



## **SAR EVALUATION REPORT**

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

*For*

**Tablet**

**FCC ID: PY7TM-0053**

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NVLAP LAB CODE 200065-0

## REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
--	9/11/2014	Initial Issue	--

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### 1. Attestation of Test Results

Applicant Name	SONY MOBILE COMMUNICATIONS, INC.				
Application Purpose	<input checked="" type="checkbox"/> Original Grant <input type="checkbox"/> Class II Permissive Change				
FCC ID	PY7TM-0053				
DUT Description	Tablet				
Exposure Category	General Population/Uncontrolled Exposure (1g SAR limit: 1.6 W/kg)				
The highest reported SAR	RF Exposure Conditions	Equipment Class			
		Licensed	DTS	UNII	Bluetooth
	Stand-alone	1.382 W/kg	1.030 W/kg	1.423 W/kg	0.246 W/kg
	Simultaneous Transmission	0.146 W/kg	0.146 W/kg	N/A	N/A
Applicable Standards	FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013				
Test Results	Pass				
Date tested	8/11/2014 – 8/27/2014				
<p>UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.</p> <p><b>Note:</b> The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.</p>					
Approved & Released By:    Devin Chang Senior Engineer UL Verification Services Inc.			Prepared By:    Yu Chen Laboratory Technician UL Verification Services Inc.		

## 2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR Parts 1 & 2, IEEE STD 1528-2013, the following FCC Published RF exposure KDB procedures, and TCB workshop updates:

- 447498 D01 General RF Exposure Guidance v05r02
- 616217 D04 SAR for Laptop and Tablets v01r01
- 941225 D01 SAR test for 3G devices v02
- 941225 D02 HSPA and 1x Advanced v02r02
- 941225 D03 SAR Test Reduction GSM GPRS EDGE v01
- 941225 D04 SAR for GSM E GPRS Dual Xfer Mode v01
- 941225 D05 SAR for LTE Devices v02r03
- 941225 D05A LTE Rel.10 KDB Inquiry Sheet v01r01
- 248227 D01 SAR Meas for 802 11abg v01r02
- 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
- 865664 D02 SAR Reporting v01r01
- 690783 D01 SAR Listings on Grants v01r02

## 3. Facilities and Accreditation

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

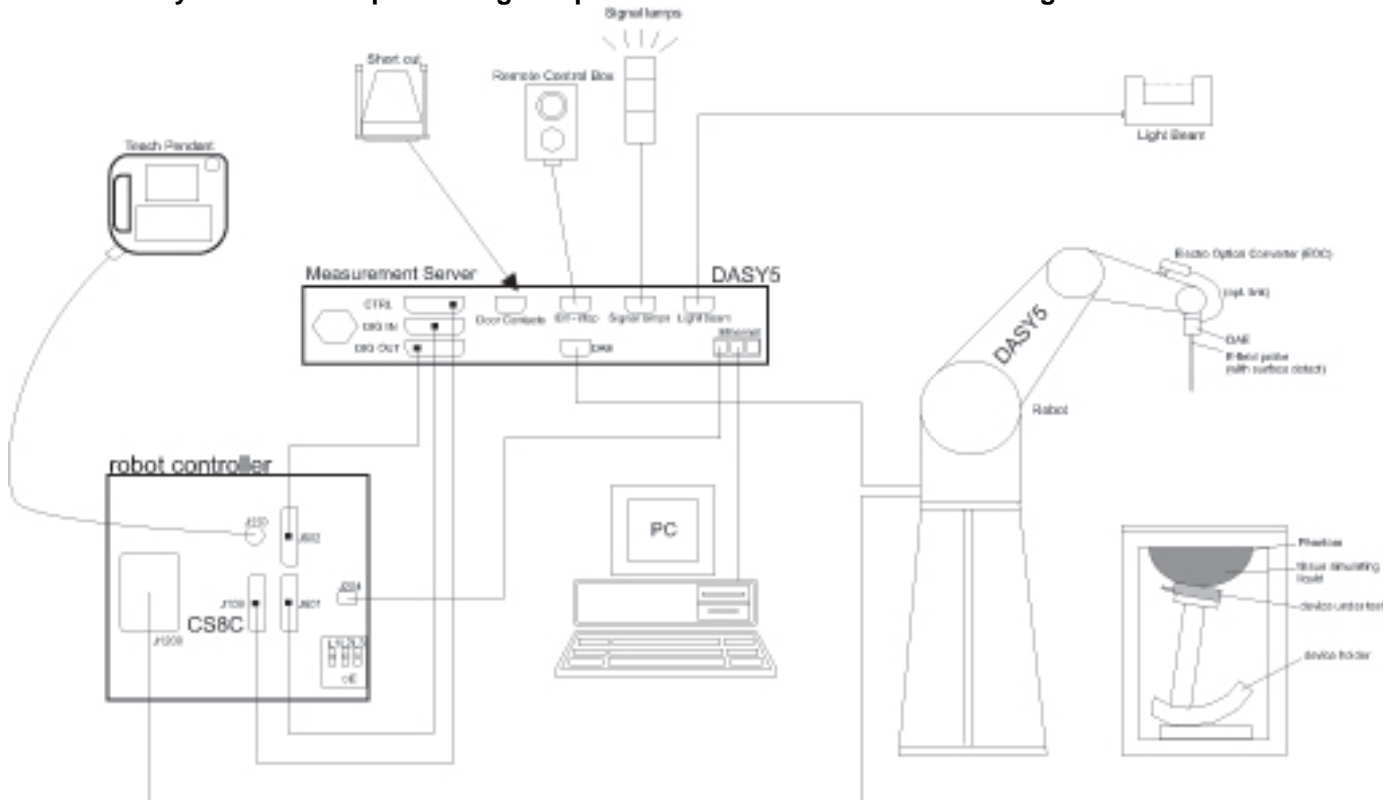
47173 Benicia Street	47266 Benicia Street
SAR Lab A	SAR Lab 1
SAR Lab B	SAR Lab 2
SAR Lab C	SAR Lab 3
SAR Lab D	SAR Lab 4
SAR Lab E	SAR Lab 5
SAR Lab F	
SAR Lab G	
SAR Lab H	

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

## 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 Procedure

### Step 1: Power Reference Measurement

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

### 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: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$		$\leq 2$ 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: $\Delta z_{\text{Zoom}}(n)$	$\leq 5$ mm	3 – 4 GHz: $\leq 4$ mm 4 – 5 GHz: $\leq 3$ mm 5 – 6 GHz: $\leq 2$ mm	
	graded grid	$\Delta z_{\text{Zoom}}(1)$ : 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
		$\Delta z_{\text{Zoom}}(n>1)$ : between subsequent points	$\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$	
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 area scan based <i>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	ENA Series/E5071B	MY42100131	2/24/2015
Dielectronic Probe kit	SPEAG	DAK-3.5	1087	11/13/2014
Dielectronic Probe kit	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	Control Company	4242	122529163	9/19/2014
Thermometer	EXTECH	445703	CCS-200	3/24/2015

#### System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Synthesized Signal Generator	HP	8665B	3744A01155	5/12/2015
Power Meter	HP	438A	3513U04320	10/2/2014
Power Sensor	Agilent	8481A	2702A66876	9/30/2014
Power Sensor	Agilent	8481A	3318A95392	9/30/2014
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1622052	N/A
Bi-directional coupler	Werlatone, Inc.	C8060-102	2711	N/A
DC Power Supply	HP	6296A	2841A-05955	N/A
E-Field Probe (SAR 2)	SPEAG	EX3DV3	3531	11/21/2014
E-Field Probe (SAR 3)	SPEAG	EX3DV4	3773	4/22/2015
E-Field Probe (SAR 4)	SPEAG	EX3DV4	3929	5/9/2015
Data Acquisition Electronics (SAR 2)	SPEAG	DAE4	1359	2/17/2015
Data Acquisition Electronics (SAR 3)	SPEAG	DAE4	1380	7/23/2015
Data Acquisition Electronics (SAR 4)	SPEAG	DAE4	1352	9/11/2014
System Validation Dipole	SPEAG	D835V2	4d002	11/15/2015
System Validation Dipole	SPEAG	D1900V2	5d043	11/12/2015
System Validation Dipole	SPEAG	D2450V2	899	9/10/2014
System Validation Dipole	SPEAG	D2600V2	1006	9/11/2014
System Validation Dipole	SPEAG	D5GHzV2	1138	11/19/2014
System Validation Dipole	SPEAG	D5GHzV2	1168	12/12/2014
Thermometer (SAR Lab 2)	EXTECH	445703	CCS-203	3/28/2015
Thermometer (SAR Lab 3)	EXTECH	445703	CCS-237	6/3/2015
Thermometer (SAR Lab 4)	EXTECH	445703	CCS-238	6/3/2015

#### Others

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Power Meter	Agilent	N1912A	MY53040015	7/10/2015
Power Sensor	Agilent	N1921A	MY52020011	5/6/2015
Power Sensor	Agilent	N1921A	MY52200012	9/25/2014
Base Station Simulator	Agilent	8960	GB46160222	11/21/2014
Base Station Simulator	R & S	CMW500	132910-cp	4/25/2015
Bluetooth Tester	R & S	CBT	100987-ww	4/21/2015

## 5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is  $< 1.5$  W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2003 & 2013 is not required in SAR reports submitted for equipment approval.

## 6. Device Under Test (DUT) Information

### 6.1. DUT Description

Device Dimension	Refer to Appendix 14.1
Battery Back Cover	The rechargeable battery is not user accessible.
Battery Options	The rechargeable battery is not user accessible.
Wireless Router (Hotspot)	<p>Wi-Fi Hotspot mode permits the device to share its cellular data connection with other Wi-Fi-enabled devices.</p> <input checked="" type="checkbox"/> Mobile Hotspot (Wi-Fi 2.4 GHz) <input type="checkbox"/> Mobile Hotspot (Wi-Fi 5 GHz)
Wi-Fi Direct	<p>Wi-Fi Direct enabled devices transfer data directly between each other</p> <input checked="" type="checkbox"/> Wi-Fi Direct (Wi-Fi 2.4 GHz) <input checked="" type="checkbox"/> Wi-Fi Direct (Wi-Fi 5 GHz) (Group Client only)

### 6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode	Duty Cycle used for SAR testing
GSM	850, 1900	GPRS (GMSK) EGPRS (8PSK)	GPRS/EGPRS: 1 Slot: 12.5%; 2 Slots: 25%, 3 Slots: 37.5%, 4 Slots: 50%,
		GPRS Multi-Slot Class: <input type="checkbox"/> Class 8 - One Up <input type="checkbox"/> Class 10 - Two Up <input type="checkbox"/> Class 12 - Four Up <input checked="" type="checkbox"/> Class 33 - Four Up DTM (Dual Transfer Mode): Support	
W-CDMA (UMTS)	Band II, V	UMTS Rel. 99 (Voice & Data) HSDPA (Rel. 7) HSUPA (Rel. 6) DC-HSDPA (Rel. 8) HSPA+ (Rel. 6)	100%
LTE (FDD)	Band 5 / 7	QPSK, 16QAM (Rel. 10) Do not support Carrier Aggregation (CA).	100%
		Does this device SV-LTE (1xRTT-LTE)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20)	100%
	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40) 802.11ac (VHT20) 802.11ac (VHT40) 802.11ac (VHT80)	100%
Bluetooth	2.4 GHz	Version 4.0 LE	32.25% (DH1), 66.68% (DH3), 77.52% (DH5)

### 6.3. Nominal and Maximum Output Power

RF Air interface	Mode		Full Power			Reduce Power		
			Target (dBm)	Tolerance (dB)	Max. Tune-up Limit (dBm)	Target (dBm)	Tolerance (dB)	Max. Tune-up Limit (dBm)
GSM850	GPRS GMSK	Tx Slot 1	33.0	-1.4 ~ 0.6	<b>33.6</b>	27.5	-2.4 ~ 1.6	<b>29.1</b>
		Tx Slot 2	31.0	-1.5 ~ 0.6	<b>31.6</b>	24.5	-2.5 ~ 1.6	<b>26.1</b>
		Tx Slot 3	29.0	-1.5 ~ 0.6	<b>29.6</b>	23.0	-2.5 ~ 1.6	<b>24.6</b>
		Tx Slot 4	28.0	-1.5 ~ 0.6	<b>28.6</b>	21.5	-2.5 ~ 1.6	<b>23.1</b>
	EGPRS 8PSK	Tx Slot 1	27.0	-1.5 ~ 1.0	<b>28.0</b>	27.0	-1.5 ~ 1.0	<b>28.0</b>
		Tx Slot 2	25.0	-1.5 ~ 1.0	<b>26.0</b>	23.6	-2.5 ~ 2.0	<b>25.6</b>
		Tx Slot 3	24.0	-1.5 ~ 1.0	<b>25.0</b>	22.1	-2.5 ~ 2.0	<b>24.1</b>
		Tx Slot 4	22.0	-1.5 ~ 1.0	<b>23.0</b>	20.6	-2.5 ~ 2.0	<b>22.6</b>
GSM1900	GPRS GMSK	Tx Slot 1	30.0	-0.7 ~ 0.6	<b>30.6</b>	22.4	-1.7 ~ 1.6	<b>24.0</b>
		Tx Slot 2	28.0	-1.5 ~ 0.6	<b>28.6</b>	19.9	-2.5 ~ 1.6	<b>21.5</b>
		Tx Slot 3	27.0	-1.5 ~ 0.6	<b>27.6</b>	17.9	-2.5 ~ 1.6	<b>19.5</b>
		Tx Slot 4	26.0	-1.5 ~ 0.6	<b>26.6</b>	16.4	-2.5 ~ 1.6	<b>18.0</b>
	EGPRS 8PSK	Tx Slot 1	26.0	-1.5 ~ 1.0	<b>27.0</b>	21.5	-2.5 ~ 2.0	<b>23.5</b>
		Tx Slot 2	24.0	-1.5 ~ 1.0	<b>25.0</b>	19.0	-2.5 ~ 2.0	<b>21.0</b>
		Tx Slot 3	23.0	-1.5 ~ 1.0	<b>24.0</b>	17.0	-2.5 ~ 2.0	<b>19.0</b>
		Tx Slot 4	22.0	-1.5 ~ 1.0	<b>23.0</b>	15.5	-2.5 ~ 2.0	<b>17.5</b>

#### Dual Transfer Mode

RF Air interface	Mode		Full Power			Reduce Power				
			Target (dBm)	Tolerance (dB)	Max. Tune-up Limit (dBm)	Target (dBm)	Tolerance (dB)	Max. Tune-up Limit (dBm)		
GSM850	GSM(Voice) + GPRS(Data)	Tx Slot 1	CS	33.0	-1.4 ~ 0.6	<b>33.6</b>	27.5	-2.4 ~ 1.6	<b>29.1</b>	
		Tx Slot 2	CS	31.0	-1.5 ~ 0.6	<b>31.6</b>	24.5	-2.4 ~ 1.6	<b>26.1</b>	
			PS	31.0	-1.5 ~ 0.6	<b>31.6</b>	24.5	-2.4 ~ 1.6	<b>26.1</b>	
		Tx Slot 3	CS	29.0	-1.5 ~ 0.6	<b>29.6</b>	23.0	-2.4 ~ 1.6	<b>24.6</b>	
			PS	29.0	-1.5 ~ 0.6	<b>29.6</b>	23.0	-2.4 ~ 1.6	<b>24.6</b>	
		GSM(Voice) + EGPRS(Data)	Tx Slot 1	CS	33.0	-1.4 ~ 0.6	<b>33.6</b>	27.5	-2.4 ~ 1.6	<b>29.1</b>
	Tx Slot 2		CS	31.0	-1.5 ~ 0.6	<b>31.6</b>	24.5	-2.5 ~ 1.6	<b>26.1</b>	
			PS	25.0	-1.5 ~ 1.0	<b>26.0</b>	23.6	-2.5 ~ 2.0	<b>25.6</b>	
	Tx Slot 3		CS	29.0	-1.5 ~ 0.6	<b>29.6</b>	23.0	-2.5 ~ 1.6	<b>24.6</b>	
			PS	24.0	-1.5 ~ 1.0	<b>25.0</b>	22.1	-2.5 ~ 2.0	<b>24.1</b>	
	GSM1900		GSM(Voice) + GPRS(Data)	Tx Slot 1	CS	30.0	-0.7 ~ 0.6	<b>30.6</b>	22.4	-1.7 ~ 1.6
		Tx Slot 2		CS	28.0	-1.5 ~ 0.6	<b>28.6</b>	19.9	-2.5 ~ 1.6	<b>21.5</b>
PS				28.0	-1.5 ~ 0.6	<b>28.6</b>	19.9	-2.5 ~ 1.6	<b>21.5</b>	
Tx Slot 3		CS		27.0	-1.5 ~ 0.6	<b>27.6</b>	17.9	-2.5 ~ 1.6	<b>19.5</b>	
		PS		27.0	-1.5 ~ 0.6	<b>27.6</b>	17.9	-2.5 ~ 1.6	<b>19.5</b>	
GSM(Voice) + EGPRS(Data)		Tx Slot 1		CS	30.0	-0.7 ~ 0.6	<b>30.6</b>	22.4	-1.7 ~ 1.6	<b>24.0</b>
		Tx Slot 2	CS	28.0	-1.5 ~ 0.6	<b>28.6</b>	19.9	-2.5 ~ 1.6	<b>21.5</b>	
			PS	24.0	-1.5 ~ 1.0	<b>25.0</b>	19.0	-2.5 ~ 2.0	<b>21.0</b>	
		Tx Slot 3	CS	27.0	-1.5 ~ 0.6	<b>27.6</b>	17.9	-2.5 ~ 1.6	<b>19.5</b>	
			PS	23.0	-1.5 ~ 1.0	<b>24.0</b>	17.0	-2.5 ~ 2.0	<b>19.0</b>	

