



SAR EVALUATION REPORT

**FCC 47 CFR § 2.1093
IEEE Std 1528-2013**

For
CDMA/LTE Phone + Bluetooth & DTS b/g/n + NFC

**Model: LG-VS810PP, VS810PP, LGVS810PP
FCC ID: ZNFVS810PP**

**Report Number: 14U18508-S1A
Issue Date: 9/11/2014**

Prepared for
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NVLAP LAB CODE 200065-0

REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
--	9/2/2014	Initial Issue	--
<u>A</u>	9/11/2014	Updated Section 2 with appropriate KDBs Updated Section 6.5 with correct Power Reduction Targets Updated Appendix 14.1	Nathan Sousa

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1. Attestation of Test Results

Applicant Name	LG ELECTRONICS MOBILECOMM U.S.A., INC.		
Application Purpose	<input checked="" type="checkbox"/> Original Grant <input type="checkbox"/> Class II Permissive Change		
FCC ID	ZNFVS810PP		
DUT Description	CDMA/LTE Phone + Bluetooth & DTS/UNII b/g/n + NFC		
Exposure Category	General Population/Uncontrolled Exposure (1g SAR limit: 1.6 W/kg)		
The Highest Reported SAR	RF Exposure Conditions	Equipment Class	
		Licensed	DTS
	Head	0.829 W/kg	0.373 W/kg
	Body-worn Accessory	1.020 W/kg	0.189 W/kg
	Wireless Router (Hotspot)		
	Wi-Fi Direct	N/A	
Simultaneous Transmission	Head: 1.285 W/kg		
		Body: 1.585 W/kg	N/A
Applicable Standards	FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013		
Test Results	Pass		
Date tested	08/12/2014 – 08/19/2014		
<p>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.</p> <p>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.</p>			
Approved & Released By:	Prepared By:		
			
Dave Weaver Program Manager UL Verification Services Inc.	Nathan Sousa 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 1528-2003 & 2013, the following FCC Published RF exposure KDB procedures, and TCB workshop updates:

- 447498 D01 General RF Exposure Guidance v05r02
- 648474 D04 Handset SAR v01r02
- 941225 D01 SAR test for 3G devices v02
- 941225 D02 HSPA and 1x Advanced v02r02
- 941225 D05 SAR for LTE Devices v02r03
- 941225 D05A LTE Rel.10 KDB Inquiry Sheet v01
- 941225 D06 Hotspot Mode SAR v01r01
- 248227 D01 SAR Meas for 802 11abg v01r02
- 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
- 865664 D02 SAR Reporting v01r01
- 690783 D01 SAR Listings on Grants v01r03

3. Facilities and Accreditation

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

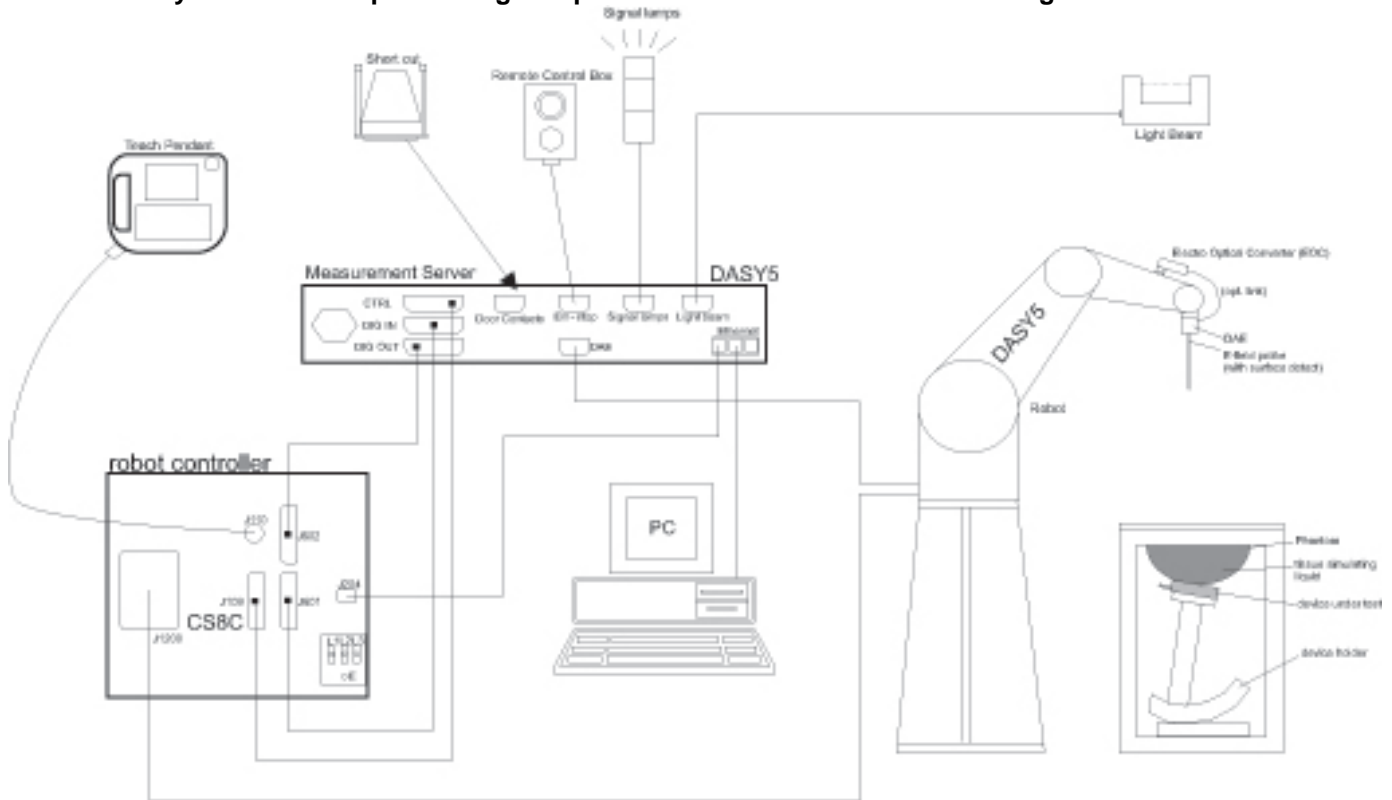
47173 Benicia Street	47266 Benicia Street
SAR Lab A	SAR Lab 1
SAR Lab B	SAR Lab 2
SAR Lab C	SAR Lab 3
SAR Lab D	SAR Lab 4
SAR Lab E	SAR Lab 5
SAR Lab F	
SAR Lab G	
SAR Lab H	

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>

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. 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	E5071B	MY42100131	2/24/2015
Dielectronic Probe kit	SPEAG	DAK-3.5	1087	11/13/2014
Dielectronic Probe kit	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	Control Company	4242	122529163	9/19/2014

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Synthesized Signal Generator	HP	8665B	3744A01155	5/12/2015
Power Meter	HP	438A	3513U04320	10/2/2014
Power Sensor	Agilent	8481A	2702A66876	9/30/2014
Power Sensor	Agilent	8481A	3318A95392	9/30/2014
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1622052	N/A
Bi-directional coupler	Werlatone, Inc.	C8060-102	2711	N/A
DC Power Supply	HP	6296A	2841A-05955	N/A
E-Field Probe (SAR 1)	SPEAG	EX3DV4	3902	5/19/2015
E-Field Probe (SAR 2)	SPEAG	EX3DV3	3531	11/21/2014
E-Field Probe (SAR 5)	SPEAG	EX3DV4	3991	5/16/2015
Data Acquisition Electronics (SAR 1)	SPEAG	DAE3	427	1/21/2015
Data Acquisition Electronics (SAR 2)	SPEAG	DAE4	1359	2/17/2015
Data Acquisition Electronics (SAR 5)	SPEAG	DAE4	1439	5/14/2015
System Validation Dipole	SPEAG	D750V3	1071	11/15/2014
System Validation Dipole	SPEAG	D835V2	4d002	11/15/2014
System Validation Dipole	SPEAG	D835V2	4d142	9/17/2014
System Validation Dipole	SPEAG	D1750V2	1077	9/12/2014
System Validation Dipole	SPEAG	D1900V2	5d043	11/12/2014
System Validation Dipole	SPEAG	D1900V2	5d163	9/17/2014
System Validation Dipole	SPEAG	D2450V2	899	9/10/2014
Thermometer (SAR Lab 1)	EXTECH	445703	CCS-205	3/24/2015
Thermometer (SAR Lab 2)	EXTECH	445703	CCS-203	3/28/2015
Thermometer (SAR Lab 5)	EXTECH	445703	CCS-239	6/3/2015

Others

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Power Meter	Agilent	N1912A	MY53040015	7/10/2015
Power Sensor	Agilent	N1921A	MY52020011	5/6/2015
Base Station Simulator	Agilent	8960 E5155E	MY53211024	9/11/2014
Base Station Simulator	R & S	CMW500	132910-cp	4/25/2015
Base Station Simulator	R & S	CMW500	127733-cy	6/2/2015

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 1528-2003 & 2013 is not required in SAR reports submitted for equipment approval.

