



**SAR EVALUATION REPORT**

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

*For*  
**GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC**

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NVLAP LAB CODE 200065-0

**Revision History**

Rev.	Date	Revisions	Revised By
V1	3/8/2018	Initial Issue	--
V2	3/26/2018	Sec. 6.2.: Updated LTE release. Sec. 9.1.: Updated. Sec. 9.6.: Corrected typo. Updated Appendix A.	Devin Chang

## Table of Contents

<b>1.</b>	<b>Attestation of Test Results .....</b>	<b>5</b>
<b>2.</b>	<b>Test Specification, Methods and Procedures.....</b>	<b>6</b>
<b>3.</b>	<b>Facilities and Accreditation.....</b>	<b>6</b>
<b>4.</b>	<b>SAR Measurement System &amp; Test Equipment .....</b>	<b>7</b>
4.1.	<i>SAR Measurement System.....</i>	7
4.2.	<i>SAR Scan Procedures.....</i>	8
4.3.	<i>Test Equipment.....</i>	10
<b>5.</b>	<b>Measurement Uncertainty.....</b>	<b>12</b>
<b>6.</b>	<b>Device Under Test (DUT) Information .....</b>	<b>13</b>
6.1.	<i>DUT Description .....</i>	13
6.2.	<i>Wireless Technologies.....</i>	14
6.3.	<i>General LTE SAR Test and Reporting Considerations.....</i>	15
6.4.	<i>LTE (TDD) Considerations.....</i>	17
<b>7.</b>	<b>RF Exposure Conditions (Test Configurations).....</b>	<b>18</b>
<b>8.</b>	<b>Dielectric Property Measurements &amp; System Check .....</b>	<b>19</b>
8.1.	<i>Dielectric Property Measurements .....</i>	19
8.2.	<i>System Check.....</i>	22
<b>9.</b>	<b>Conducted Output Power Measurements.....</b>	<b>24</b>
9.1.	<i>GSM .....</i>	24
9.2.	<i>W-CDMA .....</i>	28
9.3.	<i>LTE.....</i>	33
9.4.	<i>LTE Carrier Aggregation .....</i>	46
9.5.	<i>Wi-Fi 2.4GHz (DTS Band) .....</i>	46
9.6.	<i>Wi-Fi 5GHz (U-NII Bands).....</i>	47
9.7.	<i>Bluetooth .....</i>	49
<b>10.</b>	<b>Measured and Reported (Scaled) SAR Results.....</b>	<b>50</b>
10.1.	<i>GSM850.....</i>	52
10.2.	<i>GSM1900.....</i>	52
10.3.	<i>W-CDMA Band II.....</i>	53
10.4.	<i>W-CDMA Band IV .....</i>	53
10.5.	<i>W-CDMA Band V .....</i>	54
10.6.	<i>LTE Band 4 (20MHz Bandwidth) .....</i>	54
10.7.	<i>LTE Band 5 (10MHz Bandwidth) .....</i>	55



10.8.	<i>LTE Band 7 (20MHz Bandwidth)</i> .....	56
10.9.	<i>LTE Band 13 (10MHz Bandwidth)</i> .....	57
10.10.	<i>LTE Band 17 (10MHz Bandwidth)</i> .....	58
10.11.	<i>LTE Band 41 (20MHz Bandwidth)</i> .....	59
10.12.	<i>Wi-Fi (DTS Band)</i> .....	60
10.13.	<i>Wi-Fi (U-NII Band)</i> .....	61
10.14.	<i>Bluetooth</i> .....	62
<b>11.</b>	<b>SAR Measurement Variability</b> .....	<b>63</b>
<b>12.</b>	<b>Simultaneous Transmission SAR Analysis</b> .....	<b>64</b>
12.1.	<i>Sum of the SAR for WWAN &amp; Wi-Fi &amp; BT</i> .....	65
<b>Appendixes</b>	.....	<b>66</b>
	<i>12132730-S1V1 Appendix A: SAR Setup Photos</i> .....	66
	<i>12132730-S1V1 Appendix B: SAR System Check Plots</i> .....	66
	<i>12132730-S1V1 Appendix C: Highest SAR Test Plots</i> .....	66
	<i>12132730-S1V1 Appendix D: SAR Liquid Tissue Ingredients</i> .....	66
	<i>12132730-S1V1 Appendix E: SAR Probe Calibration Certificates</i> .....	66
	<i>12132730-S1V1 Appendix F: SAR Dipole Calibration Certificates</i> .....	66

# 1. Attestation of Test Results

Applicant Name	SONY MOBILE COMMUNICATIONS INC.			
FCC ID	PY7-43153F			
Applicable Standards	FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013			
Exposure Category	SAR Limits (W/Kg)			
	Peak spatial-average (1g of tissue)		Product specific (10g of tissue)	
General population / Uncontrolled exposure	1.6		4	
RF Exposure Conditions	Equipment Class - Highest Reported SAR (W/kg)			
	PCE	DTS	NII	DSS
Head	0.301	0.409	0.521	0.275
Body-worn	0.232	0.034	0.049	0.021
Hotspot/Wi-Fi Direct	0.814	0.104	N/A	0.046
Product specific 10g SAR	N/A	N/A	0.275	N/A
Simultaneous TX	1.068	0.934	1.068	1.068
Date Tested	2/21/2018 to 3/7/2018			
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 Test Engineer UL Verification Services Inc.	Kenneth C. Mak Test 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 v02r02
- 447498 D01 General RF Exposure Guidance v06
- 447498 D03 Supplement C Cross-Reference v01
- 648474 D04 Handset SAR v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02
- 941225 D01 3G SAR Procedures v03r01
- 941225 D05 SAR for LTE Devices v02r05
- 941225 D05A LTE Rel.10 KDB Inquiry Sheet v01r02
- 941225 D06 Hotspot Mode v02r01

In addition to the above, the following information was used:

- [TCB workshop](#) October, 2014; Page 36, RF Exposure Procedures Update (Overlapping LTE Bands)
- [TCB workshop](#) October, 2014; Page 37, RF Exposure Procedures Update (Other LTE Considerations)
- [TCB workshop](#) October, 2015; Page 6, RF Exposure Procedures (KDB 941225 D05A)
- [TCB workshop](#) April, 2016; Page 13, RF Exposure Procedures (LTE Carrier Aggregation for DL)
- [TCB workshop](#) October, 2016; Page 7, RF Exposure Procedures (Bluetooth Duty Factor)

## 3. Facilities and Accreditation

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

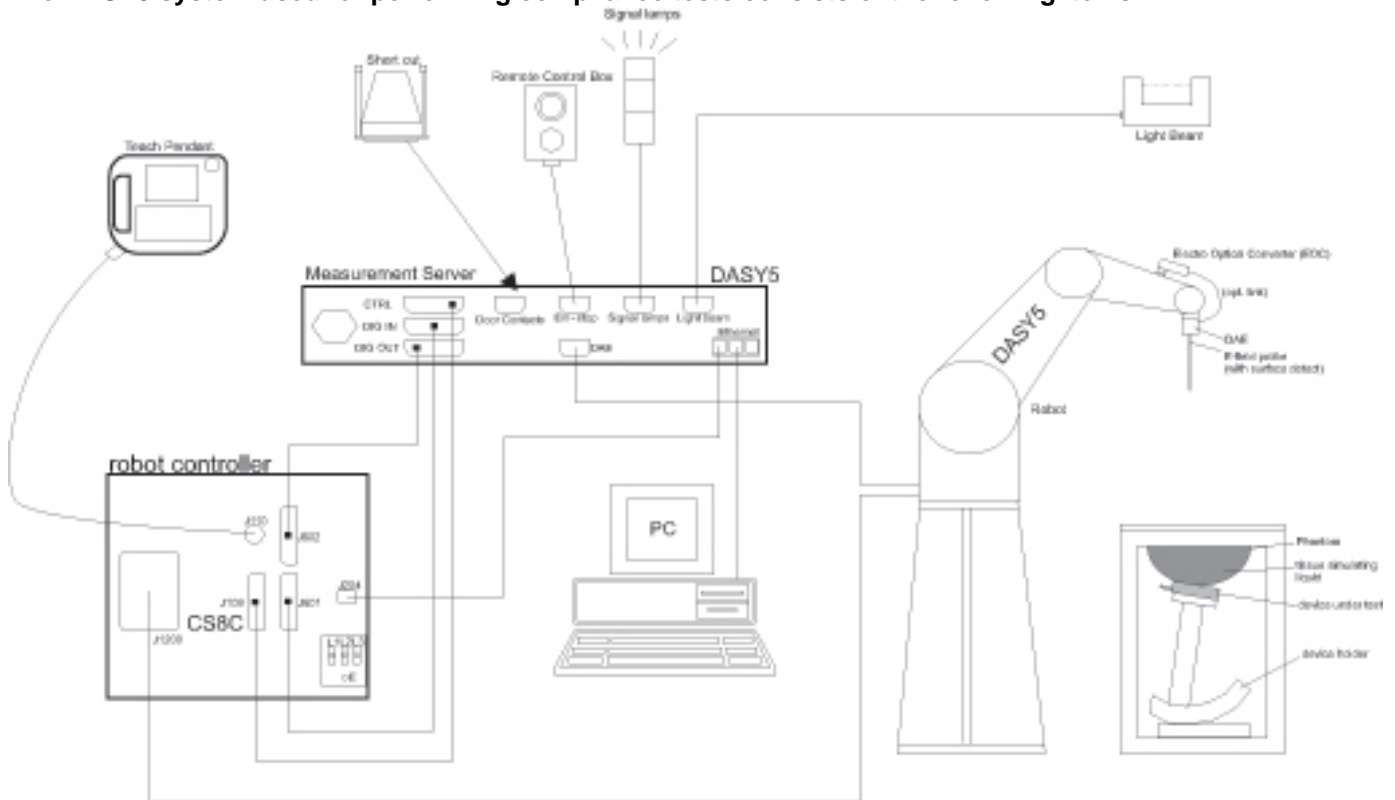
47173 Benicia Street	47266 Benicia Street
SAR Lab A	SAR Lab 1
SAR Lab B	SAR Lab 2
SAR Lab C	SAR Lab 3
SAR Lab D	SAR Lab 4
SAR Lab E	
SAR Lab F	
SAR Lab G	
SAR Lab H	

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

	$\leq 3$ GHz	$> 3$ GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	$5 \pm 1$ mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{Area}$ , $\Delta y_{Area}$	$\leq 2$ GHz: $\leq 15$ mm $2 - 3$ GHz: $\leq 12$ mm	$3 - 4$ GHz: $\leq 12$ mm $4 - 6$ GHz: $\leq 10$ mm
	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 $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	



**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

		$\leq 3$ GHz	$> 3$ GHz	
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}, \Delta y_{Zoom}$		$\leq 2$ GHz: $\leq 8$ mm 2 – 3 GHz: $\leq 5$ mm*	3 – 4 GHz: $\leq 5$ mm* 4 – 6 GHz: $\leq 4$ mm*	
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	$\leq 5$ mm	3 – 4 GHz: $\leq 4$ mm 4 – 5 GHz: $\leq 3$ mm 5 – 6 GHz: $\leq 2$ mm	
	graded grid	$\Delta z_{Zoom}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface	$\leq 4$ mm	3 – 4 GHz: $\leq 3$ mm 4 – 5 GHz: $\leq 2.5$ mm 5 – 6 GHz: $\leq 2$ mm
		$\Delta z_{Zoom}(n>1)$ : between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	$\geq 30$ mm	3 – 4 GHz: $\geq 28$ mm 4 – 5 GHz: $\geq 25$ mm 5 – 6 GHz: $\geq 22$ mm	
Note: $\delta$ 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 <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is $\leq 1.4$ W/kg, $\leq 8$ mm, $\leq 7$ mm and $\leq 5$ 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	8753ES	MY40001647	9/15/2018
Dielectric Probe kit	SPEAG	DAK-3.5	1087	11/14/2018
Shorting block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	11/14/2018
Thermometer	Traceable Calibration Control Co.	4242	150378159	5/26/2018

#### System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Synthesized Signal Generator	Agilent	N5181A	MY50140610	5/31/2018
Power Meter	Keysight	N1912A	MY55196008	5/12/2018
Power Sensor	Agilent	N1921A	MY53260001	10/27/2018
Power Sensor	Agilent	N1921A	MY53020038	4/13/2018
DC Power Supply	HP	6296A	2841A-05955	N/A
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1795093	N/A
Directional coupler	Werlatone	C8060-102	2149	N/A
Synthesized Signal Generator	Agilent	N5181A	MY50140630	5/16/2018
Power Meter	HP	437B	3125U12345	8/10/2018
Power Meter	HP	437B	3125U11347	8/15/2018
Power Sensor	HP	8481A	3318A92374	8/15/2018
Power Sensor	HP	8481A	1926A27048	8/10/2018
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1795092	N/A
Directional coupler	Werlatone	C8060-102	2141	N/A
DC Power Supply	BK Precision	1611	215-02292	N/A

**Lab Equipment**

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
E-Field Probe (SAR Lab A)	SPEAG	EX3DV4	7463	7/5/2018
E-Field Probe (SAR Lab B)	SPEAG	EX3DV4	7335	3/15/2018
E-Field Probe (SAR Lab B)	SPEAG	EX3DV4	3772	2/13/2019
E-Field Probe (SAR Lab D)	SPEAG	EX3DV4	7356	4/21/2018
E-Field Probe (SAR Lab E)	SPEAG	EX3DV4	3989	1/16/2019
E-Field Probe (SAR Lab F)	SPEAG	EX3DV4	3773	4/21/2018
E-Field Probe (SAR Lab G)	SPEAG	EX3DV4	3871	8/23/2018
E-Field Probe (SAR Lab H)	SPEAG	EX3DV4	7483	12/12/2018
Data Acquisition Electronics (SAR Lab A)	SPEAG	DAE4	1434	4/19/2018
Data Acquisition Electronics (SAR Lab B)	SPEAG	DAE4	1380	7/24/2018
Data Acquisition Electronics (SAR Lab D)	SPEAG	DAE4	1352	11/8/2018
Data Acquisition Electronics (SAR Lab E)	SPEAG	DAE4	1259	1/10/2019
Data Acquisition Electronics (SAR Lab F)	SPEAG	DAE4	1377	10/11/2018
Data Acquisition Electronics (SAR Lab G)	SPEAG	DAE4	1472	3/10/2018
Data Acquisition Electronics (SAR Lab G)	SPEAG	DAE4	1359	2/9/2019
Data Acquisition Electronics (SAR Lab H)	SPEAG	DAE4	1257	10/11/2018
System Validation Dipole	SPEAG	D750V3	1019	3/13/2018
System Validation Dipole	SPEAG	D835V2	4d002	11/21/2018
System Validation Dipole	SPEAG	D835V2	4d117	5/22/2018
System Validation Dipole	SPEAG	D1750V2	1050	4/18/2018
System Validation Dipole	SPEAG	D1900V2	5d140	4/19/2018
System Validation Dipole	SPEAG	D1900V2	5d163	10/5/2018
System Validation Dipole	SPEAG	D2450V2	748	2/14/2019
System Validation Dipole	SPEAG	D2600V2	1006	10/5/2018
System Validation Dipole	SPEAG	D5GHzV2	1168	11/23/2018

**Other**

Name of Equipment	Manufacturer	Type/Model	T Number	Serial No.	Cal. Due Date
Power Meter	Keysight	N1912A	T1273	MY55196007	7/17/2018
Power Meter	Keysight	N1912A	T1263	MY55196004	7/14/2018
Power Meter	Agilent	N1912A	T733	MY50001008	10/17/2018
Power Sensor	Agilent	N1921A	T751	MY53260010	10/17/2018
Power Sensor	Agilent	N1921A	T748	MY53020038	4/13/2018
DC Power Supply	HP	6296A	N/A	2841A-05955	N/A
Base station Simulator	R&S	CMW500	T978	137877	2/19/2019
Base station Simulator	R&S	CMW500	T960	135384	2/20/2019
Base station Simulator	R&S	CMW500	T948	135393	2/17/2019
Base station Simulator	R&S	CMW500	T958	134855	2/15/2019
Base station Simulator	R&S	CMW500	T259	124594	2/21/2019
Base station Simulator	R&S	CMW500	T1526	147543	2/17/2019
Base station Simulator	R&S	CMW500	T964	134853	2/16/2019
Base station Simulator	R&S	CMW500	T268	124593	2/22/2019
Base station Simulator	R&S	CMW500	T953	135390	2/16/2019
Base station Simulator	R&S	CMW500	T959	137873	2/17/2019
Base station Simulator	R&S	CMW500	T919	125236	2/21/2019
Base station Simulator*	Agilent	E5515C	T213	GB47050526	2/21/2018

**Note(s):**

\*Equipment not used past calibration due date.

## 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 and the measured 10-g SAR within a frequency band is  $< 3.75$  W/kg. The expanded SAR measurement uncertainty must be  $\leq 30\%$ , for a confidence interval of  $k = 2$ . If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.