Note: CS : circuit switched PS : packet switched

RF Air interface	Mode	Full Power			Reduce Power			
		Target (dBm)	Tolerance (dB)	Max. Tune-up Limit (dBm)	Target (dBm)	Tolerance (dB)	Max. Tune-up Limit (dBm)	
WCDMA Band II	R99	24.0	-0.7 ~ 0.5	<b>24.5</b>	13.5	-2.0 ~ 2.0	<b>15.5</b>	
	HSDPA	Subtest 1	24.0	-0.7 ~ 0.5	<b>24.5</b>	13.5	-2.0 ~ 2.0	<b>15.5</b>
		Subtest 2	24.0	-0.7 ~ 0.5	<b>24.5</b>	13.5	-2.0 ~ 2.0	<b>15.5</b>
		Subtest 3	24.0	-0.7 ~ 0.5	<b>24.5</b>	13.5	-2.0 ~ 2.0	<b>15.5</b>
		Subtest 4	24.0	-0.7 ~ 0.5	<b>24.5</b>	13.5	-2.0 ~ 2.0	<b>15.5</b>
	HSUPA	Subtest 1	24.0	-0.7 ~ 0.5	<b>24.5</b>	13.5	-2.0 ~ 2.0	<b>15.5</b>
		Subtest 2	24.0	-0.7 ~ 0.5	<b>24.5</b>	13.5	-2.0 ~ 2.0	<b>15.5</b>
		Subtest 3	24.0	-0.7 ~ 0.5	<b>24.5</b>	13.5	-2.0 ~ 2.0	<b>15.5</b>
		Subtest 4	24.0	-0.7 ~ 0.5	<b>24.5</b>	13.5	-2.0 ~ 2.0	<b>15.5</b>
		Subtest 5	24.0	-0.7 ~ 0.5	<b>24.5</b>	13.5	-2.0 ~ 2.0	<b>15.5</b>
	DC-HSDPA	Subtest 1	24.0	-0.7 ~ 0.5	<b>24.5</b>	13.5	-2.0 ~ 2.0	<b>15.5</b>
		Subtest 2	24.0	-0.7 ~ 0.5	<b>24.5</b>	13.5	-2.0 ~ 2.0	<b>15.5</b>
		Subtest 3	24.0	-0.7 ~ 0.5	<b>24.5</b>	13.5	-2.0 ~ 2.0	<b>15.5</b>
Subtest 4		24.0	-0.7 ~ 0.5	<b>24.5</b>	13.5	-2.0 ~ 2.0	<b>15.5</b>	
WCDMA Band V	R99	24.0	-0.7 ~ 0.5	<b>24.5</b>	19.0	-1.0 ~ 1.0	<b>20.0</b>	
	HSDPA	Subtest 1	24.0	-0.7 ~ 0.5	<b>24.5</b>	19.0	-1.0 ~ 1.0	<b>20.0</b>
		Subtest 2	24.0	-0.7 ~ 0.5	<b>24.5</b>	19.0	-1.0 ~ 1.0	<b>20.0</b>
		Subtest 3	24.0	-0.7 ~ 0.5	<b>24.5</b>	19.0	-1.0 ~ 1.0	<b>20.0</b>
		Subtest 4	24.0	-0.7 ~ 0.5	<b>24.5</b>	19.0	-1.0 ~ 1.0	<b>20.0</b>
	HSUPA	Subtest 1	24.0	-0.7 ~ 0.5	<b>24.5</b>	19.0	-1.0 ~ 1.0	<b>20.0</b>
		Subtest 2	24.0	-0.7 ~ 0.5	<b>24.5</b>	19.0	-1.0 ~ 1.0	<b>20.0</b>
		Subtest 3	24.0	-0.7 ~ 0.5	<b>24.5</b>	19.0	-1.0 ~ 1.0	<b>20.0</b>
		Subtest 4	24.0	-0.7 ~ 0.5	<b>24.5</b>	19.0	-1.0 ~ 1.0	<b>20.0</b>
		Subtest 5	24.0	-0.7 ~ 0.5	<b>24.5</b>	19.0	-1.0 ~ 1.0	<b>20.0</b>
	DC-HSDPA	Subtest 1	24.0	-0.7 ~ 0.5	<b>24.5</b>	19.0	-1.0 ~ 1.0	<b>20.0</b>
		Subtest 2	24.0	-0.7 ~ 0.5	<b>24.5</b>	19.0	-1.0 ~ 1.0	<b>20.0</b>
		Subtest 3	24.0	-0.7 ~ 0.5	<b>24.5</b>	19.0	-1.0 ~ 1.0	<b>20.0</b>
Subtest 4		24.0	-0.7 ~ 0.5	<b>24.5</b>	19.0	-1.0 ~ 1.0	<b>20.0</b>	
RF Air interface	Mode	Full Power			Reduce Power			
		Target (dBm)	Tolerance (dB)	Max. Tune-up Limit (dBm)	Target (dBm)	Tolerance (dB)	Max. Tune-up Limit (dBm)	
LTE B5	QPSK	23.0	-1.0 ~ 1.0	<b>24.0</b>	19.0	-1.0 ~ 1.0	<b>20.0</b>	
	16QAM	22.0	-1.0 ~ 1.0	<b>23.0</b>	19.0	-1.0 ~ 1.0	<b>20.0</b>	
LTE B7	QPSK	23.0	-1.5 ~ 1.0	<b>24.0</b>	12.5	-2.0 ~ 2.0	<b>14.5</b>	
	16QAM	22.0	-1.5 ~ 1.0	<b>23.0</b>	12.5	-2.0 ~ 2.0	<b>14.5</b>	

RF Air interface	Mode	Full Power
		Max. Tune-up Limit (dBm)
Wi-Fi 2.4 GHz	802.11b	<b>14.0</b>
	802.11g	<b>13.5</b>
	802.11n HT20	<b>13.5</b>
Wi-Fi 5 GHz	802.11a	<b>11.5</b>
	802.11n HT20	<b>11.5</b>
	802.11n HT40	<b>11.5</b>
	802.11ac VHT20	<b>11.5</b>
	802.11ac VHT40	<b>11.5</b>
	802.11ac VHT80	<b>11.5</b>
Bluetooth	BDR	<b>10.5</b>
	EDR	<b>7.9</b>
	BLE	<b>2.4</b>

### 6.4. Simultaneous Transmission Condition

RF Exposure Condition	Capable Transmit Configurations
Body	1. WWAN + Wi-Fi 2.4 GHz (MIMO) 2. WWAN + Wi-Fi 5 GHz (MIMO) + BT
Notes: 1. WWAN include GSM850/1900, W-CDMA Band V/IV/II, LTE Band 2/4/5/7/13/17. 2. Wi-Fi 2.4/5 GHz supports MIMO only. 3. Wi-Fi 2.4 GHz Radio cannot transmit simultaneously with Wi-Fi 5 GHz Radio. 4. Wi-Fi 2.4 GHz Radio cannot transmit simultaneously with Bluetooth Radio. 5. Wi-Fi 5 GHz Radio can transmit simultaneously with Bluetooth Radio.	

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

Item	Description																																								
Frequency range, Channel Bandwidth, Numbers and Frequencies	<table border="1"> <thead> <tr> <th rowspan="3">Band 5</th> <th colspan="6">Frequency range: 824 - 849 MHz</th> </tr> <tr> <th colspan="6">Channel Bandwidth</th> </tr> <tr> <th>20 MHz</th> <th>15 MHz</th> <th>10 MHz</th> <th>5 MHz</th> <th>3 MHz</th> <th>1.4 MHz</th> </tr> </thead> <tbody> <tr> <td>Low</td> <td></td> <td></td> <td>20450/829</td> <td>20425/826.5</td> <td>20415/825.5</td> <td>20407/824.7</td> </tr> <tr> <td>Mid</td> <td></td> <td></td> <td>20525/836.5</td> <td>20525/836.5</td> <td>20525/836.5</td> <td>20525/836.5</td> </tr> <tr> <td>High</td> <td></td> <td></td> <td>20600/844</td> <td>20625/846.5</td> <td>20635/847.5</td> <td>20643/848.3</td> </tr> </tbody> </table>	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
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	High			20600/844	20625/846.5	20635/847.5	20643/848.3																																		
	<table border="1"> <thead> <tr> <th rowspan="3">Band 7</th> <th colspan="6">Frequency range: 2500 - 2570 MHz</th> </tr> <tr> <th colspan="6">Channel Bandwidth</th> </tr> <tr> <th>20 MHz</th> <th>15 MHz</th> <th>10 MHz</th> <th>5 MHz</th> <th>3 MHz</th> <th>1.4 MHz</th> </tr> </thead> <tbody> <tr> <td>Low</td> <td>20850 2510</td> <td>20825 2507.5</td> <td>20800 2505</td> <td>20775 2502.5</td> <td></td> <td></td> </tr> <tr> <td>Mid</td> <td>21100 2535</td> <td>21100 2535</td> <td>21100 2535</td> <td>21100 2535</td> <td></td> <td></td> </tr> <tr> <td>High</td> <td>21350 2560</td> <td>21375 2562.5</td> <td>21400 2565</td> <td>21425 2567.5</td> <td></td> <td></td> </tr> </tbody> </table>	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 7		Frequency range: 2500 - 2570 MHz																																						
			Channel Bandwidth																																						
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Mid	21100 2535	21100 2535	21100 2535	21100 2535																																					
High	21350 2560	21375 2562.5	21400 2565	21425 2567.5																																					
LTE transmitter and antenna implementation	LTE has one (1) TX/RX antennas and one (1) RX antennas Refer to Appendix 14.1. Photos and Antenna Locations.																																								
Maximum power reduction (MPR)	<p align="center"><b>Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3</b></p> <table border="1"> <thead> <tr> <th rowspan="2">Modulation</th> <th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th> <th rowspan="2">MPR (dB)</th> </tr> <tr> <th>1.4 MHz</th> <th>3.0 MHz</th> <th>5 MHz</th> <th>10 MHz</th> <th>15 MHz</th> <th>20 MHz</th> </tr> </thead> <tbody> <tr> <td>QPSK</td> <td>&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> </tbody> </table> <p>MPR Built-in by design A-MPR (additional MPR) was disabled during SAR testing</p>	Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1	16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2		
Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)																																		
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz																																			
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1																																		
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1																																		
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2																																		
Power reduction	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.																																								

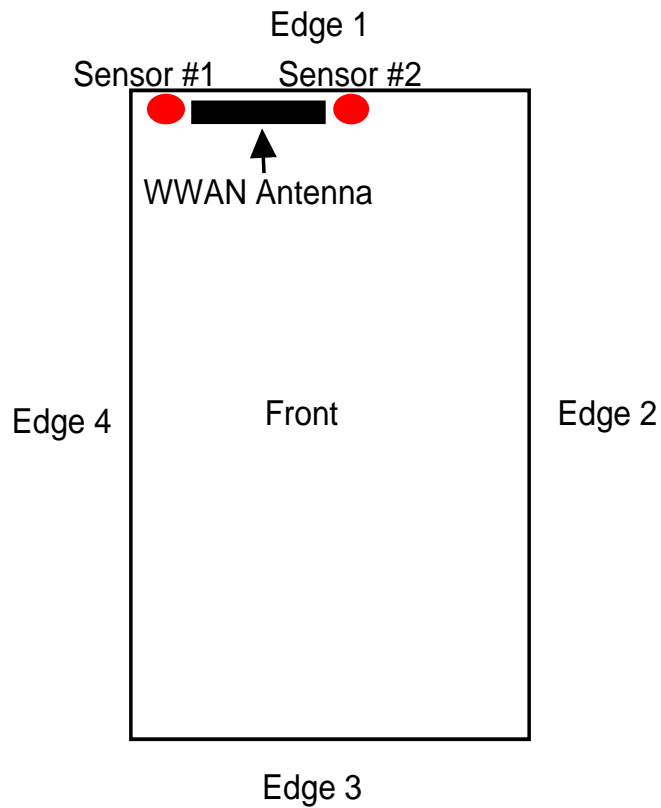
### 6.6. Antenna Dimensions and Separation Distances

Refer to Appendix 14.1. Photos and Antenna Locations.



## 6.7. Power Reduction by Proximity Sensing

The DUT has two proximity sensors to reduce the output power. The position of the sensors and antenna are as shown in the graphic.



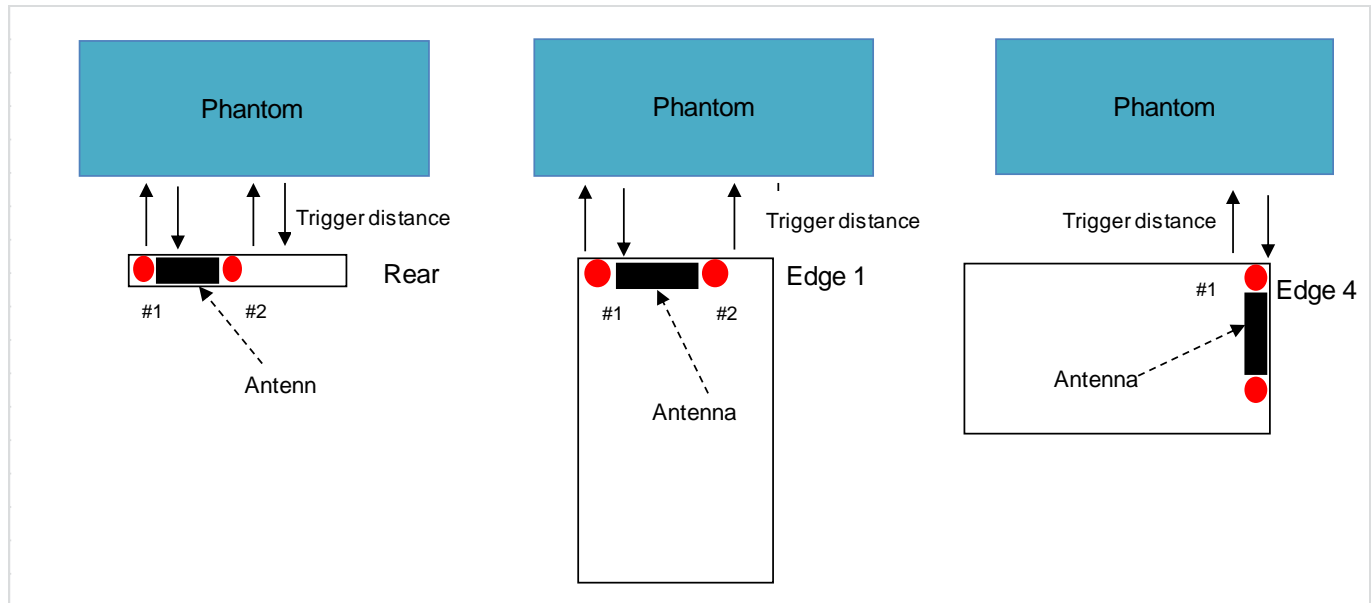
### 6.7.1. Proximity Sensor Triggering Distance (KDB 616217 §6.2)

Edge 1 of the DUT was placed directly below the flat phantom. The DUT was moved toward the phantom in accordance with the steps outlined in KDB 616217 §6.2 to determine the trigger distance for enabling power reduction. The DUT was moved away from the phantom to determine the trigger distance for resuming full power.

The measurement was then repeated for the Rear surface.

The DUT featured a visual indicator on its display that showed the status of the proximity sensor (Triggered or not triggered). This was used to determine the status of the sensor during the proximity sensor assessment as monitoring the output power directly was not practical without affecting the measurement.

It was confirmed separately that the output power was altered according to the proximity sensor status indication. This was achieved by observing the proximity sensor status at the same time as monitoring the conducted power. Section 9 contains both the full and reduced conducted power measurements.



