



## SAR EVALUATION REPORT

FCC 47 CFR § 2.1093  
IEEE Std 1528-2013

*For*

WCDMA/LTE Tablet + Bluetooth/BLE, DTS/UNII a/b/g/n/ac and ANT+

FCC ID: A3LSMT677A  
Model Name: SM-T677A

Report Number: 15K21698-S1V1  
Issue Date: 9/22/2015

*Prepared for*

**SAMSUNG ELECTRONICS CO., LTD.**  
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,  
GYEONGGI-DO, 443-742, KOREA

*Prepared by*

**UL Korea, Ltd. Suwon Laboratory**  
218 Maeyeong-ro, Yeongtong-gu,  
Suwon-si, Gyeonggi-do, 443-823, Korea  
TEL: (031) 337-9902  
FAX: (031) 213-5433



TL-637

**Revision History**



Rev.	Date	Revisions	Revised By
--	9/22/2015	Initial Issue	DoYoung Seo

## Table of Contents

<b>1.</b>	<b>Attestation of Test Results .....</b>	<b>5</b>
<b>2.</b>	<b>Test Specification, Methods and Procedures.....</b>	<b>6</b>
<b>3.</b>	<b>Facilities and Accreditation .....</b>	<b>6</b>
<b>4.</b>	<b>SAR Measurement System &amp; Test Equipment .....</b>	<b>7</b>
4.1.	<i>SAR Measurement System.....</i>	7
4.2.	<i>SAR Scan Procedures .....</i>	8
4.3.	<i>Test Equipment.....</i>	10
<b>5.</b>	<b>Measurement Uncertainty.....</b>	<b>10</b>
<b>6.</b>	<b>Device Under Test (DUT) Information .....</b>	<b>11</b>
6.1.	<i>DUT Description .....</i>	11
6.2.	<i>Wireless Technologies.....</i>	11
6.3.	<i>Nominal and Maximum Output Power.....</i>	12
6.4.	<i>General LTE SAR Test and Reporting Considerations.....</i>	13
6.5.	<i>Power Reduction by Proximity Sensing .....</i>	15
6.5.1.	<i>Proximity Sensor Triggering Distance (KDB 616217 §6.2).....</i>	15
6.5.2.	<i>Proximity Sensor Coverage (KDB 616217 §6.3).....</i>	19
6.5.3.	<i>Proximity Sensor Tilt Angle Assessment (KDB 616217 §6.4).....</i>	19
6.5.4.	<i>Resulting test positions for SAR measurements .....</i>	19
<b>7.</b>	<b>RF Exposure Conditions (Test Configurations) .....</b>	<b>20</b>
7.1.	<i>Standalone SAR Test Exclusion Considerations.....</i>	20
7.2.	<i>Required Test Configurations .....</i>	23
<b>8.</b>	<b>Dielectric Property Measurements &amp; System Check .....</b>	<b>24</b>
8.1.	<i>Dielectric Property Measurements .....</i>	24
8.2.	<i>System Check.....</i>	27
<b>9.</b>	<b>Conducted Output Power Measurements.....</b>	<b>30</b>
9.1.	<i>W-CDMA .....</i>	30
9.2.	<i>LTE.....</i>	34
9.2.1.	<i>LTE Rel. 10 Carrier Aggregation.....</i>	45
9.3.	<i>Wi-Fi 2.4GHz (DTS Band) .....</i>	46
9.4.	<i>Wi-Fi 5GHz (U-NII Bands).....</i>	47
9.5.	<i>Bluetooth .....</i>	48
<b>10.</b>	<b>Measured and Reported (Scaled) SAR Results.....</b>	<b>49</b>
10.1.	<i>W-CDMA Band V .....</i>	51