6. Device Under Test (DUT) Information

6.1. DUT Description

Model: LG-VS810PP, VS810PP, LGVS810PP	
Device Dimension	Overall (Length x Width): 127.5 mm x 67.9 mm Overall Diagonal: 136 mm Display Diagonal: 115 mm
Battery Back Cover	<input checked="" type="checkbox"/> Normal Battery Cover <input type="checkbox"/> Normal Battery Cover with NFC <input type="checkbox"/> Wireless Charger Battery Cover <input type="checkbox"/> Wireless Charger Battery Cover with NFC.
Battery Options	<input checked="" type="checkbox"/> Standard – Lithium-ion battery, Rating 3.8Vdc, 8.0Wh <input type="checkbox"/> Extended (large capacity)
Accessory	Headset
Wireless Router (Hotspot)	Wi-Fi Hotspot mode permits the device to share its cellular data connection with other Wi-Fi-enabled devices. <input checked="" type="checkbox"/> Mobile Hotspot (Wi-Fi 2.4 GHz) <input type="checkbox"/> Mobile Hotspot (Wi-Fi 5 GHz)
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other <input checked="" type="checkbox"/> Wi-Fi Direct (Wi-Fi 2.4 GHz) <input type="checkbox"/> Wi-Fi Direct (Wi-Fi 5 GHz)

6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode	Duty Cycle used for SAR testing
CDMA2000	BC0 and BC1	1xRTT (Voice & Data) 1xEV-DO Rel. 0 1xEV-DO Rev. A	1xRTT: 100% 1xEV-DO Rel. 0: 100% 1xEV-DO Rev. A: 100%
		Does this device support SV-DO (1xRTT-1xEVDO)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
LTE (FDD)	Band 4 / 13	QPSK, 16QAM	100%
	Does this device support SV-LTE (1xRTT-LTE)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20)	100%
Bluetooth	2.4 GHz	Version 4.0 LE + EDR	32.25% (DH1), 66.68% (DH3), 77.52% (DH5)

6.3. Nominal and Maximum Output Power

Upper limit (dB): 0.5 ~ -1.5		RF Output Power (MAX) (dBm)		RF Output Power with Power Reduction (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit	Target	Max. tune-up tolerance limit
CDMA BC0	1xRTT	24.2	24.7	18.1	18.6
	1xEVDO Rel. 0	24.2	24.7		
	1xEVDO Rev. A	24.2	24.7		
CDMA BC1	1xRTT	24.2	24.7	17.7	18.2
	1xEVDO Rel. 0	24.2	24.7		
	1xEVDO Rev. A	24.2	24.7		
LTE Band 4	QPSK	22.7	23.2	18.7	19.2
LTE Band 13	QPSK	23.8	24.3	19.8	20.3

Upper limit (dB): 1.0		RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit
WiFi 2.4 GHz	802.11b	14.5	15.5
	802.11g	11.5	12.5
	802.11n HT20	10.5	11.5
Upper limit (dB): 0.5		RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit
	Bluetooth	9.0	9.5
	Bluetooth LE	0.0	0.5

6.4. Simultaneous Transmission Condition

RF Exposure Condition	Capable Transmit Configurations
Head	<ol style="list-style-type: none"> 1. CDMA 1xRTT BC0 / BC1 + Wi-Fi 2.4 GHz 2. CDMA 1xEVDO BC0 / BC1 + Wi-Fi 2.4 GHz (VoIP) 3. LTE Band 4 / 13 + Wi-Fi 2.4 GHz 4. CDMA 1x RTT BC0 / BC1 + LTE B4 / B13 + Wi-Fi 2.4 GHz (SV-LTE + Wi-Fi)
Body-worn Accessory	<ol style="list-style-type: none"> 1. CDMA 1xRTT BC0 / BC1 + Wi-Fi 2.4 GHz 2. CDMA 1xRTT BC0 / BC1 + BT 3. CDMA 1xEVDO BC0 / BC1 + Wi-Fi 2.4 (VoIP) 4. CDMA 1xEVDO BC0 / BC1 + BT (VoIP) 5. LTE Band 4 / 13 + Wi-Fi 2.4 GHz 6. LTE Band 4 / 13 + BT 7. CDMA 1xRTT BC0 / BC1 + LTE B4 / B13 + Wi-Fi 2.4 GHz (SV-LTE + Wi-Fi) 8. CDMA 1xRTT BC0 / BC1 + LTE B4 / B13 + BT (SV-LTE + BT)
Wireless Router (Hotspot)	<ol style="list-style-type: none"> 1. CDMA 1xEVDO BC0 / BC1 + Wi-Fi 2.4 GHz 2. LTE Band 4 / 13 + Wi-Fi 2.4 GHz 3. CDMA 1xRTT BC0 / BC1 + LTE B4 / B13 + Wi-Fi 2.4 GHz (SV-LTE + Wi-Fi)
Wi-Fi Direct	<ol style="list-style-type: none"> 1. CDMA 1xEVDO BC0 / BC1 + Wi-Fi 2.4 GHz (GO / GC) 2. LTE Band 4 / 13 + Wi-Fi 2.4 GHz (GO / GC) 3. CDMA 1xRTT BC0 / BC1 + LTE B4 / B13 + Wi-Fi 2.4 GHz (SV-LTE + Wi-Fi) (GO / GC)
<p>Notes:</p> <ol style="list-style-type: none"> 1. CDMA 1xEVDO and LTE support Hotspot. 2. VoIP is supported in CDMA and LTE(e.g. 3rd part VoIP and VoLTE) 3. Wi-Fi 2.4 GHz supports Hotspot and Wi-Fi Direct (GO/GC). 4. Wi-Fi and Bluetooth cannot transmit simultaneously because they share the same chip. 	

6.5. General LTE SAR Test and Reporting Considerations

Item	Description																																								
Frequency range, Channel Bandwidth, Numbers and Frequencies	<table border="1"> <thead> <tr> <th rowspan="3">Band 4</th> <th colspan="6">Frequency range: 1710 - 1755 MHz</th> </tr> <tr> <th colspan="6">Channel Bandwidth</th> </tr> <tr> <th>20 MHz</th> <th>15 MHz</th> <th>10 MHz</th> <th>5 MHz</th> <th>3 MHz</th> <th>1.4 MHz</th> </tr> </thead> <tbody> <tr> <td>Low</td> <td>20050/ 1720</td> <td>20025/ 1717.5</td> <td>20000/ 1715</td> <td>19975/ 1712.5</td> <td></td> <td></td> </tr> <tr> <td>Mid</td> <td>20175/ 1732.5</td> <td>20175/ 1732.5</td> <td>20175/ 1732.5</td> <td>20175/ 1732.5</td> <td></td> <td></td> </tr> <tr> <td>High</td> <td>20300/ 1745</td> <td>20325/ 1747.5</td> <td>20350/ 1750</td> <td>20375/ 1752.5</td> <td></td> <td></td> </tr> </tbody> </table>	Band 4	Frequency range: 1710 - 1755 MHz						Channel Bandwidth						20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz	Low	20050/ 1720	20025/ 1717.5	20000/ 1715	19975/ 1712.5			Mid	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5			High	20300/ 1745	20325/ 1747.5	20350/ 1750	20375/ 1752.5		
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	High	20300/ 1745	20325/ 1747.5	20350/ 1750	20375/ 1752.5																																				
	<table border="1"> <thead> <tr> <th rowspan="3">Band 13</th> <th colspan="6">Frequency range: 777 - 787 MHz</th> </tr> <tr> <th colspan="6">Channel Bandwidth</th> </tr> <tr> <th>20 MHz</th> <th>15 MHz</th> <th>10 MHz</th> <th>5 MHz</th> <th>3 MHz</th> <th>1.4 MHz</th> </tr> </thead> <tbody> <tr> <td>Low</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Mid</td> <td></td> <td></td> <td>23230/ 782</td> <td></td> <td></td> <td></td> </tr> <tr> <td>High</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Band 13	Frequency range: 777 - 787 MHz						Channel Bandwidth						20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz	Low							Mid			23230/ 782				High						
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Mid			23230/ 782																																						
High																																									
LTE Transmitter and Antenna Implementation	LTE has one (1) TX/RX antenna and two (2) RX antenna Refer to Appendix 14.1. Photos and Antenna Locations.																																								
Maximum Power Reduction (MPR)	<p>Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3</p> <table border="1"> <thead> <tr> <th rowspan="2">Modulation</th> <th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th> <th rowspan="2">MPR (dB)</th> </tr> <tr> <th>1.4 MHz</th> <th>3.0 MHz</th> <th>5 MHz</th> <th>10 MHz</th> <th>15 MHz</th> <th>20 MHz</th> </tr> </thead> <tbody> <tr> <td>QPSK</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 2</td> </tr> </tbody> </table> <p>MPR Built-in by design A-MPR (additional MPR) was disabled during SAR testing</p>	Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1	16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2		
Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)																																		
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz																																			
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1																																		
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1																																		
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2																																		
Power Reduction	<table border="1"> <thead> <tr> <th>Mode</th> <th>CDMA Current Voice Power for BC0 & BC1</th> <th>LTE B13 & B4 Max Power</th> </tr> </thead> <tbody> <tr> <td rowspan="2">SVLTE</td> <td>P ≤ 18.1 dBm (BC0) P ≤ 17.7 dBm (BC1)</td> <td>B13: 23.8 dBm (Limited) B4: 22.7 dBm (Limited)</td> </tr> <tr> <td>P > 18.1 dBm (BC0) P > 17.7 dBm (BC1)</td> <td>B13: 19.8 dBm (Limited) B4: 18.7 dBm (Limited)</td> </tr> </tbody> </table>	Mode	CDMA Current Voice Power for BC0 & BC1	LTE B13 & B4 Max Power	SVLTE	P ≤ 18.1 dBm (BC0) P ≤ 17.7 dBm (BC1)	B13: 23.8 dBm (Limited) B4: 22.7 dBm (Limited)	P > 18.1 dBm (BC0) P > 17.7 dBm (BC1)	B13: 19.8 dBm (Limited) B4: 18.7 dBm (Limited)																																
Mode	CDMA Current Voice Power for BC0 & BC1	LTE B13 & B4 Max Power																																							
SVLTE	P ≤ 18.1 dBm (BC0) P ≤ 17.7 dBm (BC1)	B13: 23.8 dBm (Limited) B4: 22.7 dBm (Limited)																																							
	P > 18.1 dBm (BC0) P > 17.7 dBm (BC1)	B13: 19.8 dBm (Limited) B4: 18.7 dBm (Limited)																																							
Spectrum Plots for RB Configurations	A properly configured base station simulator was used for the SAR and power measurements; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.																																								

7. RF Exposure Conditions (Test Configurations)

Refer to Appendix 14.1.Photos and Antenna Locations for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