#### Summary of Trigger Distances

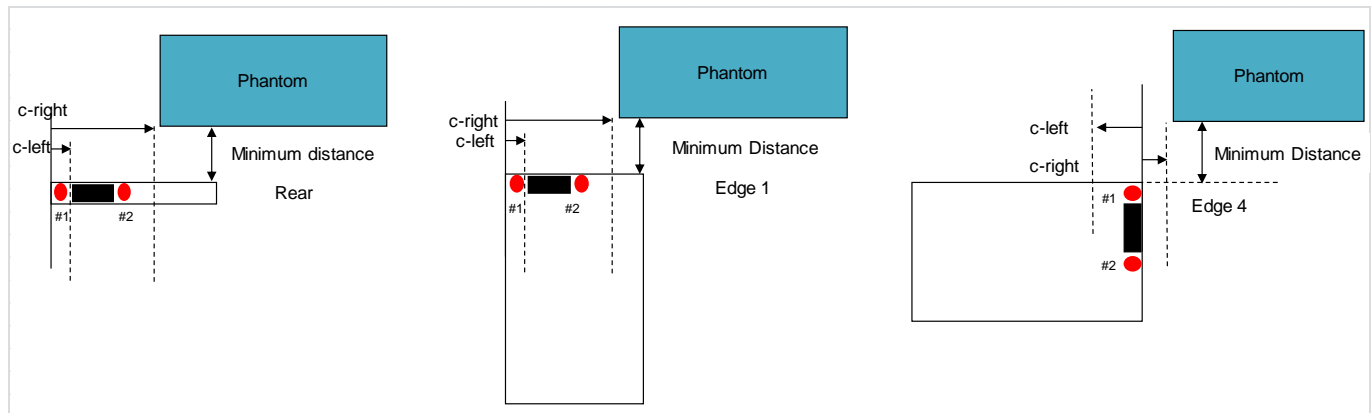
Band		Rear				Edge 1				Edge 4	
		#1		#2		#1		#2		#1	
		upward	downward	upward	downward	upward	downward	upward	downward	upward	downward
LTE	5	28	32	31	35	22	29	24	30	17	21
	7	28	33	30	34	22	30	24	30	16	21
UMTS	II	27	32	30	34	22	29	23	30	16	21
	V	27	31	29	33	22	30	23	31	16	22
GSM	1900	28	31	30	34	22	29	22	30	17	22
	850	29	32	30	34	22	29	22	32	17	22

### 6.7.2. Proximity Sensor Coverage (KDB 616217 §6.3)

The rear surface or edge of the tablet is positioned at a test separation distance less than or equal to the distance required for rear surface or edge triggering, with both the antenna and sensor pad located at least 20 mm laterally outside the edge (boundary) of the phantom, along the direction of maximum antenna and sensor offset.

For the rear surface, if the direction of maximum offset is not aligned with the tablet coordinates (physical edges) the tablet test position would not be aligned with the phantom coordinates (orientations).

Each applicable tablet edge should be positioned perpendicularly to the phantom to determine sensor coverage. For antennas and/or sensors located near the corner of a tablet, both adjacent edges must be considered.



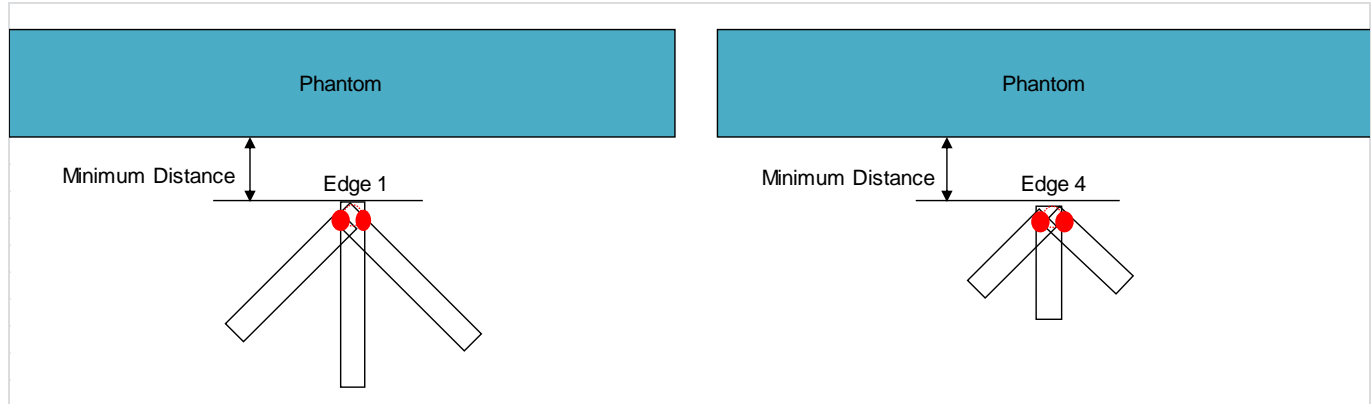
#### Summary of Tablet Sensor coverage to Proximity Sensor Triggering

Band	Rear (mm)		Minimum Distance (mm)	Edge 1 (mm)		Minimum Distance (mm)	Edge 4 (mm)		Minimum Distance (mm)	
	#1	#2		#1	#2		#1			
	c-left	c-right		c-left	c-right		c-left	c-right		
LTE	5	0	62	18	0	53	18	6	2	16
	7	0	62	18	0	52	18	5	2	16
UMTS	II	0	64	18	0	54	18	6	2	16
	V	0	62	18	0	53	18	6	2	16
GSM	1900	0	63	18	0	52	18	6	1	16
	850	0	63	18	0	53	18	6	2	16

### 6.7.3. Proximity Sensor Tilt Angle Assessment (KDB 616217 §6.4)

The DUT was positioned directly below the flat phantom at the minimum measured trigger distance with Edge 1 and Edge 4 parallel to the base of the flat phantom for each band.

The EUT was rotated about Edge 1 and Edge 4 for angles up to +/- 45°. If the output power increased during the rotation the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up to +/- 45°.



Proximity sensor tilt angle assessment (Edge 1 and Edge 4) KDB 616217 §6.4

### Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering

Band		Minimum Distance (mm)		
		Edge 1		Edge 4
		#1	#2	#1
LTE	5	17	17	17
	7	16	17	16
UMTS	II	18	18	17
	V	18	18	17
GSM	1900	18	18	17
	850	18	18	17

### 6.7.4. Resulting test positions for SAR measurements

Position	§6.2 Triggering Distance	§6.3 Coverage	§6.4 Tilt Angle	Worst case distance for SAR
Rear	27 mm	18 mm	N/A	
Edge 1	21 mm	18 mm	16 mm	
Edge 4	16 mm	16 mm	16 mm	

## 7. RF Exposure Conditions (Test Configurations)

The EUT implements the power reduction scheme for SAR compliance, for specific device configuration and orientations, as described below. The complete description of the implementation and functionality is provided in the “Operational Description of Power Reduction” exhibit.

### 7.1. Standalone SAR Test Exclusion Considerations

Since the *Dedicated Host Approach* is applied, the standalone SAR test exclusion procedure in KDB 447498 § 4.3.1 is applied in conjunction with KDB 616217 § 4.3 to determine the minimum test separation distance:

- When the separation distance from the antenna to an adjacent edge is ≤ 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.
- When the separation distance from the antenna to an adjacent edge is > 5 mm, the actual antenna-to-edge separation distance is applied to determine SAR test exclusion.

### SAR Test Exclusion Calculations for WWAN

#### Antennas < 50mm to adjacent edges

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
<b>Full Power, Proximity Sensor Off. A sensor triggering of 15 mm is included for Rear and Edge 1 &amp; 4</b>																
Cellular	GPRS 4 Slots	848.8	28.60	362	17.46	18	67.6	200.4	19.45		19.6	18.5	> 50 mm	> 50 mm	17.6	
Cellular	GPRS 4 Slots	1909.8	26.60	229	17.46	18	67.6	200.4	19.45		-MEASURE-	-MEASURE-	> 50 mm	> 50 mm	-MEASURE-	
Cellular	W-CDMA 2	1907.6	24.50	282	17.46	18	67.6	200.4	19.45		22.9	21.6	> 50 mm	> 50 mm	20.5	
Cellular	W-CDMA 5	846.6	24.50	282	17.46	18	67.6	200.4	19.45		-MEASURE-	-MEASURE-	> 50 mm	> 50 mm	-MEASURE-	
Cellular	LTE Band 5	844	24.00	251	17.46	18	67.6	200.4	19.45		13.6	12.8	> 50 mm	> 50 mm	12.1	
Cellular	LTE Band 7	2560	24.00	251	17.46	18	67.6	200.4	19.45		-MEASURE-	-MEASURE-	> 50 mm	> 50 mm	-MEASURE-	
<b>Second Stage Power Back-off, Proximity Sensor On</b>																
Cellular	GPRS 3 Slots	848.8	24.60	108	2.46	3	67.6	200.4	4.45		19.9	19.9	> 50 mm	> 50 mm	19.9	
Cellular	GPRS 2 Slots	1909.8	21.50	35	2.46	3	67.6	200.4	4.45		-MEASURE-	-MEASURE-	> 50 mm	> 50 mm	-MEASURE-	
Cellular	W-CDMA 2	1907.6	20.00	100	2.46	3	67.6	200.4	4.45		27.6	27.6	> 50 mm	> 50 mm	27.6	
Cellular	W-CDMA 5	846.6	15.50	35	2.46	3	67.6	200.4	4.45		-MEASURE-	-MEASURE-	> 50 mm	> 50 mm	-MEASURE-	
Cellular	LTE Band 5	844	24.00	251	2.46	3	67.6	200.4	4.45		46.1	46.1	> 50 mm	> 50 mm	46.1	
Cellular	LTE Band 7	2560	14.50	28	2.46	3	67.6	200.4	4.45		-MEASURE-	-MEASURE-	> 50 mm	> 50 mm	-MEASURE-	

#### Note(s):

1. According to KDB 447498, if the calculated threshold value is >3 then SAR testing is required.

#### Antennas > 50mm to adjacent edges

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
<b>Full Power, Proximity Sensor Off. A sensor triggering of 15 mm is included for Rear and Edge 1 &amp; 4</b>																
Cellular	GPRS 4 Slots	848.8	28.60	362	17.46	18	67.6	200.4	19.45		< 50 mm	< 50 mm	262.4 mW	1013.9 mW	< 50 mm	
Cellular	GPRS 4 Slots	1909.8	26.60	229	17.46	18	67.6	200.4	19.45		< 50 mm	< 50 mm	-MEASURE-	-MEASURE-	< 50 mm	
Cellular	W-CDMA 2	1907.6	24.50	282	17.46	18	67.6	200.4	19.45		< 50 mm	< 50 mm	284.6 mW	1612.6 mW	< 50 mm	
Cellular	W-CDMA 5	846.6	24.50	282	17.46	18	67.6	200.4	19.45		< 50 mm	< 50 mm	-EXEMPT-	-EXEMPT-	< 50 mm	
Cellular	LTE Band 5	844	24.00	251	17.46	18	67.6	200.4	19.45		< 50 mm	< 50 mm	262.4 mW	1011.9 mW	< 50 mm	
Cellular	LTE Band 7	2560	24.00	251	17.46	18	67.6	200.4	19.45		< 50 mm	< 50 mm	-MEASURE-	-MEASURE-	< 50 mm	
<b>Second Stage Power Back-off, Proximity Sensor On</b>																
Cellular	GPRS 3 Slots	848.8	24.60	108	2.46	3	67.6	200.4	4.45		< 50 mm	< 50 mm	284.6 mW	1612.6 mW	< 50 mm	
Cellular	GPRS 2 Slots	1909.8	21.50	35	2.46	3	67.6	200.4	4.45		< 50 mm	< 50 mm	-EXEMPT-	-EXEMPT-	< 50 mm	
Cellular	W-CDMA 2	1907.6	20.00	100	2.46	3	67.6	200.4	4.45		< 50 mm	< 50 mm	284.6 mW	1612.6 mW	< 50 mm	
Cellular	W-CDMA 5	846.6	15.50	35	2.46	3	67.6	200.4	4.45		< 50 mm	< 50 mm	-EXEMPT-	-EXEMPT-	< 50 mm	
Cellular	LTE Band 5	844	24.00	251	2.46	3	67.6	200.4	4.45		< 50 mm	< 50 mm	262.4 mW	1011.9 mW	< 50 mm	
Cellular	LTE Band 7	2560	14.50	28	2.46	3	67.6	200.4	4.45		< 50 mm	< 50 mm	-MEASURE-	-MEASURE-	< 50 mm	

#### Note(s):

1. According to KDB 447498, if the calculated Power threshold is less than the output power then SAR testing is required.

**SAR Test Exclusion Calculations for WLAN**

**Antennas < 50mm to adjacent edges**

**MIMO**

Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
		dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
<b>Wi-Fi Main Antenna</b>															
Wi-Fi 2.4 GHz	2462	14.00	25	2.46	187.7	55.1	3	36		7.8 -MEASURE-	> 50 mm	> 50 mm	7.8 -MEASURE-	1.1 -EXEMPT-	
Wi-Fi 5.2 GHz	5240	11.50	14	2.46	187.7	55.1	3	36		6.4 -MEASURE-	> 50 mm	> 50 mm	6.4 -MEASURE-	0.9 -EXEMPT-	
Wi-Fi 5.3 GHz	5320	11.50	14	2.46	187.7	55.1	3	36		6.5 -MEASURE-	> 50 mm	> 50 mm	6.5 -MEASURE-	0.9 -EXEMPT-	
Wi-Fi 5.5 GHz	5700	11.50	14	2.46	187.7	55.1	3	36		6.7 -MEASURE-	> 50 mm	> 50 mm	6.7 -MEASURE-	0.9 -EXEMPT-	
Wi-Fi 5.8 GHz	5825	11.50	14	2.46	187.7	55.1	3	36		6.8 -MEASURE-	> 50 mm	> 50 mm	6.8 -MEASURE-	0.9 -EXEMPT-	
Bluetooth	2480	10.50	11	2.46	187.7	55.1	3	36		3.5 -MEASURE-	> 50 mm	> 50 mm	3.5 -MEASURE-	0.5 -EXEMPT-	
<b>Wi-Fi Sub Antenna</b>															
Wi-Fi 2.4 GHz	2462	14.00	25	2.32	187.7	8.85	4.6	90.685		7.8 -MEASURE-	> 50 mm	4.4 -MEASURE-	7.8 -MEASURE-	> 50 mm	
Wi-Fi 5.2 GHz	5240	11.50	14	2.32	187.7	8.85	4.6	90.685		6.4 -MEASURE-	> 50 mm	3.6 -MEASURE-	6.4 -MEASURE-	> 50 mm	
Wi-Fi 5.3 GHz	5320	11.50	14	2.32	187.7	8.85	4.6	90.685		6.5 -MEASURE-	> 50 mm	3.6 -MEASURE-	6.5 -MEASURE-	> 50 mm	
Wi-Fi 5.5 GHz	5700	11.50	14	2.32	187.7	8.85	4.6	90.685		6.7 -MEASURE-	> 50 mm	3.7 -MEASURE-	6.7 -MEASURE-	> 50 mm	
Wi-Fi 5.8 GHz	5825	11.50	14	2.32	187.7	8.85	4.6	90.685		6.8 -MEASURE-	> 50 mm	3.8 -MEASURE-	6.8 -MEASURE-	> 50 mm	

**Note(s):**

1. According to KDB 447498, if the calculated threshold value is >3 then SAR testing is required.

**Antennas > 50mm to adjacent edges**

**MIMO**

Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
		dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
<b>Wi-Fi Main Antenna</b>															
Wi-Fi 2.4 GHz	2462	14.00	25	2.46	187.7	55.1	3	36		< 50 mm	1472.6 mW -EXEMPT-	146.6 mW -EXEMPT-	< 50 mm	< 50 mm	
Wi-Fi 5.2 GHz	5240	11.50	14	2.46	187.7	55.1	3	36		< 50 mm	1442.5 mW -EXEMPT-	116.5 mW -EXEMPT-	< 50 mm	< 50 mm	
Wi-Fi 5.3 GHz	5320	11.50	14	2.46	187.7	55.1	3	36		< 50 mm	1442 mW -EXEMPT-	116 mW -EXEMPT-	< 50 mm	< 50 mm	
Wi-Fi 5.5 GHz	5700	11.50	14	2.46	187.7	55.1	3	36		< 50 mm	1439.8 mW -EXEMPT-	113.8 mW -EXEMPT-	< 50 mm	< 50 mm	
Wi-Fi 5.8 GHz	5825	11.50	14	2.46	187.7	55.1	3	36		< 50 mm	1439.2 mW -EXEMPT-	113.2 mW -EXEMPT-	< 50 mm	< 50 mm	
Bluetooth	2480	10.50	11	2.46	187.7	55.1	3	36		< 50 mm	1472.3 mW -EXEMPT-	146.3 mW -EXEMPT-	< 50 mm	< 50 mm	
<b>Wi-Fi Sub Antenna</b>															
Wi-Fi 2.4 GHz	2462	14.00	25	2.32	187.7	8.85	4.6	90.685		< 50 mm	1472.6 mW -EXEMPT-	< 50 mm	< 50 mm	502.4 mW -EXEMPT-	
Wi-Fi 5.2 GHz	5240	11.50	14	2.32	187.7	8.85	4.6	90.685		< 50 mm	1442.5 mW -EXEMPT-	< 50 mm	< 50 mm	472.4 mW -EXEMPT-	
Wi-Fi 5.3 GHz	5320	11.50	14	2.32	187.7	8.85	4.6	90.685		< 50 mm	1442 mW -EXEMPT-	< 50 mm	< 50 mm	471.9 mW -EXEMPT-	
Wi-Fi 5.5 GHz	5700	11.50	14	2.32	187.7	8.85	4.6	90.685		< 50 mm	1439.8 mW -EXEMPT-	< 50 mm	< 50 mm	469.7 mW -EXEMPT-	
Wi-Fi 5.8 GHz	5825	11.50	14	2.32	187.7	8.85	4.6	90.685		< 50 mm	1439.2 mW -EXEMPT-	< 50 mm	< 50 mm	469 mW -EXEMPT-	

**Note(s):**

1. According to KDB 447498, if the calculated Power threshold is less than the output power then SAR testing is required.

