SAR EVALUATION REPORT

FCC 47 CFR § 2.1093
IEEE Std 1528-2013

For
CDMA/BT/BLE & WLAN b/g WATCH

FCC ID: ZNFVC200
Model Name: LG-VC200, LGVC200, VC200

Report Number: 15I21066-S1
Issue Date: 7/27/2015

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Date	Revisions	Revised By
--	7/27/2015	Initial Issue	--

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1. Attestation of Test Results

Applicant Name		LG ELECTRONICS MOBILECOMM U.S.A., INC.			
FCC ID		ZNFVC200			
Model Name		LG-VC200, LGVC200, VC200			
Applicable Standards		FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013			
SAR Limits (W/Kg)					
Exposure Category		Peak spatial-average(1g of tissue)		Extremities (hands, wrists, ankles, etc.) (10g of tissue)	
General population / Uncontrolled exposure		1.6		4	
The Highest Reported SAR (W/kg)					
RF Exposure Conditions		**Equipment Class**			
		Licensed	**DTS**	**U-NII**	**DSS (BT)**
Extremity		2.937	N/A	N/A	N/A
Next To Mouth		1.142			
Simultaneous Tx	Extremity	3.071	3.021		3.071
	Next To Mouth	1.309	1.247		1.309
Date Tested		6/23/2015 to 6/30/2015			
Test Results		Pass			

UL Verification Services Inc. 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 Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 By:	Prepared By:
	
Devin Chang Senior Engineer UL Verification Services Inc.	Coltyce Sanders Laboratory Engineer UL Verification Services Inc.

2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE STD 1528-2013, the following FCC Published RF exposure KDB procedures:

- 248227 D01 802.11 Wi-Fi SAR v02
- 447498 D01 General RF Exposure Guidance v05r02
- 690783 D01 SAR Listings on Grants v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03
- 865664 D02 RF Exposure Reporting v01r01
- 941225 D01 3G SAR Procedures v03

3. Facilities and Accreditation

The test sites and measurement facilities used to collect data are located at

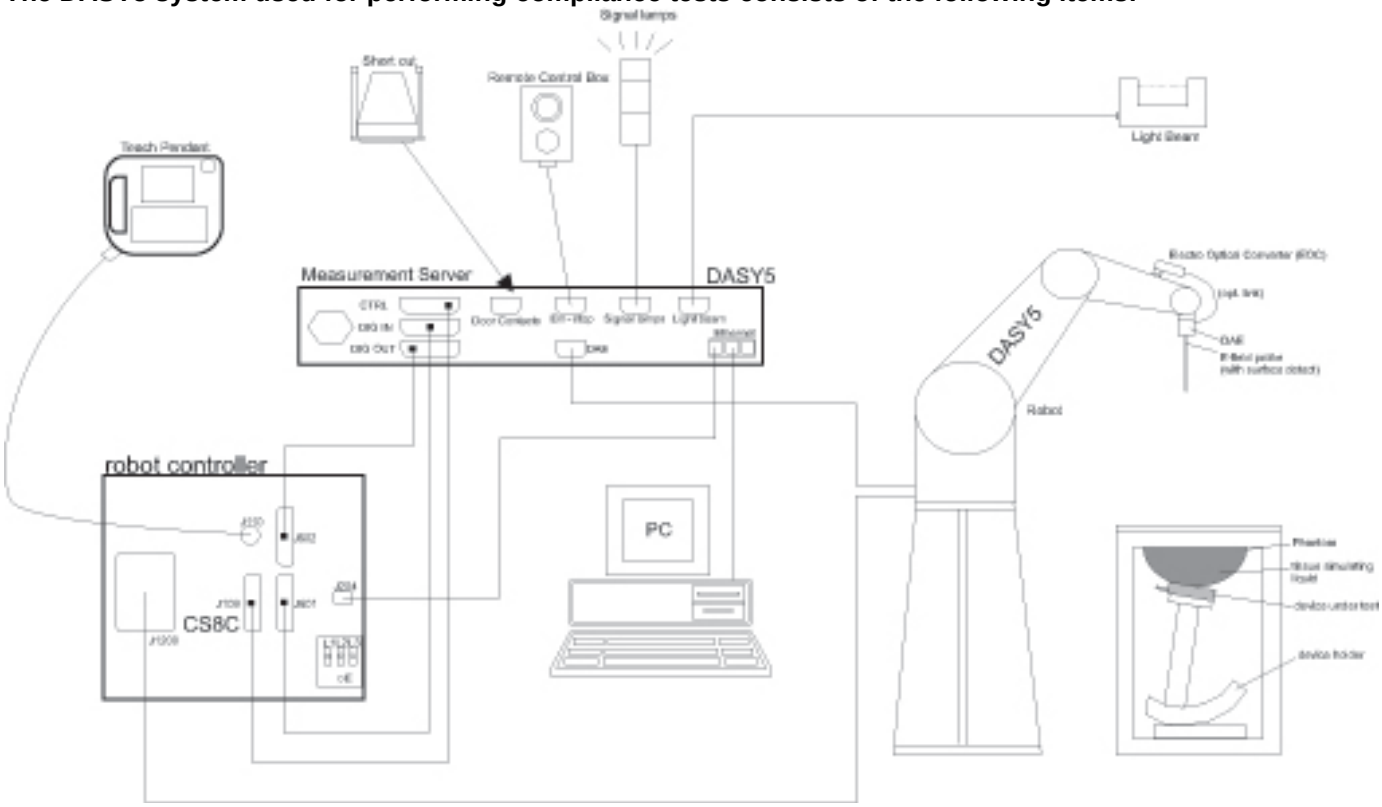
47173 Benicia Street	47266 Benicia Street
SAR Lab A	SAR Lab 1
SAR Lab B	SAR Lab 2
SAR Lab C	SAR Lab 3
SAR Lab D	SAR Lab 4
SAR Lab E	SAR Lab 5
SAR Lab F	
SAR Lab G	
SAR Lab H	