7.1. Head

For WWAN, LTE and Wi-Fi

Test Configurations	SAR Required	Note
Left Touch	Yes	
Left Tilt (15°)	Yes	
Right Touch	Yes	
Right Tilt (15°)	Yes	

7.2. Body-worn Accessory

For WWAN and LTE

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	<25 mm	Yes	
Front	<25 mm	Yes	

For Wi-Fi

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	<25 mm	Yes	
Front	<25 mm	Yes	

7.3. Wireless Router (Hotspot)

For WWAN

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	<25 mm	Yes	
Front	<25 mm	Yes	
Edge 1 (Top)	111.5 mm	No	SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR
Edge 2 (Right)	1 mm	Yes	
Edge 3 (Bottom)	1 mm	Yes	
Edge 4 (Left)	42.4 mm	No	SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR

For LTE

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	<25 mm	Yes	
Front	<25 mm	Yes	
Edge 1 (Top)	106 mm	No	SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR
Edge 2 (Right)	40.4 mm	No	SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR
Edge 3 (Bottom)	1 mm	Yes	
Edge 4 (Left)	1 mm	Yes	

For Wi-Fi

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	<25 mm	Yes	
Front	<25 mm	Yes	
Edge 1 (Top)	10 mm	Yes	
Edge 2 (Right)	53 mm	No	SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR
Edge 3 (Bottom)	105.7 mm	No	SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR
Edge 4 (Left)	2.9 mm	Yes	

8. Conducted Output Power Measurements

8.1. CDMA BC0 and BC1

1xRTT Measured Results

Band	Mode	Ch	Freq. (MHz)	Avg Pwr (dBm)	Avg Reduced Pwr (dBm)
BC 0	RC1 SO55 (Loopback)	1013	824.70	24.7	18.5
		384	836.52	24.6	18.6
		777	848.31	24.7	18.5
	RC3 SO55 (Loopback)	1013	824.70	24.7	18.5
		384	836.52	24.6	18.6
		777	848.31	24.7	18.5
	RC3 SO32 (+F-SCH)	1013	824.70	24.7	18.5
		384	836.52	24.6	18.6
		777	848.31	24.7	18.5
BC 1	RC1 SO55 (Loopback)	25	1851.25	24.6	18.1
		600	1880.00	24.7	18.1
		1175	1908.75	24.6	18.2
	RC3 SO55 (Loopback)	25	1851.25	24.6	18.0
		600	1880.00	24.7	18.1
		1175	1908.75	24.6	18.2
	RC3 SO32 (+F-SCH)	25	1851.25	24.6	18.0
		600	1880.00	24.7	18.1
		1175	1908.75	24.6	18.2

1xEV-DO Rel. 0 Measured Results

Band	FTAP Rate	RTAP Rate	Channel	Freq. (MHz)	Avg Pwr (dBm)
BC 0	307.2 kbps (2 slot, QPSK)	153.6 kbps	1013	824.70	24.7
			384	836.52	24.6
			777	848.31	24.7
BC1	307.2 kbps (2 slot, QPSK)	153.6 kbps	25	1851.25	24.5
			600	1880.00	24.7
			1175	1908.75	24.6

1xEV-DO Rev. A Measured Results

Band	FETAP Traffic Format	RETAP Data Payload Size	Channel	Freq. (MHz)	Avg Pwr (dBm)
BC 0	307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	1013	824.70	24.6
			384	836.52	24.6
			777	848.31	24.6
BC1	307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	25	1851.25	24.7
			600	1880.00	24.7
			1175	1908.75	24.6

8.2. LTE Bands 4 and 13

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

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

The allowed A-MPR values specified below in Table 6.2.4-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signalling Value of "NS_01".

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4, 10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10, 15, 20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3	13	10	Table 6.2.4-2	Table 6.2.4-2
	6.6.3.3.2				
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23 ¹	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

LTE Band 4 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Meas. MPR	Avg Pwr (dBm)		
							1720 MHz	1732.5 MHz	1745 MHz
LTE Band 4	20	QPSK	1	0	0	0	23.2	23.2	23.2
			1	50	0	0	23.2	23.1	23.2
			1	99	0	0	23.1	23.2	23.2
			50	0	1	1	22.2	22.1	22.2
			50	25	1	1	22.2	22.1	22.2
			50	50	1	1	22.0	22.1	22.2
			100	0	1	1	22.1	22.1	22.2
		16QAM	1	0	1	1	22.2	22.2	22.2
			1	50	1	1	22.2	22.2	22.2
			1	99	1	1	22.1	22.2	22.2
			50	0	2	2	21.2	21.2	21.2
			50	25	2	2	21.2	21.2	21.2
			50	50	2	2	21.2	21.2	21.2
			100	0	2	2	21.2	21.1	21.2
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Meas. MPR	Avg Reduced Pwr (dBm)		
							1720 MHz	1732.5 MHz	1745 MHz
LTE Band 4	20	QPSK	1	0	MPR is disabled when Power Reduction is enabled		19.1	19.0	19.0
			1	50			19.1	19.0	19.0
			1	99			18.9	18.8	19.1
			50	0			19.1	19.0	18.9
			50	25			19.1	19.0	19.0
			50	50			18.9	18.9	19.0
			100	0			19.0	19.0	19.0
		16QAM	1	0			19.2	19.1	19.1
			1	50			19.2	19.0	19.1
			1	99			19.0	18.9	19.2
			50	0			19.2	19.0	19.0
			50	25			19.1	19.0	19.0
			50	50			18.9	18.9	19.0
			100	0			19.0	19.0	19.0

LTE Band 4 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Meas. MPR	Avg Pwr (dBm)		
							1717.5 MHz	1732.5 MHz	1747.5 MHz
LTE Band 4	15	QPSK	1	0	0	0	23.0	23.1	23.2
			1	37	0	0	23.0	23.1	23.2
			1	74	0	0	23.0	23.1	23.2
			36	0	1	1	22.2	22.0	22.2
			36	20	1	1	22.2	22.1	22.2
			36	39	1	1	22.2	22.1	22.2
			75	0	1	1	22.2	22.1	22.2
		16QAM	1	0	1	1	22.2	22.2	22.2
			1	37	1	1	22.2	22.2	22.2
			1	74	1	1	21.9	22.2	22.2
			36	0	2	2	21.1	21.2	21.2
			36	20	2	2	21.2	21.2	21.2
			36	39	2	2	21.2	21.2	21.2
			75	0	2	2	21.2	21.1	21.2
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Meas. MPR	Avg Reduced Pwr (dBm)		
							1717.5 MHz	1732.5 MHz	1747.5 MHz
LTE Band 4	15	QPSK	1	0	MPR is disabled when Power Reduction is enabled		19.0	19.0	19.1
			1	37			18.9	18.9	19.1
			1	74			18.8	18.9	19.1
			36	0			19.1	19.0	19.0
			36	20			19.1	19.0	19.0
			36	39			19.1	18.9	19.1
			75	0			19.1	19.1	19.0
		16QAM	1	0			18.9	19.2	19.2
			1	37			18.9	19.2	19.2
			1	74			18.7	19.1	19.2
			36	0			19.1	19.1	19.0
			36	20			19.1	19.1	19.0
			36	39			19.0	19.0	19.1
			75	0			19.2	19.0	19.1

LTE Band 4 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Meas. MPR	Avg Pwr (dBm)		
							1715 MHz	1732.5 MHz	1750 MHz
LTE Band 4	10	QPSK	1	0	0	0	23.2	23.0	23.0
			1	25	0	0	23.1	23.0	23.0
			1	49	0	0	23.2	23.0	22.9
			25	0	1	1	22.2	22.1	22.2
			25	12	1	1	22.1	22.1	22.2
			25	25	1	1	22.1	22.1	22.2
			50	0	1	1	22.1	22.1	22.2
		16QAM	1	0	1	1	22.2	21.6	22.1
			1	25	1	1	22.2	21.6	22.0
			1	49	1	1	22.2	21.6	21.9
			25	0	2	2	21.1	21.2	21.2
			25	12	2	2	21.2	21.2	21.2
			25	25	2	2	21.2	21.2	21.2
			50	0	2	2	21.2	21.1	21.2
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Meas. MPR	Avg Reduced Pwr (dBm)		
							1715 MHz	1732.5 MHz	1750 MHz
LTE Band 4	10	QPSK	1	0	MPR is disabled when Power Reduction is enabled		19.0	19.0	18.9
			1	25			18.9	19.0	19.0
			1	49			19.0	18.9	19.0
			25	0			19.1	19.0	19.0
			25	12			19.0	19.0	19.1
			25	25			19.2	18.9	19.1
			50	0			19.1	19.0	19.1
		16QAM	1	0			18.9	19.2	18.8
			1	25			18.8	19.1	18.9
			1	49			18.9	19.1	18.9
			25	0			19.1	19.1	19.1
			25	12			19.0	19.0	19.1
			25	25			19.1	19.0	19.2
			50	0			19.1	19.0	19.1

LTE Band 4 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Meas. MPR	Avg Pwr (dBm)		
							1712.5 MHz	1732.5 MHz	1752.5 MHz
LTE Band 4	5	QPSK	1	0	0	0	23.1	23.2	23.2
			1	12	0	0	23.0	23.0	23.2
			1	24	0	0	23.1	23.0	23.2
			12	0	1	1	22.2	22.1	22.2
			12	7	1	1	22.1	22.0	22.2
			12	13	1	1	22.1	22.0	22.2
			25	0	1	1	22.1	22.0	22.2
		16QAM	1	0	1	1	21.7	22.2	22.2
			1	12	1	1	21.6	22.1	22.0
			1	24	1	1	21.6	22.1	21.9
			12	0	2	2	21.2	21.1	21.2
			12	7	2	2	21.2	21.1	21.2
			12	13	2	2	21.2	21.1	21.2
			25	0	2	2	21.2	21.2	21.2
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Meas. MPR	Avg Reduced Pwr (dBm)		
							1712.5 MHz	1732.5 MHz	1752.5 MHz
LTE Band 4	5	QPSK	1	0	MPR is disabled when Power Reduction is enabled		18.9	19.0	19.0
			1	12			18.9	19.0	19.0
			1	24			18.9	18.9	19.0
			12	0			19.1	19.0	19.1
			12	7			19.0	19.0	19.1
			12	13			19.0	19.0	19.1
			25	0			19.0	19.0	19.2
		16QAM	1	0			18.8	19.0	18.9
			1	12			18.7	18.9	18.9
			1	24			18.8	18.8	18.9
			12	0			19.1	19.0	19.2
			12	7			19.1	19.0	19.2
			12	13			19.1	19.0	19.1
			25	0			19.1	19.0	19.2