## 7.2. Required Test Configurations

The table below identifies the standalone WWAN test configurations required for this device according to the findings in Section 7.1:

Test Configurations	Rear	Edge 1	Edge 2	Edge 3	Edge 4
		(Top Edge)	(Right Edge )	(Bottom Edge)	(Left Edge)
GSM850 Full Power	Yes	Yes	Yes	No	Yes
GSM850 w/ Power Reduction	Yes	Yes	No	No	Yes
GSM1900 Full Power	Yes	Yes	No	No	Yes
GSM1900 w/ Power Reduction	Yes	Yes	No	No	Yes
W-CDMA Band 2 Full Power	Yes	Yes	No	No	Yes
W-CDMA Band 2 w/ Power Reduction	Yes	Yes	No	No	Yes
W-CDMA Band 5 Full Power	Yes	Yes	Yes	No	Yes
W-CDMA Band 5 w/ Power Reduction	Yes	Yes	No	No	Yes
LTE Band 5 Full Power	Yes	Yes	No	No	Yes
LTE Band 5 w/ Power Reduction	Yes	Yes	No	No	Yes
LTE Band 7 Full Power	Yes	Yes	No	No	Yes
LTE Band 7 w/ Power Reduction	Yes	Yes	No	No	Yes
Wi-Fi 2.4 GHz MIMO	Yes	No	Yes	Yes	No
Wi-Fi 5 GHz MIMO	Yes	No	Yes	Yes	No
Bluetooth	Yes	No	No	Yes	No

### Note(s):

1. Yes = Testing is required.
2. No = Testing is not required.

## 8. RF Output Power Measurement

### 8.1. GSM850/1900

#### GSM850 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Full Pwr		Reduce Pwr	
						Burst (dBm)	Frame (dBm)	Burst (dBm)	Frame (dBm)
850	GPRS (GMSK)	CS1	1	128	824.2	33.5	24.5	29.0	20.0
				190	836.6	33.5	24.5	28.9	19.9
				251	848.8	33.5	24.5	28.9	19.9
			2	128	824.2	31.6	25.6	29.0	23.0
				190	836.6	31.6	25.6	28.9	22.9
				251	848.8	31.6	25.6	28.9	22.9
			3	128	824.2	29.5	25.2	<b>26.1</b>	<b>21.8</b>
				190	836.6	29.6	25.3	<b>26.1</b>	<b>21.8</b>
				251	848.8	29.6	25.3	<b>26.0</b>	<b>21.7</b>
			4	128	824.2	<b>28.6</b>	<b>25.6</b>	24.5	21.5
				190	836.6	<b>28.6</b>	<b>25.6</b>	24.5	21.5
				251	848.8	<b>28.6</b>	<b>25.6</b>	24.4	21.4
	EGPRS (8PSK)	MCS5	1	128	824.2	27.7	18.7	23.0	14.0
				190	836.6	27.8	18.8	23.0	14.0
				251	848.8	27.8	18.8	23.0	14.0
			2	128	824.2	25.6	19.6	27.7	21.7
				190	836.6	25.7	19.7	27.7	21.7
				251	848.8	25.7	19.7	27.6	21.6
			3	128	824.2	24.8	20.5	25.3	21.0
				190	836.6	24.9	20.6	25.3	21.0
				251	848.8	24.9	20.6	25.3	21.0
			4	128	824.2	22.8	19.8	23.9	20.9
				190	836.6	22.9	19.9	23.9	20.9
				251	848.8	22.9	19.9	24.0	21.0

#### Notes:

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

RF Exposure Conditions	Mode	Pwr Back-off	Tx Slot
Body-worn	GPRS (GMSK)	OFF	4
Body-worn	GPRS (GMSK)	ON	3

- SAR is not required for EGPRS (8PSK) mode because its output power is less than that of GPRS Mode.



**GSM1900 Measured Results**

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Full Pwr		Reduce Pwr	
						Burst (dBm)	Frame (dBm)	Burst (dBm)	Frame (dBm)
1900	GPRS (GMSK)	CS1	1	512	1850.2	30.1	21.1	23.7	14.7
				661	1880.0	30.4	21.4	23.6	14.6
				810	1909.8	30.2	21.2	23.5	14.5
			2	512	1850.2	30.1	24.1	<b>23.7</b>	<b>17.7</b>
				661	1880.0	30.4	24.4	<b>23.6</b>	<b>17.6</b>
				810	1909.8	30.2	24.2	<b>23.5</b>	<b>17.5</b>
			3	512	1850.2	28.4	24.1	21.3	17.0
				661	1880.0	28.5	24.2	21.3	17.0
				810	1909.8	28.4	24.1	21.2	16.9
			4	512	1850.2	<b>27.6</b>	<b>24.6</b>	19.3	16.3
				661	1880.0	<b>27.6</b>	<b>24.6</b>	19.2	16.2
				810	1909.8	<b>27.5</b>	<b>24.5</b>	19.1	16.1
	EGPRS (8PSK)	MCS5	1	512	1850.2	26.5	17.5	17.8	8.8
				661	1880.0	26.6	17.6	17.7	8.7
				810	1909.8	26.5	17.5	17.6	8.6
			2	512	1850.2	26.5	20.5	23.1	17.1
				661	1880.0	26.6	20.6	23.2	17.2
				810	1909.8	26.5	20.5	23.1	17.1
			3	512	1850.2	24.7	20.4	20.9	16.6
				661	1880.0	24.8	20.5	20.9	16.6
				810	1909.8	24.7	20.4	20.9	16.6
			4	512	1850.2	23.6	20.6	19.0	16.0
				661	1880.0	23.6	20.6	19.0	16.0
				810	1909.8	23.5	20.5	18.8	15.8

**Notes:**

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

RF Exposure Conditions	Mode	Pwr Back-off	Tx Slot
Body-worn	GPRS (GMSK)	OFF	4
Body-worn	GPRS (GMSK)	ON	2

- SAR is not required for EGPRS (8PSK) mode because its output power is less than that of GPRS Mode

**GSM850 DTM Measured Results**

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Full Pwr				Reduce Pwr			
						CS		PS		CS		PS	
						Burst (dBm)	Frame (dBm)	Burst (dBm)	Frame (dBm)	Burst (dBm)	Frame (dBm)	Burst (dBm)	Frame (dBm)
850	GSM(Voice) + GPRS(GMSK)	CS1	1	128	824.2	33.2	24.2			29.1	20.1		
				190	836.6	33.2	24.2			29.1	20.1		
				251	848.8	33.2	24.2			29.0	20.0		
			2	128	824.2	31.1	25.1	31.2	25.2	26.1	20.1	26.0	20.0
				190	836.6	31.2	25.2	31.3	25.3	26.1	20.1	26.0	20.0
				251	848.8	31.2	25.2	31.3	25.3	26.1	20.1	26.0	20.0
			3	128	824.2	29.2	24.9	29.3	25.0	24.6	20.3	24.6	20.3
				190	836.6	29.2	24.9	29.4	25.1	24.6	20.3	24.5	20.2
				251	848.8	29.2	24.9	29.3	25.0	24.6	20.3	24.5	20.2
	GSM(Voice) + EGPRS(8PSK)	MCS5	1	128	824.2	33.2	24.2			29.1	20.1		
				190	836.6	33.2	24.2			29.1	20.1		
				251	848.8	33.2	24.2			29.0	20.0		
			2	128	824.2	31.2	25.2	25.3	19.3	26.1	20.1	25.0	19.0
				190	836.6	31.3	25.3	25.3	19.3	26.1	20.1	24.9	18.9
				251	848.8	31.3	25.3	25.3	19.3	26.0	20.0	24.8	18.8
			3	128	824.2	29.2	24.9	24.3	20.0	24.6	20.3	23.6	19.3
				190	836.6	29.4	25.1	24.4	20.1	24.6	20.3	23.6	19.3
				251	848.8	29.3	25.0	24.4	20.1	24.6	20.3	23.5	19.2

**Notes:**

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

RF Exposure Conditions	Mode	Pwr Back-off	Tx Slot
Body-worn	GSM(Voice) + GPRS(GMSK)	OFF	2
Body-worn	GSM(Voice) + GPRS(GMSK)	ON	3

- SAR is not required for EGPRS (8PSK) mode because its output power is less than that of GPRS Mode

**GSM1900 DTM Measured Results**

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Full Pwr				Reduce Pwr			
						CS		PS		CS		PS	
						Burst (dBm)	Frame (dBm)	Burst (dBm)	Frame (dBm)	Burst (dBm)	Frame (dBm)	Burst (dBm)	Frame (dBm)
1900	GSM(Voice) + GPRS(GMSK)	CS1	1	512	1850.2	29.9	20.9			24.0	15.0		
				661	1880.0	30.0	21.0			24.0	15.0		
				810	1909.8	29.9	20.9			24.0	15.0		
			2	512	1850.2	28.2	22.2	28.1	22.1	21.5	15.5	21.5	15.5
				661	1880.0	28.4	22.4	28.3	22.3	21.5	15.5	21.5	15.5
				810	1909.8	28.2	22.2	28.1	22.1	21.5	15.5	21.5	15.5
			3	512	1850.2	27.4	23.1	27.3	23.0	19.5	15.2	19.5	15.2
				661	1880.0	27.5	23.2	27.4	23.1	19.5	15.2	19.5	15.2
				810	1909.8	27.4	23.1	27.3	23.0	19.5	15.2	19.5	15.2
	GSM(Voice) + EGPRS(8PSK)	MCS5	1	512	1850.2	29.9	20.9			24.0	15.0		
				661	1880.0	30.2	21.2			24.0	15.0		
				810	1909.8	30.0	21.0			24.0	15.0		
			2	512	1850.2	28.2	22.2	24.4	18.4	21.5	15.5	20.7	14.7
				661	1880.0	28.4	22.4	24.5	18.5	21.5	15.5	20.7	14.7
				810	1909.8	28.4	22.4	24.4	18.4	21.5	15.5	20.7	14.7
			3	512	1850.2	27.4	23.1	23.3	19.0	19.5	15.2	18.9	14.6
				661	1880.0	27.5	23.2	23.4	19.1	19.5	15.2	18.9	14.6
				810	1909.8	27.4	23.1	23.3	19.0	19.5	15.2	18.7	14.4

**Notes:**

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

RF Exposure Conditions	Mode	Pwr Back-off	Tx Slot
Body-worn	GSM(Voice) + GPRS(GMSK)	OFF	3
Body-worn	GSM(Voice) + GPRS(GMSK)	ON	2

- SAR is not required for EGPRS (8PSK) mode because its output power is less than that of GPRS Mode

## 8.2. W-CDMA Band V/II

### Release 99

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 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	$\beta_c/\beta_d$	8/15

### Measured Results

Band	Mode	UL Ch No.	Freq. (MHz)	Full Avg Pwr (dBm)	Reduce Avg Pwr (dBm)
W-CDMA Band V	Rel 99 (RMC, 12.2 kbps)	4132	826.4	24.5	19.8
		4183	836.6	24.4	19.8
		4233	846.6	24.4	19.9
W-CDMA Band II	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	24.0	15.3
		9400	1880.0	24.0	15.4
		9538	1907.6	23.9	15.3

**HSDPA**

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-Set1			
	Power Control Algorithm	Algorithm 2			
	$\beta_c$	2/15	12/15	15/15	15/15
	$\beta_d$	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	$\beta_c/\beta_d$	2/15	12/15	15/8	15/4
	$\beta_{hs}$	4/15	24/15	30/15	30/15
MPR (dB)	0	1	1.5	1.5	
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			

**Measured Results**

Band	Mode	UL Ch No.	Freq. (MHz)	Full Avg Pwr (dBm)	Reduce Avg Pwr (dBm)
W-CDMA Band V	Subtest 1	4132	826.4	24.4	19.8
		4183	836.6	24.4	19.8
		4233	846.6	24.5	19.8
	Subtest 2	4132	826.4	24.5	20.0
		4183	836.6	24.4	19.9
		4233	846.6	24.4	19.9
	Subtest 3	4132	826.4	24.0	19.4
		4183	836.6	24.0	19.4
		4233	846.6	23.9	19.4
	Subtest 4	4132	826.4	24.0	19.4
		4183	836.6	24.0	19.4
		4233	846.6	23.9	19.5
W-CDMA Band II	Subtest 1	9262	1852.4	23.4	14.5
		9400	1880.0	23.5	14.9
		9538	1907.6	23.3	14.8
	Subtest 2	9262	1852.4	23.5	14.5
		9400	1880.0	23.5	15.0
		9538	1907.6	23.4	14.7
	Subtest 3	9262	1852.4	23.5	14.7
		9400	1880.0	23.5	15.0
		9538	1907.6	23.3	14.7
	Subtest 4	9262	1852.4	23.4	14.9
		9400	1880.0	23.5	15.1
		9538	1907.6	23.3	14.8

Maximum output power levels that are possible for all subtests reported.

**HSPA (HSDPA & HSUPA)**

The following 5 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	HSPA	HSPA	HSPA	HSPA	HSPA
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	$\beta_c$	11/15	6/15	15/15	2/15	15/15
	$\beta_d$	15/15	15/15	9/15	15/15	15/15
	$\beta_{ec}$	209/225	12/15	30/15	2/15	24/15
	$\beta_c/\beta_d$	11/15	6/15	15/9	2/15	15/15
	$\beta_{hs}$	22/15	12/15	30/15	4/15	30/15
	$\beta_{ed}$	1309/225	94/75	47/15	56/75	134/15
CM (dB)	1.0	3.0	2.0	3.0	1.0	
MPR (dB)	0	2	1	2	0	
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	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	D E-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_TFCIs	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18		E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27

**Measured Results**

Band	Mode	UL Ch No.	Freq. (MHz)	Full Avg Pwr (dBm)	Reduce Avg Pwr (dBm)
W-CDMA Band V	Subtest 1	4132	826.4	23.5	18.9
		4183	836.6	23.3	18.8
		4233	846.6	23.4	18.9
	Subtest 2	4132	826.4	22.5	18.4
		4183	836.6	22.5	18.3
		4233	846.6	22.5	18.3
	Subtest 3	4132	826.4	23.3	18.9
		4183	836.6	23.2	18.7
		4233	846.6	23.4	18.8
	Subtest 4	4132	826.4	22.5	18.1
		4183	836.6	22.5	18.0
		4233	846.6	22.5	18.1
	Subtest 5	4132	826.4	24.5	19.8
		4183	836.6	24.4	19.8
		4233	846.6	24.4	19.9
W-CDMA Band II	Subtest 1	9262	1852.4	23.4	14.7
		9400	1880.0	23.3	14.8
		9538	1907.6	23.3	14.7
	Subtest 2	9262	1852.4	22.1	13.4
		9400	1880.0	22.0	13.5
		9538	1907.6	22.3	13.3
	Subtest 3	9262	1852.4	22.8	14.1
		9400	1880.0	22.7	14.3
		9538	1907.6	22.6	14.1
	Subtest 4	9262	1852.4	22.3	13.6
		9400	1880.0	22.3	13.8
		9538	1907.6	22.3	13.4
	Subtest 5	9262	1852.4	23.4	14.7
		9400	1880.0	23.5	14.8
		9538	1907.6	23.3	14.7

**DC-HSDPA**

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS34.108 v9.5.0. A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

**Table E.5.0: Levels for HSDPA connection setup**

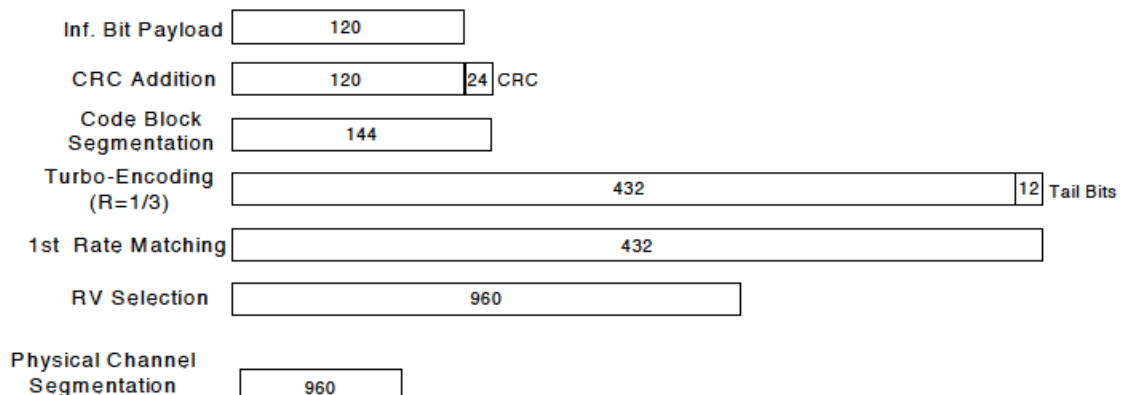
Parameter During Connection setup	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH_Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

**Table C.8.1.12: Fixed Reference Channel H-Set 12**

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload ( $N_{INF}$ )	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table. Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		



**Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)**

The following 4 Sub-tests for HSDPA were completed according to Release 8 procedures in section 5.2 of 3GPP TS34.121. A summary of subtest settings are illustrated below:

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	$\beta_c$	2/15	12/15	15/15	15/15
	$\beta_d$	15/15	15/15	8/15	4/15
	$\beta_d$ (SF)	64			
	$\beta_c/\beta_d$	2/15	12/15	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	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack Repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	A <sub>hs</sub> = $\beta_{hs}/\beta_c$	30/15			

Up commands are set continuously to set the UE to Max power.