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

The DASY5 system used for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- 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 Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- 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.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

4.2. SAR Scan Procedures

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.

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 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.

Area Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

<table>
<tr><td></td><td>≤ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td>Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td>Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
</table>

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 points (refer to table below) 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.

Zoom Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the area scan based *1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

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 (FCC only)

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.

4.3. Test Equipment

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

Dielectric Property Measurements

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Network Analyzer	Agilent	E753ES	MY40000980	4/17/2016
Dielectric Probe kit	SPEAG	DAK-3.5	1082	9/16/2015
Shorting block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	Control Company	Traceable	122529163	10/8/2015

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Synthesized Signal Generator	Agilent	8665B	3438A00633	7/10/2015
Power Meter	HP	437B	3125U09516	8/27/2015
Power Meter	HP	437B	3125U11347	10/6/2015
Power Sensor	HP	8481A	3318A95392	10/6/2015
Power Sensor	HP	8481A	1926A16917	10/10/2015
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1808938	N/A
Bi-directional coupler	Werlatone, Inc.	C8060-102	2710	N/A
DC Power Supply	HP	6296A	2841A-05955	N/A
E-Field Probe (SAR Lab 1)	SPEAG	EX3DV4	3929	4/22/2016
E-Field Probe (SAR Lab 3)	SPEAG	EX3DV4	3749	1/26/2016
Data Acquisition Electronics (SAR Lab 1)	SPEAG	DAE4	1352	11/7/2015
Data Acquisition Electronics (SAR Lab 3)	SPEAG	DAE4	1380	7/23/2015
System Validation Dipole	SPEAG	D835V2	4d117	5/18/2016
System Validation Dipole	SPEAG	D835V2	4d142	9/9/2015
System Validation Dipole	SPEAG	D1900V2	5d163	9/11/2015
Thermometer (SAR Lab 1)	EXTECH	445703	CCS-205	3/20/2016
Thermometer (SAR Lab 3)	EXTECH	445703	CCS-237	6/5/2016

Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Base Station Simulator	R & S	CMW500	135387	4/20/2016