LTE Band 13 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Meas. MPR	Avg Pwr (dBm)
							782 MHz
LTE Band 13	10	QPSK	1	0	0	0	24.2
			1	25	0	0	24.0
			1	49	0	0	24.1
			25	0	1	1	23.3
			25	12	1	1	23.2
			25	25	1	1	23.0
			50	0	1	1	23.2
		16QAM	1	0	1	1	23.3
			1	25	1	1	23.1
			1	49	1	1	23.1
			25	0	2	2	22.3
			25	12	2	2	22.3
			25	25	2	2	22.2
			50	0	2	2	22.3
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Meas. MPR	Avg Reduced Pwr (dBm)
LTE Band 13	10	QPSK	1	0	MPR is disabled when Power Reduction is enabled		20.3
			1	25			20.3
			1	49			20.3
			25	0			20.3
			25	12			20.3
			25	25			20.3
			50	0			20.3
		16QAM	1	0			20.3
			1	25			20.3
			1	49			20.3
			25	0			20.3
			25	12			20.3
			25	25			20.3
			50	0			20.3

Note(s):

10/5 MHz Bandwidths does not support at least three non-overlapping channels in certain channel bandwidths. When a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing per KDB 941225 D05 SAR for LTE Devices

8.3. SVLTE

8.3.1. CDMA BC0 + LTE Band 4

Agilent 8960		R&S CMW 500			
CDMA BC0 (1xRTT)		LTE Band 4 (20MHz)			
P > 18.6 dBm		Limit = 19.2 dBm			
Ch. #	Avg Pwr (dBm)	Ch. #	Mod	UL RB Setting	Avg Pwr (dBm)
1013		20175	QPSK	1 0	19.0
				1 49	19.0
				1 99	18.8
				50 0	19.0
				50 24	19.0
				50 50	18.9
				100 0	19.0
		16QAM	1 0	19.1	
			1 49	19.0	
			1 99	18.9	
			50 0	19.0	
			50 24	19.0	
			50 50	18.9	
			100 0	19.0	
384		20175	QPSK	1 0	19.0
				1 49	19.0
				1 99	18.8
				50 0	19.0
				50 24	19.0
				50 50	18.9
				100 0	19.0
		16QAM	1 0	19.1	
			1 49	19.0	
			1 99	18.9	
			50 0	19.0	
			50 24	19.0	
			50 50	18.9	
			100 0	19.0	
777		20175	QPSK	1 0	19.0
				1 49	19.0
				1 99	18.8
				50 0	19.0
				50 24	19.0
				50 50	18.9
				100 0	19.0
		16QAM	1 0	19.1	
			1 49	19.0	
			1 99	18.9	
			50 0	19.0	
			50 24	19.0	
			50 50	18.9	
			100 0	19.0	

Agilent 8960		R&S CMW 500			
CDMA BC0 (1xRTT)		LTE Band 4 (20MHz)			
P ≤ 18.6 dBm		Limit = 23.2 dBm			
Ch. #	Avg Pwr (dBm)	Ch. #	Mod	UL RB Setting	Avg Pwr (dBm)
1013		20175	QPSK	1 0	23.2
				1 49	23.1
				1 99	23.2
				50 0	22.1
				50 24	22.1
				50 50	22.1
				100 0	22.1
		16QAM	1 0	22.2	
			1 49	22.2	
			1 99	22.2	
			50 0	21.2	
			50 24	21.2	
			50 50	21.2	
			100 0	21.1	
384		20175	QPSK	1 0	23.2
				1 49	23.1
				1 99	23.2
				50 0	22.1
				50 24	22.1
				50 50	22.1
				100 0	22.1
		16QAM	1 0	22.2	
			1 49	22.2	
			1 99	22.2	
			50 0	21.2	
			50 24	21.2	
			50 50	21.2	
			100 0	21.1	
777		20175	QPSK	1 0	23.2
				1 49	23.1
				1 99	23.2
				50 0	22.1
				50 24	22.1
				50 50	22.1
				100 0	22.1
		16QAM	1 0	22.2	
			1 49	22.2	
			1 99	22.2	
			50 0	21.2	
			50 24	21.2	
			50 50	21.2	
			100 0	21.1	

8.3.2. CDMA BC1 + LTE Band 4

Agilent 8960		R&S CMW 500				
CDMA BC1 (1xRTT)		LTE Band 4 (20MHz)				
P > 18.2 dBm		Limit = 19.2 dBm				
Ch. #	Avg Pwr (dBm)	Ch. #	Mod	UL RB Setting		Avg Pwr (dBm)
25		20175	QPSK	1	0	19.0
				1	49	19.0
				1	99	18.8
				50	0	19.0
				50	24	19.0
				50	50	18.9
			16QAM	100	0	19.0
				1	0	19.1
				1	49	19.0
				1	99	18.9
				50	0	19.0
				50	24	19.0
				50	50	18.9
				100	0	19.0
				600		20175
1	49	19.0				
1	99	18.8				
50	0	19.0				
50	24	19.0				
50	50	18.9				
16QAM	100	0	19.0			
	1	0	19.1			
	1	49	19.0			
	1	99	18.9			
	50	0	19.0			
	50	24	19.0			
	50	50	18.9			
	100	0	19.0			
	1175		20175			
1				49	19.0	
1				99	18.8	
50				0	19.0	
50				24	19.0	
50				50	18.9	
16QAM				100	0	19.0
				1	0	19.1
				1	49	19.0
				1	99	18.9
				50	0	19.0
				50	24	19.0
				50	50	18.9
				100	0	19.0

Agilent 8960		R&S CMW 500				
CDMA BC1 (1xRTT)		LTE Band 4 (20MHz)				
P ≤ 18.2 dBm		Limit = 23.2 dBm				
Ch. #	Avg Pwr (dBm)	Ch. #	Mod	UL RB Setting		Avg Pwr (dBm)
25		20175	QPSK	1	0	23.2
				1	49	23.1
				1	99	23.2
				50	0	22.1
				50	24	22.1
				50	50	22.1
			16QAM	100	0	22.1
				1	0	22.2
				1	49	22.2
				1	99	22.2
				50	0	21.2
				50	24	21.2
				50	50	21.2
				100	0	21.1
				600		20175
1	49	23.1				
1	99	23.2				
50	0	22.1				
50	24	22.1				
50	50	22.1				
16QAM	100	0	22.1			
	1	0	22.2			
	1	49	22.2			
	1	99	22.2			
	50	0	21.2			
	50	24	21.2			
	50	50	21.2			
	100	0	21.1			
	1175		20175			
1				49	23.1	
1				99	23.2	
50				0	22.1	
50				24	22.1	
50				50	22.1	
16QAM				100	0	22.1
				1	0	22.2
				1	49	22.2
				1	99	22.2
				50	0	21.2
				50	24	21.2
				50	50	21.2
				100	0	21.1

8.3.3. CDMA BC0 + LTE Band 13

Agilent 8960		R&S CMW 500				
CDMA BC0 (1xRTT)		LTE Band 13 (10 MHz)				
P > 18.6 dBm		Limit = 20.3 dBm				
Ch. #	Avg Pwr (dBm)	Ch. #	Mod	UL RB Setting		Avg Pwr (dBm)
1013		23230	QPSK	1	0	20.3
				1	25	20.3
				1	49	20.3
				25	0	20.3
				25	12	20.3
				25	25	20.3
			16QAM	50	0	20.3
				1	0	20.3
				1	25	20.3
				1	49	20.3
				25	0	20.3
				25	12	20.3
				25	25	20.3
				50	0	20.3
				50	0	20.3
384		23230	QPSK	1	0	20.3
				1	25	20.3
				1	49	20.3
				25	0	20.3
				25	12	20.3
				25	25	20.3
			16QAM	50	0	20.3
				1	0	20.3
				1	25	20.3
				1	49	20.3
				25	0	20.3
				25	12	20.3
				25	25	20.3
				50	0	20.3
				50	0	20.3
777		23230	QPSK	1	0	20.3
				1	25	20.3
				1	49	20.3
				25	0	20.3
				25	12	20.3
				25	25	20.3
			16QAM	50	0	20.3
				1	0	20.3
				1	25	20.3
				1	49	20.3
				25	0	20.3
				25	12	20.3
				25	25	20.3
				50	0	20.3
				50	0	20.3

Agilent 8960		R&S CMW 500				
CDMA BC0 (1xRTT)		LTE Band 13 (10MHz)				
P ≤ 18.6 dBm		Limit = 24.3 dBm				
Ch. #	Avg Pwr (dBm)	Ch. #	Mod	UL RB Setting		Avg Pwr (dBm)
1013		23230	QPSK	1	0	24.20
				1	25	24.00
				1	49	24.10
				25	0	23.30
				25	12	23.20
				25	25	23.00
			16QAM	50	0	23.20
				1	0	23.30
				1	25	23.10
				1	49	23.10
				25	0	22.30
				25	12	22.30
				25	25	22.15
				50	0	22.25
				50	0	22.25
384		23230	QPSK	1	0	24.2
				1	25	24.0
				1	49	24.1
				25	0	23.3
				25	12	23.2
				25	25	23.0
			16QAM	50	0	23.2
				1	0	23.3
				1	25	23.1
				1	49	23.1
				25	0	22.3
				25	12	22.3
				25	25	22.2
				50	0	22.3
				50	0	22.3
777		23230	QPSK	1	0	24.2
				1	25	24.0
				1	49	24.1
				25	0	23.3
				25	12	23.2
				25	25	23.0
			16QAM	50	0	23.2
				1	0	23.3
				1	25	23.1
				1	49	23.1
				25	0	22.3
				25	12	22.3
				25	25	22.2
				50	0	22.3
				50	0	22.3

