of this tool allows for a complete three-way combination of the SAR measurements, including compensations for power drift and corrections for probe calibration required for LTE Band 13 measurements.

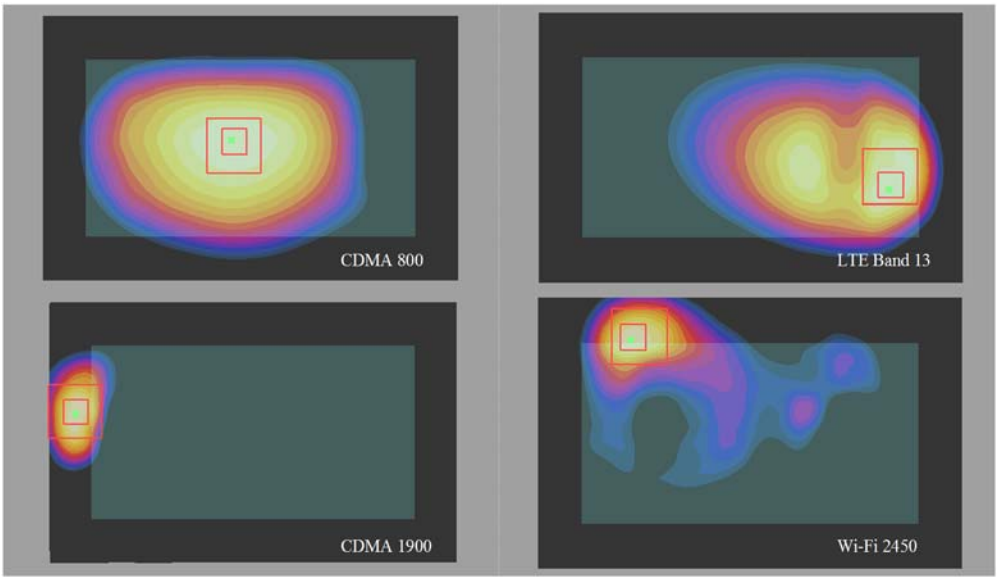
A comparison can be performed between the stand-alone measurements for each noted transmitter and the measurements provided for simultaneous transmission. The measurements were not performed sequentially and thus may show slightly different results due to a number of reasons including, but not limited to, slight differences in DUT positioning.

Aggregate 1-g SAR Measurement, Right Cheek					
	Transmitter Stand-Alone 1 g SAR Values (W/kg)			**Aggregate 1 g (W/kg)**	
Band / **Position**	***CDMA 1900*** ***(Reduced Power)***[11]	***LTE Band 13 (svLTE)***	**Wi-Fi 2450**	***CDMA 1900 + LTE Band 13 +*** **Wi-Fi 2450**	**Plot Pages**
Right Cheek	***0.99***	***0.57***	**0.39**	**1.42**	**A72-A75**

Plots for these measurements and their three-way combination are provided in Appendix 6.

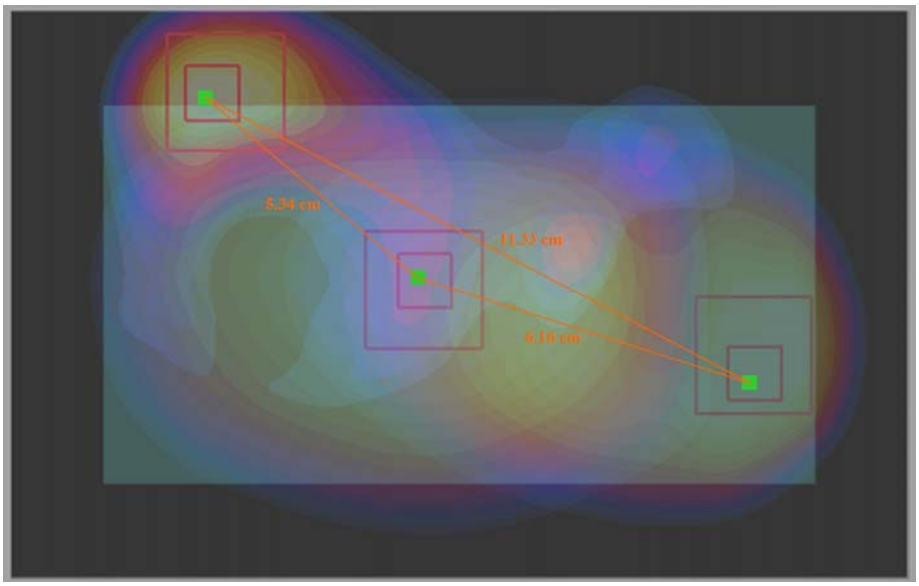
[11] Due to limitations in the DUT's software at the time of evaluation, the operation of CDMA 1900 for this test was conducted with a power limit reduction of 1.5 dB (for CDMA + Wi-Fi noted in section 2.2.2) instead of the intended 6 dB for operation during a mobile hotspot session. As the aggregate SAR measurement demonstrates compliance at this higher power limit, compliance with the device operating at the intended reduced power limit is implied.