10.2.	<i>W-CDMA Band II</i> .....	51
10.3.	<i>LTE Band 2 (20MHz Bandwidth)</i> .....	51
10.4.	<i>LTE Band 4 (20MHz Bandwidth)</i> .....	51
10.5.	<i>LTE Band 5 (10MHz Bandwidth)</i> .....	52
10.6.	<i>LTE Band 12 (10MHz Bandwidth)</i> .....	52
10.7.	<i>LTE Band 17 (10MHz Bandwidth)</i> .....	52
10.8.	<i>LTE Band 30 (10MHz Bandwidth)</i> .....	52
10.9.	<i>Wi-Fi (DTS Band)</i> .....	53
10.10.	<i>Wi-Fi (U-NII Band)</i> .....	53
10.11.	<i>Bluetooth</i> .....	54
<b>11.</b>	<b>SAR Measurement Variability</b> .....	<b>55</b>
<b>12.</b>	<b>Simultaneous Transmission SAR Analysis</b> .....	<b>56</b>
12.1.	<i>Sum of the SAR for WCDMA Band V &amp; Wi-Fi &amp; BT</i> .....	58
12.2.	<i>Sum of the SAR for WCDMA Band II &amp; Wi-Fi &amp; BT</i> .....	58
12.3.	<i>Sum of the SAR for LTE Band 2 &amp; Wi-Fi &amp; BT</i> .....	58
12.4.	<i>Sum of the SAR for LTE Band 4 &amp; Wi-Fi &amp; BT</i> .....	59
12.5.	<i>Sum of the SAR for LTE Band 5 &amp; Wi-Fi &amp; BT</i> .....	59
12.6.	<i>Sum of the SAR for LTE Band 12 &amp; Wi-Fi &amp; BT</i> .....	59
12.7.	<i>Sum of the SAR for LTE Band 30 &amp; Wi-Fi &amp; BT</i> .....	59
<b>Appendixes</b>	.....	<b>62</b>
	<i>15K21698-S1V1 FCC Report SAR_App A_Photos &amp; Ant. Locations</i> .....	62
	<i>15K21698-S1V1 FCC Report SAR_App B_Highest SAR Test Plots</i> .....	62
	<i>15K21698-S1V1 FCC Report SAR_App C_System Check Plots</i> .....	62
	<i>15K21698-S1V1 FCC Report SAR_App D_SAR Tissue Ingredients</i> .....	62
	<i>15K21698-S1V1 FCC Report SAR_App E_Probe Cal. Certificates</i> .....	62

# 1. Attestation of Test Results

Applicant Name	SAMSUNG ELECTRONICS CO.,LTD.			
FCC ID	A3LSMT677A			
Model Name	SM-T677A			
Applicable Standards	FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013			
<b>SAR Limits (W/Kg)</b>				
Exposure Category	Peak spatial-average(1g of tissue)			
General population / Uncontrolled exposure	1.6			
<b>The Highest Reported SAR (W/kg)</b>				
<b>RF Exposure Conditions</b>	<b>Equipment Class</b>			
	<b>Licensed</b>	<b>DTS</b>	<b>U-NII</b>	<b>DTS(BT)</b>
Standalone	0.957	0.501	1.095	N/A
Simultaneous TX	1.412	1.088	1.412	N/A
Date Tested	WWAN : 9/2/2015 to 9/21/2015, WLAN : 8/27/2015 to 9/7/2015			
Test Results	Pass			
<p><b>Note:</b> The Wi-Fi (DTS/U-NII) and Bluetooth SAR measurement results from the original filling can be found in SAR test report 15K21654-S1, FCC ID A3LSMT670. The WLAN/BT antennas and surrounding circuitry is the same between these two units, and tune up power targets are identical for WLAN/BT operations. Therefore, SAR data for WLAN/BT from the original filling was used for this model. Spot checks for WLAN/BT were performed to ensure that the SAR measurements for both devices are the same.</p>				
<p>UL Korea, Ltd. 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 Korea, Ltd. 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 Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. 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 IAS, any agency of the Federal Government, or any agency of any government.</p>				
Approved & Released By:		Prepared By:		
				