8.3.4. CDMA BC1 + LTE Band 13

Agilent 8960		R&S CMW 500			
CDMA BC1 (1xRTT)		LTE Band 13 (10 MHz)			
P > 18.2 dBm		Limit = 20.3 dBm			
Ch. #	Avg Pwr (dBm)	Ch. #	Mod	UL RB Setting	Avg Pwr (dBm)
25		23230	QPSK	1 0	20.3
				1 25	20.3
				1 49	20.3
				25 0	20.3
				25 12	20.3
				25 25	20.3
				50 0	20.3
			16QAM	1 0	20.3
				1 25	20.3
				1 49	20.3
				25 0	20.3
				25 12	20.3
				25 25	20.3
				50 0	20.3
600		23230	QPSK	1 0	20.3
				1 25	20.3
				1 49	20.3
				25 0	20.3
				25 12	20.3
				25 25	20.3
				50 0	20.3
			16QAM	1 0	20.3
				1 25	20.3
				1 49	20.3
				25 0	20.3
				25 12	20.3
				25 25	20.3
				50 0	20.3
1175		23230	QPSK	1 0	20.3
				1 25	20.3
				1 49	20.3
				25 0	20.3
				25 12	20.3
				25 25	20.3
				50 0	20.3
			16QAM	1 0	20.3
				1 25	20.3
				1 49	20.3
				25 0	20.3
				25 12	20.3
				25 25	20.3
				50 0	20.3

Agilent 8960		R&S CMW 500			
CDMA BC1 (1xRTT)		LTE Band 13 (10MHz)			
P ≤ 18.2 dBm		Limit = 24.3 dBm			
Ch. #	Avg Pwr (dBm)	Ch. #	Mod	UL RB Setting	Avg Pwr (dBm)
25		23230	QPSK	1 0	24.2
				1 25	24.0
				1 49	24.1
				25 0	23.3
				25 12	23.2
				25 25	23.0
				50 0	23.2
			16QAM	1 0	23.3
				1 25	23.1
				1 49	23.1
				25 0	22.3
				25 12	22.3
				25 25	22.2
				50 0	22.3
600		23230	QPSK	1 0	24.2
				1 25	24.0
				1 49	24.1
				25 0	23.3
				25 12	23.2
				25 25	23.0
				50 0	23.2
			16QAM	1 0	23.3
				1 25	23.1
				1 49	23.1
				25 0	22.3
				25 12	22.3
				25 25	22.2
				50 0	22.3
1175		23230	QPSK	1 0	24.2
				1 25	24.0
				1 49	24.1
				25 0	23.3
				25 12	23.2
				25 25	23.0
				50 0	23.2
			16QAM	1 0	23.3
				1 25	23.1
				1 49	23.1
				25 0	22.3
				25 12	22.3
				25 25	22.2
				50 0	22.3

8.4. Wi-Fi (2.4 GHz Band)

Required Test Channels per KDB 248227 D01

Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Avg Pwr (dBm)	SAR Test (Yes/No)
2.4 (DTS)	802.11b	1 Mbps	1	2412	15.2	Yes
			6	2437	15.1	
			11	2462	15.2	
	802.11g	6 Mbps	1	2412	11.3	No
			6	2437	11.4	
			11	2462	11.6	
	802.11n (HT20)	MCS0	1	2412	10.5	No
			6	2437	10.6	
			11	2462	10.6	

Note(s):

- Per KDB 248227 D01, 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.

Power measurements to determine worst-case data rates

Mode	Ch #	Freq. (MHz)	Data Rate	Avg Pwr (dBm)	SAR test (Yes/No)
802.11b	6	2437	1 Mbps	15.2	Yes
			2 Mbps	15.0	No
			5.5 Mbps	15.0	No
			11 Mbps	14.8	No

8.5. Bluetooth

Maximum tune-up tolerance limit is 9.5 dBm from the rated nominal maximum output power. This power level qualifies for exclusion of SAR testing. Refer to Standalone SAR Test Exclusion Considerations Section.

9. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within $\pm 2^\circ\text{C}$ 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.

9.1. 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

9.2. Dielectric Property Measurements Results

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within $\pm 2^\circ\text{C}$ 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.

SAR Lab 1

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit \pm (%)	
8/14/2014	Head 1750	e'	38.9200	Relative Permittivity (ϵ_r):	38.92	40.08	-2.91	5
		e"	14.0800	Conductivity (σ):	1.37	1.37	0.08	5
	Head 1710	e'	39.0900	Relative Permittivity (ϵ_r):	39.09	40.15	-2.63	5
		e"	13.9500	Conductivity (σ):	1.33	1.35	-1.49	5
	Head 1755	e'	38.9000	Relative Permittivity (ϵ_r):	38.90	40.08	-2.94	5
		e"	14.0800	Conductivity (σ):	1.37	1.37	0.16	5
8/14/2014	Body 1750	e'	53.3000	Relative Permittivity (ϵ_r):	53.30	53.44	-0.26	5
		e"	15.6700	Conductivity (σ):	1.52	1.49	2.60	5
	Body 1710	e'	53.4500	Relative Permittivity (ϵ_r):	53.45	53.54	-0.17	5
		e"	15.5700	Conductivity (σ):	1.48	1.46	1.29	5
	Body 1755	e'	53.2800	Relative Permittivity (ϵ_r):	53.28	53.43	-0.28	5
		e"	15.6800	Conductivity (σ):	1.53	1.49	2.74	5
8/18/2014	Head 1900	e'	38.2900	Relative Permittivity (ϵ_r):	38.29	40.00	-4.28	5
		e"	13.1000	Conductivity (σ):	1.38	1.40	-1.15	5
	Head 1850	e'	38.6800	Relative Permittivity (ϵ_r):	38.68	40.00	-3.30	5
		e"	12.9500	Conductivity (σ):	1.33	1.40	-4.85	5
	Head 1910	e'	38.2500	Relative Permittivity (ϵ_r):	38.25	40.00	-4.38	5
		e"	13.1300	Conductivity (σ):	1.39	1.40	-0.40	5
8/18/2014	Body 1900	e'	50.9700	Relative Permittivity (ϵ_r):	50.97	53.30	-4.37	5
		e"	14.9800	Conductivity (σ):	1.58	1.52	4.12	5
	Body 1850	e'	51.3100	Relative Permittivity (ϵ_r):	51.31	53.30	-3.73	5
		e"	14.7900	Conductivity (σ):	1.52	1.52	0.09	5
	Body 1910	e'	50.9400	Relative Permittivity (ϵ_r):	50.94	53.30	-4.43	5
		e"	15.0200	Conductivity (σ):	1.60	1.52	4.94	5

SAR Lab 2

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
8/12/2014	Body 2450	e'	50.4500	Relative Permittivity (ϵ_r):	50.45	52.70	-4.27	5
		e"	14.7300	Conductivity (σ):	2.01	1.95	2.90	5
	Body 2410	e'	50.5700	Relative Permittivity (ϵ_r):	50.57	52.76	-4.15	5
		e"	14.6500	Conductivity (σ):	1.96	1.91	2.92	5
	Body 2475	e'	50.3500	Relative Permittivity (ϵ_r):	50.35	52.67	-4.40	5
		e"	14.7800	Conductivity (σ):	2.03	1.99	2.46	5
8/14/2014	Head 2450	e'	38.3000	Relative Permittivity (ϵ_r):	38.30	39.20	-2.30	5
		e"	13.4300	Conductivity (σ):	1.83	1.80	1.64	5
	Head 2410	e'	38.4600	Relative Permittivity (ϵ_r):	38.46	39.28	-2.09	5
		e"	13.3100	Conductivity (σ):	1.78	1.76	1.31	5
	Head 2475	e'	38.2000	Relative Permittivity (ϵ_r):	38.20	39.17	-2.47	5
		e"	13.5000	Conductivity (σ):	1.86	1.83	1.69	5
8/15/2014	Body 750	e'	53.7400	Relative Permittivity (ϵ_r):	53.74	55.55	-3.25	5
		e"	23.1700	Conductivity (σ):	0.97	0.96	0.33	5
	Body 700	e'	54.3300	Relative Permittivity (ϵ_r):	54.33	55.74	-2.53	5
		e"	23.6000	Conductivity (σ):	0.92	0.96	-4.24	5
	Body 790	e'	53.3500	Relative Permittivity (ϵ_r):	53.35	55.39	-3.69	5
		e"	22.8900	Conductivity (σ):	1.01	0.97	4.07	5
8/18/2014	Head 750	e'	40.4600	Relative Permittivity (ϵ_r):	40.46	41.96	-3.58	5
		e"	21.6200	Conductivity (σ):	0.90	0.89	0.95	5
	Head 700	e'	41.2100	Relative Permittivity (ϵ_r):	41.21	42.22	-2.39	5
		e"	21.9200	Conductivity (σ):	0.85	0.89	-4.05	5
	Head 790	e'	39.8900	Relative Permittivity (ϵ_r):	39.89	41.76	-4.47	5
		e"	21.3800	Conductivity (σ):	0.94	0.90	4.80	5

