



FCC OET BULLETIN 65 SUPPLEMENT C 01-01

IEEE STD 1528:2003

SAR EVALUATION REPORT

For

Cellular/PCS CDMA and GSM/WCDMA and LTE Phone with Bluetooth and WLAN

MODEL: LG-VS920, VS920 and LGVS920

FCC ID: BEJVS920

REPORT NUMBER: 11U13867-20A

ISSUE DATE: August 8, 2011

Prepared for

LG ELECTRONICS INC.

1000 SYLVAN AVENUE

ENGLEWOOD CLIFFS, NEW JERSEY 07632

Prepared by

COMPLIANCE CERTIFICATION SERVICES (UL CCS)

47173 BENICIA STREET

FREMONT, CA 94538, U.S.A.

TEL: (510) 771-1000

FAX: (510) 661-0888



NVLAP LAB CODE 200065-0

Revision History

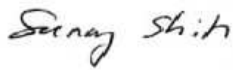
<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	July 26, 2011	Initial Issue	--
A	August 8, 2011	Updated report based on reviewer's comments	Sunny Shih

Table of Contents

1. Attestation of Test Results	5
2. Test Methodology.....	6
3. Facilities and Accreditation.....	6
4. Calibration and Uncertainty.....	7
4.1. Measuring Instrument Calibration.....	7
4.2. Measurement Uncertainty	8
5. System Specifications	9
6. Composition of Ingredients for Tissue Simulating Liquids.....	10
7. SAR Measurement Procedure	11
8. Equipment Under Test	12
8.1. LTE Maximum Power Reduction (MPR).....	13
8.2. SVDO/SVLTE Power Reduction.....	13
8.3. Wireless Charger Back Cover	13
8.4. 941225 D05 "SAR for LTE Devices v01"	14
8.5. Simultaneous SAR Assessment based upon user Scenarios.....	18
9. Simulating Liquid Parameters	19
9.1. Liquid Parameter Check Results	20
10. System Verification	22
10.1. System Check Results	23
11. RF Output Power Measurements	25
11.1. CDMA2000 1xRTT.....	25
11.2. CDMA2000 1x EVDO.....	26
11.3. GSM.....	28
11.4. WiFi.....	30
11.5. WCDMA (UMTS Band II)	31
11.6. LTE Band 13.....	33
11.7. Power Reduction for SVLTE & SVDO	34
4. Standalone SAR Test Results	40
4.1. LTE Band 13.....	41
4.2. CDMA850	43
4.3. CDMA1900	45

4.4.	GSM850.....	47
4.5.	GSM1900.....	49
4.6.	WCDMA 1900 (UMTS Band II).....	51
4.7.	WiFi 2.4 GHz.....	52
5.	Simultaneous Transmission SAR Analysis (KDB 648474)	53
5.1.	Head Exposure Conduction	53
5.2.	Body-worn and Body-hotspot Exposure Condition	54
5.3.	SAR to Peak Location Separation Ratio.....	55
6.	Volume Scans.....	59
6.1.	Volume Scan Test Results	59
6.2.	Multi Band Results	59
7.	Appendix.....	69
8.	Antenna Locations & Separation Distances.....	70
9.	Test Set-up Photos.....	71
10.	External Photos	79

1. Attestation of Test Results

Tested for:	LG ELECTRONICS INC. 1000 SYLVAN AVENUE ENGLEWOOD CLIFFS, NEW JERSEY 07632		
EUT description:	Cellular/PCS CDMA and GSM/WCDMA and LTE Phone with Bluetooth and WLAN		
Model number:	LG-VS920, VS920 and LGVS920, IMEI: 99 0000610001267		
Device category:	Portable devices		
Exposure category:	General Population/Uncontrolled Exposure		
Date tested:	June 20 - July 2 , 2011		
FCC Rule Parts	Freq. Range [MHz]	Highest 1-g SAR (W/kg)	Limit (W/kg)
22H	824-849	Head: 0.612 W/kg (Left Touch) Body-worn: 0.667 W/kg (Rear w/ 10 mm distance) Body-hotspot: 0.666 W/kg (Rear w/ 10 mm distance)	1.6
24E	1850-1910	Head: 0.856 W/kg (Right Touch) Body-worn: 1.11 W/kg (Rear w/ 10 mm distance) Body-hotspot: 1.11 W/kg (Rear w/ 10 mm distance)	
27	777-787	Head: 0.3 W/kg (Left Touch) Body-worn: 0.282 W/kg (Front w/ 10 mm distance) Body-hotspot: 0.337 W/kg (Left hand side w/ 10 mm distance)	
15.247	2412-2462	Head: 0.144 W/kg (Right Touch) Body-worn: 0.08 W/kg (Rear w/ 10 mm distance) Body-hotspot: 0.08 W/kg (Rear w/ 10 mm distance)	
Applicable Standards			Test Results
FCC OET BULLETIN 65 SUPPLEMENT C; IEEE STD 1528:2003; RSS-102 Issue 4, March 2010			Pass
Compliance Certification Services, Inc. (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report. Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.			
Approved & Released For UL CCS By:		Tested By:	
			
Sunny Shih Engineering Team Leader Compliance Certification Services (UL CCS)		David Lee Associate RF Engineer Compliance Certification Services (UL CCS)	

2. Test Methodology

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C Edition 01-01, IEEE STD 1528:2003, RSS-102 Issue 4, March 2010, and RSS-102 Supplementary Procedures (SPR)-001, January 1, 2011 and the following KDB Procedures.

- o 648474 D01 SAR Handsets Multi Xmitter and Ant, v01r05
- o 248227 D01 SAR meas for 802 11abg v01r02
- o 941225 D01 SAR test for 3G devices v02
- o 941225 D02 Guidance for 3GPP R6 and R7 HSPA v02v01
- o 941225 D03 SAR Test Reduction GSM GPRS EDGE v01
- o 941225 D05 SAR for LTE Devices v01
- o 941225 D06 Hot Spot SAR v01

KDB inquiry #: 181634

3. Facilities and Accreditation

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4. Calibration and Uncertainty

4.1. Measuring Instrument Calibration

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due date		
				MM	DD	Year
Dielectronic Probe kit	HP	85070C	N/A	N/A		
ESA Series Network Analyzer	Agilent	E5071B	MY42100131	8	2	2011
Synthesized Signal Generator	HP	83732B	US34490599	7	14	2012
E-Field Probe	SPEAG	EX3DV4	3749	12	13	2011
E-Field Probe	SPEAG	EX3DV4	3686	1	24	2012
Thermometer	ERTCO	639-1S	1718	7	19	2011
Data Acquisition Electronics	SPEAG	DAE3	427	7	21	2011
Data Acquisition Electronics	SPEAG	DAE4	1239	11	11	2011
System Validation Dipole	SPEAG	D750V3	1024	4	20	2012
System Validation Dipole	SPEAG	D835V2	4d117	4	15	2012
System Validation Dipole	SPEAG	D1900V2	5d140	4	18	2012
System Validation Dipole	SPEAG	*D2450V2	706	4	19	2012
Power Meter	Giga-tronics	8651A	8651404	5	13	2012
Power Sensor	Giga-tronics	80701A	1834588	5	13	2012
Power Meter	HP	437B	3125U16345	5	13	2012
Power Sensor	HP	8481A	2702A60780	5	13	2012
Amplifier	MITEQ	4D00400600-50-30P	1620606	N/A		
Directional coupler	Werlatone	C8060-102	2141	N/A		

Notes:

Per KDB 450824 D02 requirements for dipole calibration, UL CCS has adopted two years calibration intervals. On annual basis, each measurement dipole has been evaluated and is in compliance with the following criteria:

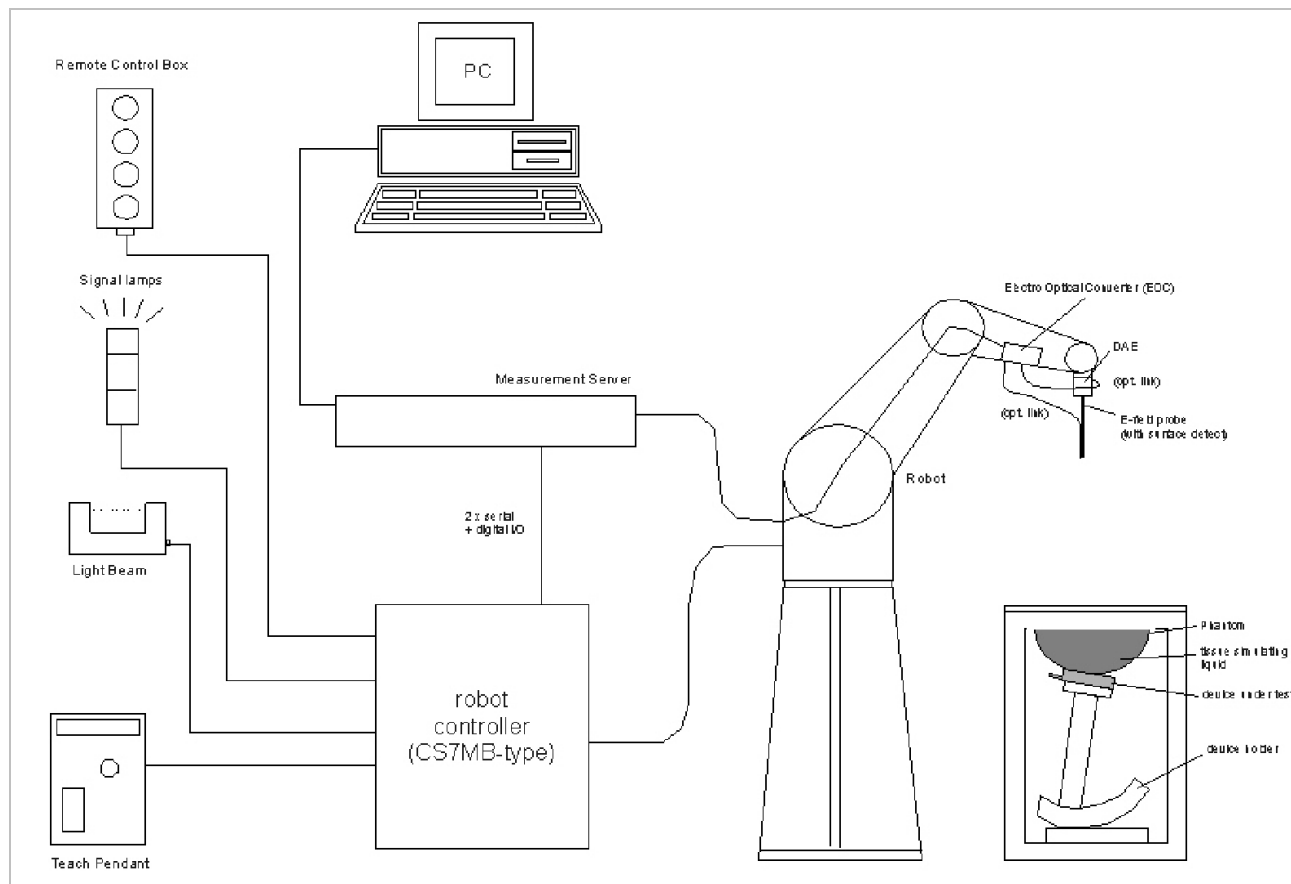
1. There is no physical damage on the dipole
2. System validation with specific dipole is within 10% of calibrated value.
3. Return-loss is within 20% of calibrated measurement. (See Appendix "8_Calibration Certificate - Validation Dipole D2450V2 - SN 706" with extended cal. data)
4. Impedance is within 5Ω of calibrated measurement (See Appendix "8_Calibration Certificate - Validation Dipole D2450V2 - SN 706" with extended cal. data)

4.2. Measurement Uncertainty

Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram

Component	error, %	Probe Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	5.50	Normal	1	1	5.50
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	3.45	Rectangular	1.732	1	1.99
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	0.30	Normal	1	1	0.30
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	1.00	Rectangular	1.732	1	0.58
Test Sample Related					
Test Sample Positioning	2.90	Normal	1	1	2.90
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.64	1.85
Liquid Conductivity - measurement (Head 835)	2.08	Normal	1	0.64	1.33
Liquid Permittivity - deviation from target		Rectangular	1.732	0.6	0.00
Liquid Permittivity - measurement uncertainty (Head 835)	3.18	Normal	1	0.6	1.91
Combined Standard Uncertainty Uc(y) =					9.57
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				19.13	%
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				1.52	dB

5. System Specifications



The DASY system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY software.
- Remote controls with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing validating the proper functioning of the system.

6. Composition of Ingredients for Tissue Simulating Liquids

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
 Water: De-ionized, 16 MΩ+ resistivity HEC: Hydroxyethyl Cellulose
 DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
 Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

MSL/HSL750 (Body and Head liquids for 700 – 800 MHz)

Item	Head Tissue Simulation Liquids HSL750 Muscle (body) Tissue Simulation Liquids HSL750
Type No	SL AAH 075
Manufacturer	SPEAG
The item is composed of the following ingredients:	
H ² O	Water, 35 – 58%
Sucrose	Sugar, white, refined, 40-60%
NaCl	Sodium Chloride, 0-6%
Hydroxyethyl-cellulose	Medium Viscosity (CAS# 9004-62-0), <0.3%
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone, 0.1-0.7%

MSL/HSL1750 (Body and Head liquids for 1700 – 1800 MHz)

Item	Head Tissue Simulation Liquids HSL1750 Muscle (body) Tissue Simulation Liquids HSL1750
Type No	SL AAM 175
Manufacturer	SPEAG
The item is composed of the following ingredients:	
H ² O	Water, 52 – 75%
C8H18O3	Diethylene glycol monobutyl ether (DGBE), 25-48%
NaCl	Sodium Chloride, <1.0%

7. SAR Measurement Procedure

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties (for example, 1.2 mm for an EX3DV3 probe type).

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE Standard 1528, EN 50361 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures $\geq 7 \times 7 \times 9$ (above 4.5 GHz) or $5 \times 5 \times 7$ (below 3 GHz) points within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

Step 5: Z-Scan

The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation, the extrapolated distance should not be larger than the step size in Z-direction.

8. Equipment Under Test

Cellular/PCS CDMA and GSM/WCDMA and LTE Phone with Bluetooth and WLAN.

The device is capable of personal hotspot mode.

Model: LG-VS920, VS920 and LGVS920

Normal operation:	- Held to head, - Worn on body (LCD facing-up and LCD facing-down) with 10 mm separation distance. - Personal Hot Spot with 10 mm separation distance to all sides and edges.
Body Worn Accessory	- Headset - Standard back cover and Wireless Charger Back Cover
Antenna-to-antenna and antenna-to-edges' separation distances:	Please refer to Section "16 Antenna Locations & Separation Distances" for details

The EUT is a dual transmitter Simultaneous Voice and Data device that contains two independent WWAN transmitters with the capabilities listed in **Table 1**. The first transmitter supports a CDMA2000 1x call (e.g. voice, SMS) and the second transmitter supports a CDMA2000 EVDO or LTE data call. A simultaneous CDMA 1x voice and CDMA EVDO data connection is referred to as "SVDO" while a simultaneous CDMA 1x voice and LTE data connection is referred to as "SVLTE". When the device is connected to GSM network, CDMA/EVDO and/or LTE is disconnected.

The transmitters are independent in respect to the RF chains as each transmitter has dedicated RF circuitry (PA, RF filtering) and a unique transmit antenna as shown in section 8. The device also contains an additional antenna associated with receiver diversity or unlicensed transmitters. The LTE UL MIMO configuration is 1x2 (1 UL antenna and 2 DL RX antennas).

Although the RF circuits are independent for both transmitters, the QUALCOMM Incorporated SVDO/SVLTE implementation does include electrical connections between the voice and data transmitters such that the device can coordinate the transmit power of both transmitters. That said, the transmitters operate independently in the sense that they independently support voice or data connection without interaction between the modems or signaling from the WWAN network.

Table 1 EUT Technology Support

Mode	Radio Technology	Supported Frequency Band(s) (MHz)	Channel BW (MHz)
Voice	CDMA2000 1x	Band Class 0: 824-848; Band Class I: 1850-1910	1.23 MHz
Voice	GSM	Cellular / 850 MHz and PCS / 1900 MHz bands	250 kHz
Voice	WCDMA	Band II: PCS/1900 MHz Band	5 MHz
Data	**CDMA2000 1xEVDO RevA	Band Class 0: 824-848; Band Class I: 1850-1910	1.23 MHz
Data	**GPRS/EDGE Class 12	Cellular /850 MHz and PCS/1900 MHz bands	250 kHz
Data	HSPA	Band II: PCS/1900 MHz Band	5 MHz
Data	*LTE	Band 13 (Upper 700 MHz): 777-787	10 MHz
Data	**802.11b/g/n	2412 – 2462 MHz	20 MHz max
Data	Bluetooth 3.0 EDR	2402 – 2480 MHz	2 MHz

Notes:

*The EUT does implement Maximum Power Reduction per 36.101 Section 6.2.3

** Supported VOIP.

8.1. LTE Maximum Power Reduction (MPR)

The EUT enables maximum power reduction in accordance with 3GPP 36.101. The LTE MPR targets are document in the tune up procedure. The MPR settings are configured during the manufacture process and are not configurable by the network, carrier, or end user.

8.2. SVDO/SVLTE Power Reduction

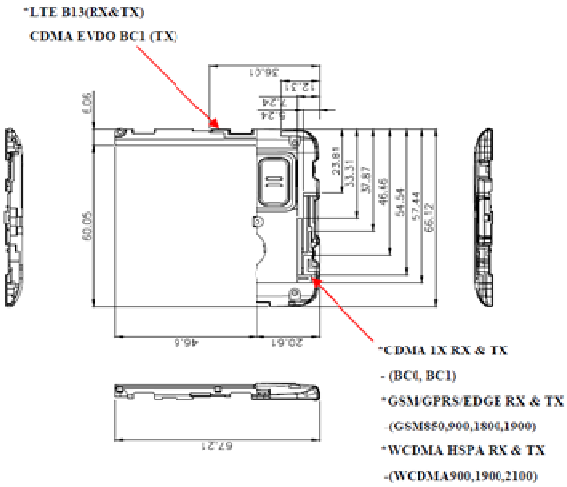
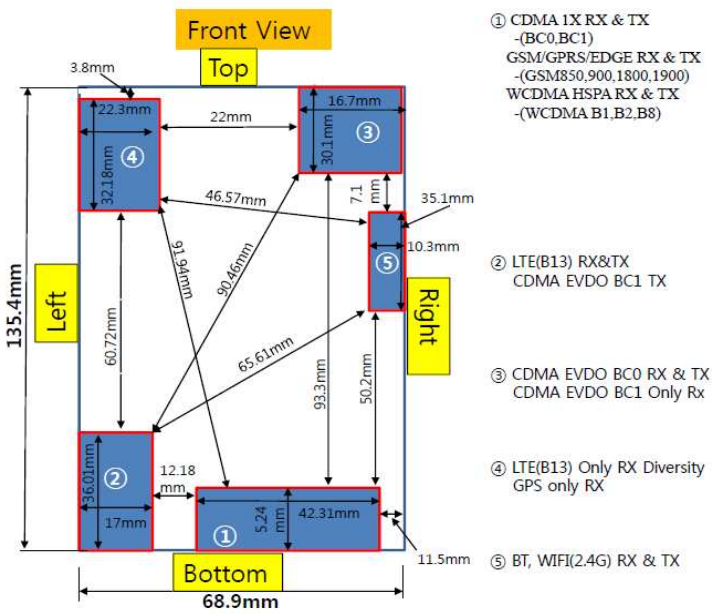
The EUT uses a power reduction technique where the data mode transmit power is reduced a predetermined amount based on the voice transmit power. As voice 1x power approaches maximum transmit power, the data mode transmit power is reduced a configured magnitude. For low voice 1x power levels, there is no restriction on the data mode transmit power.