JiHo Choi Operations Manager UL Korea, Ltd Suwon Laboratory		DoYoung Seo Laboratory Engineer UL Korea, Ltd Suwon Laboratory		

## 2. Test Specification, Methods and Procedures

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

- 248227 D01 802.11 Wi-Fi SAR v02r01
- 447498 D01 General RF Exposure Guidance v05r02
- 616217 D04 SAR for laptop and tablets v01r01
- 690783 D01 SAR Listings on Grants v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r01
- 941225 D05 SAR for LTE Devices v02r03
- 941225 D05A LTE Rel.10 KDB Inquiry Sheet v01r01
- 941225 D06 Hotspot Mode v02

## 3. Facilities and Accreditation

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

Suwon
SAR 1 Room
SAR 2 Room
SAR 3 Room

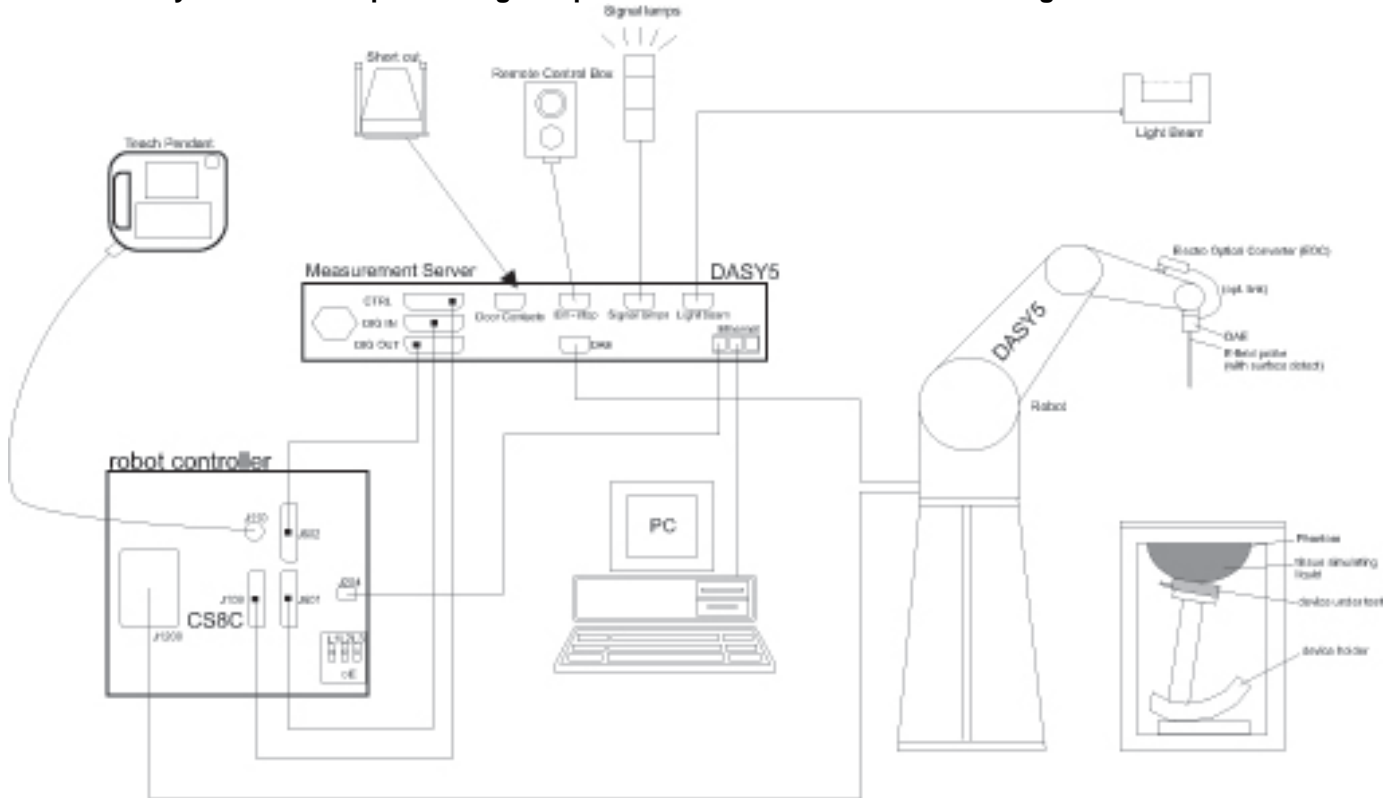
UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637.