## 6. Device Under Test (DUT) Information

### 6.1. DUT Description

Device Dimension	Please refer to Appendix A		
Back Cover	<input checked="" type="checkbox"/> The Back Cover is not removable.		
Battery Options	<input checked="" type="checkbox"/> The rechargeable battery is not user accessible.		
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)		
Test sample information	<b>S/N</b>	<b>Technology</b>	<b>Notes</b>
	BH9000EZBN	FCC SAR GSM/UMTS	Conducted
	BH900085BN	FCC SAR LTE LB/MB	Conducted
	BH9000FMBN	FCC SAR LTE HB	Conducted
	BH90009HBN	WLAN 2.4GHz	Conducted
	BH900089BN	WLAN 5GHz	Conducted
	BH900037BN	FCC SAR MB GSM/UMTS #1	Radiated
	BH90002NBN	FCC SAR MB GSM/UMTS #2	Radiated
	BH90001LBQ	FCC SAR LB GSM/UMTS #1	Radiated
	BH90002ZB2	FCC SAR LB GSM/UMTS #2	Radiated
	BH90002GBQ	FCC SAR LTE LB # 1	Radiated
	BH90004ABN	FCC SAR LTE LB # 2	Radiated
	BH9000DABN	FCC SAR LTE MB # 1	Radiated
	BH900077BN	FCC SAR LTE MB # 2	Radiated
	BH90004HBN	FCC SAR LTE HB # 1	Radiated
	BH90005BBN	FCC SAR LTE HB # 2	Radiated
	BH90003DBN	SAR WLAN 2.4GHz # 1	Radiated
	BH90004WBN	SAR WLAN 2.4GHz # 2	Radiated
	BH90006JBN	SAR WLAN 2.4GHz # 3	Radiated
	BH900046BQ	SAR WLAN 2.4GHz # 4	Radiated
BH9000HHBN	SAR WLAN 5GHz # 1	Radiated	
BH90004LBN	SAR WLAN 5GHz # 2	Radiated	
BH90004QBN	SAR WLAN 5GHz # 3	Radiated	
BH90006UBN	SAR WLAN 5GHz # 4	Radiated	
Hardware Version	A		
Software Version	0.123		

## 6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode		Duty Cycle used for SAR testing
GSM	850 1900	Voice (GMSK) GPRS (GMSK) EGPRS (8PSK)	Multi-Slot Class: <input type="checkbox"/> Class 8 - 1 Up, 4 Down <input type="checkbox"/> Class 10 - 2 Up, 4 Down <input type="checkbox"/> Class 12 - 4 Up, 4 Down <input checked="" type="checkbox"/> Class 33 - 4 Up, 5 Down	GSM Voice: 12.5% (E)GPRS: 1 Slot: 12.5% 2 Slots: 25% 3 Slots: 37.5% 4 Slots: 50%
W-CDMA (UMTS)	Band II Band IV Band V	UMTS Rel. 99 (Voice & Data) HSDPA (Rel. 5) HSUPA (Rel. 6) HSPA+ (Rel. 9)		100%
LTE	FDD Band 4 FDD Band 5 FDD Band 7 FDD Band 13 FDD Band 17 TDD Band 41	QPSK 16QAM 64AQAM Rel. 12 Carrier Aggregation (1 Uplink and 2 Downlinks)		100% (FDD) 63.3% (TDD) <sup>2</sup> Refer to §6.4.
Wi-Fi	2.4 GHz	802.11b		99.35% <sub>(802.11b)</sub> <sup>1</sup>
		802.11g		98.11% <sub>(802.11g)</sub> <sup>1</sup>
	802.11n (HT20)		97.70% <sub>(802.11n)</sub> <sup>1</sup>	
	5 GHz	802.11a		98.16% <sub>(802.11a)</sub> <sup>1</sup>
802.11n (HT20)		97.93% <sub>(802.11n HT20)</sub> <sup>1</sup>		
802.11n (HT40)		93.47% <sub>(802.11n HT40)</sub> <sup>1</sup>		
802.11ac (VHT20)		88.44% <sub>(802.11ac VHT20)</sub> <sup>1</sup>		
802.11ac (VHT40)				
802.11ac (VHT80)				
Does this device support bands 5.60 ~ 5.65 GHz? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
Does this device support Band gap channel(s)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
Bluetooth	2.4 GHz	Version 5.0 LE		76.88%(DH5)

**Notes:**

- Duty cycle for Wi-Fi is referenced from the DTS and UNII report.
- This device supports uplink-downlink configuration 0-6. The configuration with the highest duty cycle was used (Subframe Number 0 at 63.3%).

### 6.3. General LTE SAR Test and Reporting Considerations

Item	Description						
Frequency range, Channel Bandwidth, Numbers and Frequencies	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	19965/ 1711.5	19957/ 1710.7
	Mid	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5
	High	20300/ 1745	20325/ 1747.5	20350/ 1750	20375/ 1752.5	20385/ 1753.5	20393/ 1754.3
	Band 5	Frequency range: 824 - 849 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low			20450/ 829	20425/ 826.5	20415/ 825.5	20407/ 824.7
	Mid			20525/ 836.5	20525/ 836.5	20525/ 836.5	20525/ 836.5
	High			20600/ 844	20625/ 846.5	20635/ 847.5	20643/ 848.3
	Band 7	Frequency range: 2500 - 2570 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	20850 2510	20825 2507.5	20800 2505	20775 2502.5		
	Mid	21100 2535	21100 2535	21100 2535	21100 2535		
	High	21350 2560	21375 2562.5	21400 2565	21425 2567.5		
	Band 13	Frequency range: 777 - 787 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low				23205/ 779.5		
	Mid			23230/ 782	23230/ 782		
	High				23255/ 784.5		
	Band 17	Frequency range: 704 - 716 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low			23780/ 709	23755/ 706.5		
Mid			23790/ 710	23790/ 710			
High			23800/ 711	23825/ 713.5			
Band 41	Frequency range: 2496 - 2690 MHz						
	Channel Bandwidth						
	20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz	
Low	39750 / 2506.0						
Low-Mid	40185 / 2549.5						
Mid	40620 / 2593.0						
Mid-High	41055 / 2636.5						
High	41490 / 2680.0						

**General LTE SAR Test and Reporting Considerations (Continued)**

LTE transmitter and antenna implementation	Refer to Appendix A.																																																														
Maximum power reduction (MPR)	<p style="text-align: center;"><b>Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Modulation</th> <th colspan="6">Channel bandwidth / Transmission bandwidth (N<sub>RB</sub>)</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>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 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>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 18</td> <td>≤ 3</td> </tr> <tr> <td>256 QAM</td> <td colspan="6" style="text-align: center;">≥ 1</td> <td>≤ 5</td> </tr> </tbody> </table> <p>MPR Built-in by design                      The manufacturer MPR values are always within the 3GPP maximum MPR allowance but may not follow the default MPR values.                      A-MPR (additional MPR) was disabled during SAR testing</p>	Modulation	Channel bandwidth / Transmission bandwidth (N <sub>RB</sub> )						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	64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2	64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3	256 QAM	≥ 1						≤ 5
Modulation	Channel bandwidth / Transmission bandwidth (N <sub>RB</sub> )						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																																																								
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2																																																								
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3																																																								
256 QAM	≥ 1						≤ 5																																																								
Power reduction	No																																																														
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.																																																														

**Notes:**

- SAR Testing for LTE was performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).



### 6.4. LTE (TDD) Considerations

According to KDB 941225 D05 SAR for LTE Devices, for Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.

LTE TDD Bands support 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations and Table 4.2-1 for Special subframe configurations.

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS).

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$		
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-		
9	$13168 \cdot T_s$			-		

#### Calculated Duty Cycle

Uplink-Downlink Configuration	Downlink-to-Uplink Switch-point Periodicity	Subframe Number										Calculated Duty Cycle (%)
		0	1	2	3	4	5	6	7	8	9	
0	5 ms	D	S	U	U	U	D	S	U	U	U	63.33
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.33
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.33
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.67
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.67
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.67
6	5 ms	D	S	U	U	U	D	S	U	U	D	53.33

Calculated Duty Cycle = Extended cyclic prefix in uplink x ( $T_s$ ) x # of S + # of U

Example for Calculated Duty Cycle for Uplink-Downlink Configuration 0:

Calculated Duty Cycle =  $5120 \times [1/(15000 \times 2048)] \times 2 + 6 \text{ ms} = 63.33\%$

where

$T_s = 1/(15000 \times 2048)$  seconds

#### Note(s):

This device supports uplink-downlink configurations 0-6. The configuration with highest duty cycle was used for SAR Testing: configuration 0 at 63.3% duty cycle and Special Subframe 7.

### 7. RF Exposure Conditions (Test Configurations)

Refer to Appendix A 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	
WWAN Main Ant. 1 & 2	Head	0 mm	Left Touch	N/A	Yes	
			Left Tilt (15°)	N/A	Yes	
			Right Touch	N/A	Yes	
			Right Tilt (15°)	N/A	Yes	
	Body	15 mm	Rear	N/A	Yes	
			Front	N/A	Yes	
	Hotspot	10 mm	Rear	< 25 mm	Yes	
			Front	< 25 mm	Yes	
			Edge 1 (Top)	> 25 mm	No	
			Edge 2 (Right)	< 25 mm	Yes	
			Edge 3 (Bottom)	< 25 mm	Yes	
			Edge 4 (Left)	< 25 mm	Yes	
WLAN/BT (Chain 0)	Head	0 mm	Left Touch	N/A	Yes	
			Left Tilt (15°)	N/A	Yes	
			Right Touch	N/A	Yes	
			Right Tilt (15°)	N/A	Yes	
	Body	15 mm	Rear	N/A	Yes	
			Front	N/A	Yes	
	Hotspot / Wi-Fi Direct (2.4 GHz only)	10 mm	Rear	< 25 mm	Yes	
			Front	< 25 mm	Yes	
			Edge 1 (Top)	< 25 mm	Yes	
			Edge 2 (Right)	> 25 mm	No	
			Edge 3 (Bottom)	> 25 mm	No	
			Edge 4 (Left)	< 25 mm	Yes	
	Product specific (5 GHz bands only)	0 mm	Rear	< 25 mm	Yes	
			Front	< 25 mm	Yes	
			Edge 1 (Top)	< 25 mm	Yes	
			Edge 2 (Right)	> 25 mm	No	
			Edge 3 (Bottom)	> 25 mm	No	
			Edge 4 (Left)	< 25 mm	Yes	
	WLAN (Chain 1)	Head	0 mm	Left Touch	N/A	Yes
				Left Tilt (15°)	N/A	Yes
Right Touch				N/A	Yes	
Right Tilt (15°)				N/A	Yes	
Body		15 mm	Rear	N/A	Yes	
			Front	N/A	Yes	
Hotspot / Wi-Fi Direct (2.4 GHz only)		10 mm	Rear	< 25 mm	Yes	
			Front	< 25 mm	Yes	
			Edge 1 (Top)	> 25 mm	No	
			Edge 2 (Right)	< 25 mm	Yes	
			Edge 3 (Bottom)	> 25 mm	No	
			Edge 4 (Left)	> 25 mm	No	
Product specific (5 GHz bands only)		0 mm	Rear	< 25 mm	Yes	
			Front	< 25 mm	Yes	
			Edge 1 (Top)	> 25 mm	No	
			Edge 2 (Right)	< 25 mm	Yes	
	Edge 3 (Bottom)		> 25 mm	No		
	Edge 4 (Left)		> 25 mm	No		

**Notes:**

- SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR.
- When Hotspot Mode is not supported, 10-g Extremity SAR is required for all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions.
- When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.
- The WWAN Sub Antenna does not support FCC bands.

## 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  $\pm 2^\circ\text{C}$  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.

The dielectric constant ( $\epsilon_r$ ) and conductivity ( $\sigma$ ) of typical tissue-equivalent media recipes are expected to be within  $\pm 5\%$  of the required target values; but for SAR measurement systems that have implemented the SAR error compensation algorithms documented in IEEE Std 1528-2013, to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, the tolerance for  $\epsilon_r$  and  $\sigma$  may be relaxed to  $\pm 10\%$ . This is limited to frequencies  $\leq 3$  GHz.

#### Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

Target Frequency (MHz)	Head		Body	
	$\epsilon_r$	$\sigma$ (S/m)	$\epsilon_r$	$\sigma$ (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	Date	Band (MHz)	Tissue Type	Frequency (MHz)	Relative Permittivity ( $\epsilon_r$ )			Conductivity ( $\sigma$ )		
					Measured	Target	Delta (%)	Measured	Target	Delta (%)
A	2/22/2018	835	Head	835	40.82	41.50	-1.64	0.90	0.90	0.02
				805	41.18	41.68	-1.20	0.87	0.90	-3.02
				915	39.79	41.50	-4.12	0.97	0.98	-0.70
A	2/22/2018	835	Body	835	53.00	55.20	-3.99	1.00	0.97	3.51
				805	53.34	55.33	-3.60	0.96	0.97	-0.27
				905	52.27	55.00	-4.96	1.07	1.05	1.38
A	2/26/2018	835	Head	835	41.91	41.50	0.99	0.90	0.90	-0.32
				805	42.28	41.68	1.44	0.87	0.90	-2.94
				915	40.97	41.50	-1.28	0.97	0.98	-1.08
A	2/26/2018	835	Body	835	54.19	55.20	-1.83	0.99	0.97	2.21
				805	54.42	55.33	-1.65	0.96	0.97	-0.82
				905	53.48	55.00	-2.76	1.06	1.05	0.81
A	2/28/2018	2600	Body	2600	52.48	52.51	-0.06	2.15	2.16	-0.41
				2495	52.73	52.64	0.16	2.02	2.01	0.19
				2690	52.22	52.40	-0.34	2.26	2.29	-1.02
B	2/21/2018	1750	Head	1750	40.05	40.08	-0.09	1.33	1.37	-2.63
				1710	40.23	40.15	0.21	1.30	1.35	-3.82
				1800	39.89	40.00	-0.27	1.38	1.40	-1.29
B	2/26/2018	1900	Head	1900	40.00	40.00	0.00	1.47	1.40	4.79
				1850	40.23	40.00	0.57	1.43	1.40	1.79
				1980	39.72	40.00	-0.70	1.54	1.40	9.86
B	2/26/2018	1750	Head	1750	40.61	40.08	1.31	1.33	1.37	-2.85
				1710	40.72	40.15	1.43	1.30	1.35	-3.45
				1800	40.36	40.00	0.90	1.38	1.40	-1.21
B	2/26/2018	1750	Body	1750	53.98	53.44	1.01	1.52	1.49	2.48
				1710	54.06	53.54	0.96	1.50	1.46	2.70
				1755	53.95	53.43	0.98	1.52	1.49	2.27
B	3/1/2018	1900	Head	1900	40.52	40.00	1.30	1.44	1.40	2.57
				1850	40.64	40.00	1.60	1.38	1.40	-1.21
				1920	40.40	40.00	1.00	1.45	1.40	3.79
B	3/1/2018	1900	Body	1900	51.70	53.30	-3.00	1.51	1.52	-0.66
				1850	51.73	53.30	-2.95	1.46	1.52	-4.28
				1920	51.55	53.30	-3.28	1.53	1.52	0.39
B	3/5/2018	1900	Head	1900	40.21	40.00	0.53	1.45	1.40	3.29
				1880	40.27	40.00	0.68	1.43	1.40	2.14
				1920	40.18	40.00	0.45	1.47	1.40	4.64
B	3/7/2018	1900	Body	1900	52.46	53.30	-1.58	1.56	1.52	2.70
				1850	52.55	53.30	-1.41	1.52	1.52	-0.07
				1920	52.39	53.30	-1.71	1.57	1.52	3.49

SAR Lab	Date	Band (MHz)	Tissue Type	Frequency (MHz)	Relative Permittivity ( $\epsilon_r$ )			Conductivity ( $\sigma$ )		
					Measured	Target	Delta (%)	Measured	Target	Delta (%)
D	2/26/2018	750	Head	750	40.42	41.96	-3.67	0.90	0.89	0.80
				695	41.10	42.24	-2.71	0.85	0.89	-4.85
				790	39.81	41.76	-4.66	0.94	0.90	4.33
D	2/28/2018	750	Body	750	57.63	55.55	3.75	0.93	0.96	-3.77
				695	57.99	55.76	4.00	0.87	0.96	-9.30
				790	57.38	55.39	3.59	0.97	0.97	-0.04
D	3/1/2018	750	Body	750	57.45	55.55	3.43	0.97	0.96	0.54
				695	58.00	55.76	4.02	0.92	0.96	-3.87
				790	57.23	55.39	3.32	1.00	0.97	3.48
E	2/27/2018	2600	Head	2600	39.44	39.01	1.10	2.04	1.96	4.02
				2495	39.86	39.14	1.83	1.92	1.85	4.08
				2690	39.11	38.90	0.55	2.14	2.06	3.86
E	3/5/2018	2600	Head	2600	40.14	39.01	2.89	2.02	1.96	2.90
				2495	40.46	39.14	3.36	1.91	1.85	3.05
				2690	39.80	38.90	2.32	2.12	2.06	3.04
F	2/26/2018	2450	Head	2450	39.80	39.20	1.53	1.87	1.80	3.83
				2400	39.98	39.30	1.74	1.79	1.75	1.90
				2480	39.71	39.16	1.40	1.90	1.83	3.41
F	2/27/2018	2450	Body	2450	52.12	52.70	-1.10	1.90	1.95	-2.82
				2400	52.33	52.77	-0.84	1.84	1.90	-2.90
				2480	51.99	52.66	-1.28	1.95	1.99	-2.17
G	2/28/2018	5200	Body	5200	47.91	49.02	-2.26	5.23	5.29	-1.32
				5150	48.12	49.09	-1.97	5.19	5.24	-0.81
				5350	47.79	48.82	-2.10	5.39	5.47	-1.51
G	2/28/2018	5600	Body	5600	47.43	48.48	-2.16	5.65	5.76	-1.93
				5500	47.67	48.61	-1.94	5.53	5.64	-2.05
				5725	47.31	48.31	-2.07	5.82	5.91	-1.54
G	2/28/2018	5800	Body	5800	47.19	48.20	-2.10	5.86	6.00	-2.33
				5700	47.44	48.34	-1.87	5.76	5.88	-1.97
				5850	47.07	48.20	-2.34	5.94	6.00	-1.03
H	2/26/2018	5200	Head	5200	37.60	35.99	4.47	4.72	4.65	1.48
				5150	37.65	36.05	4.45	4.67	4.60	1.53
				5350	37.47	35.82	4.61	4.89	4.80	1.78
H	2/26/2018	5600	Head	5600	37.06	35.53	4.29	5.14	5.06	1.58
				5500	37.19	35.65	4.33	5.02	4.96	1.17
				5725	36.91	35.39	4.29	5.30	5.19	2.14
H	2/26/2018	5800	Head	5800	36.72	35.30	4.02	5.36	5.27	1.63
				5700	36.84	35.42	4.01	5.24	5.16	1.56
				5850	36.67	35.30	3.88	5.43	5.27	2.98

## 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  $\pm$ 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  $\geq$  15.0 cm for SAR measurements  $\leq$  3 GHz and  $\geq$  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.