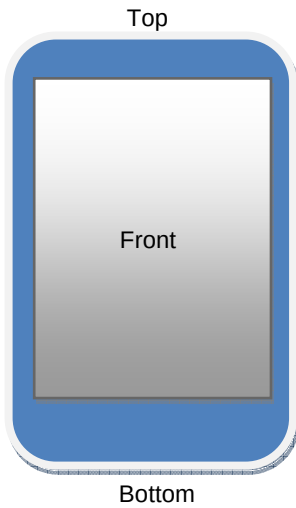
Although this device supports SVDO/SVLTE power reduction, initial SAR evaluation will use the max. output power without power reduction. If the SVDO and SVLTE mode of operation can achieve SAR compliance without power reduction, SVDO and SVLTE with reduced power will not be performed. However, if during SAR evaluation, it is determined that power reduction is required to achieve SAR compliance; test report will include the output power used during final SAR evaluation.

8.3. Wireless Charger Back Cover

Wireless charger back cover will be sold as optional device for the phone. SAR evaluation will be performed on the standard cover and repeat the SAR evaluation on the highest SAR value for Head/Body worn and mobile hot spot mode with Wireless Charger Back Cover.

8.4. 941225 D05 "SAR for LTE Devices v01"

#	Description	Parameter
1	Identify the operating frequency range of each LTE transmission band used by the device	Band 13: frequency range - 777.0 MHz to 787 MHz
2	Identify the channel bandwidths used in each frequency band; 1.4, 3, 5, 10, 15, 20 MHz etc	Channel Bandwidth used is 10MHz
3	Identify the high, middle and low (H, M, L) channel numbers and frequencies in each LTE frequency band	The channel in the 10MHz is Ch No.: 23230 and Frequency: 782MHz
4	Specify the UE category and uplink modulations used	The UE Category is 3 and the Uplink modulations used are QPSK, 16QAM
5	Descriptions of the LTE transmitter and antenna implementation & identify whether it is a standalone transmitter operating independently of other wireless transmitters in the device or sharing hardware components and/or antenna(s) with other transmitters etc.	This model (VS920) has the same hardware and one Tx antenna for CDMA PCS (US), EVDO and LTE.  *LTE B13(RX&TX) CDMA EVDO BC1 (TX) *CDMA 1X RX & TX -(BC0, BC1) *GSM/GPRS/EDGE RX & TX -(GSM850,900,1800,1900) *WCDMA HSPA RX & TX -(WCDMA900,1900,2100) * VS920 Antenna Distance  ① CDMA 1X RX & TX -(BC0,BC1) GSM/GPRS/EDGE RX & TX -(GSM850,900,1800,1900) WCDMA HSPA RX & TX -(WCDMA B1,B2,B8) ② LTE(B13) RX&TX CDMA EVDO BC1 TX ③ CDMA EVDO BC0 RX & TX CDMA EVDO BC1 Only Rx ④ LTE(B13) Only RX Diversity GPS only RX ⑤ BT, WIFI(2.4G) RX & TX

#	Description	Parameter																
6	Identify the LTE voice/data requirements in each operating mode and exposure condition with respect to head and body test configurations, antenna locations, handset flip-cover or slide positions, antenna diversity conditions, etc.	The following exposure condition with respect to head and body test are required for both voice and data modes due to EUT functionality and antenna locations. 1) Body SAR is required at 10 mm separation distance 2) Mobile Hot Spot Mode will be tested by positioning the smart phone with 10 mm separation distance. - Wireless Personal Hotspot mode with consideration for the Front Display of EUT, Rear of EUT, Left Hand side of EUT, Right Hand side of EUT, Top Edge of EUT and Bottom Edge of EUT with respect to the antenna location. The test separation distance between the EUT edge and phantom flat surface for this mode will be 10mm as the dimensions of the device is > 9cm x 5cm. 3) Head SAR is required in LTE mode as this model supports SVLTE operation.  The diagram shows a blue smartphone with a white screen. Labels indicate the orientation: 'Top' at the top, 'Bottom' at the bottom, 'Left hand side' on the left, 'Right hand side' on the right, and 'Front' in the center of the screen area.																
7	Identify if Maximum Power Reduction (MPR) is optional or mandatory, i.e. built-in by design: a) only mandatory MPR may be considered during SAR testing, when the maximum output power is permanently limited by the MPR implemented within the UE; and only for the applicable RB (resource block) configurations specified in LTE standards b) A-MPR (additional MPR) must be disabled.	The EUT incorporates MPR as per 36.101 as shown in the table below. MPR cannot be disabled after the phone is manufactured, MPR is mandatory. * Target MPR (10 MHz) - QPSK 1RB 0offset: 0dB, QPSK 1RB 49offset: 0dB - 16QAM 1RB 0offset: 1dB, 16QAM 1RB 49offset: 1dB - QPSK 25RB 13offset: 1dB, 16QAM 25RB 13offset: 2dB - QPSK 50RB 0offset: 1dB, 16QAM 50RB 0offset: 2dB A-MPR is always disabled during the SAR testing. 1. Power reduction operation table for SVDO mode <table border="1"> <thead> <tr> <th>Mode</th><th>CDMA current voice power</th><th>CDMA EVDO max. power</th></tr> </thead> <tbody> <tr> <td rowspan="2">SVDO</td><td>P < 15.5 dBm</td><td>24.7 dBm (limited)</td></tr> <tr> <td>P ≥ 15.5 dBm</td><td>19.7 dBm (limited)</td></tr> </tbody> </table> 2. Power reduction operation table for SVLTE mode <table border="1"> <thead> <tr> <th>Mode</th><th>CDMA current voice power for BC0 & BC1</th><th>LTE max. power for BC13</th></tr> </thead> <tbody> <tr> <td rowspan="2">SVLTE</td><td>P < 18.5 dBm</td><td>23.5 dBm (limited)</td></tr> <tr> <td>P ≥ 18.5 dBm</td><td>19.5 dBm (limited)</td></tr> </tbody> </table>	Mode	CDMA current voice power	CDMA EVDO max. power	SVDO	P < 15.5 dBm	24.7 dBm (limited)	P ≥ 15.5 dBm	19.7 dBm (limited)	Mode	CDMA current voice power for BC0 & BC1	LTE max. power for BC13	SVLTE	P < 18.5 dBm	23.5 dBm (limited)	P ≥ 18.5 dBm	19.5 dBm (limited)
Mode	CDMA current voice power	CDMA EVDO max. power																
SVDO	P < 15.5 dBm	24.7 dBm (limited)																
	P ≥ 15.5 dBm	19.7 dBm (limited)																
Mode	CDMA current voice power for BC0 & BC1	LTE max. power for BC13																
SVLTE	P < 18.5 dBm	23.5 dBm (limited)																
	P ≥ 18.5 dBm	19.5 dBm (limited)																

#	Description	Parameter																																																			
8	Include the maximum average conducted output power measured on the required test channels for each channel bandwidth and UL modulation used in each frequency band: a) with 1 RB allocated at the upper edge of a channel b) with 1 RB allocated at the lower edge of a channel c) using 50% RB allocation centered within a channel d) using 100% RB allocation	<table><tr><th>Ch.BW (MHz)</th><th>Mode</th><th>RB size</th><th>RB offset</th><th>MPR</th><th>Target max power (dBm)</th><th>Measured avg. power (dBm)</th></tr><tr><td rowspan="4">10</td><td rowspan="4">QPSK</td><td>1</td><td>0</td><td>0</td><td>23.5</td><td>23.66</td></tr><tr><td>1</td><td>49</td><td>0</td><td>23.5</td><td>23.35</td></tr><tr><td>25</td><td>12</td><td>1</td><td>22.5</td><td>22.55</td></tr><tr><td>50</td><td>0</td><td>1</td><td>22.5</td><td>22.46</td></tr><tr><td rowspan="4">10</td><td rowspan="4">16QAM</td><td>1</td><td>0</td><td>1</td><td>22.5</td><td>22.56</td></tr><tr><td>1</td><td>49</td><td>1</td><td>22.5</td><td>22.31</td></tr><tr><td>25</td><td>12</td><td>2</td><td>21.5</td><td>21.71</td></tr><tr><td>50</td><td>0</td><td>2</td><td>21.5</td><td>21.50</td></tr></table>	Ch.BW (MHz)	Mode	RB size	RB offset	MPR	Target max power (dBm)	Measured avg. power (dBm)	10	QPSK	1	0	0	23.5	23.66	1	49	0	23.5	23.35	25	12	1	22.5	22.55	50	0	1	22.5	22.46	10	16QAM	1	0	1	22.5	22.56	1	49	1	22.5	22.31	25	12	2	21.5	21.71	50	0	2	21.5	21.50
Ch.BW (MHz)	Mode	RB size	RB offset	MPR	Target max power (dBm)	Measured avg. power (dBm)																																															
10	QPSK	1	0	0	23.5	23.66																																															
		1	49	0	23.5	23.35																																															
		25	12	1	22.5	22.55																																															
		50	0	1	22.5	22.46																																															
10	16QAM	1	0	1	22.5	22.56																																															
		1	49	1	22.5	22.31																																															
		25	12	2	21.5	21.71																																															
		50	0	2	21.5	21.50																																															
9	Identify all other U.S. wireless operating modes (3G, Wi-Fi, WiMax, Bluetooth etc), device/exposure configurations (head and body, antenna and handset flip-cover or slide positions, antenna diversity conditions etc.) and frequency bands used for these modes	The following bands are supported for the exposure conditions 1) GSM (850/1900) and WCDMA 1900 - Exposure conditions: Head/Body worn SAR required for GSM / WCDMA and wireless personal hotspot. DTM is not supported. 2) Bluetooth 2.4GHz (Basic Rate & EDR) - Exposure conditions: BT SAR is not required as maximum output power < 12mW & antenna separation distance > 5cm. 3) WiFi 2.4GHz - Exposure conditions: Head/Body SAR required for wireless personal hotspot. No power reduction.																																																			
10	Include the maximum average conducted output power measured for the other wireless mode and frequency bands	See section 11 RF output power measurements in SAR evaluation report.																																																			
11	Identify the simultaneous transmission conditions for the voice and data configurations supported by all wireless modes, device configurations and frequency bands, for the head and body exposure conditions and device operating configurations (handset flip or cover positions, antenna diversity conditions etc.)	<table><tr><th>Worst-Case Σ Condition</th></tr><tr><td>CDMA835 voice + LTE700 data + WiFi data</td></tr><tr><td>CDMA1900 voice + LTE700 data + WiFi data</td></tr><tr><td>CDMA835 voice + DO835 data + WiFi data</td></tr><tr><td>CDMA835 voice + DO1900 data + WiFi data</td></tr><tr><td>CDMA1900 voice + DO835 data + WiFi data</td></tr><tr><td>CDMA1900 voice + DO1900 data + WiFi data</td></tr><tr><td>CDMA835 voice + LTE700 data</td></tr><tr><td>CDMA1900 voice + LTE700 data</td></tr><tr><td>CDMA835 voice + DO835 data</td></tr><tr><td>CDMA835 voice + DO1900 data</td></tr><tr><td>CDMA1900 voice + DO835 data</td></tr><tr><td>CDMA1900 voice + DO1900 data</td></tr><tr><td>GSM850 data + WiFi data</td></tr><tr><td>GSM1900 data + WiFi data</td></tr><tr><td>WCDMA data + WiFi data</td></tr><tr><td>DO835 data + WiFi data</td></tr><tr><td>DO1900 + WiFi data</td></tr><tr><td>LTE700 + WiFi data</td></tr></table>	Worst-Case Σ Condition	CDMA835 voice + LTE700 data + WiFi data	CDMA1900 voice + LTE700 data + WiFi data	CDMA835 voice + DO835 data + WiFi data	CDMA835 voice + DO1900 data + WiFi data	CDMA1900 voice + DO835 data + WiFi data	CDMA1900 voice + DO1900 data + WiFi data	CDMA835 voice + LTE700 data	CDMA1900 voice + LTE700 data	CDMA835 voice + DO835 data	CDMA835 voice + DO1900 data	CDMA1900 voice + DO835 data	CDMA1900 voice + DO1900 data	GSM850 data + WiFi data	GSM1900 data + WiFi data	WCDMA data + WiFi data	DO835 data + WiFi data	DO1900 + WiFi data	LTE700 + WiFi data																																
Worst-Case Σ Condition																																																					
CDMA835 voice + LTE700 data + WiFi data																																																					
CDMA1900 voice + LTE700 data + WiFi data																																																					
CDMA835 voice + DO835 data + WiFi data																																																					
CDMA835 voice + DO1900 data + WiFi data																																																					
CDMA1900 voice + DO835 data + WiFi data																																																					
CDMA1900 voice + DO1900 data + WiFi data																																																					
CDMA835 voice + LTE700 data																																																					
CDMA1900 voice + LTE700 data																																																					
CDMA835 voice + DO835 data																																																					
CDMA835 voice + DO1900 data																																																					
CDMA1900 voice + DO835 data																																																					
CDMA1900 voice + DO1900 data																																																					
GSM850 data + WiFi data																																																					
GSM1900 data + WiFi data																																																					
WCDMA data + WiFi data																																																					
DO835 data + WiFi data																																																					
DO1900 + WiFi data																																																					
LTE700 + WiFi data																																																					

#	Description	Parameter
12	When power reduction is applied to certain wireless modes to satisfy SAR compliance for simultaneous transmission conditions, other equipment certification or operating requirements, include the maximum average conducted output power measured in each power reduction mode applicable to the simultaneous voice/data transmission configurations for such wireless configurations and frequency bands; and also include details of the power reduction implementation and measurement setup	Device implements SVDO/SVLTE power reduction. The reduction is not required for SAR compliance. No power reduction on WiFi. A-MPR is not implemented.
13	Include descriptions of the test equipment, test software, built-in test firmware etc. required to support testing the device when power reduction is applied to one or more transmitters/antennas for simultaneous voice/data transmission	A R&S CMW500 call simulators which support LTE data mode and voice is used for testing

8.5. Simultaneous SAR Assessment based upon user Scenarios

User usage	SAR Test distance	Mode	Worst-Case Σ Condition	CDMA 835 (1)	CDMA 1900 (2)	WCDMA 1900 (3)	GSM 850 (4)	GSM 1900 (5)	DO 835 data (No TX back off) (6)	DO 835 data (TX back off) (7)	DO 1900 data (No TX back off) (8)	DO 1900 data (TX back off) (9)	LTE700 Data (No TX back off) (10)	LTE700 Data (TX back off) (11)	WiFi 2.4G (12)	Total SUM Vs 1.6 W/kg
Held-To-Ear	-	SVLTE	CDMA835 voice + LTE700 data + WiFi data	✓	No	No	No	No	No	No	No	No	No	✓	✓	1+1+12
			CDMA1900 voice + LTE700 data + WiFi data	No	✓	No	No	No	No	No	No	No	No	✓	✓	2+1+12
		SVDO	CDMA835 voice + DO835 data + WiFi data	✓	No	No	No	No	No	✓	No	No	No	No	✓	1+7+12
			CDMA835 voice + DO1900 data + WiFi data	✓	No	No	No	No	No	No	No	✓	No	No	✓	1+9+12
			CDMA1900 voice + DO835 data + WiFi data	No	✓	No	No	No	No	✓	No	No	No	No	✓	2+7+12
			CDMA1900 voice + DO1900 data + WiFi data	No	✓	No	No	No	No	No	No	✓	No	No	✓	2+9+12
		Voice	CDMA835 Voice	✓	No	No	No	No	No	No	No	No	No	No	No	N/A
			CDMA 1900 Voice	No	✓	No	No	No	No	No	No	No	No	No	No	N/A
			GSM850 Voice	No	No	No	✓	No	No	No	No	No	No	No	No	N/A
			GSM 1900 Voice	No	No	No	No	✓	No	No	No	No	No	No	No	N/A
			WCDMA1900 Voice	No	No	✓	No	No	No	No	No	No	No	No	No	N/A
Body-Worn	1.0cm	SVLTE	CDMA835 voice + LTE700 data	✓	No	No	No	No	No	No	No	No	No	✓	No	1+11
			CDMA1900 voice + LTE700 data	No	✓	No	No	No	No	No	No	No	No	✓	No	2+11
		SVDO	CDMA835 voice + DO835 data	✓	No	No	No	No	No	✓	No	No	No	No	No	1+7
			CDMA835 voice + DO1900 data	✓	No	No	No	No	No	No	No	✓	No	No	No	1+9
			CDMA1900 voice + DO835 data	No	✓	No	No	No	No	✓	No	No	No	No	No	2+7
			CDMA1900 voice + DO1900 data	No	✓	No	No	No	No	No	No	✓	No	No	No	2+9
		Data	GSM850 data	No	No	No	✓	No	No	No	No	No	No	No	No	N/A
			GSM1900 data	No	No	No	No	✓	No	No	No	No	No	No	No	N/A
			WCDMA data	No	No	✓	No	No	No	No	No	No	No	No	No	N/A
			DO835 data	No	No	No	No	No	✓	No	No	No	No	No	No	N/A
			DO1900 data	No	No	No	No	No	No	No	✓	No	No	No	No	N/A
			LTE700 data	No	No	No	No	No	No	No	No	No	✓	No	No	N/A
Hotspot	1.0cm	Voice & LTE hotspot	CDMA835 voice + LTE700 data + WiFi data	✓	No	No	No	No	No	No	No	No	No	✓	✓	1+11+12
			CDMA1900 voice + LTE700 data + WiFi data	No	✓	No	No	No	No	No	No	No	No	✓	✓	2+11+12
		Voice & EVDO hotspot	CDMA835 voice + DO835 data + WiFi data	✓	No	No	No	No	No	✓	No	No	No	No	✓	1+7+12
			CDMA835 voice + DO1900 data + WiFi data	✓	No	No	No	No	No	No	No	✓	No	No	✓	1+9+12
			CDMA1900 voice + DO835 data + WiFi data	No	✓	No	No	No	No	✓	No	No	No	No	✓	2+7+12
			CDMA1900 voice + DO1900 data + WiFi data	No	✓	No	No	No	No	No	No	✓	No	No	✓	2+9+12
		GSM, WCDMA hotspot	GSM850 data + WiFi data	No	No	No	✓	No	No	No	No	No	No	No	✓	4+12
			GSM1900 data + WiFi data	No	No	No	No	✓	No	No	No	No	No	No	✓	5+12
			WCDMA data + WiFi data	No	No	✓	No	No	No	No	No	No	No	No	✓	3+12
		EVDO, LTE hotspot	DO835 data + WiFi data	No	No	No	No	No	✓	No	No	No	No	No	✓	6+12
			DO1900 + WiFi data	No	No	No	No	No	No	No	✓	No	No	No	✓	8+12
			LTE700 + WiFi data	No	No	No	No	No	No	No	No	No	✓	No	✓	10+12

9. Simulating Liquid Parameters

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine if the dielectric parameters are within the tolerances of the specified target values. For frequencies in 300 MHz to just under 2 GHz, the measured conductivity and relative permittivity should be within $\pm 5\%$ of the target values. For frequencies in the range of 2–3 GHz and above the measured conductivity should be within $\pm 5\%$ of the target values. The measured relative permittivity tolerance can be relaxed to no more than $\pm 10\%$.

Reference Values of Tissue Dielectric Parameters for Head & Body Phantom

The body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE Standard 1528.