The full scope of accreditation can be viewed at <http://www.iasonline.org/PDF/TL/TL-637.pdf>.

## 4. SAR Measurement System & Test Equipment

### 4.1. SAR Measurement System

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

## 4.2. SAR Scan Procedures

### Step 1: Power Reference Measurement

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

### Step 2: Area Scan

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

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

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

**Step 3: Zoom Scan**

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

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

		$\leq 3$ GHz	$> 3$ GHz
Maximum zoom scan spatial resolution: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$		$\leq 2$ 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
		$\Delta z_{\text{Zoom}}(n>1)$ : 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	E5071C	MY46522054	8-18-2016
Dielectric Assessment Kit	SPEAG	DAK-3.5	1196	8-4-2016
Shorting block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	LKM	DTM3000	3424	8-19-2016

#### System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
MXG Analog Signal Generator	Agilent	N5181A	MY50145882	8-18-2016
Power Sensor	Agilent	U2000A	MY54260010	8-18-2016
Power Sensor	Agilent	U2000A	MY54260007	8-18-2016
Power Amplifier	EXODUS	1410025-AMP2027-10003	10003	8-18-2016
Directional Coupler	Agilent	772D	MY52180193	8-18-2016
Directional Coupler	Agilent	778D	MY52180432	8-18-2016
Low Pass Filter	MICROLAB	LA-15N	03943	8-18-2016
Low Pass Filter	FILTRON	L14012FL	1410003S	8-18-2016
Low Pass Filter	MICROLAB	LA-60N	03942	8-18-2016
Attenuator	Agilent	8491B/003	MY39269292	8-18-2016
Attenuator	Agilent	8491B/010	MY39269315	8-18-2016
Attenuator	Agilent	8491B/020	MY39269298	8-18-2016
E-Field Probe	SPEAG	EX3DV4	7330	2-12-2016
E-Field Probe	SPEAG	EX3DV4	7313	7-23-2016
E-Field Probe	SPEAG	EX3DV4	7352	3-6-2016
E-Field Probe	SPEAG	EX3DV4	7376	9-2-2016
Data Acquisition Electronics	SPEAG	DAE4	1446	8-17-2016
Data Acquisition Electronics	SPEAG	DAE3	479	10-15-2015
System Validation Dipole	SPEAG	D750V3	1122	8-17-2016
System Validation Dipole	SPEAG	D835V2	4d159	11-19-2015
System Validation Dipole	SPEAG	D1750V2	1125	8-20-2016
System Validation Dipole	SPEAG	D1900V2	5d199	2-6-2016
System Validation Dipole	SPEAG	D2450V2	960	2-5-2016
System Validation Dipole	SPEAG	D5GHzV2	1209	2-10-2016
Thermometer	Lutron	MHB-382SD	AH.50215	8-19-2016
Thermometer	Lutron	MHB-382SD	AH.50213	11-18-2015

#### Others

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Base Station Simulator	R & S	CMW500	150313	8-18-2016
Base Station Simulator	R & S	CMW500	150314	8-18-2016