**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	Date	Tissue Type	Dipole Type Serial #	Dipole Cal. Due Data	Measured Results for 1g SAR				Measured Results for 10g SAR				Plot No.
					Zoom Scan to 100 mW	Normalize to 1 W	Target (Ref. Value)	Delta ±10 %	Zoom Scan to 100 mW	Normalize to 1 W	Target (Ref. Value)	Delta ±10 %	
A	2/22/2018	Head	D835V2 SN:4d117	5/22/2018	0.994	9.94	9.43	5.41	0.653	6.53	6.09	7.22	1,2
A	2/22/2018	Body	D835V2 SN:4d117	5/22/2018	1.020	10.20	10.39	-1.83	0.675	6.75	6.76	-0.15	
A	2/26/2018	Head	D835V2 SN:4d002	11/21/2018	0.987	9.87	10.27	-3.89	0.650	6.50	6.76	-3.85	
A	2/26/2018	Body	D835V2 SN:4d002	11/21/2018	0.983	9.83	10.23	-3.91	0.648	6.48	6.80	-4.71	3,4
A	2/28/2018	Body	D2600V2 SN:1006	10/5/2018	5.890	58.90	56.13	4.93	2.580	25.80	25.00	3.20	5,6
B	2/21/2018	Head	D1750V2 SN:1050	4/18/2018	3.620	36.20	36.76	-1.52	1.910	19.10	19.60	-2.55	
B	2/26/2018	Head	D1900V2 SN:5d140	4/19/2018	4.330	43.30	40.80	6.13	2.200	22.00	21.16	3.97	7,8
B	2/26/2018	Head	D1750V2 SN:1050	4/18/2018	3.610	36.10	36.76	-1.80	1.900	19.00	19.60	-3.06	9,10
B	2/26/2018	Body	D1750V2 SN:1050	4/18/2018	3.760	37.60	37.68	-0.21	1.990	19.90	19.92	-0.10	
B	3/1/2018	Head	D1900V2 SN:5d163	10/5/2018	4.160	41.60	38.77	7.30	2.110	21.10	20.10	4.98	11,12
B	3/1/2018	Body	D1900V2 SN:5d163	10/5/2018	4.140	41.40	42.99	-3.70	2.110	21.10	21.97	-3.96	
B	3/5/2018	Head	D1900V2 SN:5d140	4/19/2018	4.120	41.20	40.80	0.98	2.100	21.00	21.16	-0.76	
B	3/7/2018	Body	D1900V2 SN:5d140	4/19/2018	4.090	40.90	41.20	-0.73	2.090	20.90	21.52	-2.88	
D	2/26/2018	Head	D750V3 SN:1019	3/13/2018	0.805	8.05	8.22	-2.07	0.529	5.29	5.39	-1.86	
D	2/28/2018	Body	D750V3 SN:1019	3/13/2018	0.855	8.55	8.76	-2.40	0.573	5.73	5.80	-1.21	13,14
E	2/27/2018	Head	D2600V2 SN:1006	10/5/2018	5.910	59.10	55.73	6.05	2.570	25.70	25.08	2.47	15,16
E	3/5/2018	Head	D2600V2 SN:1006	10/5/2018	5.820	58.20	55.73	4.43	2.510	25.10	25.08	0.08	
F	2/26/2018	Head	D2450V2 SN:748	2/14/2019	5.480	54.80	52.94	3.51	2.450	24.50	24.60	-0.41	17,18
F	2/27/2018	Body	D2450V2 SN:748	2/14/2019	4.950	49.50	50.95	-2.85	2.250	22.50	23.80	-5.46	
G	2/28/2018	Body	D5GHzV2 SN:1168 (5.2 GHz)	11/23/2018	7.240	72.40	70.70	2.40	2.040	20.40	19.70	3.55	
G	2/28/2018	Body	D5GHzV2 SN:1168 (5.6 GHz)	11/23/2018	8.040	80.40	75.60	6.35	2.230	22.30	20.80	7.21	
G	2/28/2018	Body	D5GHzV2 SN:1168 (5.8 GHz)	11/23/2018	7.090	70.90	65.30	8.58	1.970	19.70	18.20	8.24	19,20
H	2/26/2018	Head	D5GHzV2 SN:1168 (5.2 GHz)	11/23/2018	7.460	74.60	80.90	-7.79	2.140	21.40	22.80	-6.14	21,22
H	2/26/2018	Head	D5GHzV2 SN:1168 (5.6 GHz)	11/23/2018	8.060	80.60	87.20	-7.57	2.260	22.60	24.40	-7.38	
H	2/26/2018	Head	D5GHzV2 SN:1168 (5.8 GHz)	11/23/2018	7.720	77.20	79.10	-2.40	2.190	21.90	22.10	-0.90	

## 9. Conducted Output Power Measurements

### 9.1. GSM

#### Per KDB 941225 D01 3G SAR Procedures:

SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.

When different maximum output power applies to GSM voice or GPRS/EDGE time slots, GSM voice and GPRS/EDGE time slots should be tested separately to determine compliance by summing the corresponding reported SAR.

The GMSK EDGE configurations are grouped with GPRS and considered with respect to time-averaged maximum output power to determine compliance

#### Per October 2013 TCB Workshop:

When the maximum frame-averaged powers levels are within 0.25 dB of each other, test the configuration with the most number of time slots.

#### GSM850 Measured Results

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			
					Measured		Tune-up Limit	
					Burst Pw r	Frame Pw r	Burst Pw r	Frame Pw r
GSM/GPRS	CS1	1	128	824.4	32.80	23.77	33.20	24.17
			190	836.6	32.80	23.77		
			251	848.8	33.00	23.97		
GPRS (GMSK)	CS1	2	128	824.4	30.70	24.68	31.20	25.18
			190	836.6	30.90	24.88		
			251	848.8	30.90	24.88		
		3	128	824.4	28.60	24.34	29.20	24.94
			190	836.6	28.70	24.44		
			251	848.8	29.00	24.74		
		4	128	824.4	27.70	24.69	28.20	25.19
			190	836.6	27.70	24.69		
			251	848.8	27.70	24.69		
EGPRS (8PSK)	MCS5	1	128	824.4	26.80	17.77	28.00	18.97
			190	836.6	26.90	17.87		
			251	848.8	27.00	17.97		
		2	128	824.4	25.40	19.38	26.50	20.48
			190	836.6	25.40	19.38		
			251	848.8	25.50	19.48		
		3	128	824.4	23.30	19.04	24.50	20.24
			190	836.6	23.40	19.14		
			251	848.8	23.50	19.24		
		4	128	824.4	22.20	19.19	23.50	20.49
			190	836.6	22.40	19.39		
			251	848.8	22.40	19.39		

#### Notes:

The worst-case configuration and mode for SAR testing is determined to be as follows:

- GMSK (GPRS) mode with 4 time slots for Max power based on the Tune-up Procedure.
- SAR is not required for EGPRS (8PSK) mode because the maximum output power and tune-up limit is  $\leq 1/4$ dB higher than GMSK GPRS or the adjusted SAR of the highest reported SAR of GMSK GPRS is  $\leq 1.2$ W/kg.



**GSM1900 Measured Results**

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			
					Measured		Tune-up Limit	
					Burst Pw r	Frame Pw r	Burst Pw r	Frame Pw r
GSM/GPRS	CS1	1	512	1850.2	28.20	19.17	28.70	19.67
			661	1880.0	28.40	19.37		
			810	1909.8	28.30	19.27		
GPRS (GMSK)	CS1	2	512	1850.2	26.10	20.08	26.70	20.68
			661	1880.0	26.20	20.18		
			810	1909.8	26.30	20.28		
		3	512	1850.2	24.10	19.84	24.70	20.44
			661	1880.0	24.30	20.04		
			810	1909.8	24.20	19.94		
		4	512	1850.2	23.10	20.09	23.70	20.69
			661	1880.0	23.40	20.39		
			810	1909.8	23.20	20.19		
EGPRS (8PSK)	MCS5	1	512	1850.2	25.70	16.67	27.00	17.97
			661	1880.0	25.90	16.87		
			810	1909.8	25.80	16.77		
		2	512	1850.2	24.30	18.28	25.50	19.48
			661	1880.0	24.40	18.38		
			810	1909.8	24.30	18.28		
		3	512	1850.2	22.40	18.14	23.50	19.24
			661	1880.0	22.60	18.34		
			810	1909.8	22.50	18.24		
		4	512	1850.2	21.30	18.29	22.50	19.49
			661	1880.0	21.50	18.49		
			810	1909.8	21.40	18.39		

**Notes:**

The worst-case configuration and mode for SAR testing is determined to be as follows:

- GMSK (GPRS) mode with 4 time slots for Max power based on the Tune-up Procedure.
- SAR is not required for EGPRS (8PSK) mode because the maximum output power and tune-up limit is  $\leq 1/4$ dB higher than GMSK GPRS or the adjusted SAR of the highest reported SAR of GMSK GPRS is  $\leq 1.2$ W/kg.

**GSM850 DTM Measured Results**

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Maximum Average Power (dBm)								
					Measured				Tune-up Limit				
					CS Burst Pwr	PS Burst Pwr	CS Frame Pwr	PS Frame Pwr	CS Burst Pwr	PS Burst Pwr	CS Frame Pwr	PS Frame Pwr	
GSM (Voice) + GPRS (GMSK)	CS1	1	128	824.2	32.80		23.77			33.20		24.17	
			190	836.6	32.80		23.77						
			251	848.8	33.00		23.97						
		2	128	824.2	30.50	30.70	24.48	24.68		31.20	31.20	25.18	25.18
			190	836.6	30.70	30.90	24.68	24.88					
			251	848.8	30.90	31.10	24.88	25.08					
		3	128	824.2	28.60	28.80	24.34	24.54		29.20	29.20	24.94	24.94
			190	836.6	28.80	28.90	24.54	24.64					
			251	848.8	28.80	29.00	24.54	24.74					
GSM (Voice) + EGPRS (8PSK)	MCS5	1	128	824.2	32.80		23.77		33.20		24.17		
			190	836.6	32.80		23.77						
			251	848.8	33.00		23.97						
		2	128	824.2	30.60	25.30	24.58	19.28		31.20	26.50	25.18	20.48
			190	836.6	30.80	25.50	24.78	19.48					
			251	848.8	30.90	25.60	24.88	19.58					
		3	128	824.2	28.50	23.20	24.24	18.94		29.20	24.50	24.94	20.24
			190	836.6	28.90	23.40	24.64	19.14					
			251	848.8	28.90	23.40	24.64	19.14					

**Notes:**

The worst-case configuration and mode for SAR testing is determined to be as follows:

- GSM(Voice) + GMSK(GPRS) mode with 2 time slots for Max power based on the Tune-up Procedure.
- SAR is not required for GSM(Voice) + EGPRS (8PSK) mode because the maximum output power and tune-up limit is ≤ 1/4dB higher than that of GSM(Voice) + GMSK (GPRS) mode or the adjusted SAR of the highest reported SAR of GSM(Voice) + GMSK (GPRS) is ≤ 1.2W/kg.

**GSM1900 DTM Measured Results**

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Maximum Average Power (dBm)							
					Measured				Tune-up Limit			
					CS Burst Pwr	PS Burst Pwr	CS Frame Pwr	PS Frame Pwr	CS Burst Pwr	PS Burst Pwr	CS Frame Pwr	PS Frame Pwr
GSM (Voice) + GPRS (GMSK)	CS1	1	512	1850.2	28.20		19.17		28.70		19.67	
			661	1880.0	28.40		19.37					
			810	1909.8	28.30		19.27					
		2	512	1850.2	26.00	26.10	19.98	20.08	26.70	26.70	20.68	20.68
			661	1880.0	26.20	26.40	20.18	20.38				
			810	1909.8	26.20	26.30	20.18	20.28				
		3	512	1850.2	24.00	24.10	19.74	19.84	24.70	24.70	20.44	20.44
			661	1880.0	24.30	24.40	20.04	20.14				
			810	1909.8	24.20	24.30	19.94	20.04				
GSM (Voice) + EGPRS (8PSK)	MCS5	1	512	1850.2	28.20		19.17		28.70		19.67	
			661	1880.0	28.40		19.37					
			810	1909.8	28.30		19.27					
		2	512	1850.2	26.00	24.30	19.98	18.28	26.70	25.50	20.68	19.48
			661	1880.0	26.10	24.40	20.08	18.38				
			810	1909.8	26.10	24.30	20.08	18.28				
		3	512	1850.2	24.00	22.40	19.74	18.14	24.70	23.50	20.44	19.24
			661	1880.0	24.20	22.50	19.94	18.24				
			810	1909.8	24.10	22.60	19.84	18.34				

**Notes:**

The worst-case configuration and mode for SAR testing is determined to be as follows:

- GSM(Voice) + GMSK(GPRS) mode with 2 time slots for Max power based on the Tune-up Procedure.
- SAR is not required for GSM(Voice) + EGPRS (8PSK) mode because the maximum output power and tune-up limit is ≤ 1/4dB higher than that of GSM(Voice) + GMSK (GPRS) mode or the adjusted SAR of the highest reported SAR of GSM(Voice) + GMSK (GPRS) is ≤ 1.2W/kg.

## 9.2. W-CDMA

### Release 99 Setup Procedures used to establish the test signals

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The DUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7).