5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

6. Device Under Test (DUT) Information

6.1. DUT Description

Device Dimension	Overall (Length x Width): 56 mm x 41.5 mm Overall Diagonal: 53.8 mm Display Diagonal: 33 mm		
Back Cover	The rechargeable battery is not user accessible.		
Battery Options	The rechargeable battery is not user accessible.		
Wireless Router (Hotspot)	Wi-Fi Hotspot mode permits the device to share its cellular data connection with other Wi-Fi-enabled devices. Wi-Fi Hotspot mode is NOT SUPPORTED		
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other Wi-Fi Direct is NOT SUPPORTED		
Test sample information	**S/N**	**IMEI**	**Notes**
	1ZRY4	A1000040E03993	Conducted Sample
	1ZRY3	A1000040E03992	SAR Sample

6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode	Duty Cycle used for SAR testing
CDMA (CDMA2000)	BC0 BC1	1xRTT (Voice & Data)	100%
Wi-Fi	2.4 GHz	802.11b 802.11g	100%
Bluetooth	2.4 GHz	Version 4.0 LE	77.5% (DH5)

6.3. Nominal and Maximum Output Power

KDB 447498 sec.4.1.(3) at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit

Upper limit (dB): -1.5 ~ 0.5		Max. RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit
CDMA BC0	1xRTT	23.7	**24.2**
CDMA BC1	1xRTT	21.2	**21.7**
Upper limit (dB): 1.0		Max. RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit
WiFi 2.4 GHz	802.11b	6.0	**7.0**
	802.11g	5.0	**6.0**
Bluetooth		8.0	**9.0**
Bluetooth LE		7.0	**8.0**

7. RF Exposure Conditions (Test Configurations)

Refer to “SAR Photos and Ant locations” Appendix for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

Wireless technologies	RF Exposure Conditions	DUT-to-User Separation	Test Position	Antenna-to-edge/surface	SAR Required
WLAN	Extremity (Hand/Wrist/Ankle)	0	Rear	N/A	Yes
	Next to Mouth	10	Front	N/A	Yes

The neck region of the SAM phantom was chosen for wrist-worn extremity SAR testing in accordance with KDB 447498 §6.2.
A non-standard setup was used for SAR testing based on guidance from the FCC. The operational description contains additional information.

8. Dielectric Property Measurements & System Check

8.1. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 2°C of the temperature when the tissue parameters are characterized.
The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.
Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.

Tissue Dielectric Parameters
FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5000	36.2	4.45	49.3	5.07
5100	36.1	4.55	49.1	5.18
5200	36.0	4.66	49.0	5.30
5300	35.9	4.76	48.9	5.42
5400	35.8	4.86	48.7	5.53
5500	35.6	4.96	48.6	5.65
5600	35.5	5.07	48.5	5.77
5700	35.4	5.17	48.3	5.88
5800	35.3	5.27	48.2	6.00

IEEE Std 1528-2013
Refer to Table 3 within the IEEE Std 1528-2013

Dielectric Property Measurements Results:

SAR Lab 1

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
6/24/2015	Body 835	e'	53.2800	Relative Permittivity (ϵ_r):	53.28	55.20	-3.48	5
		e''	21.4600	Conductivity (σ):	1.00	0.97	2.72	5
	Body 820	e'	53.4000	Relative Permittivity (ϵ_r):	53.40	55.28	-3.40	5
		e''	21.5900	Conductivity (σ):	0.98	0.97	1.64	5
	Body 850	e'	53.0600	Relative Permittivity (ϵ_r):	53.06	55.16	-3.80	5
		e''	21.5400	Conductivity (σ):	1.02	0.99	3.13	5