Target Frequency (MHz)	Head		Body	
	ϵ_r	σ (S/m)	ϵ_r	σ (S/m)
150	52.3	0.76	61.9	0.8
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
750	41.96	0.89	55.6	0.96
835	41.5	0.9	55.2	0.97
900	41.5	0.97	55	1.05
915	41.5	0.98	55	1.06
1450	40.5	1.2	54	1.3
1610	40.3	1.29	53.8	1.4
1750	40.08	1.37	53.44	1.49
1800 – 2000	40	1.4	53.3	1.52
2450	39.2	1.8	52.7	1.95
3000	38.5	2.4	52	2.73

(ϵ_r = relative permittivity, σ = conductivity and $\rho = 1000 \text{ kg/m}^3$)

9.1. Liquid Parameter Check Results

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)
6/20/2011	Head 750	e'	42.4100	Relative Permittivity (ϵ_r):	42.41	41.96	1.07
		e''	21.6956	Conductivity (σ):	0.90	0.89	1.31
6/30/2011	Head 750	e'	42.4100	Relative Permittivity (ϵ_r):	42.41	41.96	1.07
		e''	21.4427	Conductivity (σ):	0.89	0.89	0.13
6/22/2011	Head 835	e'	42.3894	Relative Permittivity (ϵ_r):	42.39	41.50	2.14
		e''	19.0597	Conductivity (σ):	0.88	0.90	-1.68
6/23/2011	Head 835	e'	42.3800	Relative Permittivity (ϵ_r):	42.38	41.50	2.12
		e''	19.0597	Conductivity (σ):	0.88	0.90	-1.68
6/25/2011	Head 835	e'	42.4755	Relative Permittivity (ϵ_r):	42.48	41.50	2.35
		e''	19.1482	Conductivity (σ):	0.89	0.90	-1.22
6/29/2011	Head 835	e'	42.8200	Relative Permittivity (ϵ_r):	42.82	41.50	3.18
		e''	19.1635	Conductivity (σ):	0.89	0.90	-1.14
6/30/2011	Head 835	e'	42.8200	Relative Permittivity (ϵ_r):	42.82	41.50	3.18
		e''	19.1635	Conductivity (σ):	0.89	0.90	-1.14
6/20/2011	Head 1900	e'	39.3434	Relative Permittivity (ϵ_r):	39.34	40.00	-1.64
		e''	13.4470	Conductivity (σ):	1.42	1.40	1.47
6/25/2011	Head 1900	e'	39.1712	Relative Permittivity (ϵ_r):	39.17	40.00	-2.07
		e''	13.2736	Conductivity (σ):	1.40	1.40	0.16
6/27/2011	Head 1900	e'	39.7143	Relative Permittivity (ϵ_r):	39.71	40.00	-0.71
		e''	13.2997	Conductivity (σ):	1.41	1.40	0.36
6/29/2011	Head 1900	e'	39.3300	Relative Permittivity (ϵ_r):	39.33	40.00	-1.68
		e''	13.1379	Conductivity (σ):	1.39	1.40	-0.86
6/30/2011	Head 1900	e'	39.3300	Relative Permittivity (ϵ_r):	39.33	40.00	-1.68
		e''	13.1379	Conductivity (σ):	1.39	1.40	-0.86
6/24/2011	Head 2450	e'	40.2900	Relative Permittivity (ϵ_r):	40.29	39.20	2.78
		e''	13.3251	Conductivity (σ):	1.82	1.80	0.85

Liquid Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)
6/21/2011	Body 750	e'	55.3100	Relative Permittivity (ϵ_r):	55.31	55.55	-0.43
		e''	22.5579	Conductivity (σ):	0.94	0.96	-2.32
6/22/2011	Body 750	e'	54.3880	Relative Permittivity (ϵ_r):	54.39	55.55	-2.09
		e''	22.2875	Conductivity (σ):	0.93	0.96	-3.49
6/23/2011	Body 750	e'	54.3880	Relative Permittivity (ϵ_r):	54.39	55.55	-2.09
		e''	22.2875	Conductivity (σ):	0.93	0.96	-3.49
6/30/2011	Body 750	e'	55.5882	Relative Permittivity (ϵ_r):	55.59	55.55	0.08
		e''	22.6456	Conductivity (σ):	0.94	0.96	-1.94
7/1/2011	Body 750	e'	55.5882	Relative Permittivity (ϵ_r):	55.59	55.55	0.08
		e''	22.6456	Conductivity (σ):	0.94	0.96	-1.94
6/22/2011	Body 835	e'	55.5547	Relative Permittivity (ϵ_r):	55.55	55.20	0.64
		e''	20.7938	Conductivity (σ):	0.97	0.97	-0.47
6/23/2011	Body 835	e'	52.7400	Relative Permittivity (ϵ_r):	52.74	55.20	-4.46
		e''	20.7938	Conductivity (σ):	0.97	0.97	-0.47
6/24/2011	Body 835	e'	53.7187	Relative Permittivity (ϵ_r):	53.72	55.20	-2.68
		e''	20.9029	Conductivity (σ):	0.97	0.97	0.05
6/25/2011	Body 835	e'	53.7200	Relative Permittivity (ϵ_r):	53.72	55.20	-2.68
		e''	20.9028	Conductivity (σ):	0.97	0.97	0.05
6/29/2011	Body 835	e'	55.2000	Relative Permittivity (ϵ_r):	55.20	55.20	0.00
		e''	21.3269	Conductivity (σ):	0.99	0.97	2.08
6/30/2011	Body 835	e'	55.2000	Relative Permittivity (ϵ_r):	55.20	55.20	0.00
		e''	21.3269	Conductivity (σ):	0.99	0.97	2.08
6/20/2011	Body 1900	e'	53.5292	Relative Permittivity (ϵ_r):	53.53	53.30	0.43
		e''	14.3917	Conductivity (σ):	1.52	1.52	0.03
6/21/2011	Body 1900	e'	53.5300	Relative Permittivity (ϵ_r):	53.53	53.30	0.43
		e''	14.3917	Conductivity (σ):	1.52	1.52	0.03
6/22/2011	Body 1900	e'	53.5300	Relative Permittivity (ϵ_r):	53.53	53.30	0.43
		e''	14.3917	Conductivity (σ):	1.52	1.52	0.03
6/25/2011	Body 1900	e'	51.6404	Relative Permittivity (ϵ_r):	51.64	53.30	-3.11
		e''	14.1316	Conductivity (σ):	1.49	1.52	-1.78
6/27/2011	Body 1900	e'	53.1187	Relative Permittivity (ϵ_r):	53.12	53.30	-0.34
		e''	14.3868	Conductivity (σ):	1.52	1.52	-0.01
6/28/2011	Body 1900	e'	51.4700	Relative Permittivity (ϵ_r):	51.47	53.30	-3.43
		e''	13.9535	Conductivity (σ):	1.47	1.52	-3.02
6/28/2011	Body 2450	e'	52.9200	Relative Permittivity (ϵ_r):	52.92	52.70	0.42
		e''	14.3234	Conductivity (σ):	1.95	1.95	0.06

10. System Verification

The system performance check is performed prior to any usage of the system in order to verify SAR system measurement accuracy. The system performance check verifies that the system operates within its specifications of $\pm 10\%$.

System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Head or Body simulating liquid of the following parameters.
- The DASY system with an Isotropic E-Field Probe EX3DV3 SN3531 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 fine cube was chosen for cube
- Distance between probe sensors and phantom surface was set to 3 mm.
For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was 100 mW
- The results are normalized to 1 W input power.

Reference SAR Values for HEAD & BODY-tissue from calibration certificate of SPEAG.

System validation dipole	Cal. certificate #	Cal. due date	Cal. Freq. (MHz)	SAR Avg (mW/g)		
				Tissue:	Head	Body
D750V2	D750V3-1024_Apr11	4/20/12	750	1g SAR:	85.2	88.0
				10g SAR:	5.56	58.4
D835V2	D835V2-4d117_Ar11	4/15/12	835	1g SAR:	9.64	10.1
				10g SAR:	6.28	6.6
D1900V2	D1900V2-5d140_Apr11	4/18/12	1900	1g SAR:	41.6	41.2
				10g SAR:	21.5	21.6
D2450V2	D2450V2-706_Apr10	4/19/12	2450	1g SAR:	51.6	52.4
				10g SAR:	24.4	24.5

10.1. System Check Results

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)	Plot #
		Tissue:	Head				
D750V3	06/20/11	1g SAR:	80.40	85.2	-5.63	±10	320
		10g SAR:	5.26	5.56	-5.40		
D750V3	06/30/11	1g SAR:	83.60	85.2	-1.88	±10	327
		10g SAR:	5.47	5.56	-1.62		
D750V3	07/01/11	1g SAR:	80.00	85.2	-6.10	±10	329
		10g SAR:	5.24	5.56	-5.76		
D835V2	6/22/2011	1g SAR:	9.74	9.64	1.04	±10	302
		10g SAR:	6.36	6.28	1.27		
D835V2	6/25/2011	1g SAR:	9.40	9.64	-2.49	±10	305
		10g SAR:	6.13	6.28	-2.39		
D835V2	6/29/2011	1g SAR:	9.50	9.64	-1.45	±10	310
		10g SAR:	6.20	6.28	-1.27		
D1900V2	6/20/2011	1g SAR:	39.80	41.6	-4.33	±10	300
		10g SAR:	20.70	21.5	-3.72		
D1900V2	6/25/2011	1g SAR:	40.20	41.6	-3.37	±10	306
		10g SAR:	20.80	21.5	-3.26		
D1900V2	6/27/2011	1g SAR:	38.90	41.6	-6.49	±10	325
		10g SAR:	20.20	21.5	-6.05		
D1900V2	6/29/2011	1g SAR:	40.90	41.6	-1.68	±10	309
		10g SAR:	21.10	21.5	-1.86		
D2450V2	6/24/2011	1g SAR:	49.50	51.6	-4.07	±10	323
		10g SAR:	23.90	24.4	-2.05		

System Check Results (Continued)

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)	Plot #
		Tissue:	Body				
D750V3	06/21/11	1g SAR:	89.10	88	1.25	±10	321
		10g SAR:	59.10	58.4	1.20		
D750V3	06/22/11	1g SAR:	85.70	88	-2.61	±10	322
		10g SAR:	56.80	58.4	-2.74		
D750V3	06/30/11	1g SAR:	87.20	88	-0.91	±10	328
		10g SAR:	57.90	58.4	-0.86		
D750V3	07/01/11	1g SAR:	82.00	88	-6.82	±10	330
		10g SAR:	54.50	58.4	-6.68		
D835V2	6/22/2011	1g SAR:	10.40	10.1	2.97	±10	303
		10g SAR:	6.83	6.6	3.48		
D835V2	6/24/2011	1g SAR:	9.91	10.1	-1.88	±10	304
		10g SAR:	6.49	6.6	-1.67		
D835V2	6/29/2011	1g SAR:	10.10	10.1	0.00	±10	311
		10g SAR:	6.62	6.6	0.30		
D1900V2	6/21/2011	1g SAR:	41.50	41.2	0.73	±10	301
		10g SAR:	21.70	21.6	0.46		
D1900V2	6/25/2011	1g SAR:	41.30	41.2	0.24	±10	307
		10g SAR:	21.60	21.6	0.00		
D1900V2	6/27/2011	1g SAR:	39.30	41.2	-4.61	±10	308
		10g SAR:	20.60	21.6	-4.63		
D2450V2	6/24/2011	1g SAR:	56.50	52.4	7.82	±10	324
		10g SAR:	26.50	24.5	8.16		

Note(s):

See appendix for details of data and plots

11.1. CDMA2000 1xRTT

Modes		1xRTT				
		Radio Configuration (RC)	RC1	RC3	RC3	RC3
		Service Option (SO)	55 (Loopback)	55 (Loopback)	32 (+ F-SCH)	32 (+ SCH)
Band	Channel	Frequency (MHz)	Power (dBm) Avg	Power (dBm) Avg.	Power (dBm) Avg.	Power (dBm) Avg.
850	1013	824.70	25.04	24.84	24.82	24.80
	384	836.52	24.97	24.84	24.82	24.73
	777	848.31	25.03	24.81	24.85	24.82
1900	25	1851.25	25.12	24.95	24.90	24.92
	600	1880.00	25.15	24.94	25.00	25.03
	1175	1908.75	24.97	25.09	24.86	25.05

Maximum output power is verified on the Low, Middle and High channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E for 1xRTT, section 3.1.2.3.4 of 3GPP2 C.S0033-0/TIA-866 for Rel. 0 and section 4.3.4 of 3GPP2 C.S0033-A for Rev. A

1xRTT

Application	Rev, License
-------------	--------------

- Protocol Rev > 6 (IS-2000-0)
- System ID: 28 (Cell) & 18 (PCS); NID: 65535 (Cell & PCS); Reg. Ch. #: 384 (Cell) & 600 (PCS)
- Radio Config (RC) > Please see following table for details
- FCH Service Option (SO) Setup > Please see following table or details
- Traffic Data Rate > Full
- TDSO SCH Info > F-SCH Parameters > F-SCH Data Rate > 153.6 kbps
 > R-SCH Parameters > R-SCH Data Rate > 153.6 kbps
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

11.2. CDMA2000 1x EVDO

Modes		CDMA 1xEv-Do Rel 0			CDMA 1xEv-Do Rev A	
			FTAP Rate	RTAP Rate	FETAP Traffic Format	RETAP Data Payload Size
			307.2 kbps (2 slot, QPSK)	153.6 kbps	307.2k, QPSK/ ACK channel is transmitted at all the slots	4096
Band	Channel	Frequency (MHz)	Power (dBm) Avg.	Power (dBm) Avg.	Power (dBm) Avg.	Power (dBm) Avg.
850	1013	824.70	24.91	24.93	24.93	24.96
	384	836.52	24.77	25.01	24.74	24.89
	777	848.31	24.70	24.74	24.71	24.65
1900	25	1851.25	25.06	25.11	25.06	25.07
	600	1880.00	24.95	25.02	24.9	25.00
	1175	1908.75	24.90	24.94	24.89	24.95

***Conducted Sample: (IMEI: 990000610001267)**

Maximum output power is verified on the Low, Middle and High channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E for 1xRTT, section 3.1.2.3.4 of 3GPP2 C.S0033-0/TIA-866 for Rel. 0 and section 4.3.4 of 3GPP2 C.S0033-A for Rev. A

EVDO Release 0 – RTAP

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

- | <u>Application</u> | <u>Rev, License</u> |
|---|---------------------|
| CDMA2000 Mobile Test | B.13.08, L |
| • Call Setup > Shift & Preset | |
| • Call Control: | |
| o Access Network Info > Cell Parameters > Sector ID > 00000000 : 00000000 : 00000000 : 00000000 > Subnet Mask > 0 | |
| o Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots | |
| • Call Params: | |
| o Cell Power > -105.5 dBm/1.23 MHz | |
| o Cell Band > (Select US Cellular or US PCS) | |
| o Channel > (Enter channel number) | |
| o Application Config > Enhanced Test Application Protocol > RTAP | |
| o RTAP Rate > 153.6 kbps | |
| o Rvs Power Ctrl > Active bits | |
| o Protocol Rel > 0 (1xEV-DO) | |
| • Press “Start Data Connection” when “Session Open” appear in “Active Cell” | |
| • Rvs Power Ctrl > All Up bits (Maximum TxPout) | |

EVDO Release 0 – FTAP

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

- | Application | Rev, License |
|---|--------------|
| • CDMA2000 Mobile Test | B.13.08, L |
| • Call Setup > Shift & Preset | |
| • Call Control: | |
| o Access Network Info > Cell Parameters > Sector ID > 00000000 : 00000000 : 00000000 : 00000000 > Subnet Mask > 0 | |
| o Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots | |
| • Call Params: | |
| o Cell Power > -105.5 dBm/1.23 MHz | |
| o Cell Band > (Select US Cellular or US PCS) | |
| o Channel > (Enter channel number) | |
| o Application Config > Enhanced Test Application Protocol > FTAP (default) | |
| o FTAP Rate > 307.2 kbps (2 Slot, QPSK) | |
| o Rvs Power Ctrl > Active bits | |
| o Protocol Rel > 0 (1xEV-DO) | |
| • Press “Start Data Connection” when “Session Open” appear in “Active Cell” | |
| • Rvs Power Ctrl > All Up bits (Maximum TxPout) | |

EVDO Rev. A – RETAP

- Call Setup > Shift & Preset
- Cell Power > -60 dBm/1.23 MHz
 - Protocol Rev > A (1xEV-DO-A)
 - Application Config > Enhanced Test Application Protocol > RETAP
 - R-Data Pkt Size > 4096
 - Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- > PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Access Network Info > Cell Parameters > Sector ID > 00000000: 00000000: 00000000: 00000000
 > Subnet Mask > 0
 - Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots
 > ACK R-Data After > Subpacket 0 (All ACK)
 - Rvs Power Ctrl > All Up bits (to get the maximum power)

EVDO Rev. A - FETAP

- Call Setup > Shift & Preset
- Cell Power > -60 dBm/1.23 MHz
 - Protocol Rev > A (1xEV-DO-A)
 - Application Config > Enhanced Test Application Protocol > FETAP
 - F-Traffic Format > 4 (1024, 2,128) Canonical (307.2k, QPSK)
 - Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- > PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Access Network Info > Cell Parameters > Sector ID > 00000000: 00000000: 00000000: 00000000
 > Subnet Mask > 0
 - Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots
 > ACK R-Data After > Subpacket 0 (All ACK)
 - Rvs Power Ctrl > All Up bits (to get the maximum power)

11.3. GSM

Conducted Average Power Measurement GSM Band Without Consideration for Duty Factor

Channel Number	Frequency (MHZ)	GSM – TX Power before Test (dBm)	GPRS – TX Power before Test (dBm)				Note
			1-Uplink Slot	2-Uplink Slot	3-Uplink Slot	4-Uplink Slot	
128	824.2	33.30	33.25	30.95	29.74	28.76	Conducted
190	836.6	33.41	33.27	30.74	29.82	28.86	Conducted
251	848.8	33.36	33.27	31.17	29.9	28.88	Conducted
512	1850.2	29.57	29.47	29.4	28.2	27.01	Conducted
661	1880.0	29.60	29.46	29.43	28.22	26.9	Conducted
810	1909.8	29.65	29.53	29.4	28.1	26.9	Conducted

Conducted Average Power Measurement GSM Band With Consideration for Duty Factor

Channel Number	Frequency (MHZ)	GPRS – TX Power before Test (dBm)				Note
		1-Uplink Slot	2-Uplink Slot	3-Uplink Slot	4-Uplink Slot	
128	824.2	24.2	24.9	25.5	25.7	Conducted
190	836.6	24.2	24.7	25.6	25.8	Conducted
251	848.8	24.2	25.1	25.6	25.9	Conducted
512	1850.2	20.4	23.4	23.9	24.0	Conducted
661	1880.0	20.4	23.4	24.0	23.9	Conducted
810	1909.8	20.5	23.4	23.8	23.9	Conducted
DASY Power Reference (V/m)		18.67	19.14	20.01	17.65	

Note:

- 1 uplink time slot = $10 \cdot \log(8/1) = 9.03$
- 2 uplink time slot = $10 \cdot \log(8/2) = 6.02$
- 3 uplink time slot = $10 \cdot \log(8/3) = 4.26$
- 4 uplink time slot = $10 \cdot \log(8/4) = 3.01$