Mode	Subtest	Rel99
WCDMA General Settings	Loopback Mode	Test Mode 2
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	$\beta_c/\beta_d$	8/15

### HSDPA Setup Procedures used to establish the test signals

The following 4 Sub-tests were completed according to Release 5 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subtest	1	2	3	4
W-CDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set 1			
	Power Control Algorithm	Algorithm 2			
	$\beta_c$	2/15	11/15	15/15	15/15
	$\beta_d$	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	$\beta_c/\beta_d$	2/15	11/15	15/8	15/4
	$\beta_{hs}$	4/15	24/15	30/15	30/15
MPR (dB)	0	0	0.5	0.5	
HSDPA Specific Settings	$D_{ACK}$	8			
	$D_{NAK}$	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
$A_{hs}=\beta_{hs}/\beta_c$	30/15				

**HSPA (HSDPA & HSUPA) Setup Procedures used to establish the test signals**

The following 5 Sub-tests were completed according to Release 6 procedures in table C,11.1.3 of 3GPP TS 34.121-1 v13. A summary of these settings are illustrated below:

	Mode	HSPA				
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2 kbps RMC				
	HSDPA FRC	H-Set 1				
	HSUPA Test	HSPA				
	Power Control Algorithm	Algorithm 2				Algorithm 1
	$\beta_c$	11/15	6/15	15/15	2/15	15/15
	$\beta_d$	15/15	15/15	9/15	15/15	0
	$\beta_{ec}$	209/225	12/15	30/15	2/15	5/15
	$\beta_c/\beta_d$	11/15	6/15	15/9	2/15	-
	$\beta_{hs}$	22/15	12/15	30/15	4/15	5/15
	$\beta_{ed}$	1309/225	94/75	47/15	56/75	47/15
CM (dB)	1	3	2	3	1	
MPR (dB)	0	2	1	2	0	
HSDPA Specific Settings	DACK	8				0
	DNAK	8				0
	DCQI	8				0
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
A <sub>hs</sub> = $\beta_{hs}/\beta_c$	30/15					
HSUPA Specific Settings	E-DPDCCH	6	8	8	5	0
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	12
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	67
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E-TFCIs	5	5	2	5	1
	Reference E-TFCI	11	11	11	11	67
	Reference E-TFCI PO	4	4	4	4	18
	Reference E-TFCI	67	67	92	67	67
	Reference E-TFCI PO	18	18	18	18	18
	Reference E-TFCI	71	71	71	71	71
	Reference E-TFCI PO	23	23	23	23	23
	Reference E-TFCI	75	75	75	75	75
	Reference E-TFCI PO	26	26	26	26	26
	Reference E-TFCI	81	81	81	81	81
Reference E-TFCI PO	27	27	27	27	27	
Maximum Channelization Codes	2xSF2				SF4	

**W-CDMA Band II Measured Results**

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)		
				Measured Pwr	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	22.00	N/A	22.70
		9400	1880.0	22.30		
		9538	1907.6	22.20		
HSDPA	Subtest 1	9262	1852.4	21.00	0	22.00
		9400	1880.0	21.20		
		9538	1907.6	21.20		
	Subtest 2	9262	1852.4	21.00	0	22.00
		9400	1880.0	21.20		
		9538	1907.6	21.20		
	Subtest 3	9262	1852.4	20.50	0.5	21.50
		9400	1880.0	20.80		
		9538	1907.6	20.70		
	Subtest 4	9262	1852.4	20.50	0.5	21.50
		9400	1880.0	20.80		
		9538	1907.6	20.70		
HSUPA	Subtest 1	9262	1852.4	21.00	0	22.00
		9400	1880.0	21.30		
		9538	1907.6	21.10		
	Subtest 2	9262	1852.4	19.00	2	20.00
		9400	1880.0	19.30		
		9538	1907.6	19.20		
	Subtest 3	9262	1852.4	20.00	1	21.00
		9400	1880.0	20.20		
		9538	1907.6	20.10		
	Subtest 4	9262	1852.4	19.00	2	20.00
		9400	1880.0	19.30		
		9538	1907.6	19.20		
	Subtest 5	9262	1852.4	21.00	0	22.00
		9400	1880.0	21.30		
		9538	1907.6	21.10		

**W-CDMA Band IV Measured Results**

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)		
				Measured Pwr	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	1312	1712.4	22.20	N/A	22.70
		1413	1732.6	22.20		
		1513	1752.6	22.10		
HSDPA	Subtest 1	1312	1712.4	21.30	0	22.00
		1413	1732.6	21.30		
		1513	1752.6	21.10		
	Subtest 2	1312	1712.4	21.30	0	22.00
		1413	1732.6	21.30		
		1513	1752.6	21.10		
	Subtest 3	1312	1712.4	20.80	0.5	21.50
		1413	1732.6	20.80		
		1513	1752.6	20.70		
	Subtest 4	1312	1712.4	20.80	0.5	21.50
		1413	1732.6	20.80		
		1513	1752.6	20.70		
HSUPA	Subtest 1	1312	1712.4	21.30	0	22.00
		1413	1732.6	21.30		
		1513	1752.6	21.20		
	Subtest 2	1312	1712.4	19.30	2	20.00
		1413	1732.6	19.30		
		1513	1752.6	19.20		
	Subtest 3	1312	1712.4	20.30	1	21.00
		1413	1732.6	20.30		
		1513	1752.6	20.20		
	Subtest 4	1312	1712.4	19.30	2	20.00
		1413	1732.6	19.30		
		1513	1752.6	19.20		
	Subtest 5	1312	1712.4	21.30	0	22.00
		1413	1732.6	21.30		
		1513	1752.6	21.20		

**W-CDMA Band V Measured Results**

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)		
				Measured Pwr	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	4132	826.4	24.40	N/A	24.90
		4183	836.6	24.50		
		4233	846.6	24.40		
HSDPA	Subtest 1	4132	826.4	23.40	0	24.20
		4183	836.6	23.50		
		4233	846.6	23.40		
	Subtest 2	4132	826.4	23.40	0	24.20
		4183	836.6	23.50		
		4233	846.6	23.40		
	Subtest 3	4132	826.4	22.90	0.5	23.70
		4183	836.6	23.00		
		4233	846.6	22.90		
	Subtest 4	4132	826.4	22.90	0.5	23.70
		4183	836.6	23.00		
		4233	846.6	22.90		
HSUPA	Subtest 1	4132	826.4	23.40	0	24.20
		4183	836.6	23.50		
		4233	846.6	23.50		
	Subtest 2	4132	826.4	21.40	2	22.20
		4183	836.6	21.50		
		4233	846.6	21.50		
	Subtest 3	4132	826.4	22.40	1	23.20
		4183	836.6	22.50		
		4233	846.6	22.40		
	Subtest 4	4132	826.4	21.40	2	22.20
		4183	836.6	21.50		
		4233	846.6	21.50		
	Subtest 5	4132	826.4	23.40	0	24.20
		4183	836.6	23.50		
		4233	846.6	23.50		



### 9.3. LTE

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 1, 2 and 3**

Modulation	Channel bandwidth / Transmission bandwidth ( $N_{RB}$ )						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
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
256 QAM	≥ 1						≤ 5

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 Signaling Value of "NS\_01".

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

Network Signalling value	Requirements (subclause)	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	N/A
NS_03	6.6.2.2.1	2, 4, 10, 23, 25, 35, 36, 66, 70	3	>5	$\leq 1$
			5	>6	$\leq 1$
			10	>8	$\leq 1$
			15	>8	$\leq 1$
NS_04	6.6.2.2.2, 6.6.3.3.19	41	5, 10, 15, 20	Table 6.2.4-4, Table 6.2.4-4a	
				20	>10
NS_05	6.6.3.3.1	1	10, 15, 20	$\geq 50$ (NOTE 1)	$\leq 1$ (NOTE 1)
			15, 20	Table 6.2.4-18 (NOTE 2)	
		65 (NOTE 3)	10, 15, 20	$\geq 50$	$\leq 1$ (NOTE 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 6.6.3.3.2	13	10	Table 6.2.4-2	
NS_08	6.6.3.3.3	19	10, 15	> 44	$\leq 3$
NS_09	6.6.3.3.4	21	10, 15	> 40	$\leq 1$
				> 55	$\leq 2$
NS_10		20	15, 20	Table 6.2.4-3	
NS_11	6.6.2.2.1 6.6.3.3.13	23	1.4, 3, 5, 10, 15, 20	Table 6.2.4-5	
NS_12	6.6.3.3.5	28	1.4, 3, 5, 10, 15	Table 6.2.4-6	
NS_13	6.6.3.3.6	28	5	Table 6.2.4-7	
NS_14	6.6.3.3.7	28	10, 15	Table 6.2.4-8	
NS_15	6.6.3.3.8	28	1.4, 3, 5, 10, 15	Table 6.2.4-9 Table 6.2.4-10	
NS_16	6.6.3.3.9	27	3, 5, 10	Table 6.2.4-11, Table 6.2.4-12, Table 6.2.4-13	
NS_17	6.6.3.3.10	28	5, 10	Table 5.6-1	N/A
NS_18	6.6.3.3.11	28	5	$\geq 2$	$\leq 1$
			10, 15, 20	$\geq 1$	$\leq 4$
NS_19	6.6.3.3.12	44	10, 15, 20	Table 6.2.4-14	
NS_20	6.2.2	23	5, 10, 15, 20	Table 6.2.4-15	
	6.6.2.2.1 6.6.3.3.14				
NS_21	6.6.2.2.1 6.6.3.3.15	30	5, 10	Table 6.2.4-16	
NS_22	6.6.3.3.16	42, 43	5, 10, 15, 20	Table 6.2.4-17	
NS_23	6.6.3.3.17	42, 43	5, 10, 15, 20	N/A	
NS_24	6.6.3.3.20	65 (NOTE 4)	5, 10, 15, 20	Table 6.2.4-19	
NS_25	6.6.3.3.21	65 (NOTE 4)	5, 10, 15, 20	Table 6.2.4-20	
NS_26	6.6.3.3.22	68	10, 15	Table 6.2.4-21	
NS_27	6.6.2.2.5, 6.6.3.3.23	48	5, 10, 15, 20	Table 6.2.4-22	
NS_28	6.2.2A, 6.6.3.3.24	46 (NOTE 5)	20	Table 6.2.4-23	
NS_29	6.2.2A, 6.6.2.3.1a, 6.6.3.3.25	46 (NOTE 5)	20	Table 6.2.4-24	
NS_30	6.2.2A, 6.6.3.3.26	46 (NOTE 5)	20	Table 6.2.4-25	
NS_31	6.2.2A, 6.6.3.3.27	46 (NOTE 5)	20	Table 6.2.4-26	
NS_32	-	-	-	-	-

NOTE 1: Applicable when the lower edge of the assigned E-UTRA UL channel bandwidth frequency is larger than or equal to the upper edge of PHS band (1915.7 MHz) + 4 MHz + the channel BW assigned, where channel BW is as defined in subclause 5.6. A-MPR for

**LTE Band 4 Measured Results**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
							MPR	Tune-up Limit
				20175	1732.5 MHz			
20 MHz	QPSK	1	0				0.0	23
		1	49				0.0	23
		1	99				0.0	23
		50	0				0.0	23
		50	24				0.0	23
		50	50				0.0	23
	16QAM	100	0				0.0	23
		1	0				0.0	23
		1	49				0.0	23
		1	99				0.0	23
		50	0				0.0	23
		50	24				0.0	23
	64QAM	50	50				0.0	23
		100	0				0.0	23
		1	0				0.0	23
		1	49				0.0	23
		1	99				0.0	23
		50	0				1.0	22
15 MHz	QPSK	50	24				0.0	23
		50	50				0.0	23
		100	0				0.0	23
		1	0				0.0	23
		1	49				0.0	23
		1	99				0.0	23
	16QAM	50	0				0.0	23
		50	24				0.0	23
		50	50				0.0	23
		100	0				0.0	23
		1	0				0.0	23
		1	37				0.0	23
	64QAM	1	74				0.0	23
		36	0				0.0	23
		36	20				0.0	23
		36	39				0.0	23
		75	0				0.0	23
		1	0				0.0	23
15 MHz	16QAM	1	37				0.0	23
		1	74				0.0	23
		36	0				0.0	23
		36	20				0.0	23
		36	39				0.0	23
		75	0				0.0	23
	64QAM	1	0				0.0	23
		1	37				0.0	23
		1	74				0.0	23
		36	0				1.0	22
		36	20				1.0	22
		36	39				1.0	22
75	0				1.0	22		

**LTE Band 4 Measured Results (continued)**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				20000	20175	20350	MPR	Tune-up Limit
				1715 MHz	1732.5 MHz	1750 MHz		
10 MHz	QPSK	1	0	22.49	22.54	22.44	0.0	23
		1	25	22.50	22.57	22.36	0.0	23
		1	49	22.43	22.56	22.35	0.0	23
		25	0	22.59	22.71	22.47	0.0	23
		25	12	22.59	22.78	22.49	0.0	23
		25	25	22.54	22.75	22.47	0.0	23
		50	0	22.57	22.77	22.45	0.0	23
	16QAM	1	0	22.42	22.10	22.13	0.0	23
		1	25	22.40	22.07	22.01	0.0	23
		1	49	22.36	22.05	21.96	0.0	23
		25	0	22.20	22.28	22.15	0.0	23
		25	12	22.20	22.38	22.17	0.0	23
		25	25	22.13	22.31	22.08	0.0	23
	64QAM	50	0	22.15	22.33	22.09	0.0	23
		1	0	22.21	22.46	22.29	0.0	23
		1	25	22.21	22.48	22.17	0.0	23
		1	49	22.12	22.49	22.16	0.0	23
		25	0	21.36	21.43	21.26	1.0	22
		25	12	21.35	21.54	21.28	1.0	22
		25	25	21.33	21.49	21.23	1.0	22
	5 MHz	QPSK	50	0	21.32	21.50	21.20	1.0
1			0	22.45	22.78	22.49	0.0	23
1			12	22.39	22.68	22.46	0.0	23
1			24	22.48	22.83	22.47	0.0	23
12			0	22.46	22.67	22.46	0.0	23
12			7	22.45	22.74	22.46	0.0	23
12			13	22.46	22.74	22.43	0.0	23
16QAM		25	0	22.58	22.78	22.45	0.0	23
		1	0	22.55	22.38	22.18	0.0	23
		1	12	22.50	22.32	22.12	0.0	23
		1	24	22.59	22.43	22.14	0.0	23
		12	0	22.19	22.32	22.13	0.0	23
		12	7	22.18	22.42	22.11	0.0	23
64QAM		12	13	22.15	22.38	22.09	0.0	23
	25	0	22.19	22.35	22.00	0.0	23	
	1	0	22.34	22.20	22.31	0.0	23	
	1	12	22.31	22.13	22.26	0.0	23	
	1	24	22.41	22.23	22.29	0.0	23	
	12	0	21.51	21.80	21.61	1.0	22	
	12	7	21.51	21.90	21.61	1.0	22	
12	13	21.49	21.89	21.60	1.0	22		
25	0	21.62	21.84	21.59	1.0	22		

**LTE Band 4 Measured Results (continued)**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				19965	20175	20385	MPR	Tune-up Limit
				1711.5 MHz	1732.5 MHz	1753.5 MHz		
3 MHz	QPSK	1	0	22.45	22.58	22.38	0.0	23
		1	8	22.52	22.67	22.45	0.0	23
		1	14	22.39	22.71	22.33	0.0	23
		8	0	22.42	22.60	22.39	0.0	23
		8	4	22.45	22.67	22.44	0.0	23
		8	7	22.45	22.76	22.43	0.0	23
		15	0	22.43	22.74	22.43	0.0	23
	16QAM	1	0	22.37	22.11	22.05	0.0	23
		1	8	22.45	22.16	22.10	0.0	23
		1	14	22.35	22.14	22.00	0.0	23
		8	0	22.06	22.28	22.03	0.0	23
		8	4	22.12	22.32	22.07	0.0	23
		8	7	22.10	22.43	22.06	0.0	23
		15	0	22.04	22.34	21.98	0.0	23
	64QAM	1	0	22.11	22.51	22.22	0.0	23
		1	8	22.22	22.58	22.27	0.0	23
		1	14	22.11	22.55	22.16	0.0	23
		8	0	21.54	21.76	21.45	1.0	22
		8	4	21.62	21.82	21.50	1.0	22
		8	7	21.59	21.89	21.49	1.0	22
		15	0	21.57	21.82	21.54	1.0	22
BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				19957	20175	20393	MPR	Tune-up Limit
				1710.7 MHz	1732.5 MHz	1754.3 MHz		
1.4 MHz	QPSK	1	0	22.34	22.58	22.28	0.0	23
		1	3	22.39	22.61	22.34	0.0	23
		1	5	22.29	22.56	22.26	0.0	23
		3	0	22.38	22.53	22.28	0.0	23
		3	1	22.43	22.59	22.36	0.0	23
		3	3	22.40	22.58	22.37	0.0	23
		6	0	22.31	22.53	22.33	0.0	23
	16QAM	1	0	22.25	22.20	21.92	0.0	23
		1	3	22.30	22.25	22.00	0.0	23
		1	5	22.22	22.17	21.95	0.0	23
		3	0	22.12	22.15	22.08	0.0	23
		3	1	22.17	22.24	22.16	0.0	23
		3	3	22.18	22.22	22.16	0.0	23
		6	0	21.81	22.23	22.08	0.0	23
	64QAM	1	0	22.04	22.50	22.04	0.0	23
		1	3	22.10	22.59	22.11	0.0	23
		1	5	21.97	22.48	22.08	0.0	23
		3	0	22.06	22.46	21.84	0.0	23
		3	1	22.15	22.53	21.94	0.0	23
		3	3	22.15	22.52	21.93	0.0	23
		6	0	21.72	21.60	21.46	1.0	22