SAR Lab 3

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
6/22/2015	Head 1900	e'	38.4800	Relative Permittivity (ϵ_r):	38.48	40.00	-3.80	5
		e''	13.0500	Conductivity (σ):	1.38	1.40	-1.52	5
	Head 1850	e'	38.6800	Relative Permittivity (ϵ_r):	38.68	40.00	-3.30	5
		e''	13.0000	Conductivity (σ):	1.34	1.40	-4.48	5
	Head 1910	e'	38.4500	Relative Permittivity (ϵ_r):	38.45	40.00	-3.87	5
		e''	13.0200	Conductivity (σ):	1.38	1.40	-1.23	5
6/23/2015	Body 1900	e'	51.8300	Relative Permittivity (ϵ_r):	51.83	53.30	-2.76	5
		e''	14.4600	Conductivity (σ):	1.53	1.52	0.50	5
	Body 1850	e'	51.9100	Relative Permittivity (ϵ_r):	51.91	53.30	-2.61	5
		e''	14.2200	Conductivity (σ):	1.46	1.52	-3.77	5
	Body 1910	e'	51.8900	Relative Permittivity (ϵ_r):	51.89	53.30	-2.65	5
		e''	14.5400	Conductivity (σ):	1.54	1.52	1.59	5
6/24/2015	Head 835	e'	43.0400	Relative Permittivity (ϵ_r):	43.04	41.50	3.71	5
		e''	19.9200	Conductivity (σ):	0.92	0.90	2.76	5
	Head 820	e'	43.2500	Relative Permittivity (ϵ_r):	43.25	41.60	3.96	5
		e''	20.0100	Conductivity (σ):	0.91	0.90	1.55	5
	Head 850	e'	42.7500	Relative Permittivity (ϵ_r):	42.75	41.50	3.01	5
		e''	19.8700	Conductivity (σ):	0.94	0.92	2.63	5
6/26/2014	Head 1900	e'	39.3600	Relative Permittivity (ϵ_r):	39.36	40.00	-1.60	5
		e''	13.4000	Conductivity (σ):	1.42	1.40	1.12	5
	Head 1850	e'	39.5900	Relative Permittivity (ϵ_r):	39.59	40.00	-1.02	5
		e''	13.2900	Conductivity (σ):	1.37	1.40	-2.35	5
	Head 1910	e'	39.3100	Relative Permittivity (ϵ_r):	39.31	40.00	-1.72	5
		e''	13.4100	Conductivity (σ):	1.42	1.40	1.73	5
6/30/2015	Body 835	e'	52.8000	Relative Permittivity (ϵ_r):	52.80	55.20	-4.35	5
		e''	21.8800	Conductivity (σ):	1.02	0.97	4.73	5
	Body 820	e'	52.9700	Relative Permittivity (ϵ_r):	52.97	55.28	-4.17	5
		e''	21.9400	Conductivity (σ):	1.00	0.97	3.29	5
	Body 850	e'	52.8900	Relative Permittivity (ϵ_r):	52.89	55.16	-4.11	5
		e''	21.8700	Conductivity (σ):	1.03	0.99	4.71	5

8.2. System Check

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are re-measured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

System Performance Check Measurement Conditions:

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ±0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥ 10.0 cm for measurements > 3 GHz.
- The DASY system with an E-Field Probe 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 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the 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 Target SAR Values

The reference SAR values can be obtained from the calibration certificate of system validation dipoles

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	Target SAR Values (W/kg)		
				1g/10g	Head	Body
D835V2	4d117	5/18/2015	835	1g	9.08	9.38
				10g	5.93	6.20
D835V2	4d142	9/9/2014	835	1g	8.91	9.22
				10g	5.77	6.05
D1900V2	5d163	9/11/2014	1900	1g	40.8	40.6
				10g	21.2	21.4

System Check Results

The 1-g and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within 10% of the manufacturer calibrated dipole SAR target.

SAR Lab 1

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
6/24/2015	D835V2	4d117	Body	1g	1.02	10.2	9.38	8.74	1,2
				10g	0.68	6.8	6.2	**8.87**	

SAR Lab 3

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
6/22/2015	D1900V2	5d163	Head	1g	4.00	40.0	40.8	**-1.96**	
				10g	2.07	20.7	21.2	-2.36	
6/23/2015	D1900V2	5d163	Body	1g	4.17	41.7	40.60	2.71	3,4
				10g	2.16	21.6	21.4	**0.93**	
6/24/2015	D835V2	4d117	Head	1g	0.97	9.7	9.08	**6.94**	5,6
				10g	0.64	6.4	5.93	7.76	
6/26/2015	D1900V2	5d163	Head	1g	3.91	39.1	40.8	**-4.17**	7,8
				10g	2.02	20.2	21.2	-4.72	
6/30/2015	D835V2	4d142	Body	1g	0.88	8.8	9.22	-4.12	9,10
				10g	0.59	5.9	6.05	**-3.14**	