Conducted Average Power Measurement GSM Band

Channel Number	Frequency (MHZ)	GSM – TX Power before Test (dBm)	EGPRS – TX Power before Test (dBm)				Note
			1-Uplink Slot	2-Uplink Slot	3-Uplink Slot	4-Uplink Slot	
128	824.2	33.30	26.8	26.7	26.2	24.8	Conducted
190	836.6	33.41	26.9	26.7	26.1	24.6	Conducted
251	848.8	33.36	26.9	26.7	26.2	24.7	Conducted
512	1850.2	29.57	26.1	25.5	24.9	23.2	Conducted
661	1880.0	29.60	26.0	25.4	24.7	23.1	Conducted
810	1909.8	29.65	26.0	25.3	24.8	23.0	Conducted

11.4. WiFi

Conducted Average Power Measurement WLAN

Channel Number	Frequency (GHZ)	Average TX Power (dBm)	Note
1	2.412	18.35	2.4GHz 802.11b (1Mbps)
6	2.437	18.65	
11	2.462	18.78	
1	2.412	18.15	2.4GHz 802.11b (11Mbps)
6	2.437	18.52	
11	2.462	18.59	
1	2.412	17.85	2.4GHz 802.11g (6Mbps)
6	2.437	18.06	
11	2.462	18.27	
1	2.412	13.35	2.4GHz 802.11g (54Mbps)
6	2.437	13.64	
11	2.462	13.85	
1	2.412	14.59	2.4GHz 802.11n (MCS0)
6	2.437	14.85	
11	2.462	14.96	
1	2.412	13.98	2.4GHz 802.11n (MCS7)
6	2.437	13.53	
11	2.462	13.63	

Note: KDB 248227 - SAR is not required for 802.11g/HT20 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

11.5. WCDMA (UMTS Band II)

Conducted Average Power Measurement UMTS FDD Bands

Modes		HSDPA				WCDMA
Sets		1	2	3	4	Voice / RMC12.2kbps
Band	Channel	Power (dBm) Avg.	Power (dBm) Avg.	Power (dBm) Avg.	Power (dBm) Avg.	Power (dBm) Avg.
1900	9662	23.13	22.97	22.35	22.23	23.18
	9800	23.26	23.04	22.48	22.42	23.36
	9938	23.17	22.86	22.26	22.37	23.2
β_c		2	12	15	15	
β_d		15	15	8	4	
$\Delta_{ACK}, \Delta_{NACK}, \Delta_{CQI}$		8	8	8	8	

Sub-test 1 Setup for Release 5 HSDPA

Sub-test	β_c	β_d	B_d (SF)	β_c / β_d	$\beta_{hs}^{(1)}$	CM (dB) ⁽²⁾
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15 ⁽³⁾	15/15 ⁽³⁾	64	12/15 ⁽³⁾	24/15	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

Note 1: $\Delta_{ACK}, \Delta_{NACK}$ and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$

Note 2: CM = 1 for $\beta_c / \beta_d = 12/15$, $B_{hs}/\beta_c = 24/15$

Note 3: For subtest 2 the β_c / β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$

Conducted Average Power Measurement FDD II

Rel 6 HSPA

Modes		HSUPA					WCDMA
Sets		1	2	3	4	5	Voice / RMC12.2kbps
Band	Channel	Power (dBm) Avg.	Power (dBm) Avg.	Power (dBm) Avg.	Power (dBm) Avg.	Power (dBm) Avg.	Power (dBm) Avg.
UMTS Band II 1900	9262	23.27	23.33	22.23	23.33	23.31	23.18
	9400	23.24	23.42	22.30	23.39	23.40	23.36
	9538	23.18	23.22	22.20	23.21	23.21	23.2
β_c		11	6	15	2	15	
β_d		15	15	9	15	15	
E-TFCI		75	67	92	71	81	
AG Index		20	12	15	17	21	

Sub-test 5 Setup for Release 6 HSPA

Sub-test	β_c	β_d	B_d (SF)	β_c/β_d	$\beta_{hs}^{(1)}$	B_{oc}	B_{od}	B_{od} (SF)	B_{od} (codes)	CM ⁽²⁾ (dB)	MPR (dB)	AG ⁽⁴⁾ Index	E-TFCI
1	11/15 ⁽³⁾	15/15 ⁽³⁾	64	11/15 ⁽³⁾	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	31/15	B_{a11} : 47/15 B_{a12} : 47/15	4	1	2.0	1.0	15	92
4	2/15	15/15	64	2/15	2/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 ⁽⁴⁾	15/15 ⁽⁴⁾	64	15/15 ⁽⁴⁾	24/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $B_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH AND E-DPCCH for the MPR is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$.

Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$.

Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Tavle 5.1g.

Note 6: B_{od} can not be set directly; it is set by Absolute Grant Value.

11.6. LTE Band 13

Conducted Average Power Measurement LTE Band 13

		Uplink Channel 23230					
Ch. BW	Modulations	RB Config	Start RB Offset		MPR	Actual Max Power (dBm)	Measured Avg Power (dBm).
10 MHz	QPSK	1	Low	0	(0)	23.5	23.66
		1	High	49	(0)	23.5	23.35
		25	Mid	12	(1)	22.5	22.55
		50		0	(1)	22.5	22.46
10 MHz	16QAM	1	Low	0	(1)	22.5	22.56
		1	High	49	(1)	22.5	22.31
		25	Mid	12	(2)	21.5	21.71
		50		0	(2)	21.5	21.50

11.7. Power Reduction for SVLTE & SVDO

		QPSK				16QAM			
CDMA850	Power [dBm]	1RB, 0offset	1RB 49offset	25RB 12offset	50RB	1RB 0offset	1RB 49offset	25RB 12offset	50RB
Low_1013	11	23.76	23.43	22.7	22.55	22.88	22.71	21.62	21.71
Low_1013	12	23.83	23.65	22.64	22.5	22.87	22.77	21.71	21.68
Low_1013	13	23.88	23.7	22.65	22.53	22.88	22.79	21.69	21.65
Low_1013	14	23.88	23.7	22.66	22.53	22.85	22.8	21.7	21.69
Low_1013	15	23.85	23.69	22.63	22.53	22.86	22.76	21.72	21.68
Low_1013	16	23.83	23.7	22.65	22.53	22.87	22.79	21.7	21.68
Low_1013	17	23.9	23.69	22.65	22.52	22.87	22.81	21.69	21.7
Low_1013	18	23.85	23.67	22.62	22.51	22.86	22.8	21.69	21.69
Low_1013	19	19.73	19.85	19.67	19.72	19.76	19.73	19.7	19.75
Low_1013	20	19.75	19.82	19.68	19.7	19.78	19.81	19.73	19.76
Low_1013	21	19.75	19.83	19.65	19.6	19.76	19.77	19.69	19.77
Low_1013	22	19.74	19.81	19.64	19.58	19.82	19.82	19.71	19.74
Low_1013	23	19.76	19.8	19.65	19.56	19.75	19.73	19.71	19.75
Low_1013	24	19.83	19.78	19.65	19.55	19.78	19.77	19.7	19.72
CDMA850	Power [dBm]	1RB 0offset	1RB 49offset	25RB 12offset	50RB	1RB 0offset	1RB 49offset	25RB 12offset	50RB
Middle_384	11	23.87	23.52	22.57	22.46	22.74	22.65	21.76	21.65
Middle_384	12	23.86	23.6	22.55	22.41	22.78	22.68	21.73	21.59
Middle_384	13	23.89	23.61	22.57	22.41	22.74	22.64	21.74	21.62
Middle_384	14	23.9	23.6	22.53	22.37	22.7	22.67	21.71	21.58
Middle_384	15	23.87	23.62	22.57	22.37	22.73	22.67	21.73	21.5
Middle_384	16	23.87	23.63	22.55	22.36	22.69	22.68	21.76	21.59
Middle_384	17	23.85	23.64	22.58	22.46	22.71	22.69	21.73	21.57
Middle_384	18	23.84	23.62	22.54	22.44	22.73	22.67	21.71	21.57
Middle_384	19	19.59	19.8	19.57	19.46	19.74	19.66	19.7	19.6
Middle_384	20	19.68	19.72	19.58	19.48	19.62	19.65	19.74	19.6
Middle_384	21	19.67	19.68	19.57	19.5	19.71	19.66	19.83	19.67
Middle_384	22	19.65	19.71	19.57	19.5	19.75	19.65	19.73	19.66
Middle_384	23	19.67	19.7	19.55	19.51	19.72	19.66	19.74	19.64
Middle_384	24	19.72	19.74	19.54	19.52	19.76	19.64	19.72	19.64
CDMA850	Power [dBm]	1RB 0offset	1RB 49offset	25RB 12offset	50RB	1RB 0offset	1RB 49offset	25RB 12offset	50RB
High_777	11	23.81	23.4	22.57	22.51	22.75	22.64	21.76	21.56
High_777	12	23.71	23.57	22.53	22.44	22.74	22.66	21.78	21.55
High_777	13	23.76	23.56	22.53	22.43	22.71	22.62	21.7	21.67
High_777	14	23.75	23.57	22.55	22.44	22.74	22.66	21.68	21.62
High_777	15	23.77	23.57	22.56	22.42	22.76	22.67	21.77	21.56
High_777	16	23.74	23.56	22.54	22.45	22.75	22.64	21.79	21.57
High_777	17	23.75	23.55	22.53	22.36	22.76	22.59	21.74	21.58
High_777	18	23.74	23.57	22.55	22.4	22.75	22.67	21.75	21.56
High_777	19	19.66	19.76	22.42	19.48	19.67	19.69	19.73	19.6
High_777	20	19.79	19.74	19.58	19.45	19.73	19.68	19.71	19.57
High_777	21	19.7	19.7	19.56	19.49	19.71	19.71	19.73	19.59
High_777	22	19.7	19.69	19.55	19.47	19.69	19.65	19.72	19.64
High_777	23	19.71	19.7	19.56	19.48	19.68	19.78	19.73	19.62
High_777	24	19.71	19.7	19.55	19.47	19.67	19.7	19.73	19.66

		QPSK				16QAM			
CDMA1900	Power [dBm]	1RB 0offset	1RB 49offset	25RB 12offset	50RB	1RB 0offset	1RB 49offset	25RB 12offset	50RB
Low_25	11	23.69	23.4	22.51	22.31	22.8	22.65	21.67	21.54
Low_25	12	23.69	23.52	22.44	22.37	22.82	22.67	21.67	21.53
Low_25	13	23.68	23.61	22.49	22.37	22.84	22.63	21.66	21.56
Low_25	14	23.7	23.57	22.49	22.37	22.76	22.61	21.68	21.56
Low_25	15	23.66	23.54	22.49	22.36	22.83	22.6	21.7	21.6
Low_25	16	23.65	23.54	22.46	22.39	22.82	22.6	21.7	21.62
Low_25	17	23.64	23.55	22.51	22.39	22.85	22.65	21.69	21.6
Low_25	18	23.66	23.4	22.51	22.38	22.77	22.57	21.7	21.57
Low_25	19	19.66	19.8	19.5	19.42	19.77	19.7	19.68	19.53
Low_25	20	19.69	19.78	19.51	19.4	19.85	19.57	19.72	19.6
Low_25	21	19.71	19.74	19.52	19.38	19.88	19.7	19.7	19.58
Low_25	22	19.73	19.64	19.51	19.42	19.83	19.65	19.68	19.6
Low_25	23	19.72	19.72	19.5	19.51	19.86	19.67	19.7	19.63
Low_25	24	19.72	19.75	19.51	19.54	19.84	19.63	19.7	19.61
CDMA1900	Power [dBm]	1RB 0offset	1RB 49offset	25RB 12offset	50RB	1RB 0offset	1RB 49offset	25RB 12offset	50RB
Middle_600	11	23.56	23.5	22.54	22.42	22.68	22.66	21.71	21.62
Middle_600	12	23.64	23.45	22.53	22.41	22.72	22.67	21.71	21.58
Middle_600	13	23.72	23.53	22.53	22.4	22.72	22.69	21.71	21.51
Middle_600	14	23.69	23.59	22.53	22.35	22.71	22.64	21.71	21.56
Middle_600	15	23.68	23.57	22.53	22.39	22.72	22.68	21.71	21.55
Middle_600	16	23.69	23.6	22.53	22.42	22.7	22.7	21.7	21.57
Middle_600	17	23.67	23.63	22.52	22.42	22.72	22.63	21.7	21.56
Middle_600	18	23.68	23.6	22.52	22.4	22.75	22.56	21.72	21.57
Middle_600	19	19.65	19.76	19.69	19.52	19.69	19.66	19.74	19.72
Middle_600	20	19.73	19.86	19.5	19.45	19.65	19.7	19.76	19.56
Middle_600	21	19.68	19.73	19.59	19.5	19.68	19.64	19.7	19.66
Middle_600	22	19.68	19.75	19.57	19.51	19.65	19.66	19.71	19.65
Middle_600	23	19.67	19.71	19.59	19.48	19.62	19.67	19.7	19.7
Middle_600	24	19.67	19.7	19.56	19.5	19.63	19.6	19.7	19.62
CDMA1900	Power [dBm]	1RB 0offset	1RB 49offset	25RB 12offset	50RB	1RB 0offset	1RB 49offset	25RB 12offset	50RB
High_1175	11	23.69	23.45	22.54	22.31	22.63	22.7	21.65	21.6
High_1175	12	23.73	23.55	22.49	22.38	22.68	22.61	21.7	21.6
High_1175	13	23.69	23.56	22.54	22.38	22.71	22.6	21.72	21.57
High_1175	14	23.71	23.6	22.53	22.37	22.72	22.67	21.71	21.51
High_1175	15	23.68	23.58	22.52	22.4	22.7	22.65	21.71	21.56
High_1175	16	23.66	23.56	22.47	22.39	22.71	22.63	21.73	21.55
High_1175	17	23.73	23.59	22.52	22.43	22.71	22.66	21.71	21.56
High_1175	18	23.73	23.6	22.56	22.42	22.7	22.65	21.71	21.53
High_1175	19	19.64	19.73	19.53	19.52	19.61	19.64	19.71	19.65
High_1175	20	19.65	19.74	19.53	19.5	19.61	19.64	19.7	19.63
High_1175	21	19.66	19.7	19.55	19.49	19.66	19.62	19.71	19.61
High_1175	22	19.67	19.68	19.55	19.48	19.63	19.63	19.7	19.64
High_1175	23	19.71	19.68	19.54	19.48	19.64	19.64	19.75	19.62
High_1175	24	19.71	19.67	19.53	19.45	19.59	19.66	19.71	19.6

		EVDO 850			EVDO 1900		
CDMA850	Power [dBm]	Low_1013	Middle_384	High_777	Low_25	Middle_600	High_1175
Low_1013	11	25.04	25.06	24.88	24.93	24.88	24.71
Low_1013	12	25.09	25.02	24.9	24.89	24.85	24.7
Low_1013	13	25.08	25.05	24.83	24.9	24.86	24.6
Low_1013	14	25.14	25	24.87	24.88	24.82	24.67
Low_1013	15	25.12	25.06	24.93	24.87	24.84	24.68
Low_1013	16	19.77	19.77	19.62	19.5	19.8	19.9
Low_1013	17	19.85	19.79	19.61	19.8	19.88	19.8
Low_1013	18	19.75	19.8	19.6	19.8	19.98	19.88
Low_1013	19	19.83	19.77	19.59	19.9	19.81	19.82
Low_1013	20	19.74	19.75	19.67	19.82	20	19.87
Low_1013	21	19.83	19.82	19.58	19.85	19.91	19.81
Low_1013	22	19.82	19.83	19.66	20	19.81	19.85
Low_1013	23	19.8	19.78	19.63	19.96	19.81	19.72
Low_1013	24	19.8	19.79	19.65	19.76	19.78	19.78
CDMA850	Power [dBm]	Low_1013	Middle_384	High_777	Low_25	Middle_600	High_1175
Middle_384	11	25.18	25.03	24.82	24.98	24.91	24.7
Middle_384	12	25.17	25.1	24.85	24.9	24.86	24.73
Middle_384	13	25.16	25.1	24.8	24.87	24.82	24.73
Middle_384	14	25.2	25.03	24.86	24.88	24.85	24.7
Middle_384	15	25.12	25.02	24.9	24.87	24.9	24.65
Middle_384	16	19.82	19.8	19.6	20.08	20.06	19.54
Middle_384	17	19.81	19.72	19.63	20.09	20.08	20.02
Middle_384	18	19.83	19.8	19.65	20.05	20.07	20.01
Middle_384	19	19.81	19.81	19.62	20.07	20.05	20
Middle_384	20	19.81	19.82	19.61	20.04	20.02	19.98
Middle_384	21	19.82	19.82	19.68	20.02	20.02	20.08
Middle_384	22	19.79	19.78	19.62	19.96	20.04	19.92
Middle_384	23	19.81	19.78	19.67	20.03	20.12	20.09
Middle_384	24	19.79	19.82	19.7	20.1	20.08	19.96

CDMA850	Power [dBm]	Low 1013	Middle 384	High 777	Low 25	Middle 600	High 1175
High_777	11	25.19	25.08	24.81	25.13	24.82	24.67
High_777	12	25.17	25.06	24.84	25.13	24.83	24.68
High_777	13	25.18	25.09	24.85	25.12	24.83	24.6
High_777	14	25.17	25.04	24.82	24.74	24.8	24.67
High_777	15	25.17	25.04	24.82	24.74	24.8	24.67
High_777	16	19.6	19.69	19.6	20.03	20.02	19.56
High_777	17	19.82	19.8	19.6	20.03	20.05	20.04
High_777	18	19.82	19.83	19.6	20.12	20.02	19.93
High_777	19	19.82	19.72	19.61	20.02	20.2	20.04
High_777	20	19.82	19.71	19.69	20.11	20	20.01
High_777	21	19.78	19.78	19.61	19.99	19.99	20.04
High_777	22	19.8	19.78	19.61	20.04	20.05	20.01
High_777	23	19.77	19.76	19.61	20.04	20.04	19.99
High_777	24	19.79	19.74	19.62	20.1	20	19.98

		EVDO 850			EVDO 1900		
CDMA1900	Power [dBm]	Low_1013	Middle_384	High_777	Low_25	Middle_600	High_1175
Low_25	11	25	24.84	24.73	25.17	24.85	24.65
Low_25	12	24.95	24.83	24.67	24.87	24.85	24.7
Low_25	13	24.96	24.83	24.65	24.85	24.92	24.67
Low_25	14	24.93	24.93	24.67	24.87	24.86	24.71
Low_25	15	25.02	24.85	24.61	24.87	24.86	24.71
Low_25	16	19.57	20.17	19.93	19.6	20.05	19.88
Low_25	17	19.57	20.18	20.04	20.05	20.03	19.86
Low_25	18	19.64	19.79	19.73	19.9	20.03	19.96
Low_25	19	19.7	19.82	19.71	20	20.01	19.96
Low_25	20	19.66	19.83	19.81	19.99	20	20.02
Low_25	21	19.83	19.8	19.68	20.03	19.94	19.9
Low_25	22	19.83	19.78	19.73	20.02	20.04	19.95
Low_25	23	19.91	19.84	19.7	19.94	19.97	19.92
Low_25	24	19.72	19.82	19.73	19.93	19.94	19.96
CDMA1900	Power [dBm]	Low_1013	Middle_384	High_777	Low_25	Middle_600	High_1175
Middle_600	11	25.02	24.87	24.74	24.82	24.86	25.04
Middle_600	12	25.02	24.87	24.72	24.84	24.83	24.68
Middle_600	13	25.02	24.87	24.73	24.87	24.84	24.67
Middle_600	14	25.02	24.92	24.71	24.84	24.82	24.68
Middle_600	15	25.02	24.93	24.7	24.84	24.9	24.64
Middle_600	16	19.8	19.75	19.7	19.6	19.96	19.9
Middle_600	17	19.79	19.79	19.78	19.98	19.98	19.9
Middle_600	18	19.79	19.77	19.68	19.98	20	19.93
Middle_600	19	19.79	19.76	19.75	19.97	19.97	19.93
Middle_600	20	19.88	19.85	19.65	19.97	19.98	19.9
Middle_600	21	19.88	19.72	19.68	19.93	19.94	19.89
Middle_600	22	19.85	19.8	19.67	19.92	20.02	19.96
Middle_600	23	19.86	19.8	19.74	19.98	19.98	19.94
Middle_600	24	19.84	19.74	19.72	19.97	19.97	19.88

CDMA1900	Power [dBm]	Low 1013	Middle 384	High 777	Low 25	Middle 600	High 1175
High_1175	11	25.05	24.92	24.7	25.14	24.9	25.12
High_1175	12	25.05	24.86	24.72	25.14	24.8	24.68
High_1175	13	25.04	24.9	24.72	25.14	24.81	24.68
High_1175	14	25.06	24.93	24.72	25.14	24.82	24.61
High_1175	15	25.02	24.82	24.72	25.14	24.82	24.61
High_1175	16	19.73	19.77	19.72	19.98	19.88	19.62
High_1175	17	19.86	19.8	19.64	20	19.83	19.93
High_1175	18	19.87	19.81	19.66	20.01	20.03	19.9
High_1175	19	19.87	19.8	19.66	20.01	19.92	19.92
High_1175	20	19.87	19.8	19.73	19.99	19.9	19.9
High_1175	21	19.85	19.78	19.64	19.98	19.97	19.89
High_1175	22	19.84	19.87	19.7	20.02	19.93	19.87
High_1175	23	19.92	19.75	19.7	19.9	19.9	19.97
High_1175	24	19.82	19.83	19.74	19.95	19.96	19.91

4. Standalone SAR Test Results

The test configuration for each body exposure condition (head, body-worn, and body-hotspot) is dependent on the applicable voice or data modes, and antenna selected.