SAR Lab 5

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
8/12/2014	Head 835	e'	43.0995	Relative Permittivity (ϵ_r):	43.10	41.50	3.85	5
		e"	19.1089	Conductivity (σ):	0.89	0.90	-1.42	5
	Head 820	e'	43.2472	Relative Permittivity (ϵ_r):	43.25	41.60	3.95	5
		e"	19.1328	Conductivity (σ):	0.87	0.90	-2.91	5
	Head 850	e'	42.9542	Relative Permittivity (ϵ_r):	42.95	41.50	3.50	5
		e"	19.0880	Conductivity (σ):	0.90	0.92	-1.40	5
8/13/2014	Head 1900	e'	38.1000	Relative Permittivity (ϵ_r):	38.10	40.00	-4.75	5
		e"	13.3200	Conductivity (σ):	1.41	1.40	0.51	5
	Head 1850	e'	38.3700	Relative Permittivity (ϵ_r):	38.37	40.00	-4.08	5
		e"	13.2300	Conductivity (σ):	1.36	1.40	-2.79	5
	Head 1910	e'	38.0500	Relative Permittivity (ϵ_r):	38.05	40.00	-4.88	5
		e"	13.3400	Conductivity (σ):	1.42	1.40	1.20	5
8/14/2014	Body 1900	e'	51.3500	Relative Permittivity (ϵ_r):	51.35	53.30	-3.66	5
		e"	14.6900	Conductivity (σ):	1.55	1.52	2.10	5
	Body 1850	e'	51.5600	Relative Permittivity (ϵ_r):	51.56	53.30	-3.26	5
		e"	14.5800	Conductivity (σ):	1.50	1.52	-1.33	5
	Body 1910	e'	51.3000	Relative Permittivity (ϵ_r):	51.30	53.30	-3.75	5
		e"	14.6900	Conductivity (σ):	1.56	1.52	2.64	5
8/18/2014	Head 835	e'	40.8100	Relative Permittivity (ϵ_r):	40.81	41.50	-1.66	5
		e"	20.0200	Conductivity (σ):	0.93	0.90	3.28	5
	Head 820	e'	40.9700	Relative Permittivity (ϵ_r):	40.97	41.60	-1.52	5
		e"	19.9800	Conductivity (σ):	0.91	0.90	1.39	5
	Head 850	e'	40.6100	Relative Permittivity (ϵ_r):	40.61	41.50	-2.14	5
		e"	20.0200	Conductivity (σ):	0.95	0.92	3.41	5
8/19/2014	Body 835	e'	54.5800	Relative Permittivity (ϵ_r):	54.58	55.20	-1.12	5
		e"	21.8900	Conductivity (σ):	1.02	0.97	4.78	5
	Body 820	e'	54.7400	Relative Permittivity (ϵ_r):	54.74	55.28	-0.97	5
		e"	21.9900	Conductivity (σ):	1.00	0.97	3.53	5
	Body 850	e'	54.4400	Relative Permittivity (ϵ_r):	54.44	55.16	-1.30	5
		e"	21.8300	Conductivity (σ):	1.03	0.99	4.52	5

10. 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 remeasured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

10.1. 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
D750V3	1071	11/15/2013	750	1g	8.46	8.64
				10g	5.51	5.72
D835V2	4d002	11/15/2013	835	1g	9.49	9.43
				10g	6.18	6.21
D835V2	4d142	9/17/2013	835	1g	9.44	9.36
				10g	6.12	6.20
D1750V2	1077	9/12/2013	1750	1g	37.6	37.70
				10g	20	20.3
D1900V2	5d043	11/12/2013	1900	1g	40.1	39.0
				10g	21.1	20.8
D1900V2	5d163	9/17/2013	1900	1g	40.9	40.1
				10g	21.2	21.2
D2450V2	899	9/10/2013	2450	1g	51.3	49.7
				10g	23.9	23.3

10.2. 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 $\pm 10\%$	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
8/14/2014	D1750V2	1077	Head	1g	3.85	3.68	36.80	37.60	-2.13	4.42	
				10g	2.06	1.96	19.60	20.00	-2.00		
8/14/2014	D1750V2	1077	Body	1g	4.03	4.06	40.60	37.70	7.69	-0.74	1, 2
				10g	2.08	2.17	21.70	20.30	6.90		
8/18/2014	D1900V2	5d163	Head	1g	4.09	4.03	40.30	40.90	-1.47	1.47	
				10g	2.11	2.09	20.90	21.20	-1.42		
8/18/2014	D1900V2	5d163	Body	1g	3.86	3.80	38.00	40.10	-5.24	1.55	3, 4
				10g	1.96	1.99	19.90	21.20	-6.13		

SAR Lab 2

Date Tested	System Dipole		T.S. Liquid	Measured Results			Target (Ref. Value)	Delta $\pm 10\%$	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
8/12/2014	D2450V2	899	Body	1g	4.85	4.94	49.40	49.70	-0.60	-1.86	
				10g	2.13	2.43	24.30	23.30	4.29		
8/14/2014	D2450V2	899	Head	1g	5.32	5.41	54.10	51.30	5.46	-1.69	5, 6
				10g	2.33	2.62	26.20	23.90	9.62		
8/15/2014	D750V3	1071	Body	1g	0.888	0.888	8.88	8.64	2.78	0.00	
				10g	0.608	0.615	6.15	5.72	7.52		
8/18/2014	D750V3	1071	Head	1g	0.837	0.805	8.05	8.46	-4.85	3.82	7, 8
				10g	0.574	0.548	5.48	5.51	-0.54		

SAR Lab 5

Date Tested	System Dipole		T.S. Liquid	Measured Results			Target (Ref. Value)	Delta $\pm 10\%$	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
8/13/2014	D1900V2	5d043	Head	1g	3.98	3.95	39.50	40.10	-1.50	0.75	
				10g	2.09	2.06	20.60	21.10	-2.37		
8/14/2014	D1900V2	5d043	Body	1g	4.20	4.15	41.50	39.00	6.41	1.19	9, 10
				10g	2.12	2.16	21.60	20.80	3.85		
8/14/2014	D835V2	4d002	Body	1g	1.06	1.03	10.30	9.43	9.23	2.83	11, 12
				10g	0.708	0.680	6.80	6.21	9.50		
8/18/2014	D835V2	4d142	Head	1g	1.04	1.02	10.20	9.44	8.05	1.92	13, 14
				10g	0.702	0.672	6.72	6.12	9.80		
8/19/2014	D835V2	4d142	Body	1g	1.05	0.99	9.9	9.36	5.24	6.19	
				10g	0.70	0.65	6.5	6.2	4.52		

11. 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 648474 D04 Handset SAR:

With headset attached, when the reported SAR for body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

KDB 941225 D01 SAR test for 3G devices:

For handsets with Ev-Do capabilities, when the maximum average output power for each channel in Rev. 0 is less than a quarter dB higher than that measured in RC3 (1xRTT), body SAR for Ev-Do is not required... SAR for Rev. A is not required when the maximum average output power of each channel is less than that measured in Rev. 0 or less than a quarter dB higher than that measured in RC3.

KDB 941225 D05 SAR for LTE Devices:

SAR test reduction is applied using the following criteria:

- Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel.
- When the reported SAR is > 0.8 W/kg, testing for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel.
- Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are > 0.8 W/kg. Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation < 1.45 W/kg.
- Testing for 16-QAM modulation is not required because the reported SAR for QPSK is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of QPSK.
- Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.

KDB 248227 D01 SAR Measurements Procedures for 802.11 a/b/g Transmitters v01r02 (pg.6):

Each channel should be tested at the lowest data rate in each a-b/g mode or 4.9 GHz channel BW configuration.

When the extrapolated maximum peak SAR for the maximum output channel is ≤ 1.6 W/kg and the 1-g averaged SAR is ≤ 0.8 W/kg, testing of other channels in the "default test channels" or "required test channels" configuration is optional.

11.1. CDMA BC0

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
Head	1xRTT (RC3 SO55)	OFF	0	Left Touch	384	836.5	24.7	24.6	0.402	0.411	1
				Left Tilt	384	836.5	24.7	24.6	0.278	0.284	
				Right Touch	384	836.5	24.7	24.6	0.541	0.554	
				Right Tilt	384	836.5	24.7	24.6	0.270	0.276	
		ON	0	Left Touch	384	836.5	18.6	18.5	0.080	0.082	
				Left Tilt	384	836.5	18.6	18.5	0.067	0.069	
				Right Touch	384	836.5	18.6	18.5	0.118	0.121	
				Right Tilt	384	836.5	18.6	18.5	0.069	0.071	
	1xEVDO (Rel. 0)	OFF	0	Left Touch	384	836.5	24.7	24.6	0.369	0.378	
				Left Tilt	384	836.5	24.7	24.6	0.261	0.267	
				Right Touch	384	836.5	24.7	24.6	0.488	0.499	
				Right Tilt	384	836.5	24.7	24.6	0.267	0.273	
Body-worn & Hotspot	1xRTT (RC3 SO32)	OFF	10	Rear	384	836.5	24.7	24.6	0.613	0.627	2
				Front	384	836.5	24.7	24.6	0.467	0.478	
		ON	10	Rear	384	836.5	18.6	18.5	0.173	0.177	
				Front	384	836.5	18.6	18.5	0.117	0.120	
Hotspot	1xRTT (RC3 SO32)	OFF	10	Edge 2	384	836.5	18.6	18.5	0.484	0.495	
				Edge 3	384	836.5	18.6	18.5	0.284	0.291	
				Edge 2	384	836.5	24.7	24.6	0.150	0.153	
		ON	10	Edge 2	384	836.5	24.7	24.6	0.072	0.074	
				Edge 3	384	836.5	24.7	24.6	0.072	0.074	
				Edge 3	384	836.5	24.7	24.6	0.072	0.074	