### Measured Results

Band	Mode	UL Ch No.	Freq. (MHz)	Full Avg Pwr (dBm)	Reduce Avg Pwr (dBm)
W-CDMA Band V	Subtest 1	4132	826.4	24.5	19.8
		4183	836.6	24.4	19.7
		4233	846.6	24.3	19.8
	Subtest 2	4132	826.4	24.5	19.6
		4183	836.6	24.4	19.6
		4233	846.6	24.4	19.6
	Subtest 3	4132	826.4	24.0	19.0
		4183	836.6	24.0	19.0
		4233	846.6	23.9	19.1
	Subtest 4	4132	826.4	24.0	19.0
		4183	836.6	24.0	19.0
		4233	846.6	23.9	19.0
W-CDMA Band II	Subtest 1	9262	1852.4	23.4	14.8
		9400	1880.0	23.5	15.0
		9538	1907.6	23.3	14.8
	Subtest 2	9262	1852.4	23.4	14.8
		9400	1880.0	23.5	15.0
		9538	1907.6	23.3	14.8
	Subtest 3	9262	1852.4	23.5	14.8
		9400	1880.0	23.5	14.9
		9538	1907.6	23.3	14.7
	Subtest 4	9262	1852.4	23.4	14.7
		9400	1880.0	23.5	14.9
		9538	1907.6	23.3	14.7

### HSPA+

Since 16QAM is not used for uplink, the uplink Category and release is same as HSUPA, i.e., CAT 6 Rel 6. Therefore, the RF conducted power is not measured.



### 8.3. LTE Band 5/7

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

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

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

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

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signalling Value of "NS\_01".

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

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

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

**LTE Band 5 Measured Results**

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Full Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)				
						829 MHz	836.5 MHz	844 MHz		829 MHz	836.5 MHz	844 MHz		
LTE Band 5	10	QPSK	1	0	0	23.4	23.5	23.5	0	19.3	19.6	19.6		
			1	25	0	23.4	23.5	23.4	0	19.4	19.5	19.5		
			1	49	0	23.4	23.5	23.5	0	19.5	19.6	19.5		
			25	0	1	22.5	22.5	22.6	1	19.4	19.6	19.6		
			25	12	1	22.5	22.5	22.6	1	19.5	19.6	19.6		
			25	25	1	22.6	22.6	22.6	1	19.5	19.6	19.6		
		16QAM	1	0	1	22.3	22.7	22.4	1	19.3	19.8	19.5		
			1	25	1	22.4	22.7	22.2	1	19.3	19.8	19.4		
			1	49	1	22.3	22.7	22.3	1	19.4	19.8	19.4		
			25	0	2	21.6	21.6	21.7	2	19.4	19.7	19.7		
			25	12	2	21.6	21.5	21.7	2	19.5	19.6	19.7		
			25	25	2	21.6	21.7	21.7	2	19.5	19.6	19.7		
			50	0	2	21.6	21.5	21.7	2	19.5	19.6	19.6		
			50	0	2	21.6	21.5	21.7	2	19.5	19.6	19.6		
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Full Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)				
						826.5 MHz	836.5 MHz	846.5 MHz						
LTE Band 5	5	QPSK	1	0	0	23.4	23.6	23.7	0	19.5	19.7	19.6		
			1	12	0	23.4	23.5	23.7	0	19.4	19.7	19.6		
			1	24	0	23.4	23.6	23.7	0	19.4	19.7	19.6		
			12	0	1	22.4	22.5	22.6	1	19.4	19.7	19.6		
			12	6	1	22.5	22.5	22.5	1	19.4	19.6	19.5		
			12	11	1	22.5	22.5	22.5	1	19.5	19.6	19.6		
		16QAM	25	0	1	22.5	22.5	22.5	1	19.4	19.6	19.6		
			1	0	1	22.2	22.5	23.0	1	19.3	19.6	20.0		
			1	12	1	22.3	22.5	22.9	1	19.2	19.6	20.0		
			1	24	1	22.4	22.5	22.9	1	19.3	19.6	20.0		
			12	0	2	21.5	21.6	21.6	2	19.4	19.7	19.6		
			12	6	2	21.6	21.6	21.7	2	19.5	19.7	19.6		
			12	11	2	21.6	21.6	21.7	2	19.6	19.7	19.6		
			25	0	2	21.7	21.5	21.6	2	19.6	19.6	19.6		
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Full Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)				
						825.5 MHz	836.5 MHz	847.5 MHz						
LTE Band 5	3	QPSK	1	0	0	23.4	23.5	23.5	0	19.6	19.7	19.6		
			1	7	0	23.3	23.5	23.5	0	19.3	19.7	19.6		
			1	14	0	23.5	23.5	23.5	0	19.5	19.7	19.6		
			8	0	1	22.5	22.5	22.6	1	19.6	19.7	19.7		
			8	4	1	22.4	22.5	22.6	1	19.4	19.7	19.6		
			8	7	1	22.5	22.5	22.6	1	19.4	19.7	19.6		
		16QAM	15	0	1	22.5	22.6	22.6	1	19.4	19.7	19.7		
			1	0	1	22.3	22.7	22.4	1	19.5	19.9	19.6		
			1	7	1	22.3	22.6	22.4	1	19.2	19.9	19.5		
			1	14	1	22.4	22.7	22.3	1	19.4	19.9	19.5		
			8	0	2	21.5	21.4	21.7	2	19.6	19.6	19.8		
			8	4	2	21.5	21.4	21.7	2	19.5	19.6	19.8		
			8	7	2	21.5	21.3	21.7	2	19.5	19.6	19.8		
			15	0	2	21.5	21.6	21.6	2	19.5	19.8	19.7		

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

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Full Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						824.7 MHz	836.5 MHz	848.3 MHz		824.7 MHz	836.5 MHz	848.3 MHz
LTE Band 5	1.4	QPSK	1	0	0	23.4	23.5	23.6	0	19.6	19.6	19.6
			1	2	0	23.3	23.5	23.5	0	19.5	19.6	19.6
			1	5	0	23.5	23.5	23.6	0	19.5	19.7	19.6
			3	0	0	23.5	23.5	23.6	0	19.6	19.7	19.6
			3	1	0	23.4	23.5	23.6	0	19.5	19.7	19.7
			3	2	0	23.4	23.5	23.5	0	19.5	19.7	19.6
		16QAM	6	0	1	22.5	22.5	22.6	1	19.6	19.7	19.7
			1	0	1	22.6	22.7	22.7	1	19.7	19.6	19.8
			1	2	1	22.5	22.7	22.6	1	19.6	19.5	19.7
			1	5	1	22.5	22.7	22.7	1	19.6	19.6	19.7
			3	0	1	22.4	22.5	22.5	1	19.5	19.8	19.6
			3	1	1	22.4	22.5	22.5	1	19.5	19.8	19.6
			3	2	1	22.4	22.5	22.5	1	19.5	19.8	19.6
			6	0	2	21.6	21.4	21.7	2	19.6	19.8	19.8

**LTE Band 7 Measured Results**

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Full Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						2510 MHz	2535 MHz	2560 MHz		2510 MHz	2535 MHz	2560 MHz
LTE Band 7	20	QPSK	1	0	0	23.7	23.7	23.7	0	13.5	13.4	13.6
			1	49	0	23.8	23.6	23.6	0	13.9	13.6	13.6
			1	99	0	23.7	23.6	23.1	0	13.8	13.4	13.2
			50	0	1	22.9	22.7	22.6	0	13.7	13.3	13.9
			50	24	1	22.8	22.6	22.6	0	13.6	13.4	13.8
			50	50	1	22.8	22.7	22.6	0	13.4	13.2	13.5
			100	0	1	22.8	22.6	22.6	0	13.4	13.3	13.7
		16QAM	1	0	1	23.0	22.7	22.7	0	13.7	13.8	14.3
			1	49	1	22.9	22.7	22.7	0	14.1	13.9	14.2
			1	99	1	22.8	22.7	22.5	0	13.7	13.8	13.6
			50	0	2	21.9	21.7	21.6	0	13.4	13.3	13.8
			50	24	2	21.8	21.7	21.6	0	13.6	13.3	13.8
			50	50	2	21.8	21.7	21.5	0	13.4	13.1	13.4
			100	0	2	21.8	21.6	21.7	0	13.4	13.2	13.7
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Full Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						2507.5 MHz	2535 MHz	2562.5 MHz		2507.5 MHz	2535 MHz	2562.5 MHz
LTE Band 7	15	QPSK	1	0	0	23.8	23.6	23.5	0	14.0	13.8	14.0
			1	37	0	23.8	23.7	23.5	0	14.0	13.8	13.6
			1	74	0	23.6	23.6	23.3	0	13.9	13.8	13.7
			36	0	1	22.8	22.7	22.6	0	13.9	13.7	13.8
			36	20	1	22.9	22.7	22.6	0	13.7	13.7	13.7
			36	39	1	22.8	22.6	22.6	0	13.6	13.6	13.6
			75	0	1	22.9	22.6	22.5	0	13.7	13.6	13.8
		16QAM	1	0	1	22.7	23.0	22.4	0	13.6	13.9	14.0
			1	37	1	22.7	23.0	22.5	0	13.6	13.7	13.6
			1	74	1	22.5	23.0	22.2	0	13.7	13.8	13.5
			36	0	2	21.7	21.7	21.7	0	13.7	13.4	13.8
			36	20	2	21.8	21.7	21.6	0	13.7	13.4	13.6
			36	39	2	21.7	21.7	21.6	0	13.7	13.3	13.5
			75	0	2	21.8	21.6	21.6	0	13.9	13.4	13.7
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Full Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						2505 MHz	2535 MHz	2565 MHz		2505 MHz	2535 MHz	2565 MHz
LTE Band 7	10	QPSK	1	0	0	23.8	23.6	23.6	0	14.3	13.9	13.9
			1	25	0	23.7	23.6	23.5	0	14.1	14.0	13.6
			1	49	0	23.8	23.6	23.4	0	14.3	14.1	14.0
			25	0	1	22.8	22.7	22.7	0	14.2	14.1	13.8
			25	12	1	22.8	22.7	22.6	0	14.1	13.9	13.6
			25	25	1	22.9	22.7	22.6	0	14.2	14.1	13.7
			50	0	1	22.9	22.6	22.6	0	14.1	14.0	13.6
		16QAM	1	0	1	22.8	22.5	22.5	0	14.1	13.9	14.1
			1	25	1	22.6	22.5	22.4	0	14.0	13.8	13.9
			1	49	1	22.7	22.5	22.3	0	14.1	13.9	14.2
			25	0	2	21.7	21.8	21.7	0	14.2	14.0	13.6
			25	12	2	21.7	21.8	21.6	0	14.1	13.8	13.5
			25	25	2	21.8	21.8	21.6	0	14.2	14.0	13.6
			50	0	2	21.9	21.7	21.6	0	14.1	13.9	13.6

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

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Full Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						2502.5 MHz	2535 MHz	2567.5 MHz		2502.5 MHz	2535 MHz	2567.5 MHz
LTE Band 7	5	QPSK	1	0	0	23.8	23.8	23.6	0	14.1	14.0	13.7
			1	12	0	23.7	23.8	23.5	0	14.1	14.0	13.8
			1	24	0	23.7	23.8	23.4	0	14.1	14.0	13.9
			12	0	1	22.9	22.7	22.7	0	14.1	14.0	13.8
			12	7	1	22.8	22.7	22.5	0	14.2	14.0	13.8
			12	13	1	22.8	22.7	22.6	0	14.0	14.0	13.8
		25	0	1	22.8	22.7	22.6	0	14.1	14.0	13.8	
		16QAM	1	0	1	22.6	22.7	23.0	0	14.1	14.1	14.4
			1	12	1	22.5	22.7	23.0	0	14.1	14.1	14.5
			1	24	1	22.6	22.7	23.0	0	14.1	14.1	14.5
			12	0	2	21.9	21.8	21.7	0	14.1	13.9	13.8
			12	7	2	21.8	21.8	21.7	0	14.2	13.9	13.8
			12	13	2	21.8	21.8	21.7	0	14.0	13.9	13.8
			25	0	2	21.8	21.7	21.6	0	14.2	13.8	13.7

## 8.4. Wi-Fi (2.4 GHz Band)

Required Test Channels per KDB 248227 D01

### Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Main Ant	Sub Ant	SAR Test (Yes/No)
					Avg Pwr (dBm)		
2.4 (DTS)	802.11b	1 Mbps	1	2412	13.0	13.3	Yes
			6	2437	13.3	13.3	
			11	2462	14.0	13.8	
	802.11g	6 Mbps	1	2412	12.8	13.0	No
			6	2437	12.8	13.0	
			11	2462	13.5	13.1	
	802.11n (HT20)	MCS0	1	2412	12.8	13.0	No
			6	2437	12.8	13.0	
			11	2462	13.5	13.1	

### Note(s):

- Per KDB 248227 D01, SAR is not required for 802.11g/HT20 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

### Power measurements to determine worst-case data rates

Mode	Ch #	Freq. (MHz)	Data Rate	Main Ant	Sub Ant	SAR test (Yes/No)
				Avg Pwr (dBm)		
802.11b	11	2462	1 Mbps	14.0	13.8	Yes
			2 Mbps	14.0	13.8	No
			5.5 Mbps	14.0	13.7	No
			11 Mbps	14.0	13.7	No

### 8.5. Wi-Fi (5 GHz Bands)

Required Test Channels per KDB 248227 D01

#### Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Main Ant	Sub Ant	SAR Test (Yes/No)
					Avg Pwr (dBm)		
5.2 (U-NII-1)	802.11a	6 Mbps	36	5180	11.5	10.4	Yes
			40	5200	11.5	10.5	
			44	5220	11.5	10.6	
			48	5240	11.5	10.6	
	802.11n (HT20)	MCS0	36	5180	11.4	10.4	No
			40	5200	11.4	10.6	
			48	5240	11.5	10.5	
	802.11n (HT40)	MCS0	38	5190	11.4	10.6	No
			46	5230	11.3	10.3	
	802.11ac (VHT20)	MCS0	36	5180	11.4	10.5	Yes
			40	5200	11.4	10.4	
			48	5240	11.4	10.5	
	802.11ac (VHT40)	MCS0	38	5190	11.3	10.5	No
			46	5230	11.3	10.5	
802.11ac (VHT80)	MCS0	42	5210	11.3	10.4	No	
5.3 (U-NII-2A)	802.11a	6 Mbps	52	5260	11.5	10.7	Yes
			56	5280	11.5	10.7	
			60	5300	11.4	10.7	
			64	5320	11.5	10.7	
	802.11n (HT20)	MCS0	52	5260	11.4	10.7	No
			60	5300	11.5	10.6	
			64	5320	11.5	10.5	
	802.11n (HT40)	MCS0	54	5270	11.4	10.7	No
			62	5310	11.4	10.7	
	802.11ac (VHT20)	MCS0	52	5260	11.5	10.7	Yes
			60	5300	11.5	10.6	
			64	5320	11.5	10.6	
	802.11ac (VHT40)	MCS0	54	5270	11.4	10.7	No
			62	5310	11.5	10.7	
802.11ac (VHT80)	MCS0	58	5290	11.4	10.5	No	