9. Conducted Output Power Measurements

9.1. CDMA

CDMA BC0 Measured Results

Band	Mode		Ch No.	Freq. (MHz)	Max. Pwr (dBm)
BC 0	1xRTT	RC1 SO55 (Loopback)	1013	824.70	23.5
			384	836.52	23.7
			777	848.31	23.6
		RC3 SO55 (Loopback)	1013	824.70	23.3
			384	836.52	23.5
			777	848.31	23.7
		RC3 SO32 (+F-SCH)	1013	824.70	23.4
			384	836.52	23.5
			777	848.31	23.4

CDMA BC1 Measured Results

Band	Mode		Ch No.	Freq. (MHz)	Max. Pwr (dBm)
BC 1	1xRTT	RC1 SO55 (Loopback)	25	1851.25	21.2
			600	1880.00	21.4
			1175	1908.75	21.5
		RC3 SO55 (Loopback)	25	1851.25	21.5
			600	1880.00	21.3
			1175	1908.75	21.4
		RC3 SO32 (+F-SCH)	25	1851.25	21.4
			600	1880.00	21.4
			1175	1908.75	21.5

9.2. Wi-Fi 2.4GHz (DTS Band)

Maximum tune-up tolerance limit is 7.00 dBm. This power level qualifies for exclusion of SAR testing. Please refer to Section 10.3 for further details.

9.3. Bluetooth

Maximum tune-up tolerance limit is 9.00 dBm. This power level qualifies for exclusion of SAR testing. Please refer to Section 10.3 for further details.

10. Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

KDB 447498 D01 General RF Exposure Guidance:

Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

- ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
- ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

KDB 941225 D01 SAR test for 3G devices:

When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode

10.1. CDMA BC0

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled	
Extremity	1xRTT (RC3 SO32)	0	Neck	1013	824.7	24.2	23.4			2.000	2.405	
				384	836.5	24.2	23.5			2.500	**2.937**	1
				777	848.3	24.2	23.4			1.570	1.888	
Next - to - Mouth	1xRTT (RC3 SO55)	10	Flat	1013	824.7	24.2	23.3	0.778	0.957			
				384	836.5	24.2	23.5	0.972	**1.142**			2
				777	848.3	24.2	23.7	0.727	0.816			

10.2. CDMA BC1

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled	
Extremity	1xRTT (RC3 SO32)	0	Neck	600	1880.0	21.7	21.4			1.520	**1.629**	3
Next - to - Mouth	1xRTT (RC3 SO55)	10	Flat	600	1880.0	21.7	21.3	0.614	**0.673**			4

10.3. Wi-Fi (DTS Band) and Bluetooth

Standalone SAR Test Exclusion Considerations & Estimated SAR

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]·[√f(GHz)] ≤ 3.0, for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- $f_{(GHz)}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

When the standalone SAR test exclusion is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

- *(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]·[√$f_{(GHz)}$/x]* W/kg for test separation distances ≤ 50 mm;
  where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.
- 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm.

Extremity Exposure Conditions:

WLAN

Max. tune-up tolerance limit		Min. test separation distance (mm)	Frequency (GHz)	SAR test exclusion Result*	Test Configuration	Estimated 10-g SAR (W/kg)
(dBm)	(mW)					
7.0	5	5	2.462	1.6	Neck	0.084
Conclusion:						
*: The computed value is < 7.5; therefore, Wi-Fi 2.4GHz qualifies for Extremity SAR test exclusion.						