11.2. CDMA BC1

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
Head	1xRTT (RC3 SO55)	OFF	0	Left Touch	600	1880.0	24.7	24.7	0.306	0.306	3
				Left Tilt	600	1880.0	24.7	24.7	0.235	0.235	
				Right Touch	600	1880.0	24.7	24.7	0.651	0.651	
				Right Tilt	600	1880.0	24.7	24.7	0.275	0.275	
		ON	0	Left Touch	600	1880.0	18.2	18.1	0.112	0.115	
				Left Tilt	600	1880.0	18.2	18.1	0.075	0.077	
				Right Touch	600	1880.0	18.2	18.1	0.164	0.168	
				Right Tilt	600	1880.0	18.2	18.1	0.086	0.088	
	1xEVDO (Rel. 0)	OFF	0	Left Touch	600	1880.0	24.7	24.7	0.318	0.318	
				Left Tilt	600	1880.0	24.7	24.7	0.240	0.240	
				Right Touch	600	1880.0	24.7	24.7	0.595	0.595	
				Right Tilt	600	1880.0	24.7	24.7	0.280	0.280	
Body-worn & Hotspot	1xRTT (RC3 SO32)	OFF	10	Rear	25	1851.3	24.7	24.6	0.809	0.828	4
					600	1880.0	24.7	24.7	0.903	0.903	
					1175	1908.8	24.7	24.6	0.929	0.951	
		ON	10	Rear	600	1880.0	18.2	18.1	0.237	0.243	
				Front	600	1880.0	18.2	18.1	0.171	0.175	
				Front	600	1880.0	18.2	18.1	0.171	0.175	
Hotspot	1xRTT (RC3 SO32)	OFF	10	Edge 2	600	1880.0	24.7	24.7	0.391	0.391	
				Edge 3	600	1880.0	24.7	24.7	0.278	0.278	
				Edge 2	600	1880.0	18.2	18.1	0.083	0.085	
		ON	10	Edge 2	600	1880.0	18.2	18.1	0.065	0.067	
				Edge 3	600	1880.0	18.2	18.1	0.065	0.067	
				Edge 3	600	1880.0	18.2	18.1	0.065	0.067	

11.3. LTE Band 4 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	OFF	0	Left Touch	20050	1720.0	1	0	23.2	23.2	0.810	0.810	5
					20175	1732.5	1	0	23.2	23.2	0.829	0.829	
					20300	1745.0	1	0	23.2	23.2	0.733	0.733	
				Left Tilt	20175	1732.5	1	0	23.2	23.2	0.339	0.339	
					50	0	22.2	22.1	0.271	0.277			
				Right Touch	20175	1732.5	1	0	23.2	23.2	0.552	0.552	
					50	0	22.2	22.1	0.432	0.442			
				Right Tilt	20175	1732.5	1	0	23.2	23.2	0.365	0.365	
	50	0	22.2	22.1	0.295	0.302							
	QPSK	ON	0	Left Touch	20175	1732.5	1	0	19.2	19.0	0.317	0.332	
					50	0	19.2	19.0	0.354	0.371			
				Left Tilt	20175	1732.5	1	0	19.2	19.0	0.126	0.132	
					50	0	19.2	19.0	0.138	0.145			
				Right Touch	20175	1732.5	1	0	19.2	19.0	0.240	0.251	
					50	0	19.2	19.0	0.249	0.261			
				Right Tilt	20175	1732.5	1	0	19.2	19.0	0.131	0.137	
50					0	19.2	19.0	0.140	0.147				
Body-worn & Hotspot	QPSK	OFF	10	Rear	20050	1720.0	1	0	23.2	23.2	0.923	0.923	6
					20175	1732.5	1	0	23.2	23.2	0.936	0.936	
					20300	1745.0	1	0	23.2	23.2	1.020	1.020	
				Front	20050	1720.0	1	0	23.2	23.2	0.909	0.909	
					20175	1732.5	1	0	23.2	23.2	0.915	0.915	
					50	0	22.2	22.1	0.762	0.780			
	QPSK	ON	10	Rear	20175	1732.5	1	0	19.2	19.0	0.398	0.417	
					50	0	19.2	19.0	0.425	0.445			
				Front	20175	1732.5	1	0	19.2	19.0	0.390	0.408	
					50	0	19.2	19.0	0.423	0.443			
Hotspot	QPSK	OFF	10	Edge 3	20175	1732.5	1	0	23.2	23.2	0.507	0.507	
					50	0	22.2	22.1	0.389	0.398			
				Edge 4	20175	1732.5	1	0	23.2	23.2	0.465	0.465	
					50	0	22.2	22.1	0.384	0.393			
	QPSK	ON	10	Edge 3	20175	1732.5	1	0	19.2	19.0	0.143	0.150	
					50	0	19.2	19.0	0.146	0.153			
				Edge 4	20175	1732.5	1	0	19.2	19.0	0.179	0.187	
					50	0	19.2	19.0	0.195	0.204			

11.4. LTE Band 13 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	OFF	0	Left Touch	23230	782.0	1	0	24.3	24.2	0.392	0.401	7
							25	0	23.3	23.3	0.310	0.310	
				Left Tilt	23230	782.0	1	0	24.3	24.2	0.203	0.208	
							25	0	23.3	23.3	0.163	0.163	
				Right Touch	23230	782.0	1	0	24.3	24.2	0.255	0.261	
							25	0	23.3	23.3	0.209	0.209	
				Right Tilt	23230	782.0	1	0	24.3	24.2	0.169	0.173	
							25	0	23.3	23.3	0.144	0.144	
		ON	0	Left Touch	23230	782.0	1	0	20.3	20.3	0.179	0.179	
							25	0	20.3	20.3	0.191	0.191	
				Left Tilt	23230	782.0	1	0	20.3	20.3	0.092	0.092	
							25	0	20.3	20.3	0.100	0.100	
Right Touch	23230	782.0	1	0	20.3	20.3	0.128	0.128					
			25	0	20.3	20.3	0.132	0.132					
Right Tilt	23230	782.0	1	0	20.3	20.3	0.084	0.084					
			25	0	20.3	20.3	0.081	0.081					
Body-worn & Hotspot	QPSK	OFF	10	Rear	23230	782.0	1	0	24.3	24.2	0.478	0.489	8
							25	0	23.3	23.3	0.382	0.382	
				Front	23230	782.0	1	0	24.3	24.2	0.407	0.416	
							25	0	23.3	23.3	0.326	0.326	
		ON	10	Rear	23230	782.0	1	0	20.3	20.3	0.196	0.196	
							25	0	20.3	20.3	0.191	0.191	
				Front	23230	782.0	1	0	20.3	20.3	0.175	0.175	
							25	0	20.3	20.3	0.172	0.172	
Hotspot	QPSK	OFF	10	Edge 3	23230	782.0	1	0	24.3	24.2	0.409	0.419	
							25	0	23.3	23.3	0.300	0.300	
				Edge 4	23230	782.0	1	0	24.3	24.2	0.569	0.582	9
							25	0	23.3	23.3	0.421	0.421	
		ON	10	Edge 3	23230	782.0	1	0	20.3	20.3	0.161	0.161	
							25	0	20.3	20.3	0.151	0.151	
				Edge 4	23230	782.0	1	0	20.3	20.3	0.201	0.201	
							25	0	20.3	20.3	0.188	0.188	

11.5. Wi-Fi (DTS Band)

Frequency Band	RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
2.4 GHz	Head	802.11b 1 Mbps	0	Left Touch	6	2437.0	15.5	15.1	0.155	0.170	
				Left Tilt	6	2437.0	15.5	15.1	0.114	0.125	
				Right Touch	6	2437.0	15.5	15.1	0.340	0.373	10
				Right Tilt	6	2437.0	15.5	15.1	0.226	0.248	
	Body-worn, Hotspot, & Wi-Fi Direct	802.11b 1 Mbps	10	Rear	6	2437.0	15.5	15.1	0.172	0.189	11
				Front	6	2437.0	15.5	15.1	0.094	0.103	
	Hotspot & Wi-Fi Direct	802.11b 1 Mbps	10	Edge 1	6	2437.0	15.5	15.1	0.109	0.120	
				Edge 4	6	2437.0	15.5	15.1	0.053	0.058	

11.6. Bluetooth

11.6.1. Standalone SAR Test Exclusion Considerations

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:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$, for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- $f_{(\text{GHz})}$ 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.

Body-worn Accessory Exposure Conditions

Max. tune-up tolerance limit		Min. test separation distance (mm)	Frequency (GHz)	Result
(dBm)	(mW)			
9.5	9	10	2.480	1.4

Conclusion:

The computed value is < 3 ; therefore, Bluetooth qualifies for Standalone SAR test exclusion.

11.6.2. Estimated SAR

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:

- $(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f_{(\text{GHz})}/x}]$ 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.

Estimated SAR Result for Body-worn Accessory Conditions:

Test Configuration	Max. tune-up tolerance limit (mW)	Min. test separation distance (mm)	Frequency (GHz)	Estimated 1-g SAR (W/kg)
Rear/Front	9	10	2.480	0.189

12. SAR Measurement Variability

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz v01. 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.

12.1. The Highest Measured SAR Configuration in Each Frequency Band

Frequency Band (MHz)	Air Interface	Head (W/kg)	Body-worn Accessory (W/kg)	Wireless Router (Hotspot) and Wi-Fi Direct (W/kg)	Repeated SAR (Yes/No)
750	LTE Band 13			0.569	No
850	CDMA BC0		0.613		No
1900	CDMA BC1		0.929		Yes
1750	LTE Band 4		1.020		Yes
2400	Wi-Fi 802.11b/g/n	0.340			No

12.2. Repeated Measurement Results

Head

N/A

Body-worn Accessory and Wireless Router (Hotspot)

Frequency band	Test Position	Mode	Ch #.	Freq. (MHz)	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio	Note
					Original	Repeated		
LTE Band 4	Rear	QPSK RB1/0	20300	1745.0	1.020	0.997	1.02	1
CDMA BC1	Rear	1xRTT (RC3 SO32)	1175	1908.8	0.929	0.924	1.01	1

Note(s):

1. 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.