**Wi-Fi (5 GHz Bands) Measured Results (continued)**

Band (GHz)	Mode	Mode	Ch #	Freq. (MHz)	Main Ant	Sub Ant	SAR Test (Yes/No)
					Avg Pwr (dBm)		
5.5 (U-NII-2C)	802.11a	6 Mbps	100	5500	11.0	11.3	Yes
			104	5520	11.1	11.4	
			108	5540	10.7	11.0	
			112	5560	10.9	11.2	
			116	5580	10.9	11.1	
			120	5600	Not Supported		
			124	5620	Not Supported		
			128	5640	Not Supported		
			132	5660	10.8	10.8	
			136	5680	10.7	10.8	
	140	5700	11.1	11.0			
	802.11n (HT20)	MCS0	100	5500	11.3	11.4	No
			116	5580	11.1	11.3	
			140	5700	11.3	11.4	
	802.11n (HT40)	MCS0	102	5510	11.4	11.4	No
			110	5550	11.1	11.3	
			134	5670	11.2	11.2	
	802.11ac (VHT20)	MCS0	100	5500	11.4	11.3	Yes
			116	5580	11.2	11.2	
			140	5700	11.4	11.3	
	802.11ac (VHT40)	MCS0	102	5510	11.3	11.3	No
			110	5550	11.3	11.4	
			134	5670	11.4	11.4	
	802.11ac (VHT80)	MCS0	106	5530	11.2	11.2	No
122			5610	11.2	11.2		
5.8 (U-NII-3)	802.11a	6 Mbps	149	5745	10.8	10.8	Yes
			153	5765	10.9	10.9	
			157	5785	10.9	10.9	
			161	5805	11.0	11.0	
			165	5825	11.0	11.1	
	802.11n (HT20)	MCS0	149	5745	11.3	11.0	No
			157	5785	11.3	11.0	
			161	5805	11.3	11.0	
	802.11n (HT40)	MCS0	151	5755	11.3	11.0	No
			159	5795	11.3	11.0	
	802.11ac (VHT20)	MCS0	149	5745	11.3	11.0	Yes
			157	5785	11.3	11.0	
			165	5825	11.3	10.9	
	802.11ac (VHT40)	MCS0	151	5755	11.3	10.9	No
			159	5795	11.3	11.0	
	802.11ac (VHT80)	MCS0	155	5775	11.2	11	No

**Note(s):**

Per KDB 248227, SAR is not required for 802.11n HT20/HT40 and 802.11ac VHT40/VHT80 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a channels.



**Power measurements to determine worst-case data rates**

Band	Mode	Ch #	Freq. (MHz)	Data Rate	Main Ant	Sub Ant	SAR test (Yes/No)
					Avg Pwr (dBm)		
5.2 GHz (U-NII-1)	802.11a	48	5180	6 Mbps	11.5	10.6	Yes
				9 Mbps	11.4	10.6	No
				12 Mbps	11.4	10.6	No
				18 Mbps	11.5	10.5	No
				24 Mbps	11.5	10.5	No
				36 Mbps	11.5	10.5	No
				48 Mbps	11.5	10.5	No
				54 Mbps	11.5	10.5	No
5.3 GHz (U-NII-2A)	802.11a	64	5280	6 Mbps	11.5	10.9	Yes
				9 Mbps	11.5	10.8	No
				12 Mbps	11.4	10.8	No
				18 Mbps	11.4	10.8	No
				24 Mbps	11.4	10.8	No
				36 Mbps	11.4	10.8	No
				48 Mbps	11.4	10.8	No
				54 Mbps	11.4	10.8	No
5.5 GHz (U-NII-2C)	802.11a	104	5580	6 Mbps	11.1	11.4	Yes
				9 Mbps	11.1	11.4	No
				12 Mbps	11.1	11.4	No
				18 Mbps	11.2	11.4	No
				24 Mbps	11.3	11.5	No
				36 Mbps	11.4	11.5	No
				48 Mbps	11.4	11.5	No
				54 Mbps	11.4	11.5	No
5.8 GHz (U-NII-3)	802.11a	165	5745	6 Mbps	11.0	11.1	Yes
				9 Mbps	11.0	11.1	No
				12 Mbps	11.0	11.1	No
				18 Mbps	11.1	11.1	No
				24 Mbps	11.1	11.3	No
				36 Mbps	11.1	11.3	No
				48 Mbps	11.1	11.2	No
				54 Mbps	11.0	11.2	No

**8.6. Bluetooth**

Band (MHz)	Mode	Ch #	Freq. (MHz)	Freq. (MHz)	Main Ant - Conducted Avg Power	
					(dBm)	(mW)
2.4	V3.0 + EDR, GFSK	0	2402	2412	5.4	3.47
		39	2441	2437	8.8	7.59
		78	2480	2462	8.6	7.24
	V3.0 + EDR, $\pi/4$ DQPSK	0	2402	2412	3.0	2.00
		39	2441	2437	6.3	4.27
		78	2480	2462	5.8	3.80
	V3.0 + EDR, 8-DPSK	0	2402	2412	3.0	2.00
		39	2441	2437	6.3	4.27
		78	2480	2462	5.7	3.72
	V4.0 LE, GFSK	0	2402	2422	-3.9	0.41
		19	2440	2437	-0.4	0.91
		39	2480	2452	-1.6	0.69

## 9. Dielectric Property Measurements

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

The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.

Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.

### 9.1. Tissue Dielectric Parameters

#### FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

Target Frequency (MHz)	Head		Body	
	$\epsilon_r$	$\sigma$ (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

## 9.2. Dielectric Property Measurements Results

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

The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.

Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.

### SAR Lab 2

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit $\pm$ (%)	
8/19/2014	Body 835	e'	53.0200	Relative Permittivity ( $\epsilon_r$ ):	53.02	55.20	-3.95	5
		e"	21.5100	Conductivity ( $\sigma$ ):	1.00	0.97	2.96	5
	Body 820	e'	53.1800	Relative Permittivity ( $\epsilon_r$ ):	53.18	55.28	-3.79	5
		e"	21.6000	Conductivity ( $\sigma$ ):	0.98	0.97	1.69	5
	Body 850	e'	52.8700	Relative Permittivity ( $\epsilon_r$ ):	52.87	55.16	-4.15	5
		e"	21.4400	Conductivity ( $\sigma$ ):	1.01	0.99	2.65	5
8/19/2014	Body 1900	e'	51.9900	Relative Permittivity ( $\epsilon_r$ ):	51.99	53.30	-2.46	5
		e"	14.2700	Conductivity ( $\sigma$ ):	1.51	1.52	-0.82	5
	Body 1850	e'	52.1800	Relative Permittivity ( $\epsilon_r$ ):	52.18	53.30	-2.10	5
		e"	14.2000	Conductivity ( $\sigma$ ):	1.46	1.52	-3.90	5
	Body 1910	e'	51.9600	Relative Permittivity ( $\epsilon_r$ ):	51.96	53.30	-2.51	5
		e"	14.2700	Conductivity ( $\sigma$ ):	1.52	1.52	-0.30	5

### SAR Lab 3

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit $\pm$ (%)	
8/11/2014	Body 1900	e'	51.6200	Relative Permittivity ( $\epsilon_r$ ):	51.62	53.30	-3.15	5
		e"	14.7000	Conductivity ( $\sigma$ ):	1.55	1.52	2.17	5
	Body 1850	e'	51.7900	Relative Permittivity ( $\epsilon_r$ ):	51.79	53.30	-2.83	5
		e"	14.5200	Conductivity ( $\sigma$ ):	1.49	1.52	-1.74	5
	Body 1910	e'	51.6000	Relative Permittivity ( $\epsilon_r$ ):	51.60	53.30	-3.19	5
		e"	14.7300	Conductivity ( $\sigma$ ):	1.56	1.52	2.92	5
8/12/2014	Body 1900	e'	51.9000	Relative Permittivity ( $\epsilon_r$ ):	51.90	53.30	-2.63	5
		e"	14.2000	Conductivity ( $\sigma$ ):	1.50	1.52	-1.30	5
	Body 1850	e'	52.1000	Relative Permittivity ( $\epsilon_r$ ):	52.10	53.30	-2.25	5
		e"	14.0600	Conductivity ( $\sigma$ ):	1.45	1.52	-4.85	5
	Body 1910	e'	51.8700	Relative Permittivity ( $\epsilon_r$ ):	51.87	53.30	-2.68	5
		e"	14.2100	Conductivity ( $\sigma$ ):	1.51	1.52	-0.72	5
8/15/2014	Body 835	e'	53.5700	Relative Permittivity ( $\epsilon_r$ ):	53.57	55.20	-2.95	5
		e"	21.8700	Conductivity ( $\sigma$ ):	1.02	0.97	4.68	5
	Body 820	e'	53.7200	Relative Permittivity ( $\epsilon_r$ ):	53.72	55.28	-2.82	5
		e"	21.8900	Conductivity ( $\sigma$ ):	1.00	0.97	3.06	5
	Body 850	e'	53.4100	Relative Permittivity ( $\epsilon_r$ ):	53.41	55.16	-3.17	5
		e"	21.8200	Conductivity ( $\sigma$ ):	1.03	0.99	4.47	5
8/18/2014	Body 835	e'	53.6300	Relative Permittivity ( $\epsilon_r$ ):	53.63	55.20	-2.84	5
		e"	21.7300	Conductivity ( $\sigma$ ):	1.01	0.97	4.01	5
	Body 820	e'	53.7700	Relative Permittivity ( $\epsilon_r$ ):	53.77	55.28	-2.73	5
		e"	21.8300	Conductivity ( $\sigma$ ):	1.00	0.97	2.77	5
	Body 850	e'	53.4800	Relative Permittivity ( $\epsilon_r$ ):	53.48	55.16	-3.04	5
		e"	21.6600	Conductivity ( $\sigma$ ):	1.02	0.99	3.70	5
8/19/2014	Body 2600	e'	50.2900	Relative Permittivity ( $\epsilon_r$ ):	50.29	52.51	-4.23	5
		e"	15.4300	Conductivity ( $\sigma$ ):	2.23	2.16	3.23	5
	Body 2500	e'	50.5300	Relative Permittivity ( $\epsilon_r$ ):	50.53	52.64	-4.00	5
		e"	15.1400	Conductivity ( $\sigma$ ):	2.10	2.02	4.17	5
	Body 2700	e'	49.9800	Relative Permittivity ( $\epsilon_r$ ):	49.98	52.38	-4.59	5
		e"	15.6900	Conductivity ( $\sigma$ ):	2.36	2.30	2.35	5

**SAR Lab 3 (continue)**

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
8/20/2014	Body 2450	e'	50.7600	Relative Permittivity ( $\epsilon_r$ ):	50.76	52.70	-3.68	5
		e"	14.8000	Conductivity ( $\sigma$ ):	2.02	1.95	3.39	5
	Body 2410	e'	50.8800	Relative Permittivity ( $\epsilon_r$ ):	50.88	52.76	-3.56	5
		e"	14.7300	Conductivity ( $\sigma$ ):	1.97	1.91	3.48	5
	Body 2475	e'	50.6900	Relative Permittivity ( $\epsilon_r$ ):	50.69	52.67	-3.76	5
		e"	14.8700	Conductivity ( $\sigma$ ):	2.05	1.99	3.08	5

**SAR Lab 4**

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)		
8/13/2014	Body 5180	e'	47.7900	Relative Permittivity ( $\epsilon_r$ ):	47.79	49.05	-2.56	5	
		e"	18.8400	Conductivity ( $\sigma$ ):	5.43	5.27	2.94	5	
	Body 5200	e'	47.7500	Relative Permittivity ( $\epsilon_r$ ):	47.75	49.02	-2.59	5	
		e"	18.8600	Conductivity ( $\sigma$ ):	5.45	5.29	2.99	5	
	Body 5600	e'	47.0600	Relative Permittivity ( $\epsilon_r$ ):	47.06	48.48	-2.92	5	
		e"	19.2000	Conductivity ( $\sigma$ ):	5.98	5.76	3.77	5	
	Body 5800	e'	46.7300	Relative Permittivity ( $\epsilon_r$ ):	46.73	48.20	-3.05	5	
		e"	19.3800	Conductivity ( $\sigma$ ):	6.25	6.00	4.17	5	
	Body 5825	e'	46.6800	Relative Permittivity ( $\epsilon_r$ ):	46.68	48.20	-3.15	5	
		e"	19.4200	Conductivity ( $\sigma$ ):	6.29	6.00	4.83	5	
	8/20/2014	Body 5180	e'	47.8200	Relative Permittivity ( $\epsilon_r$ ):	47.82	49.05	-2.50	5
			e"	18.2600	Conductivity ( $\sigma$ ):	5.26	5.27	-0.23	5
Body 5200		e'	47.7700	Relative Permittivity ( $\epsilon_r$ ):	47.77	49.02	-2.55	5	
		e"	18.2900	Conductivity ( $\sigma$ ):	5.29	5.29	-0.12	5	
Body 5600		e'	47.1400	Relative Permittivity ( $\epsilon_r$ ):	47.14	48.48	-2.76	5	
		e"	18.7600	Conductivity ( $\sigma$ ):	5.84	5.76	1.40	5	
Body 5800		e'	46.9600	Relative Permittivity ( $\epsilon_r$ ):	46.96	48.20	-2.57	5	
		e"	19.0000	Conductivity ( $\sigma$ ):	6.13	6.00	2.12	5	
Body 5825		e'	46.9200	Relative Permittivity ( $\epsilon_r$ ):	46.92	48.20	-2.66	5	
		e"	19.0300	Conductivity ( $\sigma$ ):	6.16	6.00	2.73	5	
8/25/2014		Body 5180	e'	47.5000	Relative Permittivity ( $\epsilon_r$ ):	47.50	49.05	-3.15	5
			e"	18.4800	Conductivity ( $\sigma$ ):	5.32	5.27	0.97	5
	Body 5200	e'	47.4700	Relative Permittivity ( $\epsilon_r$ ):	47.47	49.02	-3.16	5	
		e"	18.5100	Conductivity ( $\sigma$ ):	5.35	5.29	1.08	5	
	Body 5600	e'	46.8000	Relative Permittivity ( $\epsilon_r$ ):	46.80	48.48	-3.46	5	
		e"	18.8500	Conductivity ( $\sigma$ ):	5.87	5.76	1.88	5	
	Body 5800	e'	46.4800	Relative Permittivity ( $\epsilon_r$ ):	46.48	48.20	-3.57	5	
		e"	19.0600	Conductivity ( $\sigma$ ):	6.15	6.00	2.45	5	
	Body 5825	e'	46.4400	Relative Permittivity ( $\epsilon_r$ ):	46.44	48.20	-3.65	5	
		e"	19.0900	Conductivity ( $\sigma$ ):	6.18	6.00	3.05	5	

## 10. System Check

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

### 10.1. Reference Target SAR Values

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

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	Target SAR Values (W/kg)		
				1g/10g	Head	Body
D835V2	4d002	11/15/2013	835	1g	9.49	9.43
				10g	6.18	6.21
D1900V2	5d043	11/12/2013	1900	1g	40.1	39.0
				10g	21.1	20.8
D2450V2	899	9/10/2013	2450	1g	51.3	49.7
				10g	23.9	23.3
D2600V2	1006	9/11/2013	2600	1g	56.50	55.7
				10g	25.20	24.8
D5GHzV2	1138	11/19/2013	5200	1g	78.5	72.9
				10g	22.5	20.4
			5600	1g	82.7	78.3
				10g	23.5	21.7
			5800	1g	78.3	72.8
				10g	22.4	20.1
D5GHzV2	1168	12/12/2013	5200	1g	79.3	75.2
				10g	22.7	21.0
			5600	1g	85.3	80.6
				10g	24.3	22.3
			5800	1g	81.0	75.7
				10g	22.9	20.9

## 10.2. System Check Results

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

### SAR Lab 2

Date Tested	System Dipole		T.S. Liquid	Measured Results			Target (Ref. Value)	Delta $\pm 10\%$	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
8/19/2014	D1900V2	5d043	Body	1g	3.69	3.81	38.1	39.0	-2.31	-3.25	1,2
				10g	1.86	2.12	21.2	20.8	1.92		
8/19/2014	D835V2	4d002	Body	1g	0.957	0.956	9.56	9.43	1.38	0.10	3,4
				10g	0.647	0.656	6.56	6.21	5.64		
8/25/2014	D2600V2	1006	Body	1g	5.62	5.53	55.3	55.7	-0.72	1.60	5,6
				10g	2.48	2.61	26.1	24.8	5.24		