Summary of test results for highest 1g SAR

Technology	Test configuration	Mode	Separation distance (mm)	Highest 1g SAR (W/kg)
LTE Band 13 (Part 27)	Head: Left touch	10M_QPSK, 1RB, RB offset: 49	--	0.300
	Body-worn: Front	10M_QPSK, 25RB, RB offset: 12	10	0.282
	Body-hotspot: Left hand side	10M_QPSK, 1RB, RB offset: 49	10	0.337
CDMA Cell (Part 22)	Head: Left touch	1x EVDO (Rel 0) VIOP mode	--	0.612
	Body worn: Rear	1xRTT (RC3, SO55)	10	0.663
	Body-hotspot: Rear	1xRTT (RC3, SO55)	10	0.663
GSM850 (Part 22)	Head: Left touch	GPRS 3 Slot, CS1 (VOIP mode)	--	0.532
	Body-worn: Rear	GPRS 3 Slot, CS1	10	0.667
	Body-hotspot: Rear	GPRS 3 Slot, CS1	10	0.667
CDMA PCS (Part 24)	Head: Right touch	1xRTT (RC3, SO32)	--	0.856
	Body-worn: Rear	1xRTT (RC3, SO32)	10	1.110
	Body-hotspot:	1xRTT (RC3, SO32)	10	1.110
GSM1900 (Part 24)	Head: Right touch	GPRS 3 Slot, CS1 (VOIP mode)	--	0.515
	Body worn: Rear	GPRS 3 Slot, CS1	10	0.651
	Body-hotspot: Rear	GPRS 3 Slot, CS1	10	0.651
WCDMA Band II (Part 24)	Head: Right touch	R99 (RMC, 12.2 kbps)	--	0.602
	Body worn: Rear	R99 (RMC, 12.2 kbps)	10	0.765
	Body-hotspot: Rear	R99 (RMC, 12.2 kbps)	10	0.765
WiFi 2.4 GHz (Part 15 C)	Head: Right touch	802.11b, 1 kbps	--	0.144
	Body worn: Rear	802.11b, 1 kbps	10	0.080
	Hotspot: Rear	802.11b, 1 kbps	10	0.080

4.1. LTE Band 13

Head SAR for LTE Band 13

Environmental Conditions:

Temperature Variation in Lab (°C): 25.0 to 25.0

Temperature Variation in Liquid (°C): 24.0 to 24.0

Mode	Ch. BW (MHz)	UL Ch #.	Freq. (MHz)	RB Size	RB Offset	Avg Pwr (dBm)	MPR	Test Position	SAR (mW/g)		Note
									1-g	10-g	
QPSK	10	23230	782.0	25	12	22.28	1	Left Touch	0.280	0.211	
				25	12	22.28	1	Left Tilt	0.192	0.149	
				25	12	22.18	1	Right Touch	0.213	0.160	
				25	12	22.28	1	Right Tilt	0.176	0.136	
				25	12	22.28	1	Left Touch	0.231	0.174	1
				1	0	23.43	0	Left Touch	0.267	0.201	
				1	49	23.34	0	Left Touch	0.300	0.225	
16QAM	10	23230	782.0	25	12	21.36	2	Left Touch	0.211	0.159	
				25	12	21.36	2	Left Tilt	0.150	0.114	
				25	12	21.36	2	Right Touch	0.163	0.122	
				25	12	21.36	2	Right Tilt	0.068	0.052	
				25	12	21.36	2	Left Touch	0.187	0.143	1
				1	0	22.40	1	Left Touch	0.198	0.152	
				1	49	22.35	1	Left Touch	0.222	0.169	

Note(s):

1. Wireless charger Back Cover attached, Using the worst-case configuration acquired from RB25, #RB12

2. According to 941225 D05 SAR for LTE Devices v01

- A) Begin by measuring SAR on the high, middle and low (H, M, L) channels using the largest channel bandwidth³, in QPSK with 50% RB allocation centered within the channel bandwidth.
 - i) When the SAR of a channel measured in A) is > 1.45 W/kg, also measure SAR for that channel using QPSK with 100% RB allocation.
 - a) If the highest SAR measured in i) is > 1.45 W/kg, measure SAR on all channels (H, M, L).
- B) Measure SAR in QPSK with 1 RB allocated at the high end of the channel edge using the highest SAR channel measured in A); and then repeat the measurement at the low end of the channel edge.
 - i) If the SAR measured for a 1 RB configuration in B) is > 1.45 W/kg, test that 1 RB configuration on all channels (H, M, L).

Body-worn & Body-hotspot SAR for LTE Band 13

Separation distance: 10 mm

Environmental Conditions:

Temperature Variation in Lab (°C): 25.0 to 25.0

Temperature Variation in Liquid (°C): 24.0 to 24.0

Mode	Ch. BW (MHz)	UL Ch #.	Freq. (MHz)	RB Size	RB Offset	Avg Pwr (dBm)	MPR	Test Position	SAR (mW/g)		Note
									1-g	10-g	
QPSK	10	23230	782.0	25	12	22.28	1	Front	0.282	0.217	
		23230	782.0	25	12	22.28	1	Rear	0.128	0.078	
		23230	782.0	25	12	22.28	1	Left Hand Side	0.322	0.226	
		23230	782.0	25	12	22.28	1	Right Hand Side	0.149	0.106	
		23230	782.0	25	12	22.28	1	Bottom	0.257	0.141	
		23230	782.0	25	12	22.28	1	Top	0.015	0.011	
		23230	782.0	25	12	22.28	1	Left Hand Side	0.307	0.216	1
		23230	782.0	25	12	22.28	1	Left Hand Side	0.302	0.212	2
		23230	782.0	1	0	23.43	0	Left Hand Side	0.326	0.232	
		23230	782.0	1	49	23.34	0	Left Hand Side	0.337	0.238	
16QAM	10	23230	782.0	25	12	21.50	2	Front	0.219	0.169	
		23230	782.0	25	12	21.50	2	Rear	0.222	0.168	
		23230	782.0	25	12	21.50	2	Left Hand Side	0.257	0.180	
		23230	782.0	25	12	21.50	2	Right Hand Side	0.130	0.091	
		23230	782.0	25	12	21.50	2	Bottom	0.188	0.104	
		23230	782.0	25	12	21.50	2	Top	0.013	0.010	
		23230	782.0	25	12	21.50	2	Left Hand Side	0.250	0.175	1
		23230	782.0	25	12	21.50	2	Left Hand Side	0.290	0.204	2
		23230	782.0	1	0	22.40	1	Left Hand Side	0.292	0.205	
		23230	782.0	1	49	22.35	1	Left Hand Side	0.305	0.214	

Note(s):

1. Wireless charger Back Cover attached, Using the worst-case configuration acquired from RB25, #RB12
2. Personal hands-Free Kit (headset) attached, Using the worst-case configuration acquired from RB25, RB12

4.2. CDMA850

Head SAR for CDMA850

Environmental Conditions:

Temperature Variation in Lab (°C): 25.0 to 25.0

Temperature Variation in Liquid (°C): 24.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
1xRTT (RC3, SO55)	384	836.6	24.84	Left Touch	0.487	0.372	1
			24.84	Left Tilt	0.279	0.215	1
			24.84	Right Touch	0.501	0.383	1
			24.84	Right Tilt	0.290	0.222	1
			24.84	Right Touch	0.489	0.374	1,2

Body-worn & Body-hotspot SAR for CDMA850

Separation distance: 10 mm

Environmental Conditions:

Temperature Variation in Lab (°C): 25.0 to 25.0

Temperature Variation in Liquid (°C): 24.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
1xRTT (RC3,SO32)	384	836.5	24.82	Front	0.606	0.463	2
			24.82	Rear	0.663	0.498	2
			24.82	Left Hand Side	0.424	0.295	2
			24.82	Right Hand Side	0.426	0.295	2
			24.82	Top	0.137	0.084	2
			24.82	Buttom	0.031	0.022	2
			24.82	Rear	0.571	0.425	1,2
			24.82	Rear	0.565	0.425	2,3

Note(s):

1. Wireless charger Back Cover attached, Using the worst-case configuration acquired
2. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel are optional
3. Personal Hands-Free Kit attached, Using the worst-case configuration acquired

Head SAR for CDMA850 EVDO (VOIP mode operation)

Environmental Conditions:

Temperature Variation in Lab (°C):	25.0 to 25.0
Temperature Variation in Liquid (°C):	24.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
1x EVDO (Rel 0)	384	836.52	25.01	Left Touch	0.612	0.359	2
			25.01	Left Tilt	0.552	0.316	2
			25.01	Right Touch	0.401	0.271	2
			25.01	Right Tilt	0.322	0.207	2
			25.01	Left Touch	0.547	0.316	1, 2

Body-worn & Body-hotspot SAR for CDMA850 EVDO

Separation distance: 10 mm

Environmental Conditions:

Temperature Variation in Lab (°C):	25.0 to 25.0
Temperature Variation in Liquid (°C):	24.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
1x EVDO (Rel 0)	384	836.6	25.01	Front	0.208	0.136	2
			25.01	Rear	0.358	0.234	2
			25.01	Left Hand Side	0.126	0.088	2
			25.01	Right Hand Side	0.271	0.188	2
			25.01	Top	0.158	0.100	2
			25.01	Bottom	0.016	0.010	2
			25.01	Rear	0.244	0.165	1,2
			25.01	Rear	0.399	0.256	2,3

Note(s):

1. Wireless charger Back Cover attached, Using the worst-case configuration acquired
2. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel are optional
3. Personal Hands-Free Kit attached, Using the worst-case configuration acquired

4.3. CDMA1900

Head SAR for CDMA1900

Environmental Conditions:	
Temperature Variation in Lab (°C):	25.0 to 25.0
Temperature Variation in Liquid (°C):	24.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
1xRTT (RC3, SO55)	600	1880.0	24.94	Left Touch	0.523	0.328	2
			24.94	Left Tilt	0.424	0.246	2
			24.94	Right Touch	0.856	0.536	2
			24.94	Right Tilt	0.476	0.295	2
	25	1851.3	24.95	Right Touch	0.799	0.505	2
	1175	1908.8	25.09	Right Touch	0.812	0.504	2
	600	1880.0	24.94	Right Touch	0.752	0.471	1,2

Body-worn & Body-hotspot SAR for CDMA1900

Environmental Conditions:	
Temperature Variation in Lab (°C):	23.0 to 24.0
Temperature Variation in Liquid (°C):	23.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
1xRTT (RC3, SO32)	600	1880.0	25.00	Front	0.875	0.544	2
	25	1851.25	24.90	Front	0.913	0.571	2
	1175	1908.75	24.86	Front	0.802	0.495	2
	600	1880.0	25.00	Rear	1.110	0.709	2
	25	1851.25	24.90	Rear	1.110	0.704	2
	1175	1908.75	24.86	Rear	0.929	0.593	2
	600	1880.0	25.00	Left Hand Side	0.171	0.105	2
	600	1880.0	25.00	Right Hand Side	0.661	0.398	2
	600	1880.0	25.00	Top	0.087	0.055	2
	600	1880.0	25.00	Buttom	0.297	0.176	2
	600	1880.0	25.00	Rear	0.718	0.462	1,2
	600	1880.0	25.00	Rear	0.783	0.489	2,3

Note(s):

1. Wireless charger Back Cover attached, Using the worst-case configuration acquired
2. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel are optional
3. Personal Hands-Free Kit attached, Using the worst-case configuration acquired

Head SAR for CDMA1900 EVDO (VOIP mode operation)

Environmental Conditions:

Temperature Variation in Lab (°C): 23.0 to 24.0

Temperature Variation in Liquid (°C): 23.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
1x EVDO (Rel 0)	600	1880.0	25.02	Left Touch	0.410	0.260	2
			25.02	Left Tilt	0.305	0.179	2
			25.02	Right Touch	0.360	0.230	2
			25.02	Right Tilt	0.217	0.131	2
			25.02	Left Touch	0.493	0.308	1, 2

Body-worn & Body-hotspot SAR for CDMA1900 EVDO

Environmental Conditions:

Temperature Variation in Lab (°C): 23.0 to 24.0

Temperature Variation in Liquid (°C): 23.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
1x EVDO (Rel 0)	600	1880.0	25.02	Front	0.446	0.274	2
			25.02	Rear	0.536	0.329	2
			25.02	Left Hand Side	0.360	0.194	2
			25.02	Right Hand Side	0.172	0.105	2
			25.02	Buttom	0.143	0.086	2
			25.02	Top	0.056	0.034	2
			25.02	Rear	0.296	0.182	1,2
			25.02	Rear	0.382	0.246	2,3

Note(s):

1. Wireless charger Back Cover attached, Using the worst-case configuration acquired
2. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel are optional
3. Personal Hands-Free Kit (headset) attached, using the worst-case configuration acquired

4.4. GSM850

Head SAR for GSM850

Environmental Conditions:

Temperature Variation in Lab (°C): 25.0 to 25.0

Temperature Variation in Liquid (°C): 24.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
Voice	190	836.6	33.41	Left Touch	0.421	0.320	2
			33.41	Left Tilt	0.246	0.191	2
			33.41	Right Touch	0.386	0.296	2
			33.41	Right Tilt	0.231	0.177	2
			33.41	Left Touch	0.352	0.270	1,2

Head SAR for GPRS850 (VOIP mode operation)

Environmental Conditions:

Temperature Variation in Lab (°C): 25.0 to 25.0

Temperature Variation in Liquid (°C): 24.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
GPRS 3 Slots (CS1)	190	836.6	29.80	Left Touch	0.532	0.234	1,2

Note(s):

1. Using the worst-case configuration acquired from GSM voice mode
2. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel are optional.

Body-worn & Body-hotspot SAR for GPRS850

Separation distance: 10 mm

Environmental Conditions:

Temperature Variation in Lab (°C): 25.0 to 25.0

Temperature Variation in Liquid (°C): 24.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
GPRS 3 Slots (CS1)	190	836.6	29.82	Front	0.647	0.495	2
			29.82	Rear	0.667	0.502	2
			29.82	Left Hand Side	0.540	0.375	2
			29.82	Right Hand Side	0.582	0.404	2
			29.82	Top	0.188	0.112	2
			29.82	Bottom	0.030	0.021	2
			29.82	Rear	0.616	0.460	1,2
			29.82	Rear	0.552	0.412	2,3

Body-worn & Body-hotspot SAR for GSM850 (Voice mode)

Separation distance: 10 mm

Environmental Conditions:

Temperature Variation in Lab (°C): 25.0 to 25.0

Temperature Variation in Liquid (°C): 24.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
Voice	190	836.6	33.41	Rear	0.557	0.419	1, 2, 3

Note(s):

1. Using the worst-case configuration acquired from GPRS
2. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel are optional
3. Personal Hands-Free Kit attached, Using the worst-case configuration acquired

4.5. GSM1900

Head SAR for GSM1900

Environmental Conditions:

Temperature Variation in Lab (°C): 25.0 to 25.0

Temperature Variation in Liquid (°C): 24.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
Voice	661	1880.0	29.60	Left Touch	0.120	0.074	2
			29.60	Left Tilt	0.092	0.054	2
			29.60	Right Touch	0.199	0.125	2
			29.60	Right Tilt	0.090	0.055	2
			29.60	Right Touch	0.202	0.126	1,2

Head SAR for GPRS1900 (VOIP mode operation)

Environmental Conditions:

Temperature Variation in Lab (°C): 23.0 to 23.0

Temperature Variation in Liquid (°C): 23.0 to 23.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
GPRS 3 Slots (CS1)	661	1880.0	28.22	Right Touch	0.515	0.318	1,2

Note(s):

1. Using the worst-case configuration acquired From GSM voice mode.
2. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel are optional.

Body-worn & Body-hotspot SAR for GPRS1900

Separation distance: 10 mm

Environmental Conditions:

Temperature Variation in Lab (°C):	25.0 to 25.0
Temperature Variation in Liquid (°C):	24.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
GPRS 3 Slots (CS1)	661	1880.0	28.22	Front	0.355	0.227	2
			28.22	Rear	0.513	0.327	2
			28.22	Left Hand Side	0.092	0.056	2
			28.22	Right Hand Side	0.349	0.210	2
			28.22	Top	0.057	0.035	2
			28.22	Bottom	0.143	0.085	2
			28.22	Rear	0.442	0.282	1,2
			28.22	Rear	0.651	0.388	2,3

Body-worn & Body-hotspot SAR for GPRS1900

Separation distance: 10 mm

Environmental Conditions:

Temperature Variation in Lab (°C):	25.0 to 25.0
Temperature Variation in Liquid (°C):	24.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
Voice	661	1880.0	29.60	Rear	0.271	0.173	2,3

Note(s):

1. Using the worst-case configuration acquired from GPRS
2. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel are optional.
3. Personal Hands-Free Kit (headset) attached, using the worst-case configuration acquired.