13. Simultaneous Transmission SAR Analysis

13.1. Sum of the SAR for CDMA BC0 & Wi-Fi & BT

RF Exposure conditions	Test Position		Simultaneous Transmission Scenario			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
			① CDMA BC0	② Wi-Fi(DTS)	③ Bluetooth		
Head	Left Touch	① + ②	0.411	0.170		0.581	No
	Left Tilt	① + ②	0.284	0.125		0.409	No
	Right Touch	① + ②	0.554	0.373		0.927	No
	Right Tilt	① + ②	0.276	0.248		0.524	No
Body-w orn Accessory, Hotspot, & W-Fi Direct	Rear	① + ②	0.627	0.189		0.816	No
		① + ③	0.627		0.189	0.816	No
	Front	① + ②	0.478	0.103		0.581	No
		① + ③	0.478		0.189	0.667	No
Hotspot & Wi-Fi Direct	Edge 1	① + ②		0.120		0.120	No
	Edge 2	① + ②	0.495			0.495	No
	Edge 3	① + ②	0.291			0.291	No
	Edge 4	① + ②		0.058		0.058	No

SAR to Peak Location Separation Ratio (SPLSR)

13.2. Sum of the SAR for CDMA BC1 & Wi-Fi & BT

RF Exposure conditions	Test Position		Simultaneous Transmission Scenario			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
			① CDMA BC1	② Wi-Fi(DTS)	③ Bluetooth		
Head	Left Touch	① + ②	0.318	0.170		0.488	No
	Left Tilt	① + ②	0.240	0.125		0.365	No
	Right Touch	① + ②	0.651	0.373		1.024	No
	Right Tilt	① + ②	0.280	0.248		0.528	No
Body-w orn Accessory, Hotspot, & W-Fi Direct	Rear	① + ②	0.951	0.189		1.140	No
		① + ③	0.951		0.189	1.140	No
	Front	① + ②	0.654	0.103		0.757	No
		① + ③	0.654		0.189	0.843	No
Hotspot & Wi-Fi Direct	Edge 1	① + ②		0.120		0.120	No
	Edge 2	① + ②	0.391			0.391	No
	Edge 3	① + ②	0.278			0.278	No
	Edge 4	① + ②		0.058		0.058	No

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

13.3. Sum of the SAR for LTE Band 4 & Wi-Fi & BT

RF Exposure conditions	Test Position		Simultaneous Transmission Scenario			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
			① LTE Band 4	② Wi-Fi(DTS)	③ Bluetooth		
Head	Left Touch	① + ②	0.829	0.170		0.999	No
	Left Tilt	① + ②	0.339	0.125		0.464	No
	Right Touch	① + ②	0.552	0.373		0.925	No
	Right Tilt	① + ②	0.365	0.248		0.613	No
Body-w orn Accessory, Hotspot, & W-Fi Direct	Rear	① + ②	1.020	0.189		1.209	No
		① + ③	1.020		0.189	1.209	No
	Front	① + ②	0.990	0.103		1.093	No
		① + ③	0.990		0.189	1.179	No
Hotspot & Wi-Fi Direct	Edge 1	① + ②		0.120		0.120	No
	Edge 2	① + ②				0.000	No
	Edge 3	① + ②	0.507			0.507	No
	Edge 4	① + ②	0.465	0.058		0.523	No

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

13.4. Sum of the SAR for LTE Band 13 & Wi-Fi & BT

RF Exposure conditions	Test Position		Simultaneous Transmission Scenario			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
			① LTE Band 13	② Wi-Fi(DTS)	③ Bluetooth		
Head	Left Touch	① + ②	0.401	0.170		0.571	No
	Left Tilt	① + ②	0.208	0.125		0.333	No
	Right Touch	① + ②	0.261	0.373		0.634	No
	Right Tilt	① + ②	0.173	0.248		0.421	No
Body-w orn Accessory, Hotspot, & W-Fi Direct	Rear	① + ②	0.489	0.189		0.678	No
		① + ③	0.489		0.189	0.678	No
	Front	① + ②	0.416	0.103		0.519	No
		① + ③	0.416		0.189	0.605	No
Hotspot & Wi-Fi Direct	Edge 1	① + ②		0.120		0.120	No
	Edge 2	① + ②				0.000	No
	Edge 3	① + ②	0.419			0.419	No
	Edge 4	① + ②	0.582	0.058		0.640	No

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

13.5. Sum of the SAR for SV-LTE

13.5.1. CDMA (Maximum Power), LTE (Power Reduction), Wi-Fi 2.4GHz Band, & BT

RF Exposure Conditions	Test Position	Voice (Maximum Power)		Data (Reduced Power)		Data		Σ 1-g SAR (W/kg)	SPLSR (Yes/ No)	
		CDMA BC0	CDMA BC1	LTE Band 4	LTE Band 13	WiFi DTS Band	Bluetooth			
Head	Left Touch	0.411		0.371		0.170		0.952	No	
		0.411			0.191	0.170		0.772	No	
			0.318	0.371		0.170		0.859	No	
			0.318		0.191	0.170		0.679	No	
	Left Tilt	0.284		0.145		0.125		0.554	No	
		0.284			0.100	0.125		0.509	No	
			0.240	0.145		0.125		0.510	No	
	Right Touch		0.240		0.100	0.125		0.465	No	
		0.554		0.261		0.373		1.188	No	
		0.554			0.132	0.373		1.059	No	
	Right Tilt		0.651	0.261		0.373		1.285	No	
			0.651		0.132	0.373		1.156	No	
		0.276		0.147		0.248		0.671	No	
		0.276			0.084	0.248		0.608	No	
	Body-worn, Hotspot, & Wi-Fi Direct	Rear		0.280	0.147		0.248		0.675	No
				0.280		0.084	0.248		0.612	No
0.627				0.445		0.189		1.261	No	
0.627				0.445			0.189	1.261	No	
0.627					0.196	0.189		1.012	No	
0.627					0.196		0.189	1.012	No	
			0.951	0.445		0.189		1.585	No	
			0.951	0.445			0.189	1.585	No	
Front			0.951		0.196	0.189		1.336	No	
			0.951		0.196		0.189	1.336	No	
		0.478		0.443		0.103		1.024	No	
		0.478		0.443			0.189	1.110	No	
	0.478			0.175	0.103		0.756	No		
	0.478			0.175		0.189	0.842	No		
		0.654	0.443		0.103		1.200	No		
		0.654	0.443			0.189	1.286	No		
Hotspot & Wi-Fi Direct	Edge 1					0.120		0.120	No	
		0.495						0.495	No	
	Edge 2		0.391					0.391	No	
		0.291		0.153				0.444	No	
	Edge 3	0.291			0.161			0.452	No	
			0.278	0.153				0.431	No	
			0.278		0.161			0.439	No	
	Edge 4			0.204		0.058		0.262	No	
					0.201	0.058		0.259	No	

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

13.5.2. CDMA (Power Reduction), LTE (Max Power), Wi-Fi 2.4GHz Band, & BT

RF Exposure Conditions	Test Position	Voice (Reduced Power)		Data (Maximum Power)		Data		Σ 1-g SAR (W/kg)	SPLSR (Yes/ No)
		CDMA BC0	CDMA BC1	LTE Band 4	LTE Band 13	WiFi DTS Band	Bluetooth		
Head	Left Touch	0.082		0.829		0.170		1.081	No
		0.082			0.401	0.170		0.653	No
			0.112	0.829		0.170		1.111	No
			0.112		0.401	0.170		0.683	No
	Left Tilt	0.069		0.339		0.125		0.533	No
		0.069			0.208	0.125		0.402	No
			0.075	0.339		0.125		0.539	No
			0.075		0.208	0.125		0.408	No
	Right Touch	0.121		0.552		0.373		1.046	No
		0.121			0.261	0.373		0.755	No
			0.164	0.552		0.373		1.089	No
			0.164		0.261	0.373		0.798	No
	Right Tilt	0.071		0.365		0.248		0.684	No
		0.071			0.173	0.248		0.492	No
			0.086	0.365		0.248		0.699	No
			0.086		0.173	0.248		0.507	No
Body-worn, Hotspot, & Wi-Fi Direct	Rear	0.177		1.020		0.189		1.386	No
		0.177		1.020			0.189	1.386	No
		0.177			0.489	0.189		0.855	No
		0.177			0.489		0.189	0.855	No
			0.237	1.020		0.189		1.446	No
			0.237	1.020			0.189	1.446	No
			0.237		0.489	0.189		0.915	No
			0.237		0.489		0.189	0.915	No
	Front	0.120		0.990		0.103		1.213	No
		0.120		0.990			0.189	1.299	No
		0.120			0.416	0.103		0.639	No
		0.120			0.416		0.189	0.725	No
			0.171	0.990		0.103		1.264	No
			0.171	0.990			0.189	1.350	No
			0.171		0.416	0.103		0.690	No
			0.171		0.416		0.189	0.776	No
Hotspot & Wi-Fi Direct	Edge 1					0.120		0.120	No
	Edge 2	0.153						0.153	No
			0.083					0.083	No
	Edge 3	0.074		0.507				0.581	No
		0.074			0.419			0.493	No
			0.065	0.507				0.572	No
	Edge 4		0.065		0.419			0.484	No
				0.465		0.058		0.523	No
					0.582	0.058		0.640	No
				0.465				0.465	No
			0.582				0.582	No	

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

14. Appendixes

Refer to separated files for the following appendixes.

- 14.1. Photos and Antenna Locations**
- 14.2. System Performance Check Plots**
- 14.3. Highest SAR Test Plots**
- 14.4. Calibration Certificate for E-Field Probe EX3DV4 - SN 3902**
- 14.5. Calibration Certificate for E-Field Probe EX3DV4 - SN 3531**
- 14.6. Calibration Certificate for E-Field Probe EX3DV3 - SN 3991**
- 14.7. Calibration Certificate for D750V3 - SN 1071**
- 14.8. Calibration Certificate for D835V2 - SN 4d002**
- 14.9. Calibration Certificate for D835V2 - SN 4d142**
- 14.10. Calibration Certificate for D1750V2 - SN 1077**
- 14.11. Calibration Certificate for D1900V2- SN 5d043**
- 14.12. Calibration Certificate for D1900V2- SN 5d163**
- 14.13. Calibration Certificate for D2450V2 - SN 899**

END OF REPORT