### SAR Lab 3

Date Tested	System Dipole		T.S. Liquid	Measured Results			Target (Ref. Value)	Delta $\pm 10\%$	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
8/11/2014	D1900V2	5d043	Body	1g	4.09	4.06	40.6	39.0	4.10	0.73	
				10g	2.07	2.12	21.2	20.8	7.21		
8/12/2014	D1900V2	5d043	Body	1g	3.66	3.63	36.3	39.0	-6.92	0.82	7,8
				10g	1.85	1.89	18.9	20.8	-9.13		
8/15/2014	D835V2	4d002	Body	1g	1.04	1.02	10.2	9.4	8.17	1.92	9,10
				10g	0.698	0.672	6.72	6.21	8.21		
8/18/2014	D835V2	4d002	Body	1g	1.01	0.98	9.8	9.40	4.68	2.57	
				10g	0.672	0.646	6.46	6.21	4.03		
8/19/2014	D2600V2	1006	Body	1g	6.02	5.81	58.1	55.7	4.31	3.49	11,12
				10g	2.62	2.56	25.6	24.8	3.23		
8/20/2014	D2450V2	899	Body	1g	5.43	5.40	54.0	49.7	8.65	0.55	13,14
				10g	2.34	2.49	24.9	23.3	6.87		

**SAR Lab 4**

Date Tested	System Dipole		T.S. Liquid	Measured Results			Target (Ref. Value)	Delta ±10 %	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
8/13/2014	D5GHzV2 5200	1138	Body	1g	7.39	7.57	75.7	72.9	3.84	-2.44	15,16
				10g	2.04	2.19	21.9	20.4	7.35		
8/13/2014	D5GHzV2 5600	1138	Body	1g	8.06	8.18	81.8	78.3	4.47	-1.49	17,18
				10g	2.20	2.34	23.4	21.7	7.83		
8/13/2014	D5GHzV2 5800	1138	Body	1g	7.15	7.50	75.0	72.8	3.02	-4.90	
				10g	1.96	2.19	21.9	20.1	8.96		
8/20/2014	D5GHzV2 5200	1168	Body	1g	7.48	7.60	76.0	75.2	1.06	-1.60	19,20
				10g	2.05	2.18	21.8	21.0	3.81		
8/20/2014	D5GHzV2 5600	1168	Body	1g	7.70	8.16	81.6	80.6	1.24	-5.97	21,22
				10g	2.12	2.35	23.5	22.3	5.38		
8/20/2014	D5GHzV2 5800	1168	Body	1g	7.16	7.64	76.4	75.7	0.92	-6.70	23,24
				10g	1.97	2.19	21.9	20.9	4.78		
8/25/2014	D5GHzV2 5200	1138	Body	1g	6.95	7.44	74.4	72.9	2.06	-7.05	
				10g	1.92	2.15	21.5	20.4	5.39		
8/25/2014	D5GHzV2 5600	1138	Body	1g	7.59	8.09	80.9	78.3	3.32	-6.59	
				10g	2.04	2.30	23.0	21.7	5.99		
8/25/2014	D5GHzV2 5800	1138	Body	1g	7.10	7.60	76.0	72.8	4.40	-7.04	25,26
				10g	1.93	2.17	21.7	20.1	7.96		

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

**SAR Test Reduction criteria are as follows:**

**KDB 447498 D01 General RF Exposure Guidance:**

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

- $\leq 0.8$  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 941225 D01 SAR test for 3G devices:**

Body SAR is also measured for HSPA when the maximum average output of each RF channel with HSPA active is at least  $\frac{1}{4}$  dB higher than that measured without HSPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is above 75% of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 with power control algorithm 2.

**KDB 941225 D05 SAR for LTE Devices:**

SAR test reduction is applied using the following criteria:

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

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

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

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

**April 2013 TCB Workshop Updates:**

Apply usual 802.11 test exclusion considerations, but include 802.11ac SAR for highest 802.11a configuration in each frequency band and each exposure condition.



**11.1. GSM850**

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
GPRS 3 slots	ON	0	Rear	128	824.2	24.6	24.5	1.290	1.320	1
				190	836.6	24.6	24.5	1.260	1.289	
				251	848.8	24.6	24.4	1.230	1.288	
			Edge 1	190	836.6	24.6	24.5	0.235	0.240	
			Edge 4	190	836.6	24.6	24.5	0.405	0.414	
GPRS 4 slots	OFF	15	Rear	128	824.2	28.6	28.6	0.679	0.679	
				190	836.6	28.6	28.6	0.818	0.818	
				251	848.8	28.6	28.6	0.874	0.874	
			Edge 1	190	836.6	28.6	28.6	0.422	0.422	
			Edge 2	190	836.6	28.6	28.6	0.074	0.074	
			Edge 4	190	836.6	28.6	28.6	0.158	0.158	

**Additional test in DTM (Dual Transfer Mode)**

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
CS + GPRS 3 Slots	ON	0	Rear	128	824.2	24.6	24.6	1.060	1.060	
CS + GPRS 2 Slots	OFF	15	Rear	251	848.8	31.6	31.2	0.652	0.715	

**11.2. GSM1900**

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
GPRS 2 slots	ON	0	Rear	512	1850.2	21.5	21.3	0.994	1.041	
				661	1880.0	21.5	21.3	1.180	1.236	
				810	1909.8	21.5	21.2	1.240	1.329	2
			Edge 1	512	1850.2	21.5	21.3	0.724	0.758	
				661	1880.0	21.5	21.3	0.873	0.914	
				810	1909.8	21.5	21.2	0.929	0.995	
GPRS 4 slots	OFF	15	Rear	661	1880.0	26.6	26.6	0.481	0.481	
			Edge 1	661	1880.0	26.6	26.6	0.569	0.569	
			Edge 4	661	1880.0	26.6	26.6	0.119	0.119	

**Additional test in DTM (Dual Transfer Mode)**

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
CS + GPRS 2 Slots	ON	0	Rear	810	1909.8	21.5	21.5	1.130	1.130	
CS + GPRS 3 Slots	OFF	15	Rear	661	1880.0	27.6	27.5	0.384	0.393	

**11.3. W-CDMA Band V**

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	
						Tune-up limit	Meas.	Meas.	Scaled		
Rel 99 RMC 12.2 kbps	ON	0	Rear	4132	826.4	20.0	19.8	1.120	1.173		
				4183	836.6	20.0	19.8	1.130	1.183		
				4233	846.6	20.0	19.9	1.180	1.207	3	
			Edge 1	4183	836.6	20.0	19.8	0.339	0.355		
			Edge 4	4183	836.6	20.0	19.8	0.304	0.318		
	OFF	15	Rear	4183	836.6	24.5	24.4	0.537	0.550		
				Edge 1	4183	836.6	24.5	24.4	0.299	0.306	
				Edge 2	4183	836.6	24.5	24.4	0.050	0.051	
			Edge 4	4183	836.6	24.5	24.4	0.096	0.098		

**11.4. W-CDMA Band II**

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Rel 99 RMC 12.2 kbps	ON	0	Rear	9262	1852.4	15.5	15.3	0.944	0.988	
				9400	1880.0	15.5	15.4	1.200	1.228	4
				9538	1907.6	15.5	15.3	1.130	1.183	
			Edge 1	9262	1852.4	15.5	15.3	0.722	0.756	
				9400	1880.0	15.5	15.4	0.825	0.844	
				9538	1907.6	15.5	15.3	0.835	0.874	
	Edge 4	9400	1880.0	15.5	15.4	0.122	0.125			
	OFF	15	Rear	9262	1852.4	24.5	24.0	0.988	1.109	
				9400	1880.0	24.5	24.0	1.040	1.167	
				9538	1907.6	24.5	23.9	1.010	1.160	
			Edge 1	9262	1852.4	24.5	24.0	0.643	0.721	
				9400	1880.0	24.5	24.0	0.745	0.836	
9538				1907.6	24.5	23.9	0.800	0.919		
Edge 4	9400	1880.0	24.5	24.0	0.188	0.211				

### 11.5. LTE Band 5

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		
QPSK	ON	0	Rear	20450	829.0	1	49	20.0	19.5	1.150	1.290		
						25	12	20.0	19.5	1.160	1.302		
				20525	836.6	1	0	20.0	19.6	1.170	1.283		
						25	0	20.0	19.7	1.160	1.243		
			20600	844.0	50	0	20.0	19.6	1.180	1.294			
					1	0	20.0	19.6	1.200	1.316			
			Edge 1	20525	836.6	25	0	20.0	19.6	1.260	<b>1.382</b>	5	
						1	0	20.0	19.6	0.329	0.361		
	25	0				20.0	19.7	0.318	0.341				
	1	0				20.0	19.6	0.297	0.326				
	Edge 4	20525	836.6	25	0	20.0	19.7	0.307	0.329				
				1	0	24.0	23.5	0.468	0.525				
				25	25	23.0	22.6	0.375	0.411				
				1	0	24.0	23.5	0.248	0.278				
	OFF	15	15	Rear	20525	836.6	25	25	23.0	22.6	0.212	0.232	
							1	0	24.0	23.5	0.082	0.092	
Edge 1				20525	836.6	25	25	23.0	22.6	0.072	0.079		
						1	0	24.0	23.5				

### 11.6. LTE Band 7

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		
QPSK	ON	0	Rear	20850	2510.0	1	49	14.5	13.9	0.932	1.070		
						50	0	14.5	13.7	0.858	1.032		
				21100	2535.0	1	49	14.5	13.6	0.861	1.059		
						50	24	14.5	13.4	0.859	1.107		
				21350	2560.0	1	49	14.5	13.6	1.020	1.255	6	
						50	0	14.5	13.9	0.942	1.082		
			100	0	14.5	13.7	0.934	1.123					
			Edge 1	21100	2535.0	1	49	14.5	13.6	0.164	0.202		
	50	24				14.5	13.4	0.170	0.219				
	Edge 4	21100	2535.0	1	49	14.5	13.6	0.519	0.639				
				50	24	14.5	13.4	0.511	0.658				
	OFF	15	15	Rear	21100	2535.0	1	0	24.0	23.7	0.544	0.583	
							50	0	23.0	22.7	0.422	0.452	
				Edge 1	21100	2535.0	1	0	24.0	23.7	0.269	0.288	
							50	0	23.0	22.7	0.196	0.210	
	Edge 4	21100	2535.0	1	0	24.0	23.7	0.618	0.662				
50				0	23.0	22.7	0.489	0.524					

## 11.7. Wi-Fi DTS Band

Mode		Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Main Antenna				Sub Antenna				Plot No.
						Power (dBm)		1-g SAR (W/kg)		Power (dBm)		1-g SAR (W/kg)		
						Tune-up limit	Meas.	Meas.	Scaled	Tune-up limit	Meas.	Meas.	Scaled	
MIMO (Main + Sub)	802.11a	0	Rear	1	2412	14.0	13.0	0.781	0.983	14.0	13.3	0.650	0.764	
				6	2437	14.0	13.3	0.818	0.961	14.0	13.3	0.733	0.861	
				11	2462	14.0	14.0	1.030	<b>1.030</b>	14.0	13.8	0.883	0.925	7
			Edge 2	11	2462	14.0	14.0			14.0	13.8	0.069	0.072	
			Edge 3	11	2462	14.0	14.0	0.497	0.497	14.0	13.8	0.269	0.282	

### Additional Test for 802.11n HT20 Mode

Mode		Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Main Antenna				Sub Antenna				Plot No.
						Power (dBm)		1-g SAR (W/kg)		Power (dBm)		1-g SAR (W/kg)		
						Tune-up limit	Meas.	Meas.	Scaled	Tune-up limit	Meas.	Meas.	Scaled	
MIMO (Main + Sub)	802.11n HT20	0	Rear	11	2462	13.5	13.5	0.799	0.799	13.5	13.1	0.681	0.747	

### 11.8. Wi-Fi UNII Band

Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Main Antenna				Sub Antenna				Plot No.	
					Power (dBm)		1-g SAR (W/kg)		Power (dBm)		1-g SAR (W/kg)			
					Tune-up limit	Meas.	Meas.	Scaled	Tune-up limit	Meas.	Meas.	Scaled		
MIMO (Main + Sub)	802.11a	0	Rear	40	5200	11.5	11.5	0.750	0.750	11.5	10.5	0.809	1.018	
				48	5240	11.5	11.5	0.789	0.789	11.5	10.6	0.871	1.072	
				52	5260	11.5	11.5	0.674	0.674	11.5	10.7	0.964	1.159	
				64	5320	11.5	11.5	0.670	0.670	11.5	10.7	0.836	1.005	
				104	5520	11.5	11.1	0.479	0.525	11.5	11.4	0.896	0.917	
				116	5580	11.5	10.9	0.453	0.520	11.5	11.1	0.937	1.027	8
				140	5700	11.5	11.1	0.310	0.340	11.5	11.0	0.832	0.934	
				165	5825	11.5	11.0	0.195	0.219	11.5	11.1	0.547	0.600	9
			Edge 2	40	5200	11.5	11.5			11.5	10.5	0.189	0.238	
				52	5260	11.5	11.8			11.5	10.7	0.192	0.231	
				104	5520	11.5	11.1			11.5	11.4	0.136	0.139	
				165	5825	11.5	11.0			11.5	11.1	0.102	0.112	
			Edge 3	40	5200	11.5	11.5	1.260	1.260	11.5	10.5	1.130	1.423	10
				48	5240	11.5	11.5	1.240	1.240	11.5	10.6	1.080	1.329	
				52	5260	11.5	11.5	1.190	1.190	11.5	10.7	1.110	1.335	
				64	5320	11.5	11.5	1.090	1.090	11.5	10.7	1.040	1.250	
				104	5520	11.5	11.1	0.798	0.875	11.5	11.4	0.864	0.884	
				116	5580	11.5	10.9	0.607	0.697	11.5	11.1	0.930	1.020	
				140	5700	11.5	11.1	0.278	0.305	11.5	11.0	0.788	0.884	
				165	5825	11.5	11.0	0.177	0.199	11.5	11.1	0.544	0.596	

#### Repeated SAR

Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Main Antenna				Sub Antenna				Plot No.	
					Power (dBm)		1-g SAR (W/kg)		Power (dBm)		1-g SAR (W/kg)			
					Tune-up limit	Meas.	Meas.	Scaled	Tune-up limit	Meas.	Meas.	Scaled		
MIMO (Main + Sub)	802.11ac VHT20	0	Edge 3	52	5260	11.5	11.5	1.210	1.210	11.5	10.7	1.100	1.322	11

#### Additional Test for 802.11ac VHT20 Mode

Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Main Antenna				Sub Antenna				Plot No.	
					Power (dBm)		1-g SAR (W/kg)		Power (dBm)		1-g SAR (W/kg)			
					Tune-up limit	Meas.	Meas.	Scaled	Tune-up limit	Meas.	Meas.	Scaled		
MIMO (Main + Sub)	802.11ac VHT20	0	Edge 3	40	5200	11.5	11.4	1.210	1.238	11.5	10.4	1.080	1.391	
			Edge 3	52	5260	11.5	11.5	1.170	1.170	11.5	10.7	1.110	1.335	
			Rear	116	5580	11.5	10.9			11.5	11.1	0.720	0.789	
			Rear	165	5825	11.5	11.0			11.5	11.1	0.503	0.552	

### 11.9. Bluetooth

Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
					Tune-up limit	Meas.	Meas.	Scaled	
802.16 GFSK	0	Rear	39	2441	10.5	8.8	0.166	0.246	12
		Edge 3	39	2441	10.5	8.8	0.041	0.061	

## 12. SAR Measurement Variability

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

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

### 12.1. The Highest Measured SAR Configuration in Each Frequency Band

Frequency Band (MHz)	Air Interface	Stand-alone (W/kg)	Repeated SAR (Yes/No)
850	GSM 850	1.290	Yes
	W-CDMA Band V	1.180	No
	LTE Band 5	1.260	No
1900	GSM 1900	1.240	Yes
	W-CDMA Band II	1.200	No
2400	Wi-Fi 802.11b/g/n	1.030	Yes
	Bluetooth	0.166	No
2600	LTE Band 7	1.020	Yes
5200	Wi-Fi 802.11a/n	1.260	Yes
5300	Wi-Fi 802.11a/n	1.190	Yes
5500	Wi-Fi 802.11a/n	0.937	Yes
5800	Wi-Fi 802.11a/n	0.547	No

### 12.2. Repeated Measurement Results

Frequency band (MHz)	Air Interface	Test Position	Mode	Pwr Back-off	Dist. (mm)	Ch #.	Freq. (MHz)	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio
								Original	Repeated	
850	GSM 850	Rear	GPRS 3 slots	ON	0	128	824.2	1.290	1.100	1.17
1900	GSM 1900	Rear	GPRS 2 slots	ON	0	810	1909.8	1.240	1.230	1.01
2400	Wi-Fi 802.11b/g/n	Rear	802.11b 1Mbps	N/A	0	11	2462.0	1.030	1.030	1.00
2600	LTE Band 7	Rear	QPSK RB 1/49	ON	0	21350	2560.0	1.020	0.930	1.10
5200	Wi-Fi 802.11a/n	Edge 3	802.11a 6Mbps	N/A	0	40	5200.0	1.260	1.210	1.04
5300	Wi-Fi 802.11a/n	Edge 3	802.11a 6Mbps	N/A	0	52	5260.0	1.190	1.210	1.02
5500	Wi-Fi 802.11a/n	Rear	802.11a 6Mbps	N/A	0	116	5580.0	0.937	0.820	1.14

#### Note(s):

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

## 13. Simultaneous Transmission SAR Analysis

### 13.1. Estimated SAR for Simultaneous Transmission SAR Analysis

#### Considerations for SAR estimation

1. When standalone SAR test exclusion applies, standalone SAR must also be estimated to determine simultaneous transmission SAR test exclusion.
2. Dedicated Host Approach criteria for SAR test exclusion is likewise applied to SAR estimation, with certain distinctions between test exclusion and SAR estimation:
  - When the separation distance from the antenna to an adjacent edge is  $\leq 5$  mm, a distance of 5 mm is applied for SAR estimation; this is the same between test exclusion and SAR estimation calculations.
  - When the separation distance from the antenna to an adjacent edge is  $> 5$  mm but  $\leq 50$  mm, the actual antenna-to-edge separation distance is applied for SAR estimation.
  - When the minimum test separation distance is  $> 50$  mm, the estimated SAR value is 0.4 W/kg
3. Test positions Edge 3 and Edge 4 are inherently compliant as they consist of only estimated SAR values for all applicable transmitters and consequently will always have sum of SAR values  $< 1.2$  W/kg. Simultaneous transmission SAR analysis was therefore not performed for these test positions.