4.6. WCDMA 1900 (UMTS Band II)

Head SAR for WCDMA 1900 (UMTS Band II)

Environmental Conditions:

Temperature Variation in Lab (°C):	23.5 to 25.0
Temperature Variation in Liquid (°C):	23.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
R99 (RMC, 12.2 kbps)	9400	1880.0	23.36	Left Touch	0.369	0.232	2
			23.36	Left Tilt	0.250	0.146	2
			23.36	Right Touch	0.602	0.376	2
			23.36	Right Tilt	0.274	0.168	2
			23.36	Right Touch	0.598	0.371	1,2

Body-worn & Body-hotspot SAR for WCDMA 1900 (UMTS Band II)

Separation distance: 10 mm

Environmental Conditions:

Temperature Variation in Lab (°C):	23.5 to 25.0
Temperature Variation in Liquid (°C):	23.0 to 25.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
R99 (RMC, 12.2 kbps)	9400	1880.0	23.36	Front	0.520	0.340	2
			23.36	Rear	0.765	0.489	2
			23.36	Left Hand Side	0.135	0.082	2
			23.36	Right Hand Side	0.447	0.270	2
			23.36	Top	0.213	0.126	2
			23.36	Bottom	0.086	0.053	2
			23.36	Rear	0.430	0.279	1,2
			23.36	Rear	0.753	0.464	2,3
R99 (RMC, 12.2 kbps + HSDPA Sub test 1)	9400	1880.0	23.24	Rear	0.681	0.432	2

Note(s):

1. Wireless charger Back Cover attached, Using the worst-case configuration acquired
2. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel are optional
3. Personal Hands-Free Kit attached, Using the worst-case configuration acquired

4.7. WiFi 2.4 GHz

Head SAR for WiFi 2.4 GHz

Environmental Conditions:

Temperature Variation in Lab (°C): 25.0 to 25.0

Temperature Variation in Liquid (°C): 24.0 to 24.0

Mode	Channel Number	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
802.11b	6	2437	18.65	Left Touch	0.095	0.049	2
			18.65	Left Tilt	0.045	0.022	2
			18.65	Right Touch	0.137	0.050	2
			18.65	Right Tilt	0.030	0.015	2
			18.65	Right Touch	0.144	0.069	1,2

Body-worn & Body-hotspot SAR for WiFi 2.4 GHz

Separation distance: 10 mm

Environmental Conditions:

Temperature Variation in Lab (°C): 25.0 to 25.0

Temperature Variation in Liquid (°C): 24.0 to 24.0

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)		Note
					1-g	10-g	
802.11b	6	2437	18.65	Front	0.034	0.019	2
			18.65	Rear	0.080	0.043	2
			18.65	Left Hand Side	0.011	0.005	2
			18.65	Right Hand Side	0.063	0.032	2
			18.65	Buttom	0.013	0.007	2
			18.65	Top	0.015	0.008	2
			18.65	Rear	0.062	0.035	1,2
			18.65	Rear	0.069	0.040	2,3

Note(s):

1. Wireless charger Back Cover attached, Using the worst-case configuration acquired
2. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel are optional
3. Personal Hands-Free Kit attached, Using the worst-case configuration acquired

5. Simultaneous Transmission SAR Analysis (KDB 648474)

5.1. Head Exposure Conduction

Head-to-ear	Mode	Worst-Case	CDMA 835	CDMA 1900	WCDMA 1900	GSM 850	GSM 1900	DO 835 Data (No TX back off)	DO835 (TXBack OFF)	DO1900 (No TX Back OFF)	DO1900 (TX Back OFF)	LTE 700 Data (No TX Back OFF)	LTE 700 DATA (TX Back OFF)	Wi-Fi 2.4G	Total Sum VS 1.6 w/kg
Left Touch	SVLTE	CDMA835 Voice + LTE700 Data + WiFi Data	0.487									0.280		0.095	0.862
Left Tilt	SVLTE	CDMA835 Voice + LTE700 Data + WiFi Data	0.279									0.192		0.045	0.516
Right Touch	SVLTE	CDMA835 Voice + LTE700 Data + WiFi Data	0.501									0.213		0.137	0.851
Right Tilt	SVLTE	CDMA835 Voice + LTE700 Data + WiFi Data	0.290									0.176		0.030	0.496
Left Touch	SVLTE	CDMA835 Voice + LTE700 Data	0.487									0.280			0.767
Left Tilt	SVLTE	CDMA835 Voice + LTE700 Data	0.279									0.192			0.471
Right Touch	SVLTE	CDMA835 Voice + LTE700 Data	0.501									0.213			0.714
Right Tilt	SVLTE	CDMA835 Voice + LTE700 Data	0.290									0.176			0.466
Left Touch	SVLTE	CDMA1900 Voice + LTE700 Data + WiFi Data		0.523								0.280		0.095	0.898
Left Tilt	SVLTE	CDMA1900 Voice + LTE700 Data + WiFi Data		0.424								0.192		0.045	0.661
Right Touch	SVLTE	CDMA1900 Voice + LTE700 Data + WiFi Data		0.856								0.213		0.137	1.206
Right Tilt	SVLTE	CDMA1900 Voice + LTE700 Data + WiFi Data		0.476								0.176		0.030	0.682
Left Touch	SVLTE	CDMA1900 Voice + LTE700 Data		0.523								0.280			0.803
Left Tilt	SVLTE	CDMA1900 Voice + LTE700 Data		0.424								0.192			0.616
Right Touch	SVLTE	CDMA1900 Voice + LTE700 Data		0.856								0.213			1.069
Right Tilt	SVLTE	CDMA1900 Voice + LTE700 Data		0.476								0.176			0.652
Left Touch	SVDO	CDMA835 Voice +DO835 Data + WiFi Data	0.487					0.612						0.095	1.194
Left Tilt	SVDO	CDMA835 Voice +DO835 Data + WiFi Data	0.279					0.552						0.045	0.876
Right Touch	SVDO	CDMA835 Voice +DO835 Data + WiFi Data	0.501					0.401						0.137	1.039
Right Tilt	SVDO	CDMA835 Voice +DO835 Data + WiFi Data	0.290					0.322						0.030	0.642
Left Touch	SVDO	CDMA835 Voice +DO835 Data	0.487					0.612							1.099
Left Tilt	SVDO	CDMA835 Voice +DO835 Data	0.279					0.552							0.831
Right Touch	SVDO	CDMA835 Voice +DO835 Data	0.501					0.401							0.902
Right Tilt	SVDO	CDMA835 Voice +DO835 Data	0.290					0.322							0.612
Left Touch	SVDO	CDMA835 Voice +DO1900 Data + WiFi Data	0.487							0.410				0.095	0.992
Left Tilt	SVDO	CDMA835 Voice +DO1900 Data + WiFi Data	0.279							0.305				0.045	0.629
Right Touch	SVDO	CDMA835 Voice +DO1900 Data + WiFi Data	0.501							0.360				0.137	0.998
Right Tilt	SVDO	CDMA835 Voice +DO1900 Data + WiFi Data	0.290							0.217				0.030	0.537
Left Touch	SVDO	CDMA835 Voice +DO1900 Data	0.487							0.410					0.897
Left Tilt	SVDO	CDMA835 Voice +DO1900 Data	0.279							0.305					0.584
Right Touch	SVDO	CDMA835 Voice +DO1900 Data	0.501							0.360					0.861
Right Tilt	SVDO	CDMA835 Voice +DO1900 Data	0.290							0.217					0.507
Left Touch	SVDO	CDMA1900 Voice +DO835 Data + WiFi Data		0.523				0.612						0.095	1.230
Left Tilt	SVDO	CDMA1900 Voice +DO835 Data + WiFi Data		0.424				0.552						0.045	1.021
Right Touch	SVDO	CDMA1900 Voice +DO835 Data + WiFi Data		0.856				0.401						0.137	1.394
Right Tilt	SVDO	CDMA1900 Voice +DO835 Data + WiFi Data		0.476				0.322						0.030	0.828
Left Touch	SVDO	CDMA1900 Voice +DO835 Data		0.523				0.612							1.135
Left Tilt	SVDO	CDMA1900 Voice +DO835 Data		0.424				0.552							0.976
Right Touch	SVDO	CDMA1900 Voice +DO835 Data		0.856				0.401							1.257
Right Tilt	SVDO	CDMA1900 Voice +DO835 Data		0.476				0.322							0.798
Left Touch	SVDO	CDMA1900 Voice +DO1900 Data + WiFi Data		0.523						0.410				0.095	1.028
Left Tilt	SVDO	CDMA1900 Voice +DO1900 Data + WiFi Data		0.424						0.305				0.045	0.774
Right Touch	SVDO	CDMA1900 Voice +DO1900 Data + WiFi Data		0.856						0.360				0.137	1.353
Right Tilt	SVDO	CDMA1900 Voice +DO1900 Data + WiFi Data		0.476						0.217				0.030	0.723
Left Touch	SVDO	CDMA1900 Voice +DO1900 Data		0.523						0.410					0.933
Left Tilt	SVDO	CDMA1900 Voice +DO1900 Data		0.424						0.305					0.729
Right Touch	SVDO	CDMA1900 Voice +DO1900 Data		0.856						0.360					1.216
Right Tilt	SVDO	CDMA1900 Voice +DO1900 Data		0.476						0.217					0.693
Left Touch	GSM,WCDMA Hotspot	WCDMA1900 Data + WiFi Data			0.369									0.095	0.464
Left Tilt	GSM,WCDMA Hotspot	WCDMA1900 Data + WiFi Data			0.250									0.045	0.295
Right Touch	GSM,WCDMA Hotspot	WCDMA1900 Data + WiFi Data			0.602									0.137	0.739
Right Tilt	GSM,WCDMA Hotspot	WCDMA1900 Data + WiFi Data			0.274									0.030	0.304
Left Touch	GSM,WCDMA Hotspot	GSM850 Data + WiFi Data				0.421								0.095	0.516
Left Tilt	GSM,WCDMA Hotspot	GSM850 Data + WiFi Data				0.246								0.045	0.291
Right Touch	GSM,WCDMA Hotspot	GSM850 Data + WiFi Data				0.386								0.137	0.523
Right Tilt	GSM,WCDMA Hotspot	GSM850 Data + WiFi Data				0.231								0.030	0.261
Left Touch	GSM,WCDMA Hotspot	GSM1900 Data + WiFi Data					0.120							0.095	0.215
Left Tilt	GSM,WCDMA Hotspot	GSM1900 Data + WiFi Data					0.092							0.045	0.137
Right Touch	GSM,WCDMA Hotspot	GSM1900 Data + WiFi Data					0.199							0.137	0.336
Right Tilt	GSM,WCDMA Hotspot	GSM1900 Data + WiFi Data					0.090							0.030	0.1198

5.2. Body-worn and Body-hotspot Exposure Condition

Body-Worn	Mode	Worst-Case	CDMA 835	CDMA 1900	WCDMA 1900	GSM 850	GSM 1900	DO 835 Data (No TX back off)	DO835 (TXBack OFF)	DO1900 (No TX Back OFF)	DO1900 (TX Back OFF)	LTE 700 Data (No TX Back OFF)	LTE 700 DATA (TX Back OFF)	Wi-Fi 2.4G	Total Sum VS 1.6 w/kg
Front	SVLTE	CDMA835 Voice + LTE700 Data + WiFi Data	0.606									0.282		0.034	0.922
Rear	SVLTE	CDMA835 Voice + LTE700 Data + WiFi Data	0.663									0.222		0.08	0.965
Left	SVLTE	CDMA835 Voice + LTE700 Data + WiFi Data	0.424									0.322		0.011	0.757
Right	SVLTE	CDMA835 Voice + LTE700 Data + WiFi Data	0.426									0.149		0.063	0.638
Top	SVLTE	CDMA835 Voice + LTE700 Data + WiFi Data	0.137									0.015		0.015	0.167
Bottom	SVLTE	CDMA835 Voice + LTE700 Data + WiFi Data	0.031									0.257		0.013	0.301
Front	SVLTE	CDMA835 Voice + LTE700 Data	0.606									0.282			0.888
Rear	SVLTE	CDMA835 Voice + LTE700 Data	0.663									0.222			0.885
Left	SVLTE	CDMA835 Voice + LTE700 Data	0.424									0.322			0.746
Right	SVLTE	CDMA835 Voice + LTE700 Data	0.426									0.149			0.575
Top	SVLTE	CDMA835 Voice + LTE700 Data	0.137									0.015			0.152
Bottom	SVLTE	CDMA835 Voice + LTE700 Data	0.031									0.257			0.288
Front	SVLTE	CDMA1900 Voice + LTE700 Data + WiFi Data		0.875								0.282		0.034	1.191
Rear	SVLTE	CDMA1900 Voice + LTE700 Data + WiFi Data		1.110								0.222		0.08	1.412
Left	SVLTE	CDMA1900 Voice + LTE700 Data + WiFi Data		0.171								0.322		0.011	0.504
Right	SVLTE	CDMA1900 Voice + LTE700 Data + WiFi Data		0.661								0.149		0.063	0.873
Top	SVLTE	CDMA1900 Voice + LTE700 Data + WiFi Data		0.087								0.015		0.015	0.117
Bottom	SVLTE	CDMA1900 Voice + LTE700 Data + WiFi Data		0.297								0.257		0.013	0.567
Front	SVLTE	CDMA1900 Voice + LTE700 Data		0.875								0.282			1.157
Rear	SVLTE	CDMA1900 Voice + LTE700 Data		1.110								0.222			1.332
Left	SVLTE	CDMA1900 Voice + LTE700 Data		0.171								0.322			0.493
Right	SVLTE	CDMA1900 Voice + LTE700 Data		0.661								0.149			0.810
Top	SVLTE	CDMA1900 Voice + LTE700 Data		0.087								0.015			0.102
Bottom	SVLTE	CDMA1900 Voice + LTE700 Data		0.297								0.257			0.554
Front	SVDO	CDMA835 Voice +DO835 Data + WiFi Data	0.606					0.208						0.034	0.848
Rear	SVDO	CDMA835 Voice +DO835 Data + WiFi Data	0.663					0.358						0.08	1.101
Left	SVDO	CDMA835 Voice +DO835 Data + WiFi Data	0.424					0.126						0.011	0.561
Right	SVDO	CDMA835 Voice +DO835 Data + WiFi Data	0.426					0.271						0.063	0.760
Top	SVDO	CDMA835 Voice +DO835 Data + WiFi Data	0.137					0.158						0.015	0.310
Bottom	SVDO	CDMA835 Voice +DO835 Data + WiFi Data	0.031					0.016						0.013	0.060
Front	SVDO	CDMA835 Voice +DO835 Data	0.606					0.208							0.814
Rear	SVDO	CDMA835 Voice +DO835 Data	0.663					0.358							1.021
Left	SVDO	CDMA835 Voice +DO835 Data	0.424					0.126							0.55
Right	SVDO	CDMA835 Voice +DO835 Data	0.426					0.271							0.697
Top	SVDO	CDMA835 Voice +DO835 Data	0.137					0.158							0.295
Bottom	SVDO	CDMA835 Voice +DO835 Data	0.031					0.016							0.047
Front	SVDO	CDMA835 Voice +DO1900 Data + WiFi Data	0.606							0.446				0.034	1.086
Rear	SVDO	CDMA835 Voice +DO1900 Data + WiFi Data	0.663							0.536				0.08	1.279
Left	SVDO	CDMA835 Voice +DO1900 Data + WiFi Data	0.424							0.360				0.011	0.795
Right	SVDO	CDMA835 Voice +DO1900 Data + WiFi Data	0.426							0.172				0.063	0.661
Top	SVDO	CDMA835 Voice +DO1900 Data + WiFi Data	0.137							0.056				0.015	0.209
Bottom	SVDO	CDMA835 Voice +DO1900 Data + WiFi Data	0.031							0.143				0.013	0.187
Front	SVDO	CDMA835 Voice +DO1900 Data	0.606							0.446					1.052
Rear	SVDO	CDMA835 Voice +DO1900 Data	0.663							0.536					1.199
Left	SVDO	CDMA835 Voice +DO1900 Data	0.424							0.360					0.784
Right	SVDO	CDMA835 Voice +DO1900 Data	0.426							0.172					0.598
Top	SVDO	CDMA835 Voice +DO1900 Data	0.137							0.056					0.193
Bottom	SVDO	CDMA835 Voice +DO1900 Data	0.031							0.143					0.174

Body-worn and Body-hotspot Exposure Condition (continued)

Front	SVDO	CDMA1900 Voice +DO835 Data + WiFi Data	0.875			0.208					0.034	1.117
Rear	SVDO	CDMA1900 Voice +DO835 Data + WiFi Data	1.110			0.358					0.08	1.548
Left	SVDO	CDMA1900 Voice +DO835 Data + WiFi Data	0.171			0.126					0.011	0.308
Right	SVDO	CDMA1900 Voice +DO835 Data + WiFi Data	0.661			0.271					0.063	0.995
Top	SVDO	CDMA1900 Voice +DO835 Data + WiFi Data	0.087			0.158					0.015	0.260
Bottom	SVDO	CDMA1900 Voice +DO835 Data + WiFi Data	0.297			0.016					0.013	0.326
Front	SVDO	CDMA1900 Voice +DO835 Data	0.875			0.208						1.083
Rear	SVDO	CDMA1900 Voice +DO835 Data	1.110			0.358						1.468
Left	SVDO	CDMA1900 Voice +DO835 Data	0.171			0.126						0.297
Right	SVDO	CDMA1900 Voice +DO835 Data	0.661			0.271						0.932
Top	SVDO	CDMA1900 Voice +DO835 Data	0.087			0.158						0.245
Bottom	SVDO	CDMA1900 Voice +DO835 Data	0.297			0.016						0.313
Front	SVDO	CDMA1900 Voice +DO1900 Data + WiFi Data	0.875				0.446				0.034	1.355
Rear	SVDO	CDMA1900 Voice +DO1900 Data + WiFi Data	1.110				0.536				0.08	1.726
Left	SVDO	CDMA1900 Voice +DO1900 Data + WiFi Data	0.171				0.360				0.011	0.542
Right	SVDO	CDMA1900 Voice +DO1900 Data + WiFi Data	0.661				0.172				0.063	0.896
Top	SVDO	CDMA1900 Voice +DO1900 Data + WiFi Data	0.087				0.056				0.015	0.159
Bottom	SVDO	CDMA1900 Voice +DO1900 Data + WiFi Data	0.297				0.143				0.013	0.453
Front	SVDO	CDMA1900 Voice +DO1900 Data	0.875				0.446					1.321
Rear	SVDO	CDMA1900 Voice +DO1900 Data	1.110				0.536					1.646
Left	SVDO	CDMA1900 Voice +DO1900 Data	0.171				0.360					0.531
Right	SVDO	CDMA1900 Voice +DO1900 Data	0.661				0.172					0.833
Top	SVDO	CDMA1900 Voice +DO1900 Data	0.087				0.056					0.143
Bottom	SVDO	CDMA1900 Voice +DO1900 Data	0.297				0.143					0.440

5.3. SAR to Peak Location Separation Ratio

$\sum$ 1-g SAR > 1.6 W/kg

Worst-case $\sum$ Condition (1.72 and 1.646 W/kg)	$\sum$ 1-g SAR (W/kg)	3D distance (cm)	SPLSR (SAR to peak location separation ratio)
CDMA1900 voice + DO1900 data	1.646	4.27	0.385
CDMA1900 voice +WiFi data	1.190	1.17	1.017
CDMA1900 data +WiFi data	1.190	4.82	0.247

Note:

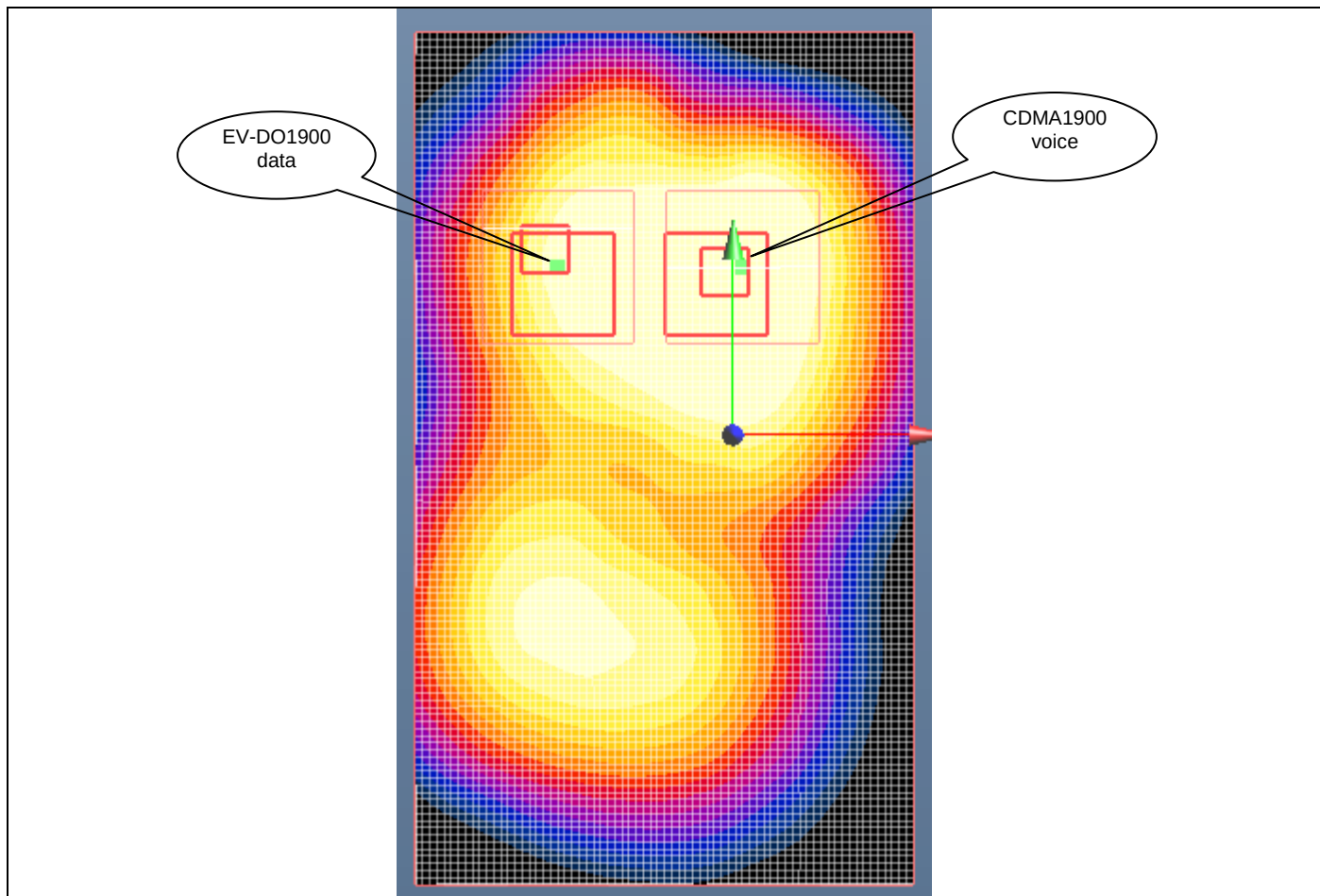
- This table indicates the actual measured distance between peak SAR locations. Refer to the following pages for 3D distances.

CONCLUSIONS:

Simultaneous transmission SAR evaluation is required due to SAR to peak location separation ratios are greater than 0.3, therefore, measure Simultaneous Transmission SAR with Volume Scans is required.

Distance calculation between Peak SAR locations

CDMA1900 voice-to-EV-DO1900 data



CDMA1900 Voice:
CDMA1900 1x EVDO:
m

Value of SAR	X	Y	Z
mW/g	m	m	m
1.71	0.000459	0.0355	-0.205
0.869	-0.0418	0.0419	-0.205

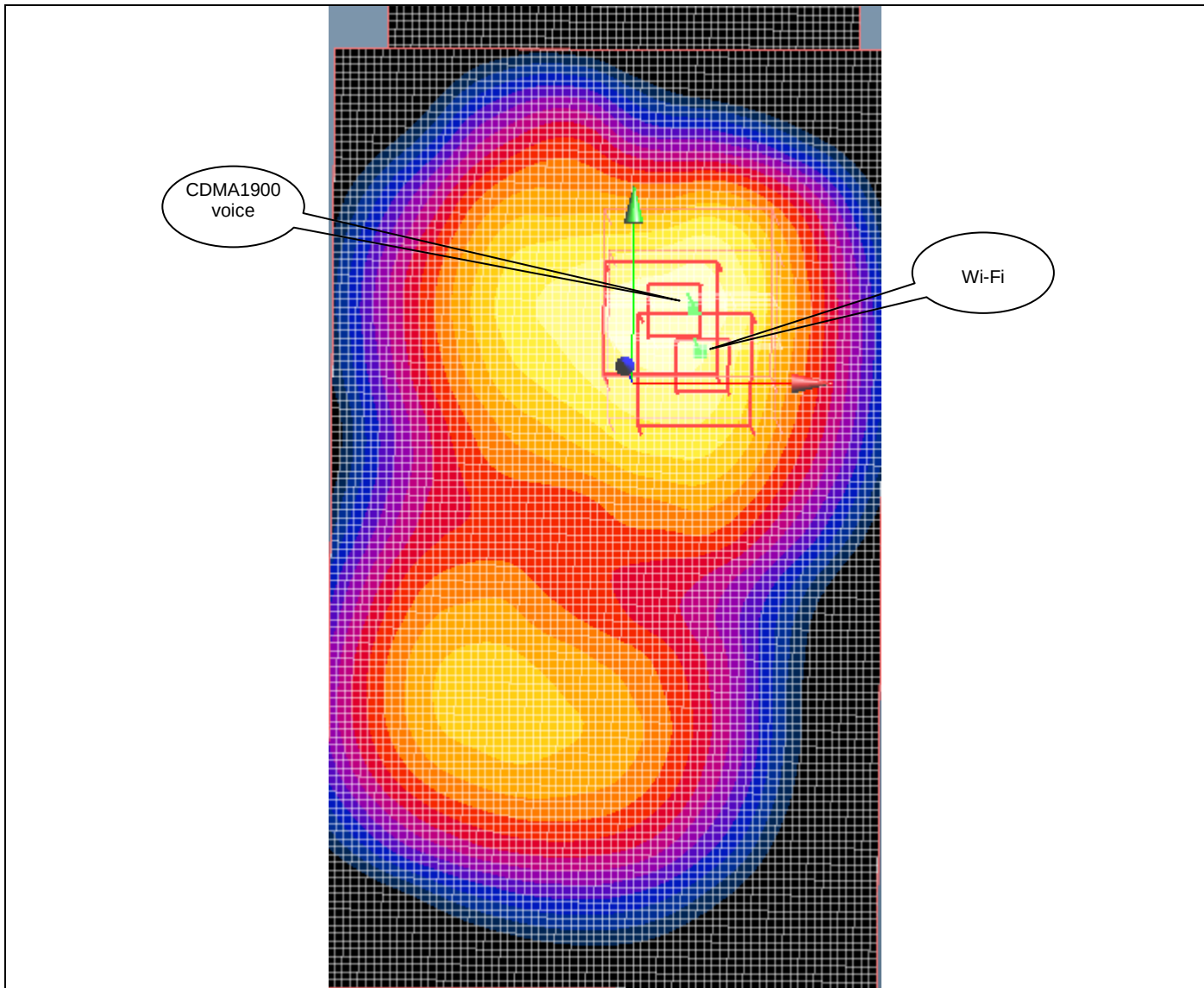
cm

Separation distance (d) = 0.0427 4.27

$\text{SQRT}((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)$

Distance calculation between Peak SAR locations

CDMA1900 voice-to-WiFi

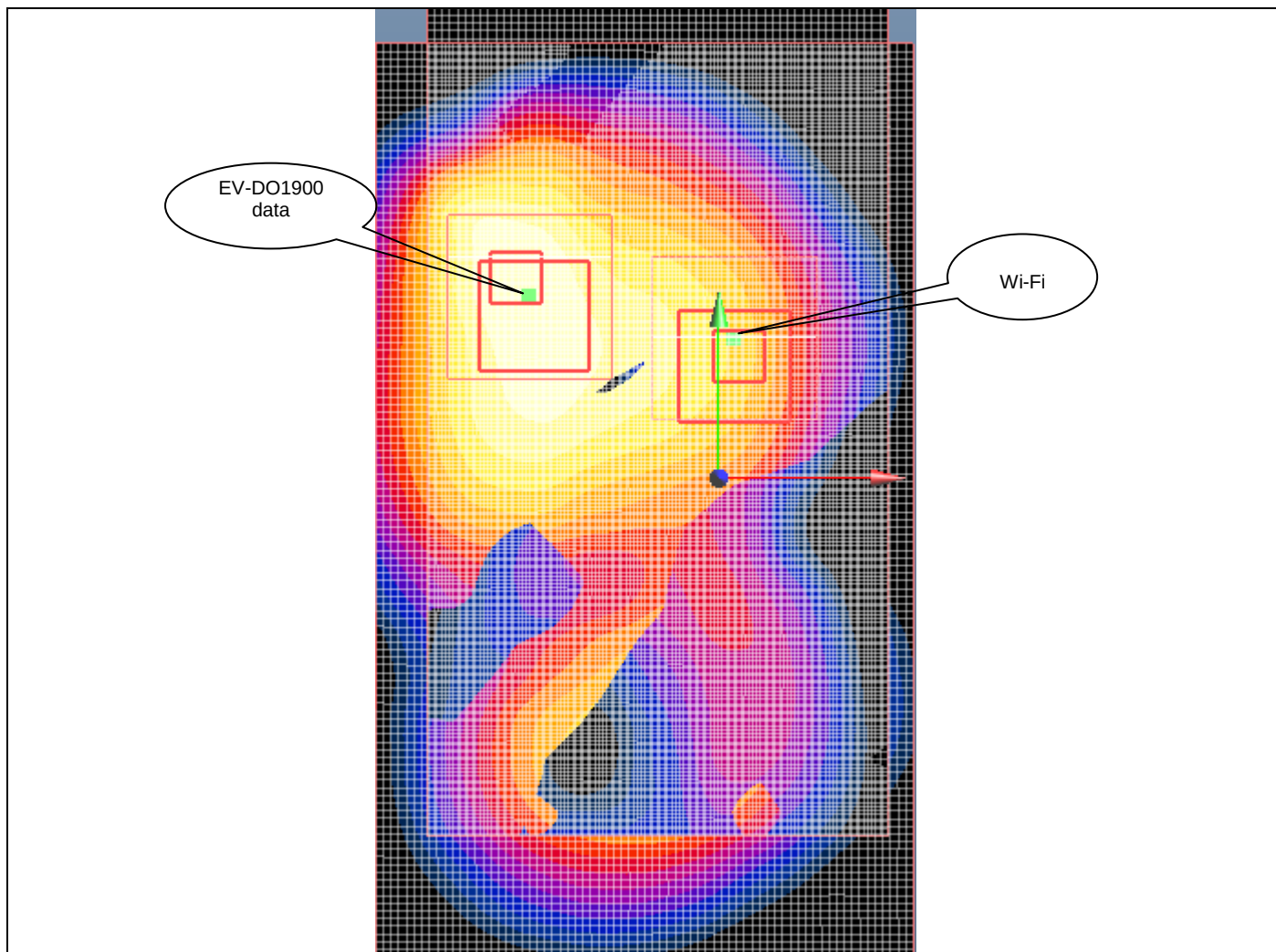


	Value of SAR mW/g	X m	Y m	Z m
CDMA1900 Voice:	1.71	0.000459	0.0355	-0.205
Wi-Fi:	0.144	0.003	0.0243	-0.207

	m	cm	
Separation distance (d) =	0.0117	1.17	
	$\text{SQRT}((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)$		

Distance calculation between Peak SAR locations

EV-DO1900 data-to-WiFi



	Value of SAR	X	Y	Z
	mW/g	m	m	m
CDMA1900 1x EVDO:	0.869	-0.0418	0.0419	-0.205
Wi-Fi:	0.144	0.003	0.0243	-0.207

	m	cm	
Separation distance (d) =	0.0482	4.82	
	SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)		

6. Volume Scans

6.1. Volume Scan Test Results

Mode	Ch. #	Freq. (MHz)	Avg Pwr (dBm)	Test Position	SAR (mW/g)	
					1-g	10-g
CDMA1900 (1xRTT)	600	1880.0	25.00	Rear	0.762	0.486
CDMA1900 (1x EVDO Rel 0)	600	1880	25.02	Rear	0.447	0.281
802.11b, 1 kbps	6	2437	18.65	Rear	0.069	0.040

6.2. Multi Band Results

Worst-case Σ Condition (1.72 and 1.646 W/kg)	1g SAR	10g SAR
CDMA1900 voice + DO1900 data + WiFi data	1.100	0.717
CDMA1900 voice + DO1900 data	1.060	0.694
CDMA1900 voice + WiFi data	0.810	0.513

Volume scans SAR test results for CDMA1900 voice mode

Date/Time: 6/22/2011

Test Laboratory: UL CCS

100 Rear_Volume Scan for CDMA1900 voice

DUT: LG; Type: VS-920; Serial: IMEI: 990000610001267

Communication System: CDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.483$ mho/m; $\epsilon_r = 52.83$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

Room Ambient Temperature: 23.0 deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(7.33, 7.33, 7.33); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: SAM A (Twin); Type: SAM A; Serial: 1050
- ; SEMCAD X Version 14.4.4 (2829)

CDMA1900 Voice/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.885 mW/g

CDMA1900 Voice/Volume Scan (12x21x7): Measurement grid: dx=8mm, dy=8mm, dz=5mm

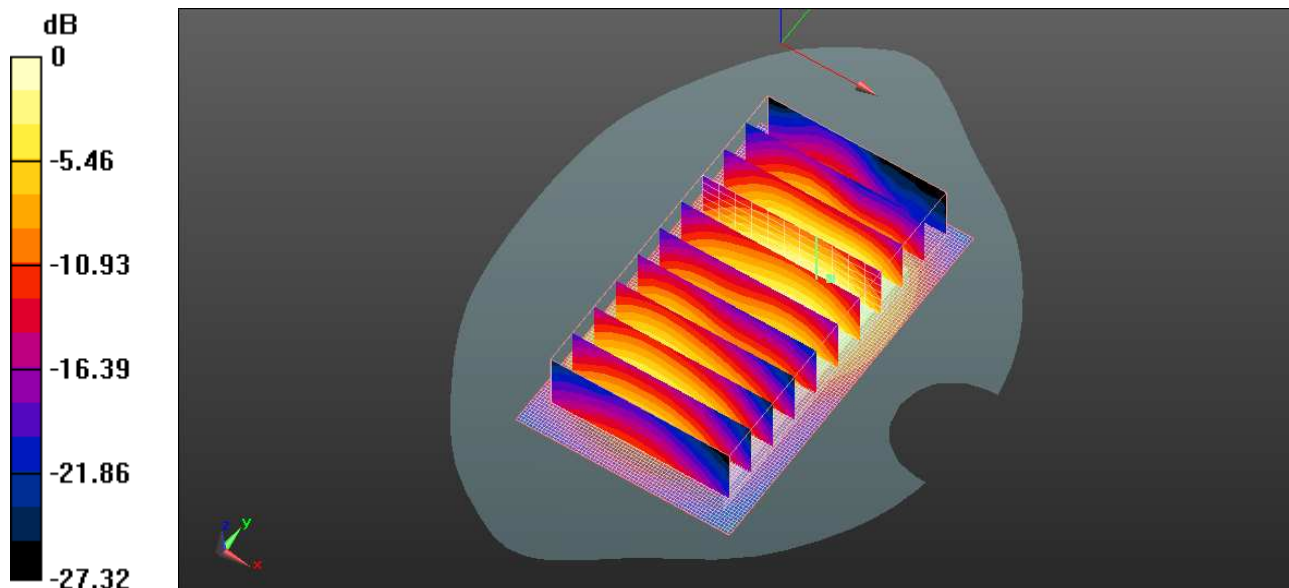
Reference Value = 12.056 V/m; Power Drift = 0.26 dB

Peak SAR (extrapolated) = 1.164 W/kg

SAR(1 g) = 0.762 mW/g; SAR(10 g) = 0.486 mW/g

Total Absorbed Power = 0.0552782 W

Maximum value of SAR (measured) = 0.924 mW/g



0 dB = 0.920mW/g

Volume scans SAR test results for CDMA1900 data mode

Date/Time: 6/21/2011

Test Laboratory: UL CCS

102 Rear_Volume Scan for CDMA1900 data

DUT: LG; Type: VS-920; Serial: IMEI: 990000610001267

Communication System: CDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.483$ mho/m; $\epsilon_r = 52.83$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

Room Ambient Temperature: 23.0 deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(7.33, 7.33, 7.33); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: SAM A (Twin); Type: SAM A; Serial: 1050
- ; SEMCAD X Version 14.4.4 (2829)

Rear - Middle EV-DO/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.574 mW/g

EV-DO/Volume Scan (12x21x7): Measurement grid: dx=8mm, dy=8mm, dz=5mm

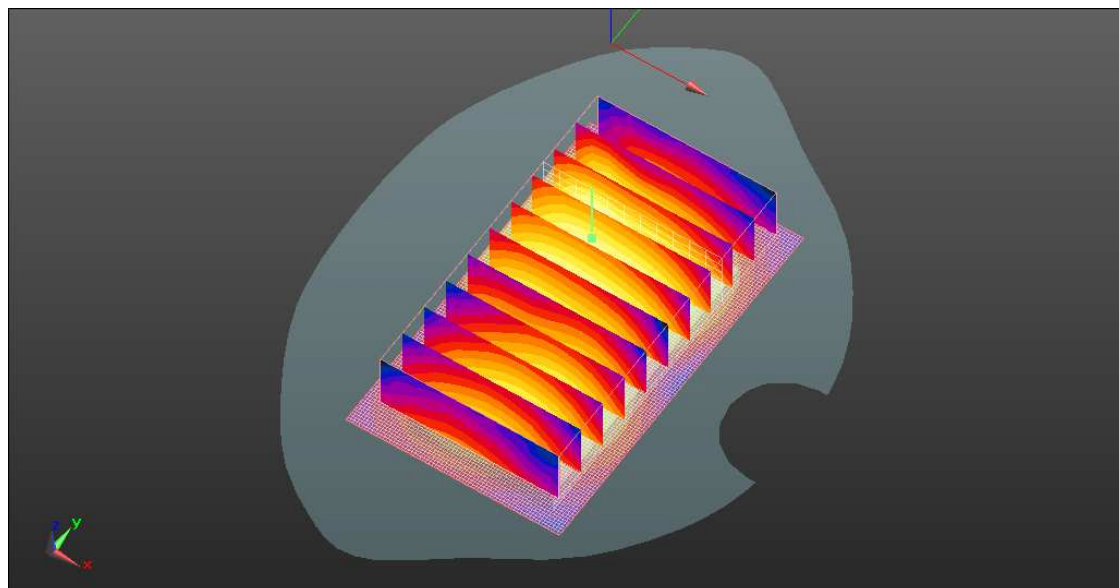
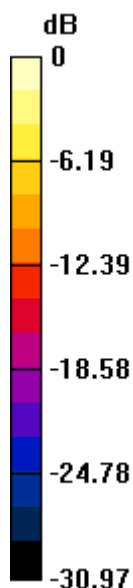
Reference Value = 11.797 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.716 W/kg