Cases C and D: Plots of individual transmitter RF peaks, Back of DUT 10 mm from Phantom



Peak SAR location plots per transmitter (plots normalized for 0 dB to -3 dB from peak SAR value per transmitter)

Case C: Back of DUT 10 mm from Phantom, CDMA 800 + LTE Band 13 + Wi-Fi 2450 (svLTE during mobile hotspot operation)



CDMA 800 + LTE Band 13 + Wi-Fi 2450 SAR plots overlaid

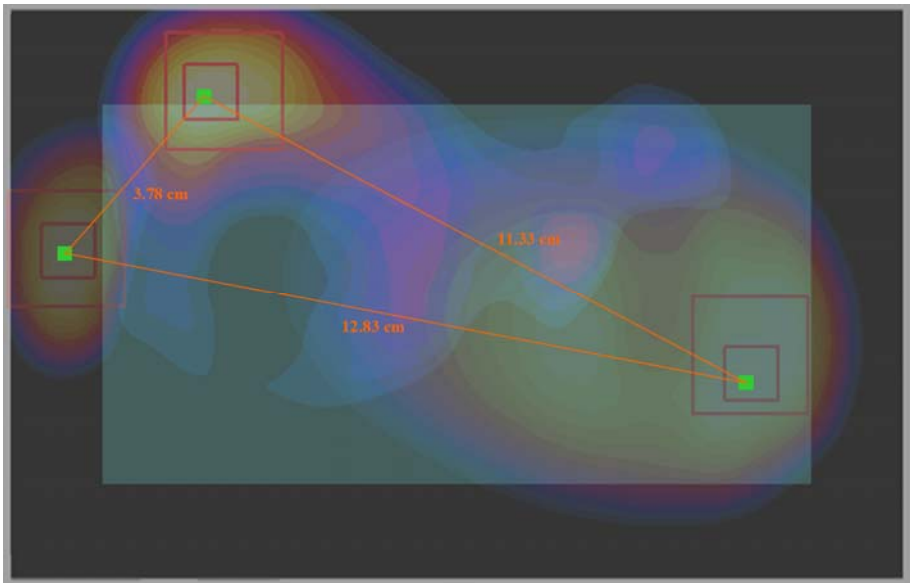
Transmitter	1-g SAR
CDMA 800	1.08
LTE Band 13 *(svLTE)*	0.70
Sum	1.78
Peak separation distance	6.16 cm
SPLSR	*0.29*

Transmitter	1-g SAR
CDMA 800	1.08
Wi-Fi 2450	0.17
Sum	1.25
Peak separation distance	5.34 cm
SPLSR	*0.23*

Transmitter	1-g SAR
Wi-Fi 2450	0.17
LTE Band 13 *(svLTE)*	0.70
Sum	0.87
Peak separation distance	11.33 cm
SPLSR	*0.08*

As all SPLSR values are below 0.30 for each pair of transmitters, no measurements to determine the aggregate 1-g SAR were required for this case.

Case D: Back of DUT 10 mm from Phantom, CDMA 1900 + LTE Band 13 + Wi-Fi 2450 (svLTE during mobile hotspot operation)



CDMA 1900 + LTE Band 13 + Wi-Fi 2450 SAR plots overlaid

Transmitter	1-g SAR
CDMA 1900 *(reduced power)*	0.93
LTE Band 13 *(svLTE)*	0.70
Sum	1.63
Peak separation distance	12.83 cm
SPLSR	*0.13*

Transmitter	1-g SAR
CDMA 1900 *(reduced power)*	0.93
Wi-Fi 2450	0.17
Sum	1.10
Peak separation distance	3.78 cm
SPLSR	*0.29*

Transmitter	1-g SAR
Wi-Fi 2450	0.17
LTE Band 13 *(svLTE)*	0.70
Sum	0.87
Peak separation distance	11.33 cm
SPLSR	*0.08*

As all SPLSR values are below 0.30 for each pair of transmitters, no measurements to determine the aggregate 1-g SAR were required for this case.

References

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

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

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

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

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

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