**LTE Band 5 Measured Results**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				20525	836.5 MHz	20625	MPR	Tune-up Limit
10 MHz	QPSK	1	0	24.69			0.0	25
		1	25	24.67			0.0	25
		1	49	24.74			0.0	25
		25	0	23.82			1.0	24
		25	12	23.79			1.0	24
		25	25	23.70			1.0	24
		50	0	23.77			1.0	24
	16QAM	1	0	23.72			1.0	24
		1	25	23.73			1.0	24
		1	49	23.68			1.0	24
		25	0	22.88			2.0	23
		25	12	22.86			2.0	23
		25	25	22.82			2.0	23
		50	0	22.83			2.0	23
	64QAM	1	0	22.58			2.0	23
		1	25	22.54			2.0	23
		1	49	22.59			2.0	23
		25	0	21.93			3.0	22
25		12	21.93			3.0	22	
25		25	21.86			3.0	22	
50		0	21.84			3.0	22	
BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				20425	20525	20625	MPR	Tune-up Limit
				826.5 MHz	836.5 MHz	846.5 MHz		
5 MHz	QPSK	1	0	24.68	24.89	24.58	0.0	25
		1	12	24.62	24.79	24.60	0.0	25
		1	24	24.61	24.91	24.40	0.0	25
		12	0	23.73	23.74	23.49	1.0	24
		12	7	23.73	23.77	23.50	1.0	24
		12	13	23.70	23.75	23.49	1.0	24
		25	0	23.71	23.79	23.52	1.0	24
	16QAM	1	0	24.00	24.00	23.71	1.0	24
		1	12	24.00	23.93	23.72	1.0	24
		1	24	24.00	23.99	23.57	1.0	24
		12	0	22.94	22.93	22.61	2.0	23
		12	7	22.95	22.92	22.62	2.0	23
		12	13	22.91	22.90	22.62	2.0	23
		25	0	22.85	22.84	22.53	2.0	23
	64QAM	1	0	22.62	22.27	22.34	2.0	23
		1	12	22.58	22.18	22.33	2.0	23
		1	24	22.56	22.27	22.31	2.0	23
		12	0	21.84	21.92	21.66	3.0	22
12		7	21.81	21.90	21.64	3.0	22	
12		13	21.78	21.87	21.64	3.0	22	
25		0	21.79	21.84	21.61	3.0	22	

**Note(s):**  
 10 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

**LTE Band 5 Measured Results (continued)**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				20415	20525	20635	MPR	Tune-up Limit
				825.5 MHz	836.5 MHz	847.5 MHz		
3 MHz	QPSK	1	0	24.85	24.72	24.47	0.0	25
		1	8	24.91	24.77	24.58	0.0	25
		1	14	24.78	24.71	24.31	0.0	25
		8	0	23.78	23.70	23.44	1.0	24
		8	4	23.84	23.73	23.55	1.0	24
		8	7	23.79	23.74	23.61	1.0	24
		15	0	23.83	23.74	23.45	1.0	24
	16QAM	1	0	24.00	23.70	23.58	1.0	24
		1	8	24.00	23.76	23.69	1.0	24
		1	14	24.00	23.62	23.41	1.0	24
		8	0	22.96	22.92	22.56	2.0	23
		8	4	23.00	22.92	22.69	2.0	23
		8	7	22.98	22.93	22.71	2.0	23
	64QAM	15	0	22.96	22.84	22.51	2.0	23
		1	0	22.59	22.36	22.32	2.0	23
		1	8	22.63	22.45	22.42	2.0	23
		1	14	22.51	22.36	22.33	2.0	23
		8	0	21.85	21.85	21.58	3.0	22
		8	4	21.90	21.90	21.70	3.0	22
		8	7	21.89	21.89	21.69	3.0	22
	1.4 MHz	QPSK	15	0	21.94	21.87	21.53	3.0
1			0	24.74	24.63	24.49	0.0	25
1	3		24.77	24.70	24.54	0.0	25	
1	5		24.73	24.65	24.38	0.0	25	
3	0		24.72	24.66	24.42	0.0	25	
3	1		24.81	24.72	24.48	0.0	25	
3	3		24.80	24.72	24.46	0.0	25	
6	0		23.74	23.63	23.46	1.0	24	
16QAM	1		0	23.85	24.00	23.59	1.0	24
	1		3	23.90	24.00	23.59	1.0	24
	1		5	23.85	24.00	23.49	1.0	24
	3		0	24.00	23.90	23.54	1.0	24
	3		1	24.00	23.96	23.59	1.0	24
	3		3	24.00	23.96	23.58	1.0	24
	6	0	23.00	22.65	22.67	2.0	23	
64QAM	1	0	22.48	22.31	22.38	2.0	23	
	1	3	22.52	22.36	22.46	2.0	23	
	1	5	22.52	22.25	22.33	2.0	23	
	3	0	22.29	22.32	22.33	2.0	23	
	3	1	22.36	22.39	22.38	2.0	23	
	3	3	22.36	22.40	22.38	2.0	23	
	6	0	21.94	22.00	21.58	3.0	22	

**LTE Band 7 Measured Results**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				20850	21100	21350	MPR	Tune-up Limit
				2510 MHz	2535 MHz	2560 MHz		
20 MHz	QPSK	1	0	22.65	22.54	22.65	0.0	23
		1	49	22.60	22.50	22.48	0.0	23
		1	99	22.55	22.58	22.55	0.0	23
		50	0	22.75	22.65	22.65	0.0	23
		50	24	22.75	22.67	22.65	0.0	23
		50	50	22.69	22.61	22.56	0.0	23
		100	0	22.71	22.61	22.60	0.0	23
	16QAM	1	0	22.77	22.68	22.69	0.0	23
		1	49	22.67	22.67	22.53	0.0	23
		1	99	22.65	22.72	22.58	0.0	23
		50	0	22.39	22.30	22.24	0.0	23
		50	24	22.38	22.29	22.22	0.0	23
		50	50	22.30	22.22	22.14	0.0	23
		100	0	22.31	22.25	22.19	0.0	23
	64QAM	1	0	22.93	22.52	22.52	0.0	23
		1	49	22.90	22.44	22.38	0.0	23
		1	99	22.84	22.54	22.37	0.0	23
		50	0	21.87	21.84	21.82	1.0	22
		50	24	21.86	21.82	21.75	1.0	22
		50	50	21.78	21.74	21.71	1.0	22
		100	0	21.78	21.76	21.75	1.0	22
BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				20825	21100	21375	MPR	Tune-up Limit
				2507.5 MHz	2535 MHz	2562.5 MHz		
15 MHz	QPSK	1	0	22.68	22.55	22.69	0.0	23
		1	37	22.65	22.50	22.56	0.0	23
		1	74	22.63	22.45	22.60	0.0	23
		36	0	22.73	22.58	22.63	0.0	23
		36	20	22.69	22.59	22.60	0.0	23
		36	39	22.65	22.58	22.55	0.0	23
		75	0	22.65	22.61	22.60	0.0	23
	16QAM	1	0	22.63	22.07	22.66	0.0	23
		1	37	22.63	22.03	22.51	0.0	23
		1	74	22.51	22.04	22.62	0.0	23
		36	0	22.41	22.21	22.19	0.0	23
		36	20	22.35	22.19	22.20	0.0	23
		36	39	22.30	22.15	22.13	0.0	23
		75	0	22.30	22.20	22.20	0.0	23
	64QAM	1	0	22.41	22.47	22.84	0.0	23
		1	37	22.39	22.45	22.72	0.0	23
		1	74	22.32	22.42	22.79	0.0	23
		36	0	21.92	21.78	21.72	1.0	22
		36	20	21.86	21.76	21.72	1.0	22
		36	39	21.83	21.70	21.66	1.0	22
		75	0	21.80	21.67	21.75	1.0	22



**LTE Band 7 Measured Results (continued)**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				20800	21100	21400	MPR	Tune-up Limit
				2505 MHz	2535 MHz	2565 MHz		
10 MHz	QPSK	1	0	22.61	22.63	22.58	0.0	23
		1	25	22.54	22.56	22.61	0.0	23
		1	49	22.61	22.55	22.61	0.0	23
		25	0	22.63	22.58	22.58	0.0	23
		25	12	22.72	22.62	22.58	0.0	23
		25	25	22.67	22.59	22.65	0.0	23
		50	0	22.70	22.61	22.57	0.0	23
	16QAM	1	0	22.24	22.57	22.09	0.0	23
		1	25	22.20	22.48	22.12	0.0	23
		1	49	22.22	22.50	22.08	0.0	23
		25	0	22.32	22.21	22.20	0.0	23
		25	12	22.44	22.25	22.20	0.0	23
		25	25	22.37	22.17	22.27	0.0	23
	64QAM	50	0	22.33	22.22	22.17	0.0	23
		1	0	22.35	22.50	22.37	0.0	23
		1	25	22.32	22.44	22.40	0.0	23
		1	49	22.40	22.45	22.35	0.0	23
		25	0	21.80	21.75	21.80	1.0	22
		25	12	21.89	21.73	21.78	1.0	22
		25	25	21.87	21.73	21.79	1.0	22
	50	0	21.83	21.72	21.66	1.0	22	
BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				20775	21100	21425	MPR	Tune-up Limit
				2502.5 MHz	2535 MHz	2567.5 MHz		
5 MHz	QPSK	1	0	22.66	22.56	22.72	0.0	23
		1	12	22.64	22.56	22.70	0.0	23
		1	24	22.60	22.52	22.70	0.0	23
		12	0	22.63	22.58	22.65	0.0	23
		12	7	22.65	22.64	22.64	0.0	23
		12	13	22.63	22.62	22.64	0.0	23
		25	0	22.63	22.60	22.64	0.0	23
	16QAM	1	0	22.35	22.65	22.35	0.0	23
		1	12	22.30	22.67	22.35	0.0	23
		1	24	22.32	22.61	22.31	0.0	23
		12	0	22.28	22.30	22.29	0.0	23
		12	7	22.32	22.33	22.34	0.0	23
		12	13	22.26	22.29	22.33	0.0	23
		25	0	22.19	22.24	22.23	0.0	23
	64QAM	1	0	22.53	22.11	22.47	0.0	23
		1	12	22.52	22.08	22.46	0.0	23
		1	24	22.46	22.10	22.44	0.0	23
		12	0	21.66	21.68	21.82	1.0	22
		12	7	21.68	21.74	21.81	1.0	22
		12	13	21.65	21.69	21.79	1.0	22
		25	0	21.67	21.65	21.79	1.0	22

**LTE Band 13 Measured Results**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			
				23230	782 MHz	MPR	Tune-up Limit
10 MHz	QPSK	1	0	24.48		0.0	25
		1	25	24.72		0.0	25
		1	49	24.87		0.0	25
		25	0	23.72		1.0	24
		25	12	23.79		1.0	24
		25	25	23.84		1.0	24
		50	0	23.75		1.0	24
	16QAM	1	0	23.44		1.0	24
		1	25	23.72		1.0	24
		1	49	23.79		1.0	24
		25	0	22.82		2.0	23
		25	12	22.87		2.0	23
		25	25	22.93		2.0	23
		50	0	22.84		2.0	23
	64QAM	1	0	22.33		2.0	23
		1	25	22.58		2.0	23
		1	49	22.67		2.0	23
		25	0	21.81		3.0	22
		25	12	21.89		3.0	22
		25	25	21.94		3.0	22
50		0	21.86		3.0	22	
BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			
				23230	782 MHz	MPR	Tune-up Limit
5 MHz	QPSK	1	0	24.69		0.0	25
		1	12	24.82		0.0	25
		1	24	24.91		0.0	25
		12	0	23.77		1.0	24
		12	7	23.79		1.0	24
		12	13	23.85		1.0	24
		25	0	23.79		1.0	24
	16QAM	1	0	23.83		1.0	24
		1	12	23.98		1.0	24
		1	24	24.00		1.0	24
		12	0	22.93		2.0	23
		12	7	22.96		2.0	23
		12	13	23.00		2.0	23
		25	0	22.89		2.0	23
	64QAM	1	0	22.13		2.0	23
		1	12	22.25		2.0	23
		1	24	22.35		2.0	23
		12	0	21.91		3.0	22
		12	7	21.92		3.0	22
		12	13	21.98		3.0	22
25		0	21.84		3.0	22	

**Note(s):**  
 10 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

**LTE Band 17 Measured Results**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			
				23790	710 MHz	MPR	Tune-up Limit
10 MHz	QPSK	1	0	24.53		0.0	25
		1	25	24.49		0.0	25
		1	49	24.52		0.0	25
		25	0	23.57		1.0	24
		25	12	23.57		1.0	24
		25	25	23.53		1.0	24
		50	0	23.54		1.0	24
	16QAM	1	0	23.62		1.0	24
		1	25	23.58		1.0	24
		1	49	23.60		1.0	24
		25	0	22.75		2.0	23
		25	12	22.71		2.0	23
		25	25	22.67		2.0	23
		50	0	22.67		2.0	23
	64QAM	1	0	22.33		2.0	23
		1	25	22.24		2.0	23
		1	49	22.22		2.0	23
		25	0	21.74		3.0	22
		25	12	21.71		3.0	22
		25	25	21.66		3.0	22
50		0	21.63		3.0	22	
BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			
				23790	710 MHz	MPR	Tune-up Limit
5 MHz	QPSK	1	0	24.66		0.0	25
		1	12	24.59		0.0	25
		1	24	24.58		0.0	25
		12	0	23.61		1.0	24
		12	7	23.58		1.0	24
		12	13	23.53		1.0	24
		25	0	23.54		1.0	24
	16QAM	1	0	23.71		1.0	24
		1	12	23.68		1.0	24
		1	24	23.67		1.0	24
		12	0	22.71		2.0	23
		12	7	22.70		2.0	23
		12	13	22.67		2.0	23
		25	0	22.59		2.0	23
	64QAM	1	0	22.42		2.0	23
		1	12	22.34		2.0	23
		1	24	22.35		2.0	23
		12	0	21.74		3.0	22
		12	7	21.73		3.0	22
		12	13	21.70		3.0	22
25		0	21.68		3.0	22	

**LTE Band 41 Measured Results**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)						
				39750	40185	40620	41055	41490	MPR	Tune-up Limit
				2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz		
20 MHz	QPSK	1	0	22.50	22.65	22.65	22.80	22.78	0.0	23
		1	49	22.44	22.62	22.52	22.62	22.57	0.0	23
		1	99	22.50	22.57	22.54	22.62	22.47	0.0	23
		50	0	22.56	22.70	22.62	22.73	22.65	0.0	23
		50	24	22.61	22.67	22.62	22.64	22.59	0.0	23
		50	50	22.55	22.61	22.54	22.57	22.52	0.0	23
	16QAM	100	0	22.58	22.64	22.61	22.68	22.58	0.0	23
		1	0	22.16	22.07	22.21	22.46	22.16	0.0	23
		1	49	22.10	22.02	22.06	22.28	21.96	0.0	23
		1	99	22.21	21.99	22.10	22.29	21.86	0.0	23
		50	0	22.17	22.26	22.20	22.32	22.26	0.0	23
		50	24	22.28	22.26	22.16	22.28	22.17	0.0	23
	64QAM	50	50	22.20	22.21	22.11	22.19	22.12	0.0	23
		100	0	22.21	22.24	22.16	22.26	22.16	0.0	23
		1	0	22.02	22.28	22.63	22.26	22.34	0.0	23
		1	49	21.96	22.23	22.47	22.09	22.15	0.0	23
		1	99	22.06	22.21	22.55	22.13	22.05	0.0	23
		50	0	21.68	21.83	21.76	21.83	21.79	1.0	22
15 MHz	QPSK	50	24	21.77	21.82	21.72	21.77	21.72	1.0	22
		50	50	21.71	21.74	21.64	21.70	21.64	1.0	22
		100	0	21.74	21.79	21.67	21.73	21.71	1.0	22
		1	0	22.44	22.57	22.60	22.75	22.67	0.0	23
		1	37	22.43	22.60	22.50	22.65	22.54	0.0	23
		1	74	22.51	22.56	22.53	22.65	22.43	0.0	23
	16QAM	36	0	22.48	22.66	22.60	22.67	22.64	0.0	23
		36	20	22.55	22.63	22.55	22.65	22.59	0.0	23
		36	39	22.50	22.61	22.50	22.59	22.54	0.0	23
		75	0	22.54	22.63	22.52	22.64	22.55	0.0	23
		1	0	22.08	22.15	22.16	22.35	22.22	0.0	23
		1	37	22.04	22.16	22.06	22.22	22.08	0.0	23
	64QAM	1	74	22.15	22.11	22.12	22.23	22.00	0.0	23
		36	0	22.12	22.26	22.18	22.29	22.18	0.0	23
		36	20	22.21	22.20	22.14	22.25	22.15	0.0	23
		36	39	22.14	22.18	22.13	22.20	22.11	0.0	23
		75	0	22.18	22.21	22.15	22.21	22.17	0.0	23
		1	0	22.33	22.03	21.81	22.54	22.08	0.0	23
64QAM	1	37	22.30	22.02	21.70	22.41	21.96	0.0	23	
	1	74	22.36	22.01	21.76	22.46	21.88	0.0	23	
	36	0	21.69	21.72	21.76	21.85	21.69	1.0	22	
	36	20	21.78	21.70	21.75	21.81	21.67	1.0	22	
	36	39	21.71	21.63	21.67	21.75	21.61	1.0	22	
	75	0	21.71	21.72	21.65	21.76	21.70	1.0	22	