Bluetooth

Max. tune-up tolerance limit		Min. test separation distance (mm)	Frequency (GHz)	SAR test exclusion Result*	Test Configuration	Estimated 10-g SAR (W/kg)
(dBm)	(mW)					
9.0	8	5	2.480	2.5	Neck	0.134
Conclusion:						
*: The computed value is < 7.5; therefore, Bluetooth qualifies for Standalone SAR test exclusion.						

Next to Mouth Exposure Conditions:

WLAN

Max. tune-up tolerance limit		Min. test separation distance (mm)	Frequency (GHz)	SAR test exclusion Result*	Test Configuration	Estimated 1-g SAR (W/kg)
(dBm)	(mW)					
7.0	5	10	2.462	0.8	Flat	0.105

Conclusion:

*: The computed value is < 3; therefore, Wi-Fi 2.4GHz qualifies for Next to Mouth SAR test exclusion.

Bluetooth

Max. tune-up tolerance limit		Min. test separation distance (mm)	Frequency (GHz)	SAR test exclusion Result*	Test Configuration	Estimated 1-g SAR (W/kg)
(dBm)	(mW)					
9.0	8	10	2.462	1.3	Flat	0.167

Conclusion:

*: The computed value is < 3; therefore, Wi-Fi 2.4GHz qualifies for Next to Mouth SAR test exclusion.

11. SAR Measurement Variability

In accordance with published RF Exposure KDB 865664 D01 SAR measurement 100 MHz to 6 GHz. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Extremity

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	Repeated Measured SAR (W/kg)	Largest to Smallest SAR Ratio
850	CDMA BC0	Extremity (Hand/Wrist/Ankle)	Neck	Yes	2.50	2.20	1.14
1900	CDMA BC1	Extremity (Hand/Wrist/Ankle)	Neck	No	1.52	N/A	1.00

Note(s):

Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the original and first repeated measurement is not > 1.20.

Next to Mouth

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	Repeated Measured SAR (W/kg)	Largest to Smallest SAR Ratio
850	CDMA BC0	Next to Mouth	Flat	Yes	0.972	0.948	1.03
1900	CDMA BC1	Next to Mouth	Flat	No	0.04	N/A	N/A

Note(s):

Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the original and first repeated measurement is not > 1.20.

12. Simultaneous Transmission SAR Analysis

Simultaneous Transmission Condition

RF Exposure Condition	Item	Capable Transmit Configurations		
Next to Mouth	1	CDMA	+	DTS
Extremity	2	CDMA	+	DTS
	3	CDMA	+	BT

Notes:

1. 1x CDMA (BC0/BC1) only
2. Not support Wi-Fi Hotspot and Wi-Fi Direct
3. Not support VoIP
4. Bluetooth and Wi-Fi can not transmit simultabeously

12.1. Sum of the SAR for WWAN & Wi-Fi & BT

Extremity

RF Exposure conditions	Test Position	① WWAN	② DTS	③ BT	①+② WWAN + DTS		①+③ WWAN + BT	
					∑ 10-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 10-g SAR (mW/g)	SPLSR (Yes/ No)
Extremity	Neck	2.937	0.084	0.134	**3.021**	No	**3.071**	No

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the either sum of the 10-g SAR is < 4.0 W/kg or the SPLSR is ≤ 0.04 for all circumstances that require SPLSR calculation.

Next to Mouth

RF Exposure conditions	Test Position	① WWAN	② DTS	③ BT	①+② WWAN + DTS		①+③ WWAN + BT	
					∑ 10-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 10-g SAR (mW/g)	SPLSR (Yes/ No)
Next To Mouth	Flat	1.142	0.105	0.167	**1.247**	No	**1.309**	No

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the either sum of the 1-g SAR is < 1.6 W/kg or the SPLSR is ≤ 0.04 for all circumstances that require SPLSR calculation.

Appendixes

Refer to separated files for the following appendixes.

A_15I21066v0 SAR Photos & Ant. Locations

B_15I21066v0 SAR System Check Plots

C_15I21066v0 SAR Highest Test Plots

D_15I21066v0 SAR Tissue Ingredients

E_15I21066v0 SAR Probe Cal. Certificates

F_15I21066v0 SAR Dipole Cal. Certificates

END OF REPORT