### 13.1.1. Estimated SAR for WWAN

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Estimated 1-g SAR Value (W/kg)					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
<b>Full Power, Proximity Sensor Off. A sensor triggering of 15 mm is included for Rear and Edge 1 &amp; 4</b>																
Cellular	GPRS 4 Slots	848.8	28.60	362	17.46	18	67.6	200.4	19.45		-MEASURE-	-MEASURE-	-MEASURE-	0.400	-MEASURE-	
Cellular	GPRS 4 Slots	1909.8	26.60	229	17.46	18	67.6	200.4	19.45		-MEASURE-	-MEASURE-	0.400	0.400	-MEASURE-	
Cellular	W-CDMA 2	1907.6	24.50	282	17.46	18	67.6	200.4	19.45		-MEASURE-	-MEASURE-	0.400	0.400	-MEASURE-	
Cellular	W-CDMA 5	846.6	24.50	282	17.46	18	67.6	200.4	19.45		-MEASURE-	-MEASURE-	-MEASURE-	0.400	-MEASURE-	
Cellular	LTE Band 5	844	24.00	251	17.46	18	67.6	200.4	19.45		-MEASURE-	-MEASURE-	0.400	0.400	-MEASURE-	
Cellular	LTE Band 7	2560	24.00	251	17.46	18	67.6	200.4	19.45		-MEASURE-	-MEASURE-	0.400	0.400	-MEASURE-	
<b>Second Stage Power Back-off, Proximity Sensor On</b>																
Cellular	GPRS 3 Slots	848.8	24.60	108	2.46	3	67.6	200.4	4.45		-MEASURE-	-MEASURE-	0.400	0.400	-MEASURE-	
Cellular	GPRS 2 Slots	1909.8	21.50	35	2.46	3	67.6	200.4	4.45		-MEASURE-	-MEASURE-	0.400	0.400	-MEASURE-	
Cellular	W-CDMA 2	1907.6	20.00	100	2.46	3	67.6	200.4	4.45		-MEASURE-	-MEASURE-	0.400	0.400	-MEASURE-	
Cellular	W-CDMA 5	846.6	15.50	35	2.46	3	67.6	200.4	4.45		-MEASURE-	-MEASURE-	0.400	0.400	-MEASURE-	
Cellular	LTE Band 5	844	24.00	251	2.46	3	67.6	200.4	4.45		-MEASURE-	-MEASURE-	0.400	0.400	-MEASURE-	
Cellular	LTE Band 7	2560	14.50	28	2.46	3	67.6	200.4	4.45		-MEASURE-	-MEASURE-	0.400	0.400	-MEASURE-	

### 13.1.2. Estimated SAR for WLAN

#### MIMO

Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Estimated 1-g SAR Value (W/kg)						
		dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	
<b>Wi-Fi Main Antenna</b>																
Wi-Fi 2.4 GHz	2462	14.00	25	2.46	187.7	55.1	3	36			-MEASURE-	0.400	0.400	-MEASURE-	0.145	
Wi-Fi 5.2 GHz	5240	11.50	14	2.46	187.7	55.1	3	36			-MEASURE-	0.400	0.400	-MEASURE-	0.119	
Wi-Fi 5.3 GHz	5320	11.50	14	2.46	187.7	55.1	3	36			-MEASURE-	0.400	0.400	-MEASURE-	0.120	
Wi-Fi 5.5 GHz	5700	11.50	14	2.46	187.7	55.1	3	36			-MEASURE-	0.400	0.400	-MEASURE-	0.124	
Wi-Fi 5.8 GHz	5825	11.50	14	2.46	187.7	55.1	3	36			-MEASURE-	0.400	0.400	-MEASURE-	0.125	
Bluetooth	2480	10.50	11	2.46	187.7	55.1	3	36			-MEASURE-	0.400	0.400	-MEASURE-	0.064	
<b>Wi-Fi Sub Antenna</b>																
Wi-Fi 2.4 GHz	2462	14.00	25	2.32	187.7	8.85	4.6	90.685			-MEASURE-	0.400	-MEASURE-	-MEASURE-	0.400	
Wi-Fi 5.2 GHz	5240	11.50	14	2.32	187.7	8.85	4.6	90.685			-MEASURE-	0.400	-MEASURE-	-MEASURE-	0.400	
Wi-Fi 5.3 GHz	5320	11.50	14	2.32	187.7	8.85	4.6	90.685			-MEASURE-	0.400	-MEASURE-	-MEASURE-	0.400	
Wi-Fi 5.5 GHz	5700	11.50	14	2.32	187.7	8.85	4.6	90.685			-MEASURE-	0.400	-MEASURE-	-MEASURE-	0.400	
Wi-Fi 5.8 GHz	5825	11.50	14	2.32	187.7	8.85	4.6	90.685			-MEASURE-	0.400	-MEASURE-	-MEASURE-	0.400	



**13.2. Sum of the SAR for GSM850 + Wi-Fi & BT**

Test Position		Simultaneous Transmission Scenario				Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
		① GSM850	② Wi-Fi(DTS)	③ Wi-Fi(UNII)	④ Bluetooth		
Rear	① + ②	1.320	1.030			2.350	Yes
	① + ③ + ④	1.320		1.159	0.246	2.725	Yes
Edge 1	① + ②	0.422	0.400			0.822	No
	① + ③ + ④	0.422		0.400	0.400	1.222	No
Edge 2	① + ②	0.074	0.072			0.146	No
	① + ③ + ④	0.074		0.238	0.400	0.712	No
Edge 4	① + ②	0.414	0.400			0.814	No
	① + ③ + ④	0.414		0.400	0.400	1.214	No

**SAR to Peak Location Separation Ratio (SPLSR)**

Test Position		Worst-case combination				Σ 1-g SAR (mW/g)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Plot No.
		① GSM850	② Wi-Fi(DTS)	③ Wi-Fi(UNII)	④ Bluetooth					
Rear	① + ②	1.320	1.030			2.350	187.6	0.019	No	1
	① + ③ + ④	1.320		1.159	0.246	2.725				2
	① + ③	1.320		1.159		2.479	203.7	0.019	No	
	① + ④	1.320			0.246	1.566	186.3	0.011	No	
	③ + ④			1.159	0.246	1.405	68.2	0.024	No	

**Conclusion:**

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

### 13.3. Sum of the SAR for GSM1900 + Wi-Fi & BT

Test Position		Simultaneous Transmission Scenario				Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
		① GSM1900	② Wi-Fi(DTS)	③ Wi-Fi(UNII)	④ Bluetooth		
Rear	① + ②	1.329	1.030			2.359	Yes
	① + ③ + ④	1.329		1.159	0.246	2.734	Yes
Edge 1	① + ②	0.995	0.400			1.395	No
	① + ③ + ④	0.995		0.400	0.400	1.795	Yes
Edge 4	① + ②	0.146	0.400			0.546	No
	① + ③ + ④	0.146		0.400	0.400	0.946	No

#### SAR to Peak Location Separation Ratio (SPLSR)

Test Position		Worst-case combination				Σ 1-g SAR (mW/g)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
		① GSM1900	② Wi-Fi(DTS)	③ Wi-Fi(UNII)	④ Bluetooth					
Rear	① + ②	1.329	1.030			2.359	194.1	0.019	No	3
	① + ③ + ④	1.329		1.159	0.246	2.734				4
	① + ③	1.329		1.159		2.488	209.2	0.019	No	
	① + ④	1.329			0.246	1.575	192.7	0.010	No	
	③ + ④			1.159	0.246	1.405	68.2	0.024	No	
Test Position		Worst-case combination				Σ 1-g SAR (mW/g)	* Estimated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
		① GSM1900	② Wi-Fi(DTS)	③ Wi-Fi(UNII)	④ Bluetooth					
Edge 1	① + ③ + ④	0.995		0.400	0.400	1.795				5
	① + ③	0.995		0.400		1.395	188.3	0.009	No	
	① + ④	0.995			0.400	1.395	185.1	0.009	No	
	③ + ④			0.400	0.400	0.800	21.2	0.034	No	

#### Note(s):

\* : The Peak Location Separation Distance is estimated by using the antenna locations

#### Conclusion:

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

**13.4. Sum of the SAR for W-CDMA Band V + Wi-Fi & BT**

Test Position		Simultaneous Transmission Scenario				Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
		① W-CDMA Band V	② Wi-Fi(DTS)	③ Wi-Fi(UNII)	④ Bluetooth		
Rear	① + ②	1.207	1.030			2.237	Yes
	① + ③ + ④	1.207		1.159	0.246	2.612	Yes
Edge 1	① + ②	0.355	0.400			0.755	No
	① + ③ + ④	0.355		0.400	0.400	1.155	No
Edge 2	① + ②	0.051	0.072			0.123	No
	① + ③ + ④	0.051		0.238	0.400	0.689	No
Edge 4	① + ②	0.318	0.400			0.718	No
	① + ③ + ④	0.318		0.400	0.400	1.118	No

**SAR to Peak Location Separation Ratio (SPLSR)**

Test Position		Worst-case combination				Σ 1-g SAR (mW/g)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
		① W-CDMA Band V	② Wi-Fi(DTS)	③ Wi-Fi(UNII)	④ Bluetooth					
Rear	① + ②	1.207	1.030			2.237	191.1	0.018	No	6
	① + ③ + ④	1.207		1.159	0.246	2.612				7
	① + ③	1.207		1.159		2.366	207.2	0.018	No	
	① + ④	1.207			0.246	1.453	189.8	0.009	No	
	③ + ④			1.159	0.246	1.405	68.2	0.024	No	

**Conclusion:**

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

**13.5. Sum of the SAR for W-CDMA Band II + Wi-Fi & BT**

Test Position		Simultaneous Transmission Scenario				Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
		① W-CDMA Band II	② Wi-Fi(DTS)	③ Wi-Fi(UNII)	④ Bluetooth		
Rear	① + ②	1.228	1.030			2.258	Yes
	① + ③ + ④	1.228		1.159	0.246	2.633	Yes
Edge 1	① + ②	0.919	0.400			1.319	No
	① + ③ + ④	0.919		0.400	0.400	1.719	Yes
Edge 4	① + ②	0.211	0.400			0.611	No
	① + ③ + ④	0.211		0.400	0.400	1.011	No

**SAR to Peak Location Separation Ratio (SPLSR)**

Test Position		Worst-case combination				Σ 1-g SAR (mW/g)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
		① W-CDMA Band II	② Wi-Fi(DTS)	③ Wi-Fi(UNII)	④ Bluetooth					
Rear	① + ②	1.228	1.030			2.258	202.4	0.017	No	8
	① + ③ + ④	1.228		1.159	0.246	2.633				9
	① + ③	1.228		1.159		2.387	215.1	0.017	No	
	① + ④	1.228			0.246	1.474	201.0	0.009	No	
	③ + ④			1.159	0.246	1.405	68.2	0.024	No	
Test Position		Worst-case combination				Σ 1-g SAR (mW/g)	* Estimated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
		① W-CDMA Band II	② Wi-Fi(DTS)	③ Wi-Fi(UNII)	④ Bluetooth					
Edge 1	① + ③ + ④	0.919		0.400	0.400	1.719				10
	① + ③	0.919		0.400		1.319	188.3	0.008	No	
	① + ④	0.919			0.400	1.319	185.1	0.008	No	
	③ + ④			0.400	0.400	0.800	21.2	0.034	No	

**Note(s):**

\* : The Peak Location Separation Distance is estimated by using the antenna locations

**Conclusion:**

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

**13.6. Sum of the SAR for LTE Band 5 + Wi-Fi & BT**

Test Position		Simultaneous Transmission Scenario				Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
		① LTE Band 5	② Wi-Fi(DTS)	③ Wi-Fi(UNII)	④ Bluetooth		
Rear	① + ②	1.382	1.030			2.412	Yes
	① + ③ + ④	1.382		1.159	0.246	2.787	Yes
Edge 1	① + ②	0.361	0.400			0.761	No
	① + ③ + ④	0.361		0.400	0.400	1.161	No
Edge 4	① + ②	0.329	0.400			0.729	No
	① + ③ + ④	0.329		0.400	0.400	1.129	No

**SAR to Peak Location Separation Ratio (SPLSR)**

Test Position		Worst-case combination				Σ 1-g SAR (mW/g)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
		① LTE Band 5	② Wi-Fi(DTS)	③ Wi-Fi(UNII)	④ Bluetooth					
Rear	① + ②	1.382	1.030			2.412	191.7	0.020	No	11
	① + ③ + ④	1.382		1.159	0.246	2.787				12
	① + ③	1.382		1.159		2.541	208.2	0.019	No	
	① + ④	1.382			0.246	1.628	190.4	0.011	No	
	③ + ④			1.159	0.246	1.405	68.2	0.024	No	

**Conclusion:**

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

**13.7. Sum of the SAR for LTE Band 7 + Wi-Fi & BT**

Test Position		Simultaneous Transmission Scenario				Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
		① LTE Band 7	② Wi-Fi(DTS)	③ Wi-Fi(UNII)	④ Bluetooth		
Rear	① + ②	1.255	1.030			2.285	Yes
	① + ③ + ④	1.255		1.159	0.246	2.660	Yes
Edge 1	① + ②	0.288	0.400			0.688	No
	① + ③ + ④	0.288		0.400	0.400	1.088	No
Edge 4	① + ②	0.662	0.400			1.062	No
	① + ③ + ④	0.662		0.400	0.400	1.462	No

**SAR to Peak Location Separation Ratio (SPLSR)**

Test Position		Worst-case combination				Σ 1-g SAR (mW/g)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
		① LTE Band 7	② Wi-Fi(DTS)	③ Wi-Fi(UNII)	④ Bluetooth					
Rear	① + ②	1.255	1.030			2.285	185.2	0.019	No	13
	① + ③ + ④	1.255		1.159	0.246	2.660				14
	① + ③	1.255		1.159		2.414	204.2	0.018	No	
	① + ④	1.255			0.246	1.501	183.9	0.010	No	
	③ + ④			1.159	0.246	1.405	68.2	0.024	No	

**Conclusion:**

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

## **14. Appendixes**

**Refer to separated files for the following appendixes.**

- 14.1. Photos and Antenna Locations**
- 14.2. System Performance Check Plots**
- 14.3. Highest SAR Test Plots**
- 14.4. Sum of the SAR for SPLSR Test Plots**
- 14.5. Calibration Certificate for E-Field Probe EX3DV3 - SN 3531**
- 14.6. Calibration Certificate for E-Field Probe EX3DV4 - SN 3773**
- 14.7. Calibration Certificate for E-Field Probe EX3DV4 - SN 3929**
- 14.8. Calibration Certificate for D835V2 - SN 4d002**
- 14.9. Calibration Certificate for D1900V2- SN 5d043**
- 14.10. Calibration Certificate for D2450V2 - SN 899**
- 14.11. Calibration Certificate for D2600V2 - SN 1006**
- 14.12. Calibration Certificate for D5GHzV2 - SN 1138**
- 14.13. Calibration Certificate for D5GHzV2 - SN 1168**

**END OF REPORT**