**LTE Band 41 Measured Results (continued)**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)						
				39750	40185	40620	41055	41490	MPR	Tune-up Limit
				2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz		
10 MHz	QPSK	1	0	22.51	22.64	22.55	22.68	22.63	0.0	23
		1	25	22.43	22.60	22.50	22.63	22.52	0.0	23
		1	49	22.49	22.56	22.46	22.57	22.49	0.0	23
		25	0	22.49	22.69	22.59	22.69	22.60	0.0	23
		25	12	22.61	22.67	22.59	22.67	22.57	0.0	23
		25	25	22.57	22.66	22.55	22.62	22.56	0.0	23
	16QAM	50	0	22.56	22.63	22.56	22.62	22.57	0.0	23
		1	0	22.21	22.24	22.13	22.35	22.17	0.0	23
		1	25	22.12	22.15	22.07	22.31	22.08	0.0	23
		1	49	22.25	22.12	22.07	22.24	22.06	0.0	23
		25	0	22.08	22.25	22.17	22.26	22.18	0.0	23
		25	12	22.22	22.21	22.17	22.26	22.17	0.0	23
	64QAM	25	25	22.20	22.20	22.15	22.22	22.15	0.0	23
		50	0	22.23	22.23	22.13	22.26	22.15	0.0	23
		1	0	22.39	22.27	21.76	22.51	22.26	0.0	23
		1	25	22.30	22.25	21.71	22.44	22.15	0.0	23
		1	49	22.36	22.26	21.68	22.41	22.14	0.0	23
		25	0	21.59	21.69	21.72	21.71	21.64	1.0	22
5 MHz	QPSK	25	12	21.69	21.67	21.71	21.71	21.62	1.0	22
		25	25	21.63	21.65	21.68	21.68	21.60	1.0	22
		50	0	21.68	21.72	21.64	21.69	21.65	1.0	22
		1	0	22.38	22.61	22.54	22.60	22.52	0.0	23
		1	12	22.35	22.59	22.53	22.55	22.50	0.0	23
		1	24	22.42	22.59	22.54	22.50	22.46	0.0	23
	16QAM	12	0	22.50	22.63	22.59	22.63	22.54	0.0	23
		12	7	22.58	22.67	22.59	22.65	22.56	0.0	23
		12	13	22.59	22.62	22.55	22.62	22.53	0.0	23
		25	0	22.59	22.62	22.55	22.65	22.53	0.0	23
		1	0	21.94	22.28	22.06	22.09	22.19	0.0	23
		1	12	21.92	22.27	22.08	22.09	22.16	0.0	23
	64QAM	1	24	22.03	22.24	22.02	22.06	22.14	0.0	23
		12	0	22.08	22.28	22.12	22.26	22.18	0.0	23
		12	7	22.19	22.30	22.12	22.25	22.20	0.0	23
		12	13	22.15	22.25	22.08	22.24	22.17	0.0	23
		25	0	22.18	22.24	22.15	22.19	22.12	0.0	23
		1	0	22.19	21.93	22.53	22.33	21.86	0.0	23
64QAM	1	12	22.18	21.91	22.51	22.31	21.83	0.0	23	
	1	24	22.28	21.89	22.49	22.25	21.77	0.0	23	
	12	0	21.50	21.71	21.78	21.64	21.68	1.0	22	
	12	7	21.62	21.75	21.77	21.65	21.67	1.0	22	
	12	13	21.61	21.70	21.75	21.63	21.61	1.0	22	
	25	0	21.59	21.74	21.65	21.63	21.67	1.0	22	

### 9.4. LTE Carrier Aggregation

The following power measurements were performed with a single carrier uplink; CA for this device is only supported in the downlinks.

This device supports CA combinations of one (1) Uplink and up to two (2) Downlinks.

Type	LTE CA combinations		PCC (UL)				SCC (DL)			LTE Rel 8 Tx. Power [dBm]	LTE Rel 11 Tx. Power [dBm]	Delta		
	PCC	+	SCC	Mode	BW (MHz)	Channel	Freq. (MHz)	RB/Offset	BW (MHz)	Channel	Freq. (MHz)			
Intra-Band Contiguous			41C	QPSK	20	39750	2506.0	50,24	20	39948	2525.8	22.48	22.46	-0.1%

**Note:**

Per KDB 941225 D05A LTE Rel. 10 KDB Inquiry Sheet: SAR is excluded for Carrier Aggregation when measured power does not exceed LTE Release 8 by more than a 1/4 dBm

### 9.5. Wi-Fi 2.4GHz (DTS Band)

**Measured Results**

Band	Mode	Data Rate	Ch #	Freq. (MHz)	Chain 0 Average Power (dBm)			Chain 1 Average Power (dBm)		
					Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
DSSS 2.4 GHz	802.11b	1 Mbps	1	2412	12.10	13.50	Yes	12.10	13.20	Yes
			6	2437	12.10	13.50		11.90	13.20	
			11	2462	12.20	13.50		12.20	13.20	
			12	2467	12.30	13.50		11.90	13.20	
			13	2472	10.90	12.00		11.90	13.20	
OFDM 2.4 GHz	802.11g	6 Mbps	1	2412	Not Required	13.80	No	Not Required	13.20	No
			6	2437		13.80			13.20	
			11	2462		13.80			13.20	
			12	2467		11.00			10.30	
			13	2472		3.00			2.30	
	802.11n (HT20)	6.5 Mbps	1	2412	13.90	No	Not Required	13.20	No	
			6	2437	13.90			13.20		
			11	2462	13.90			13.20		
			12	2467	11.10			10.30		
			13	2472	1.60			0.80		

**Note(s):**

- SAR is not required for 802.11g/n modes when the adjusted SAR for 802.11b is < 1.2 W/kg.
- For "Not required", SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band. Additional output power measurements were not deemed necessary.

### 9.6. Wi-Fi 5GHz (U-NII Bands)

#### Measured Results

Band	Mode	Data Rate	Ch #	Freq. (MHz)	Chain 0 Average Power (dBm)			Chain 1 Average Power (dBm)		
					Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-1 5.2 GHz	802.11a	6 Mbps	36	5180	10.80	12.50	Yes	Not Required	11.80	No
			40	5200	10.90	12.50			11.80	
			44	5220	11.00	12.50			11.80	
			48	5240	11.20	12.50			11.80	
	802.11n (HT20)	6.5 Mbps	36	5180	Not Required	12.40	No		11.90	No
			40	5200		12.40			11.90	
			44	5220		12.40			11.90	
			48	5240		12.40			11.90	
	802.11ac (VHT20)	6.5 Mbps	36	5180	Not Required	12.40	No		11.90	No
			40	5200		12.40			11.90	
			44	5220		12.40			11.90	
			48	5240		12.40			11.90	
	802.11n (HT40)	13.5 Mbps	38	5190	Not Required	12.40	No		10.90	No
			46	5230		12.40			11.90	
802.11ac (VHT40)	13.5 Mbps	38	5190	Not Required	12.40	No	10.90	No		
		46	5230		12.40		11.90			
802.11ac (VHT80)	29.3 Mbps	42	5210	Not Required	12.40	No	11.90	No		
Band	Mode	Data Rate	Ch #	Freq. (MHz)	Chain 0 Average Power (dBm)			Chain 1 Average Power (dBm)		
					Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-2A 5.3 GHz	802.11a	6 Mbps	52	5260	Not Required	12.30	No	10.60	Yes	
			56	5280		12.30		11.00		12.00
			60	5300		12.30		10.90		12.00
			64	5320		12.30		10.90		12.00
	802.11n (HT20)	6.5 Mbps	52	5260	Not Required	12.20	No	11.90	No	
			56	5280		12.20		11.90		
			60	5300		12.20		11.90		
			64	5320		12.20		11.90		
	802.11ac (VHT20)	6.5 Mbps	52	5260	Not Required	12.20	No	11.90	No	
			56	5280		12.20		11.90		
			60	5300		12.20		11.90		
			64	5320		12.20		11.90		
	802.11n (HT40)	13.5 Mbps	54	5270	Not Required	12.20	No	11.90	No	
			62	5310		12.20		11.90		
802.11ac (VHT40)	13.5 Mbps	54	5270	Not Required	12.20	No	11.90	No		
		62	5310		12.20		11.60			
802.11ac (VHT80)	29.3 Mbps	58	5290	Not Required	12.30	No	11.90	No		

#### Note(s):

- For "Not required", SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band. Additional output power measurements were not deemed necessary.
- When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac modes, the channel in the lower order/sequence 802.11 mode (i.e. a, g, n then ac) is selected.
- When the specified maximum output power is the same for both UNII band I and UNII band 2A, begin SAR measurement in UNII band 2A; and if the highest reported SAR for UNII band 2A is
  - ≤ 1.2 W/kg, SAR is not required for UNII band I
  - > 1.2 W/kg, both bands should be tested independently for SAR.

Band	Mode	Data Rate	Ch #	Freq. (MHz)	Chain 0 Average Power (dBm)			Chain 1 Average Power (dBm)		
					Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-2C 5.5 GHz	802.11a	6 Mbps	100	5500	Not Required	12.00	No	10.60	11.70	Yes
			116	5580		12.00		11.10	11.70	
			124	5620		12.00		11.30	11.70	
			144	5720		12.00		11.30	11.70	
	802.11n (HT20)	6.5 Mbps	100	5500		12.00	No	Not Required	11.60	No
			116	5580		12.00			11.60	
			124	5620		12.00			11.60	
			144	5720		12.00			11.60	
	802.11ac (VHT20)	6.5 Mbps	100	5500		12.00	No		11.60	No
			116	5580		12.00			11.60	
			124	5620		12.00			11.60	
			144	5720		12.00			11.60	
	802.11n (HT40)	13.5 Mbps	102	5510		12.00	No		11.60	No
			118	5590		12.00			11.60	
			126	5630		12.00			11.60	
			142	5710		12.00			11.60	
	802.11ac (VHT40)	13.5 Mbps	102	5510		12.00	No		11.60	No
			118	5590		12.00			11.60	
			126	5630		12.00			11.60	
			142	5710		12.00			11.60	
802.11ac (VHT80)	29.3 Mbps	106	5530	10.20	Yes	11.60	No			
		122	5610	10.60		11.60				
		138	5690	10.60		11.60				
Band	Mode	Data Rate	Ch #	Freq. (MHz)	Chain 0 Average Power (dBm)				Chain 1 Average Power (dBm)	
					Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-3 5.8 GHz	802.11a	6 Mbps	149	5745	Not Required	10.10	No	Not Required	9.80	No
			157	5785		10.10			9.80	
			165	5825		10.10			9.80	
	802.11n (HT20)	6.5 Mbps	149	5745		10.10	No		9.80	No
			157	5785		10.10			9.80	
			165	5825		10.10			9.80	
	802.11ac (VHT20)	6.5 Mbps	149	5745		10.10	No		9.80	No
			157	5785		10.10			9.80	
			165	5825		10.10			9.80	
	802.11n (HT40)	13.5 Mbps	151	5755		10.10	No		9.80	No
			159	5795		10.10			9.80	
	802.11ac (VHT40)	13.5 Mbps	151	5755		10.10	No		9.80	No
159			5795	10.10	9.80					
802.11ac (VHT80)	29.3 Mbps	155	5775	8.50	Yes	7.90	9.80	Yes		

**Note(s):**

- For "Not required", SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band. Additional output power measurements were not deemed necessary.
- When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac modes, the channel in the lower order/sequence 802.11 mode (i.e. a, g, n then ac) is selected.



### 9.7. Bluetooth

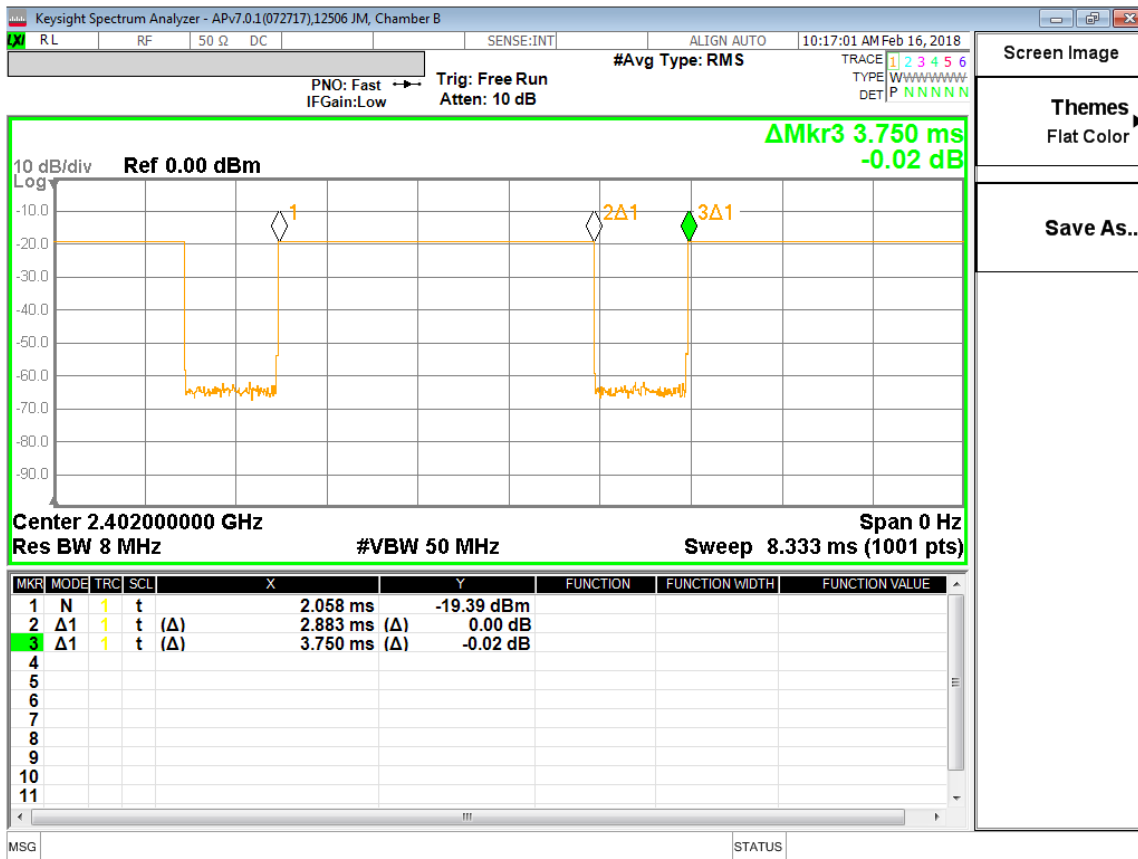
Band	Mode	Ch #	Freq. (MHz)	Chain 0 Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
2.4	GFSK	0	2402	9.08	10.30	Yes
		39	2441	9.96	10.90	
		78	2480	8.89	10.00	
	EDR, $\pi/4$ DQPSK	0	2402	6.61	7.40	No
		39	2441	7.63	8.20	
		78	2480	6.58	7.30	
	EDR, 8-DPSK	0	2402	6.63	7.40	No
		39	2441	7.59	8.20	
		78	2480	6.58	7.30	
	LE, GFSK	0	2402	3.40	4.00	No
		19	2440	4.94	5.40	
		39	2480	4.26	4.90	

#### Duty Factor Measured Results

Mode	Type	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
GFSK	DH5	2.883	3.75	76.88%	1.14

#### Duty Cycle plot

GFSK



## 10. Measured and Reported (Scaled) SAR Results

### SAR Test Reduction criteria are as follows:

Reported SAR(W/kg) for WWAN= Measured SAR \*Tune-up Scaling Factor

Reported SAR(W/kg) for Wi-Fi and Bluetooth= Measured SAR \* Tune-up scaling factor \* Duty Cycle scaling factor

### 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:

- $\leq 0.8$  W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\leq 100$  MHz
- $\leq 0.6$  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
- $\leq 0.4$  W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\geq 200$  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 648474 D04 Handset SAR (Phablet Only):

When hotspot mode does not apply, 10-g Extremity SAR is required for all surfaces and edges with an antenna located at  $\leq 25$  mm from that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR  $> 1.2$  W/kg .

Additional 1-g SAR testing at 5 mm is not required when hotspot mode 10-g extremity SAR is not required for the surfaces and edges; since all 1-g reported SAR  $< 1.2$  W/kg.

### 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  $\leq 1/4$  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  $\leq 1.2$  W/kg, SAR measurement is not required for the secondary mode.

### 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.
- For LTE bands that do not support at least three non-overlapping channels in certain channel bandwidths, test the available non-overlapping channels instead. 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; therefore, the requirement for H, M and L channels may not fully apply.

### KDB 248227 D01 SAR meas for 802.11:

SAR test reduction for 802.11 Wi-Fi transmission mode configurations are considered separately for DSSS and OFDM. An initial test position is determined to reduce the number of tests required for certain exposure configurations with multiple test positions. An initial test configuration is determined for each frequency band and aggregated band according to maximum output power, channel bandwidth, wireless mode configurations and other operating parameters to streamline the measurement requirements. For 2.4 GHz DSSS, either the initial test position or DSSS procedure is applied to reduce the number of SAR tests; these are

mutually exclusive. For OFDM, an initial test position is only applicable to next to the ear, UMPC mini-tablet and hotspot mode configurations, which is tested using the initial test configuration to facilitate test reduction. For other exposure conditions with a fixed test position, SAR test reduction is determined using only the initial test configuration.