SAR(1 g) = 0.447 mW/g; SAR(10 g) = 0.281 mW/g

Total Absorbed Power = 0.0321375 W

Maximum value of SAR (measured) = 0.534 mW/g



0 dB = 0.530mW/g

Volume scans SAR test results for WiFi

Date/Time: 6/28/2011

Test Laboratory: UL CCS SAR Lab D

103 Rear_Volume Scan for WiFi

DUT: LG; Type: VS-920; Serial: IMEI: 990000610001267

Communication System: 802.11b/g 2.4GHz; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 2.011$ mho/m; $\epsilon_r = 51.119$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Room Ambient Temperature: 23.0 deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(6.9, 6.9, 6.9); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: SAM A (Twin); Type: SAM A; Serial: 1050
- ; SEMCAD X Version 14.4.4 (2829)

Rear - Middle/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.088 mW/g

Rear - Middle/Volume Scan (12x21x7): Measurement grid: dx=8mm, dy=8mm, dz=5mm

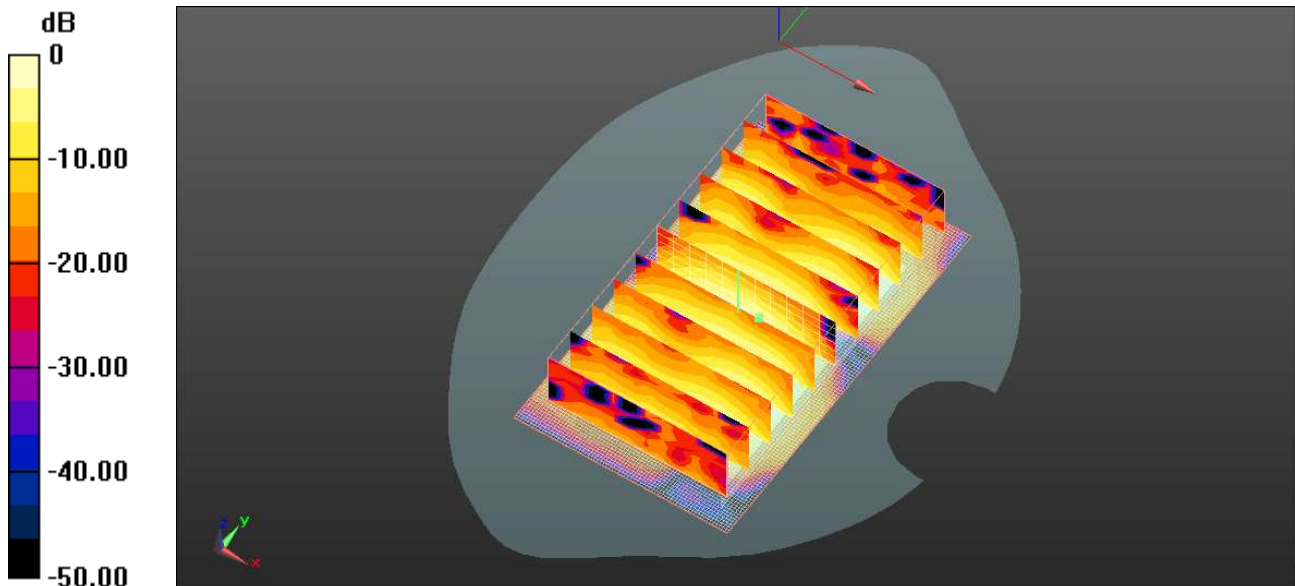
Reference Value = 6.609 V/m; Power Drift = 0.28 dB

Peak SAR (extrapolated) = 0.122 W/kg

SAR(1 g) = 0.069 mW/g; SAR(10 g) = 0.040 mW/g

Total Absorbed Power = 0.00465873 W

Maximum value of SAR (measured) = 0.087 mW/g



0 dB = 0.090mW/g

Multi Band Test Plots for CDMA1900 voice + CDMA1900 data + WiFi

Combined

Rear - Middle EV-DO/Volume Scan:

Date/Time: 6/21/2011 5:11:08 PM
Test Laboratory: UL CCS SAR Lab D
File Name: [102 Rear Volume scan for CDMA data.da4](#)

DUT: LG; Type: VS-920; Serial: IMEI:990000610001267

Communication System: CDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Simulating Liquid Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.48 \text{ mho/m}$; $\epsilon_r = 52.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

- Probe: EX3DV4 - SN3749; ConvF(7.33, 7.33, 7.33); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: SAM A (Twin); Type: SAM A; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80

DASY4 Configuration for Compliance Testing: OET Bul 65 Sup C/Rear - Middle CDMA2000/Volume Scan:

Date/Time: 6/22/2011 12:09:44 AM
Test Laboratory: UL CCS SAR Lab D
File Name: [100 Rear Volume Scan for CDMA1900 voice.da4](#)

DUT: LG; Type: VS-920; Serial: IMEI:990000610001267

Communication System: CDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Simulating Liquid Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.48 \text{ mho/m}$; $\epsilon_r = 52.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

- Probe: EX3DV4 - SN3749; ConvF(7.33, 7.33, 7.33); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: SAM A (Twin); Type: SAM A; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80

DASY4 Configuration for Compliance Testing: OET Bul 65 Sup C/Rear - Middle/Volume Scan:

Date/Time: 6/28/2011 1:07:55 AM
Test Laboratory: UL CCS SAR Lab D
File Name: [103 Rear Volume Scan for WiFi.da4](#)

DUT: LG; Type: VS-920; Serial: IMEI:990000610001267

Communication System: 802.11b/g 2.4GHz; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2400 Body Simulating Liquid Medium parameters used (interpolated): $f = 2437 \text{ MHz}$; $\sigma = 2.01 \text{ mho/m}$; $\epsilon_r = 51.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

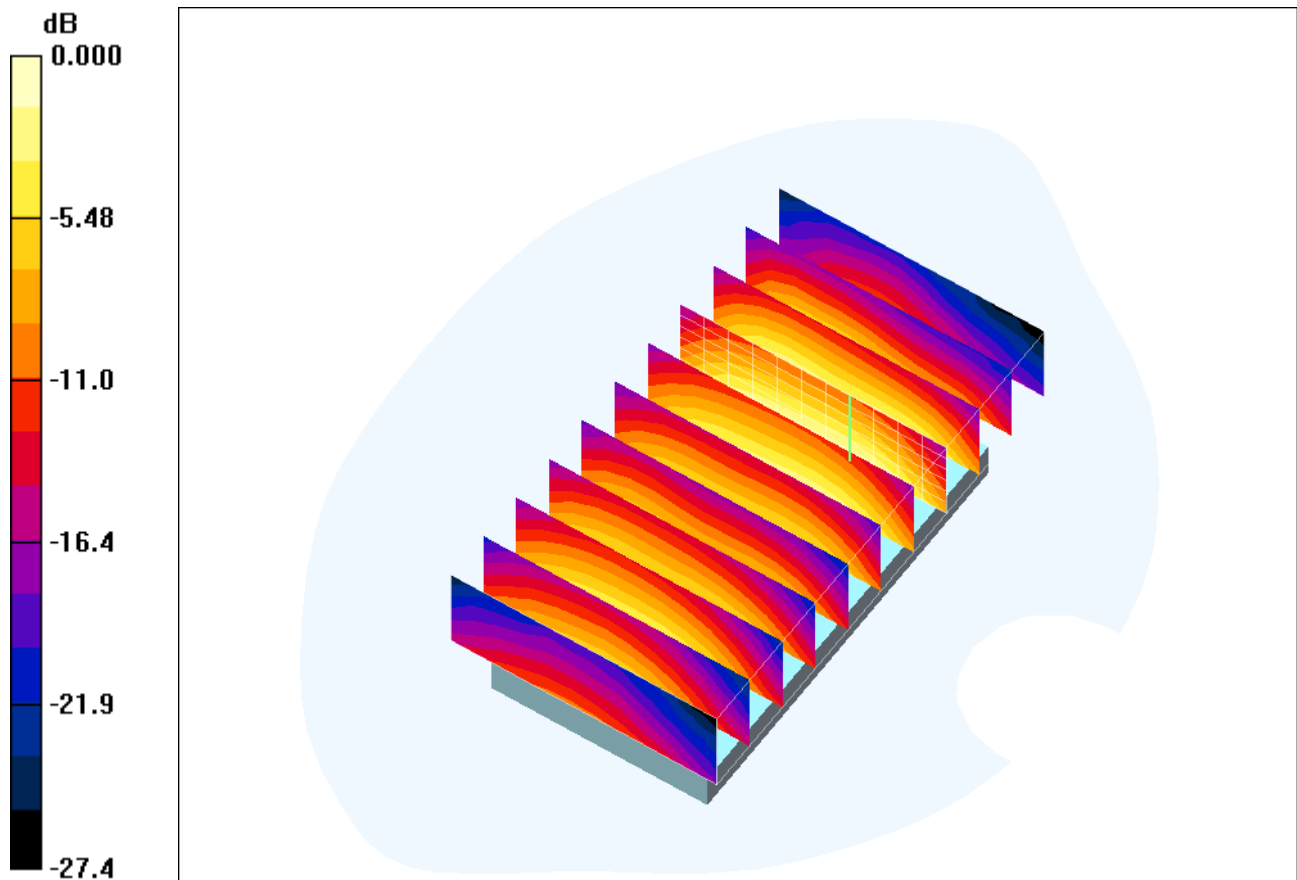
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: EX3DV4 - SN3749; ConvF(6.9, 6.9, 6.9); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: SAM A (Twin); Type: SAM A; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80

Multi Band Result:

SAR(1 g) = 1.1 mW/g; SAR(10 g) = 0.717 mW/g

Maximum value of SAR (measured) = 1.33 mW/g



0 dB = 1.33mW/g

Multi Band Test Plots for CDMA1900 voice + CDMA1900 data

Combined

Date/Time: 6/22/2011 12:09:44 AM

Test Laboratory: UL CCS SAR Lab D

File Name: [100 Rear Volume Scan for CDMA1900 voice.da4](#)

DUT: LG; Type: VS-920; Serial: IMEI:990000610001267

Communication System: CDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Simulating Liquid Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.48 \text{ mho/m}$; $\epsilon_r = 52.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

- Probe: EX3DV4 - SN3749; ConvF(7.33, 7.33, 7.33); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: SAM A (Twin); Type: SAM A; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80

DASY4 Configuration for Compliance Testing: OET Bul 65 Sup C/Rear - Middle EV-DO/Volume Scan:

Date/Time: 6/21/2011 5:11:08 PM

Test Laboratory: UL CCS SAR Lab D

File Name: [102 Rear Volume scan for CDMA data.da4](#)

DUT: LG; Type: VS-920; Serial: IMEI:990000610001267

Communication System: CDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Simulating Liquid Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.48 \text{ mho/m}$; $\epsilon_r = 52.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

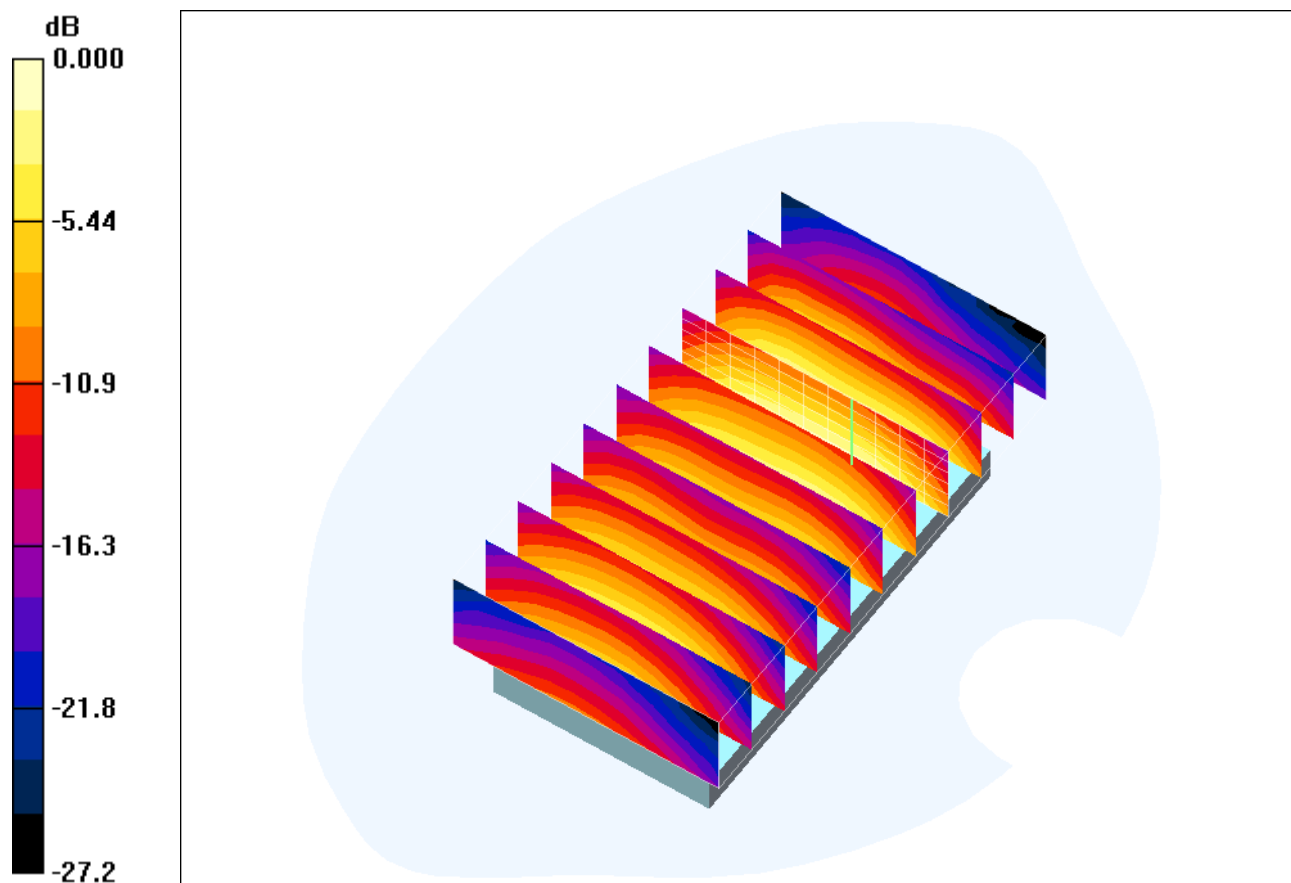
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: EX3DV4 - SN3749; ConvF(7.33, 7.33, 7.33); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: SAM A (Twin); Type: SAM A; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80

Multi Band Result:

SAR(1 g) = 1.06 mW/g; SAR(10 g) = 0.694 mW/g

Maximum value of SAR (measured) = 1.27 mW/g



0 dB = 1.27mW/g

Multi Band Test Plots for CDMA1900 voice + WiFi

Combined

DASY4 Configuration for Compliance Testing: OET Bul 65 Sup C/Rear - Middle/Volume Scan:

Date/Time: 6/28/2011 1:07:55 AM

Test Laboratory: UL CCS SAR Lab D

File Name: [103 Rear Volume Scan for WiFi.da4](#)

DUT: LG; Type: VS-920; Serial: IMEI:990000610001267

Communication System: 802.11b/g 2.4GHz; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: 2400 Body Simulating Liquid Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 2.01$ mho/m; $\epsilon_r = 51.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

- Probe: EX3DV4 - SN3749; ConvF(6.9, 6.9, 6.9); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: SAM A (Twin); Type: SAM A; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80

DASY4 Configuration for Compliance Testing: OET Bul 65 Sup C/CDMA1900 Voice/Volume Scan:

Date/Time: 6/22/2011 12:09:44 AM

Test Laboratory: The name of your organization

File Name: [100 Rear Volume Scan for CDMA1900 voice.da4](#)

DUT: LG; Type: VS-920; Serial: IMEI:990000610001267

Communication System: CDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Simulating Liquid Medium parameters used: $f = 1880$ MHz; $\sigma = 1.48$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

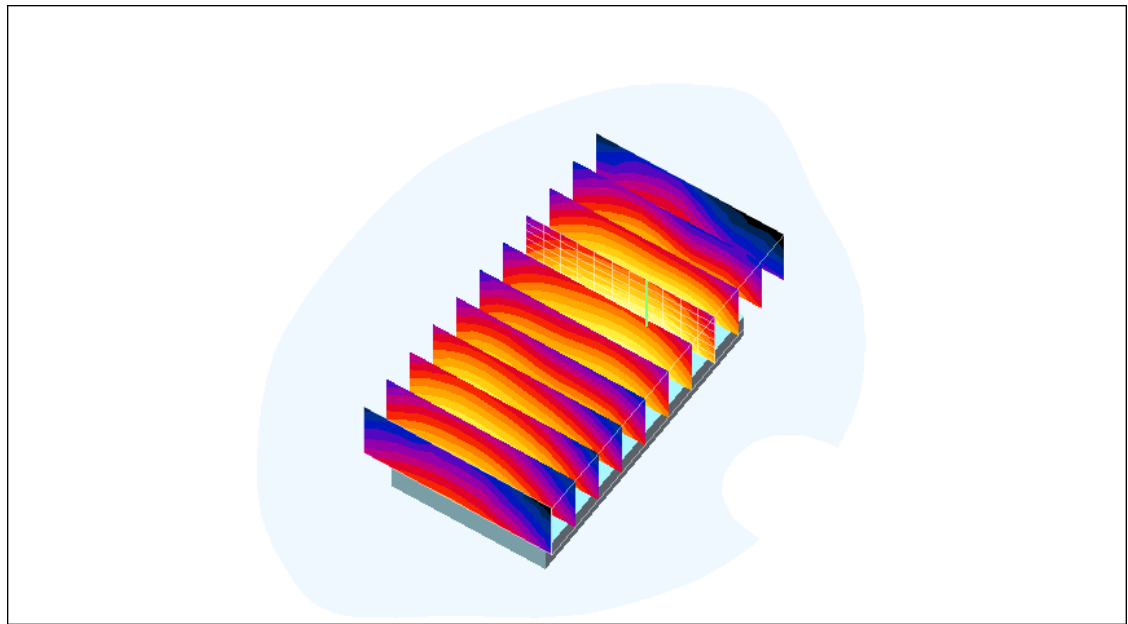
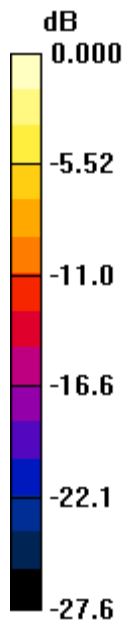
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: EX3DV4 - SN3749; ConvF(7.33, 7.33, 7.33); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: SAM A (Twin); Type: SAM A; Serial: 1050
- Measurement SW: DASY52, V52.6 Build 2

Multi Band Result:

SAR(1 g) = 0.810 mW/g; SAR(10 g) = 0.513 mW/g

Maximum value of SAR (measured) = 0.982 mW/g



0 dB = 0.982mW/g

7. Appendix

<u>No.</u>	<u>Contents</u>	<u>No. of page (s)</u>
1	System performance check plots	24
2-1	SAR Test plots for LTE	38
2-2	SAR Test plots for CDMA2000	66
2-3	SAR Test plots for GSM	36
2-4	SAR Test plots for WCMA	16
2-5	SAR Test plots for WiFi	15
3	Calibration Certificate - E-Field Probe EX3DV4 - SN 3749	11
4	Calibration Certificate - E-Field Probe EX3DV4 - SN 3686	11
5	Calibration Certificate - Validation Dipole D750V3 - SN 1024	9
6	Calibration Certificate - Validation Dipole D835V2 - SN 4d117	9
7	Calibration Certificate - Validation Dipole D1900V2 - SN 5d140	9
8	Certificate of System Validation Dipole - D2450 SN:706 with extended cal. data	11