The multiple test positions require SAR measurements in head, hotspot mode or UMPC mini-tablet configurations may be reduced according to the highest reported SAR determined using the initial test position(s) by applying the DSSS or OFDM SAR measurement procedures in the required wireless mode test configuration(s). The initial test position(s) is measured using the highest measured maximum output power channel in the required wireless mode test configuration(s). When the reported SAR for the initial test position is:

- $\leq 0.4$  W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.
- $> 0.4$  W/kg, SAR is repeated using the same wireless mode test configuration tested in the initial test position to measure the subsequent next closest/smallest test separation distance and maximum coupling test position, on the highest maximum output power channel, until the reported SAR is  $\leq 0.8$  W/kg or all required test positions are tested.
  - For subsequent test positions with equivalent test separation distance or when exposure is dominated by coupling conditions, the position for maximum coupling condition should be tested.
  - When it is unclear, all equivalent conditions must be tested.
- For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is  $> 0.8$  W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is  $\leq 1.2$  W/kg or all required test channels are considered.
  - The additional power measurements required for this step should be limited to those necessary for identifying subsequent highest output power channels to apply the test reduction.
- When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is  $\leq 1.2$  W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.
- When the specified maximum output power is different between UNII 1 and UNII 2A, begin SAR with the band that has the higher specified maximum output. If the highest reported SAR for the band with the highest specified power is  $\leq 1.2$  W/kg, testing for the band with the lower specified output power is not required; otherwise test the remaining bands independently for SAR.

To determine the initial test position, Area Scans were performed to determine the position with the *Maximum Value of SAR (measured)*. The position that produced the highest *Maximum Value of SAR* is considered the worst case position; thus used as the initial test position.

**10.1. GSM850**

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plots No.
						Tune-up Limit	Meas.	Meas.	Scaled	
Head	GPRS 4 Slots	0	Left Touch	190	836.6	28.20	27.70	0.140	0.157	1
			Left Tilt	190	836.6	28.20	27.70	0.061	0.068	
			Right Touch	190	836.6	28.20	27.70	0.150	0.168	
			Right Tilt	190	836.6	28.20	27.70	0.069	0.078	
Body-worn	GPRS 4 Slots	15	Rear	190	836.6	28.20	27.70	0.196	0.220	2
			Front	190	836.6	28.20	27.70	0.207	0.232	
Hotspot	GPRS 4 Slots	10	Rear	190	836.6	28.20	27.70	0.271	0.304	3
			Front	190	836.6	28.20	27.70	0.291	0.327	
			Edge 2	190	836.6	28.20	27.70	0.207	0.232	
			Edge 3	190	836.6	28.20	27.70	0.142	0.159	
			Edge 4	190	836.6	28.20	27.70	0.209	0.235	
Hotspot	DTM (CS + PS 1 slot)	10	Front	190	836.6	31.20	30.90	0.304	0.326	

**10.2. GSM1900**

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	
Head	GPRS 4 Slots	0	Left Touch	661	1880.0	23.70	23.40	0.141	0.151	4
			Left Tilt	661	1880.0	23.70	23.40	0.015	0.016	
			Right Touch	661	1880.0	23.70	23.40	0.094	0.101	
			Right Tilt	661	1880.0	23.70	23.40	0.003	0.004	
Body-worn	GPRS 4 Slots	15	Rear	661	1880.0	23.70	23.40	0.056	0.060	5
			Front	661	1880.0	23.70	23.40	0.073	0.078	
Hotspot	GPRS 4 Slots	10	Rear	661	1880.0	23.70	23.40	0.121	0.130	6
			Front	661	1880.0	23.70	23.40	0.127	0.136	
			Edge 2	661	1880.0	23.70	23.40	0.024	0.026	
			Edge 3	661	1880.0	23.70	23.40	0.111	0.119	
			Edge 4	661	1880.0	23.70	23.40	0.169	0.181	
Hotspot	DTM (CS + PS 1 slot)	10	Edge 4	661	1880.0	26.70	26.40	0.071	0.076	

**10.3. W-CDMA Band II**

RF Exposure Conditions	Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plots No.
							Tune-up Limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC 12.2 kbps	OFF	0	Left Touch	9400	1880.0	22.70	22.30	0.207	0.227	7
				Left Tilt	9400	1880.0	22.70	22.30	0.018	0.020	
				Right Touch	9400	1880.0	22.70	22.30	0.047	0.052	
				Right Tilt	9400	1880.0	22.70	22.30	0.016	0.018	
Body-worn	Rel 99 RMC 12.2 kbps	OFF	15	Rear	9400	1880.0	22.70	22.30	0.066	0.072	
				Front	9400	1880.0	22.70	22.30	0.083	0.091	8
Hotspot	Rel 99 RMC 12.2 kbps	OFF	10	Rear	9400	1880.0	22.70	22.30	0.142	0.156	
				Front	9400	1880.0	22.70	22.30	0.218	0.239	
				Edge 2	9400	1880.0	22.70	22.30	0.026	0.029	
				Edge 3	9400	1880.0	22.70	22.30	0.186	0.204	
				Edge 4	9400	1880.0	22.70	22.30	0.223	0.245	9

**10.4. W-CDMA Band IV**

RF Exposure Conditions	Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plots No.
							Tune-up Limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC 12.2 kbps	OFF	0	Left Touch	1413	1732.6	22.70	22.20	0.268	0.301	10
				Left Tilt	1413	1732.6	22.70	22.20	0.081	0.091	
				Right Touch	1413	1732.6	22.70	22.20	0.179	0.201	
				Right Tilt	1413	1732.6	22.70	22.20	0.085	0.095	
Body-worn	Rel 99 RMC 12.2 kbps	OFF	15	Rear	1413	1732.6	22.70	22.20	0.046	0.052	
				Front	1413	1732.6	22.70	22.20	0.134	0.150	11
Hotspot	Rel 99 RMC 12.2 kbps	OFF	10	Rear	1413	1732.6	22.70	22.20	0.168	0.188	
				Front	1413	1732.6	22.70	22.20	0.318	0.357	
				Edge 2	1413	1732.6	22.70	22.20	0.054	0.060	
				Edge 3	1413	1732.6	22.70	22.20	0.336	0.377	
				Edge 4	1413	1732.6	22.70	22.20	0.391	0.439	12

### 10.5. W-CDMA Band V

RF Exposure Conditions	Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plots No.
							Tune-up Limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC 12.2 kbps	OFF	0	Left Touch	4183	836.6	24.90	24.50	0.147	0.161	13
				Left Tilt	4183	836.6	24.90	24.50	0.073	0.080	
				Right Touch	4183	836.6	24.90	24.50	0.172	0.189	
				Right Tilt	4183	836.6	24.90	24.50	0.078	0.086	
Body-worn	Rel 99 RMC 12.2 kbps	OFF	15	Rear	4183	836.6	24.90	24.50	0.202	0.221	14
				Front	4183	836.6	24.90	24.50	0.200	0.219	
Hotspot	Rel 99 RMC 12.2 kbps	OFF	10	Rear	4183	836.6	24.90	24.50	0.291	0.319	15
				Front	4183	836.6	24.90	24.50	0.298	0.327	
				Edge 2	4183	836.6	24.90	24.50	0.188	0.206	
				Edge 3	4183	836.6	24.90	24.50	0.188	0.206	
				Edge 4	4183	836.6	24.90	24.50	0.248	0.272	

### 10.6. LTE Band 4 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plots No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	QPSK	OFF	0	Left Touch	20175	1732.5	1	0	23.00	22.77	0.280	0.295	16
							50	24	23.00	22.79	0.277	0.291	
				Left Tilt (15°)	20175	1732.5	1	0	23.00	22.77	0.101	0.106	
							50	24	23.00	22.79	0.096	0.101	
				Right Touch	20175	1732.5	1	0	23.00	22.77	0.188	0.198	
							50	24	23.00	22.79	0.192	0.202	
Right Tilt (15°)	20175	1732.5	1	0	23.00	22.77	0.102	0.108					
			50	24	23.00	22.79	0.099	0.104					
Body-worn	QPSK	OFF	15	Rear	20175	1732.5	1	0	23.00	22.77	0.114	0.120	
							50	24	23.00	22.79	0.111	0.116	
				Front	20175	1732.5	1	0	23.00	22.77	0.161	0.170	17
							50	24	23.00	22.79	0.172	0.181	
Hotspot	QPSK	OFF	10	Rear	20175	1732.5	1	0	23.00	22.77	0.221	0.233	
							50	24	23.00	22.79	0.218	0.229	
				Front	20175	1732.5	1	0	23.00	22.77	0.480	0.506	18
							50	24	23.00	22.79	0.421	0.442	
				Edge 2	20175	1732.5	1	0	23.00	22.77	0.035	0.037	
							50	24	23.00	22.79	0.035	0.037	
				Edge 3	20175	1732.5	1	0	23.00	22.77	0.264	0.278	
							50	24	23.00	22.79	0.262	0.275	
				Edge 4	20175	1732.5	1	0	23.00	22.77	0.449	0.473	
							50	24	23.00	22.79	0.447	0.469	

### 10.7. LTE Band 5 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plots No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	QPSK	OFF	0	Left Tocuh	20525	836.5	1	49	25.00	24.74	0.150	0.159	
							25	0	24.00	23.82	0.141	0.147	
				Left Tilt	20525	836.5	1	49	25.00	24.74	0.064	0.068	
							25	0	24.00	23.82	0.062	0.065	
				Right Touch	20525	836.5	1	49	25.00	24.74	0.160	0.170	19
							25	0	24.00	23.82	0.144	0.150	
Right Tilt	20525	836.5	1	49	25.00	24.74	0.074	0.079					
			25	0	24.00	23.82	0.072	0.075					
Body-worn	QPSK	OFF	15	Rear	20525	836.5	1	49	25.00	24.74	0.124	0.132	
							25	0	24.00	23.82	0.119	0.124	
				Front	20525	836.5	1	49	25.00	24.74	0.193	0.205	20
							25	0	24.00	23.82	0.179	0.187	
Hotspot	QPSK	OFF	10	Rear	20525	836.5	1	49	25.00	24.74	0.170	0.180	
							25	0	24.00	23.82	0.162	0.169	
				Front	20525	836.5	1	49	25.00	24.74	0.288	0.306	21
							25	0	24.00	23.82	0.262	0.273	
				Edge 2	20525	836.5	1	49	25.00	24.74	0.177	0.188	
							25	0	24.00	23.82	0.157	0.164	
				Edge 3	20525	836.5	1	49	25.00	24.74	0.147	0.156	
							25	0	24.00	23.82	0.131	0.137	
Edge 4	20525	836.5	1	49	25.00	24.74	0.199	0.211					
			25	0	24.00	23.82	0.182	0.190					

### 10.8. LTE Band 7 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plots No.			
								Tune-up Limit	Meas.	Meas.	Scaled				
Head	QPSK	0	Left Touch	21100	2535.0	1	99	23.00	22.58	0.089	0.098	22			
						50	24	23.00	22.67	0.086	0.093				
			Left Tilt	21100	2535.0	1	99	23.00	22.58	0.018	0.020				
						50	24	23.00	22.67	0.022	0.024				
			Right Touch	21100	2535.0	1	99	23.00	22.58	0.060	0.066				
						50	24	23.00	22.67	0.063	0.068				
			Right Tilt	21100	2535.0	1	99	23.00	22.58	0.016	0.018				
						50	24	23.00	22.67	0.019	0.020				
			Body-worn	QPSK	15	Rear	21100	2535.0	1	99	23.00	22.58	0.122	0.134	
									50	24	23.00	22.67	0.123	0.133	
						Front	21100	2535.0	1	99	23.00	22.58	0.174	0.192	
									50	24	23.00	22.67	0.180	0.194	23
Hotspot	QPSK	10	Rear	21100	2535.0	1	99	23.00	22.58	0.223	0.246				
						50	24	23.00	22.67	0.232	0.250				
			Front	21100	2535.0	1	99	23.00	22.58	0.362	0.399				
						50	24	23.00	22.67	0.380	0.410				
			Edge 2	21100	2535.0	1	99	23.00	22.58	0.170	0.187				
						50	24	23.00	22.67	0.180	0.194				
			Edge 3	20850	2510.0	50	0	23.00	22.75	0.730	0.773				
						1	99	23.00	22.58	0.707	0.779				
												50	24	23.00	22.67
			21350	2560.0	2560.0	50	0	23.00	22.65	0.553	0.599				
						1	99	23.00	22.58	0.054	0.059				
			Edge 4	21100	2535.0							1	99	23.00	22.58
50	24	23.00				22.67	0.052	0.056							



**10.9. LTE Band 13 (10MHz Bandwidth)**

RF Exposure Conditions	Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plots No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	QPSK	OFF	0	Left Touch	23230	782.0	1	49	25.00	24.87	0.103	0.106	25
							25	25	24.00	23.84	0.084	0.087	
				Left Tilt	23230	782.0	1	49	25.00	24.87	0.049	0.050	
							25	25	24.00	23.84	0.043	0.045	
				Right Touch	23230	782.0	1	49	25.00	24.87	0.099	0.102	
							25	25	24.00	23.84	0.083	0.086	
Right Tilt	23230	782.0	1	49	25.00	24.87	0.049	0.050					
			25	25	24.00	23.84	0.043	0.045					
Body-worn	QPSK	OFF	15	Rear	23230	782.0	1	49	25.00	24.87	0.161	0.166	
							25	25	24.00	23.84	0.124	0.129	
				Front	23230	782.0	1	49	25.00	24.87	0.170	0.175	26
							25	25	24.00	23.84	0.128	0.133	
Hotspot	QPSK	OFF	10	Rear	23230	782.0	1	49	25.00	24.87	0.212	0.218	27
							25	25	24.00	23.84	0.164	0.170	
				Front	23230	782.0	1	49	25.00	24.87	0.212	0.218	
							25	25	24.00	23.84	0.165	0.171	
				Edge 2	23230	782.0	1	49	25.00	24.87	0.179	0.184	
							25	25	24.00	23.84	0.135	0.140	
				Edge 3	23230	782.0	1	49	25.00	24.87	0.069	0.071	
							25	25	24.00	23.84	0.067	0.070	
Edge 4	23230	782.0	1	49	25.00	24.87	0.147	0.151					
			25	25	24.00	23.84	0.125	0.130					

### 10.10. LTE Band 17 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plots No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	QPSK	OFF	0	Left Touch	23790	710.0	1	0	25.00	24.53	0.156	0.174	28
							25	0	24.00	23.57	0.124	0.137	
				Left Tilt (15°)	23790	710.0	1	0	25.00	24.53	0.086	0.096	
							25	0	24.00	23.57	0.069	0.076	
				Right Touch	23790	710.0	1	0	25.00	24.53	0.131	0.146	
							25	0	24.00	23.57	0.106	0.117	
				Right Tilt (15°)	23790	710.0	1	0	25.00	24.53	0.072	0.080	
							25	0	24.00	23.57	0.056	0.062	
Body-worn	QPSK	OFF	15	Rear	23790	710.0	1	0	25.00	24.53	0.175	0.195	29
							25	0	24.00	23.57	0.142	0.157	
				Front	23790	710.0	1	0	25.00	24.53	0.165	0.184	
							25	0	24.00	23.57	0.134	0.148	
Hotspot	QPSK	OFF	10	Rear	23790	710.0	1	0	25.00	24.53	0.199	0.222	
							25	0	24.00	23.57	0.162	0.179	
				Front	23790	710.0	1	0	25.00	24.53	0.191	0.213	
							25	0	24.00	23.57	0.154	0.170	
				Edge 2	23790	710.0	1	0	25.00	24.53	0.210	0.234	30
							25	0	24.00	23.57	0.173	0.191	
				Edge 3	23790	710.0	1	0	25.00	24.53	0.052	0.058	
							25	0	24.00	23.57	0.044	0.049	
				Edge 4	23790	710.0	1	0	25.00	24.53	0.161	0.179	
							25	0	24.00	23.57	0.123	0.136	

### 10.11. LTE Band 41 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Pwr 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	40620	2593.0	1	0	23.00	22.65	0.083	0.090	31
							50	0	23.00	22.62	0.091	0.099	
				Left Tilt (15°)	40620	2593.0	1	0	23.00	22.65	0.015	0.016	
							50	0	23.00	22.62	0.013	0.014	
				Right Touch	40620	2593.0	1	0	23.00	22.65	0.039	0.042	
							50	0	23.00	22.62	0.040	0.044	
				Right Tilt (15°)	40620	2593.0	1	0	23.00	22.65	0.011	0.012	
							50	0	23.00	22.62	0.016	0.017	
Body-worn	QPSK	OFF	15	Rear	40620	2593.0	1	0	23.00	22.65	0.109	0.118	
							50	0	23.00	22.62	0.110	0.120	
				Front	40620	2593.0	1	0	23.00	22.65	0.130	0.141	
							50	0	23.00	22.62	0.148	0.162	
Hotspot	QPSK	OFF	10	Rear	40620	2593.0	1	0	23.00	22.65	0.199	0.216	
							50	0	23.00	22.62	0.212	0.231	
				Front	40620	2593.0	1	0	23.00	22.65	0.301	0.326	
							50	0	23.00	22.62	0.310	0.338	
				Edge 2	40620	2593.0	1	0	23.00	22.65	0.113	0.122	
							50	0	23.00	22.62	0.109	0.119	
				Edge 3	40620	2593.0	1	0	23.00	22.65	0.347	0.376	
							50	0	23.00	22.62	0.355	0.387	
				Edge 4	40620	2593.0	1	0	23.00	22.65	0.052	0.056	
							50	0	23.00	22.62	0.058	0.063	

### 10.12. Wi-Fi (DTS Band)

RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	802.11b 1 Mbps	Chain 0	0	Left Touch	12	2467	0.168	99.35%	13.50	12.30			
				Left Tilt	12	2467	0.170	99.35%	13.50	12.30			
				Right Touch	12	2467	0.468	99.35%	13.50	12.30	0.308	0.409	34
				Right Tilt	12	2467	0.375	99.35%	13.50	12.30	0.245	0.325	
Body-worn	802.11b 1 Mbps	Chain 0	15	Rear	12	2467	0.023	99.35%	13.50	12.30			
				Front	12	2467	0.036	99.35%	13.50	12.30	0.026	0.034	35
Hotspot	802.11b 1 Mbps	Chain 0	10	Rear	12	2467	0.045	99.35%	13.50	12.30			
				Front	12	2467	0.057	99.35%	13.50	12.30			
				Edge 1	12	2467	0.055	99.35%	13.50	12.30			
				Edge 4	12	2467	0.128	99.35%	13.50	12.30	0.078	0.104	36
Head	802.11b 1 Mbps	Chain 1	0	Left Touch	11	2462	0.056	99.35%	13.20	12.20			
				Left Tilt	11	2462	0.006	99.35%	13.20	12.20			
				Right Touch	11	2462	0.117	99.35%	13.20	12.20	0.071	0.090	37
				Right Tilt	11	2462	0.005	99.35%	13.20	12.20			
Body-worn	802.11b 1 Mbps	Chain 1	15	Rear	11	2462	0.006	99.35%	13.20	12.20	<0.001	<0.001	38
				Front	11	2462	0.006	99.35%	13.20	12.20			
Hotspot	802.11b 1 Mbps	Chain 1	10	Rear	11	2462	0.011	99.35%	13.20	12.20	0.012	0.016	39
				Front	11	2462	0.005	99.35%	13.20	12.20			
				Edge 2	11	2462	0.006	99.35%	13.20	12.20			

**Notes:**

- For results listed with “-”, the SAR result is less than 0.001 W/kg.
- When the 802.11b reported SAR of the highest measured maximum output power channel is ≤ 0.8 W/kg, no further SAR testing is required. If SAR is > 0.8 W/kg and ≤ 1.2 W/kg, SAR is required for the next highest measured output power channel. Finally, if SAR is > 1.2 W/kg, SAR is required for the third channel.
- SAR testing is not required for OFDM mode(s) when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

### 10.13. Wi-Fi (U-NII Band)

#### U-NII-1 & U-NII-2A

RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	802.11a	Chain 0	0	Left Touch	48	5240	0.226	98.2%	12.50	11.20			40
				Left Tilt	48	5240	0.190	98.2%	12.50	11.20			
				Right Touch	48	5240	0.788	98.2%	12.50	11.20	0.346	0.475	
				Right Tilt	48	5240	0.647	98.2%	12.50	11.20	0.199	0.273	
Body	802.11a	Chain 0	15	Rear	48	5240	0.025	98.2%	12.50	11.20			41
				Front	48	5240	0.029	98.2%	12.50	11.20	0.013	0.018	
Head	802.11a	Chain 1	0	Left Touch	56	5280	0.092	98.2%	12.00	11.00	0.027	0.035	42
				Left Tilt	56	5280	0.072	98.2%	12.00	11.00			
				Right Touch	56	5280	0.071	98.2%	12.00	11.00			
				Right Tilt	56	5280	0.079	98.2%	12.00	11.00			
Body	802.11a	Chain 1	15	Rear	56	5280	0.027	98.2%	12.00	11.00	0.008	0.010	43
				Front	56	5280	0.008	98.2%	12.00	11.00			
RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power (dBm)		10-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Product specific	802.11a	Chain 0	0	Rear	48	5240	0.415	98.2%	12.50	11.20			44
				Front	48	5240	1.200	98.2%	12.50	11.20	0.158	0.217	
				Edge 1	48	5240	0.589	98.2%	12.50	11.20			
				Edge 4	48	5240	1.010	98.2%	12.50	11.20			
Product specific	802.11a	Chain 1	0	Rear	56	5280	0.196	98.2%	12.00	11.00			45
				Front	56	5280	0.150	98.2%	12.00	11.00			
				Edge 2	56	5280	0.212	98.2%	12.00	11.00	0.016	0.021	

#### U-NII-2C

RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	802.11ac VHT80	Chain 0	0	Left Touch	138	5690	0.246	88.4%	12.00	10.60			46
				Left Tilt	138	5690	0.252	88.4%	12.00	10.60			
				Right Touch	138	5690	0.789	88.4%	12.00	10.60	0.334	0.521	
				Right Tilt	138	5690	0.512	88.4%	12.00	10.60	0.276	0.431	
Body	802.11ac VHT80	Chain 0	15	Rear	138	5690	0.084	88.4%	12.00	10.60	0.031	0.049	47
				Front	138	5690	0.034	88.4%	12.00	10.60			
Head	802.11a	Chain 1	0	Left Touch	144	5720	0.175	98.2%	11.70	11.30	0.051	0.057	48
				Left Tilt	144	5720	0.044	98.2%	11.70	11.30			
				Right Touch	144	5720	0.110	98.2%	11.70	11.30			
				Right Tilt	144	5720	0.021	98.2%	11.70	11.30			
Body	802.11a	Chain 1	15	Rear	144	5720	0.007	98.2%	11.70	11.30			49
				Front	144	5720	0.016	98.2%	11.70	11.30	0.002	0.002	
RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power (dBm)		10-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Product specific	802.11ac VHT80	Chain 0	0	Rear	138	5690	0.861	88.4%	12.00	10.60			50
				Front	138	5690	1.270	88.4%	12.00	10.60	0.176	0.275	
				Edge 1	138	5690	0.301	88.4%	12.00	10.60			
				Edge 4	138	5690	0.589	88.4%	12.00	10.60			
Product specific	802.11a	Chain 1	0	Rear	144	5720	0.369	98.2%	11.70	11.30			51
				Front	144	5720	0.690	98.2%	11.70	11.30	0.085	0.095	
				Edge 2	144	5720	0.596	98.2%	11.70	11.30			

U-NII-3

RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power (dBm)		1-g SAR (W/kg)		Plots No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	802.11ac (VHT80)	Chain 0	0	Left Touch	155	5775	0.188	88.4%	10.10	8.50			52
				Left Tilt	155	5775	0.190	88.4%	10.10	8.50			
				Right Touch	155	5775	0.420	88.4%	10.10	8.50	0.234	0.382	
				Right Tilt	155	5775	0.289	88.4%	10.10	8.50			
Body	802.11ac (VHT80)	Chain 0	15	Rear	155	5775	0.079	88.4%	10.10	8.50	0.025	0.041	53
				Front	155	5775	0.013	88.4%	10.10	8.50			
Head	802.11ac (VHT80)	Chain 1	0	Left Touch	155	5775	0.122	88.4%	9.80	7.90			54
				Left Tilt	155	5775	0.030	88.4%	9.80	7.90			
				Right Touch	155	5775	0.134	88.4%	9.80	7.90	0.040	0.070	
				Right Tilt	155	5775	0.017	88.4%	9.80	7.90			
Body	802.11ac (VHT80)	Chain 1	15	Rear	155	5775	0.009	88.4%	9.80	7.90			55
				Front	155	5775	0.013	88.4%	9.80	7.90	-	-	
RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power (dBm)		10-g SAR (W/kg)		Plots No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Product specific	802.11ac (VHT80)	Chain 0	0	Rear	155	5775	0.540	88.4%	10.10	8.50			56
				Front	155	5775	0.898	88.4%	10.10	8.50	0.122	0.199	
				Edge 1	155	5775	0.246	88.4%	10.10	8.50			
				Edge 4	155	5775	0.480	88.4%	10.10	8.50			
Product specific	802.11ac (VHT80)	Chain 1	0	Rear	155	5775	0.156	88.4%	9.80	7.90			57
				Front	155	5775	0.337	88.4%	9.80	7.90	0.034	0.060	
				Edge 2	155	5775	0.186	88.4%	9.80	7.90			

10.14. Bluetooth

RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up Limit	Meas.	Meas.	Scaled	
Head	GFSK	Chain 0	0	Left Touch	39	2441	76.9%	10.90	9.96	0.064	0.103	58
				Left Tilt	39	2441	76.9%	10.90	9.96	0.072	0.116	
				Right Touch	39	2441	76.9%	10.90	9.96	0.170	0.275	
				Right Tilt	39	2441	76.9%	10.90	9.96	0.137	0.221	
Body-worn	GFSK	Chain 0	15	Rear	39	2441	76.9%	10.90	9.96	0.005	0.008	59
				Front	39	2441	76.9%	10.90	9.96	0.013	0.021	
Hotspot	GFSK	Chain 0	10	Rear	39	2441	76.9%	10.90	9.96	0.014	0.023	60
				Front	39	2441	76.9%	10.90	9.96	0.023	0.037	
				Edge 1	39	2441	76.9%	10.90	9.96	0.017	0.028	
				Edge 4	39	2441	76.9%	10.90	9.96	0.029	0.046	

### 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 <0.8 or 2 W/kg (1-g or 10-g respectively); steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is ≥ 0.8 or 2 W/kg (1-g or 10-g respectively), 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 or 3.6 W/kg (~ 10% from the 1-g or 10-g respective SAR limit).
- 4) Perform a third repeated measurement only if the original, first, or second repeated measurement is ≥ 1.5 or 3.75 W/kg (1-g or 10-g respectively) and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	First Repeated	
						Measured SAR (W/kg)	Largest to Smallest SAR Ratio
700	LTE Band 13	Hotspot	Rear	No	0.212	N/A	N/A
	LTE Band 17	Hotspot	Edge 2	No	0.210	N/A	N/A
850	GSM 850	Hotspot	Front	No	0.291	N/A	N/A
	WCDMA Band V	Hotspot	Front	No	0.298	N/A	N/A
	LTE Band 5	Hotspot	Front	No	0.288	N/A	N/A
1700	WCDMA Band IV	Hotspot	Edge 4	No	0.391	N/A	N/A
	LTE Band 4	Hotspot	Front	No	0.480	N/A	N/A
1900	GSM 1900	Hotspot	Edge 4	No	0.169	N/A	N/A
	WCDMA Band II	Hotspot	Edge 4	No	0.223	N/A	N/A
2400	Wi-Fi 802.11b/g/n	Head	Right Touch	No	0.308	N/A	N/A
2400	BT	Head	Right Touch	No	0.170	N/A	N/A
2500	LTE Band 7	Hotspot	Edge 3	No	0.754	N/A	N/A
2600	LTE Band 41	Hotspot	Edge 3	No	0.355	N/A	N/A
5200	Wi-Fi 802.11a/n/ac	Head	Right Touch	No	0.346	N/A	N/A
5300	Wi-Fi 802.11a/n/ac	Head	Left Touch	No	0.027	N/A	N/A
5500	Wi-Fi 802.11a/n/ac	Head	Right Touch	No	0.334	N/A	N/A
5800	Wi-Fi 802.11a/n/ac	Head	Right Touch	No	0.234	N/A	N/A

**Note(s):**

Repeated measurement is not required when the original highest measured SAR is < 0.8 W/kg

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	First Repeated	
						Measured SAR (W/kg)	Largest to Smallest SAR Ratio
5200	Wi-Fi 802.11a/n/ac	Product specific	Front	No	0.158	N/A	N/A
5300	Wi-Fi 802.11a/n/ac	Product specific	Front	No	0.016	N/A	N/A
5500	Wi-Fi 802.11a/n/ac	Product specific	Front	No	0.176	N/A	N/A
5800	Wi-Fi 802.11a/n/ac	Product specific	Front	No	0.122	N/A	N/A

**Note(s):**

Repeated measurement is not required when the original highest measured SAR is < 2 W/kg

## 12. Simultaneous Transmission SAR Analysis

KDB 447498 D01 General RF Exposure Guidance explains how to calculate the SAR to Peak Location Ratio (SPLSR) between pairs of simultaneously transmitting antennas:

$$SPLSR = (SAR_1 + SAR_2)^{1.5} / Ri$$

Where:

**SAR<sub>1</sub>** is the highest reported or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

**SAR<sub>2</sub>** is the highest reported or estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

**Ri** is the separation distance between the pair of simultaneous transmitting antennas. When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of  $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$

In order for a pair of simultaneous transmitting antennas with the sum of 1-g SAR > 1.6 W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:

$$(SAR_1 + SAR_2)^{1.5} / Ri \leq 0.04$$

### Simultaneous Transmission Condition

Case	Cellular	WLAN Chain 0 / BT	WLAN Chain 1
1	GSM/GPRS/Edge	BT/BLE	(None)
2	GSM/GPRS/Edge	WLAN 2.4G	(None)
3	GSM/GPRS/Edge	WLAN 2.4G	WLAN 2.4G
4	GSM/GPRS/Edge	WLAN 2.4G	WLAN 5G
5	GSM/GPRS/Edge	WLAN 5G	WLAN 5G
6	GSM/GPRS/Edge	BT WLAN 5G	WLAN 5G
7	UMTS/HSPA	BT/BLE	(None)
8	UMTS/HSPA	WLAN 2.4G	(None)
9	UMTS/HSPA	WLAN 2.4G	WLAN 2.4G
10	UMTS/HSPA	WLAN 2.4G	WLAN 5G
11	UMTS/HSPA	WLAN 5G	WLAN 5G
12	UMTS/HSPA	BT WLAN 5G	WLAN 5G
13	LTE	BT/BLE	(None)
14	LTE	WLAN 2.4G	(None)
15	LTE	WLAN 2.4G	WLAN 2.4G
16	LTE	WLAN 2.4G	WLAN 5G
17	LTE	WLAN 5G	WLAN 5G
18	LTE	BT WLAN 5G	WLAN 5G
19	(None)	BT WLAN 5G	WLAN 5G



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

RF Exposure conditions	Test Position	Standalone SAR (W/kg)						Σ 1-g SAR (W/kg)							
		WWAN		DTS		U-NII		BT	WWAN + BT	WWAN + DTS	WWAN + DTS	WWAN + DTS + U-NII	WWAN + U-NII	WWAN+U-NII+BT	U-NII+BT
		①	Chain 0 ②	Chain 1 ③	Chain 0 ④	Chain 1 ⑤	Chain 0 ⑥	① + ⑥	① + ②	① + ② + ③	① + ② + ⑤	① + ④ + ⑤	① + ④ + ⑤ + ⑥	④ + ⑤ + ⑥	
Head	Left Touch	0.301	0.409	0.090	0.521	0.070	0.103	0.404	0.710	0.800	0.780	0.892	0.995	0.694	
	Left Tilt	0.106	0.409	0.090	0.521	0.070	0.116	0.222	0.515	0.605	0.585	0.697	0.813	0.707	
	Right Touch	0.202	0.409	0.090	0.521	0.070	0.275	0.477	0.611	0.701	0.681	0.793	1.068	0.866	
	Right Tilt	0.108	0.325	0.090	0.431	0.070	0.221	0.329	0.433	0.523	0.503	0.609	0.830	0.722	
Body-worn	Rear	0.221	0.034	0.001	0.049	0.010	0.008	0.229	0.255	0.256	0.265	0.280	0.288	0.067	
	Front	0.232	0.034	0.001	0.049	0.010	0.021	0.253	0.266	0.267	0.276	0.291	0.312	0.080	
Hotspot	Rear	0.319	0.104	0.016			0.023	0.342	0.423	0.439		0.319	0.342		
	Front	0.506	0.104	0.016			0.037	0.543	0.610	0.626		0.506	0.543		
	Edge 2	0.234	0.104	0.016			0.046	0.280	0.338	0.354					
	Edge 3	0.814	0.104	0.016			0.046	0.860	0.918	0.934					
	Edge 4	0.473	0.104	0.016			0.046	0.519	0.577	0.593					

**Conclusion:**

Simultaneous transmission SAR measurement (Volume Scan) is not required because either the 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.**

**12132730-S1V1 Appendix A: SAR Setup Photos**

**12132730-S1V1 Appendix B: SAR System Check Plots**

**12132730-S1V1 Appendix C: Highest SAR Test Plots**

**12132730-S1V1 Appendix D: SAR Liquid Tissue Ingredients**

**12132730-S1V1 Appendix E: SAR Probe Calibration Certificates**

**12132730-S1V1 Appendix F: SAR Dipole Calibration Certificates**

**END OF REPORT**