### 5. Measurement Uncertainty

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

## 6. Device Under Test (DUT) Information

### 6.1. DUT Description

Device Dimension	Overall (Length x Width): 447 mm x 272 mm Overall Diagonal: 513 mm Display Diagonal: 472 mm
Back Cover	<input checked="" type="checkbox"/> The rechargeable battery is not user accessible.
Battery Options	<input checked="" type="checkbox"/> The rechargeable battery is not user accessible.
Wireless Router (Hotspot)	Wi-Fi Hotspot mode permits the device to share its cellular data connection with other Wi-Fi-enabled devices. <input checked="" type="checkbox"/> Mobile Hotspot (Wi-Fi 2.4 GHz) <input checked="" type="checkbox"/> Mobile Hotspot (Wi-Fi 5.8 GHz)
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other <input checked="" type="checkbox"/> Wi-Fi Direct (Wi-Fi 2.4 GHz) <input checked="" type="checkbox"/> Wi-Fi Direct (Wi-Fi 5.8 GHz)

### 6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode	Duty Cycle used for SAR testing
W-CDMA (UMTS)	Band II Band V	UMTS Rel. 99 (Voice & Data) HSDPA (Rel. 5) HSUPA (Rel. 6)	100%
LTE	FDD Band 2 FDD Band 4 FDD Band 5 FDD Band 12 FDD Band 17 FDD Band 29(RX only) FDD Band 30	QPSK 16QAM <input type="checkbox"/> Rel. 10 Does not support Carrier Aggregation (CA) <input checked="" type="checkbox"/> Rel. 10 Carrier Aggregation (1 Uplink and 2 Downlinks) <input type="checkbox"/> Rel. 11 Carrier Aggregation (2 Uplink and 2 Downlinks)	100% (FDD)
Does this device support 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%
	Does this device support bands 5.60 ~ 5.65 GHz? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Does this device support Band gap channel? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
Bluetooth	2.4 GHz	Version 4.1 LE	76.99 % (DH5)

### 6.3. Nominal and Maximum Output Power

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

Upper limit (dB): -1.5 ~ 0.5		Max. RF Output Power (dBm)		Reduce RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit	Target	Max. tune-up tolerance limit
W-CDMA Band V	R99	23.0	<b>23.5</b>	21.0	<b>21.5</b>
	HSDPA	23.0	<b>23.5</b>	21.0	<b>21.5</b>
	HSUPA	23.0	<b>23.5</b>	21.0	<b>21.5</b>
W-CDMA Band II	R99	23.5	<b>24.0</b>	17.5	<b>18.0</b>
	HSDPA	23.5	<b>24.0</b>	17.5	<b>18.0</b>
	HSUPA	23.0	<b>23.5</b>	17.5	<b>18.0</b>
LTE Band 2	QPSK, 16QAM	24.0	<b>24.5</b>	17.5	<b>18.0</b>
LTE Band 4	QPSK, 16QAM	24.0	<b>24.5</b>	16.0	<b>16.5</b>
LTE Band 5	QPSK, 16QAM	24.0	<b>24.5</b>	20.5	<b>21.0</b>
LTE Band 12	QPSK, 16QAM	24.0	<b>24.5</b>	17.7	<b>18.2</b>
LTE Band 17	QPSK, 16QAM	24.0	<b>24.5</b>	17.7	<b>18.2</b>
LTE Band 29	QPSK, 16QAM	<b>RX Only</b>			
LTE Band 30	QPSK, 16QAM	22.5	<b>23.0</b>	16.5	<b>17.0</b>

Upper limit (dB): ~ 0.5		Max. RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. Power limit
WiFi 2.4 GHz	802.11b	16.0	<b>16.5</b>
	802.11g	14.0	<b>14.5</b>
	802.11n HT20	13.0	<b>13.5</b>
WiFi 5 GHz	802.11a	11.0	<b>11.5</b>
	802.11n HT20	11.0	<b>11.5</b>
	802.11n HT40	11.0	<b>11.5</b>
	802.11ac VHT20	11.0	<b>11.5</b>
	802.11ac VHT40	10.0	<b>10.5</b>
	802.11ac VHT80	9.0	<b>9.5</b>
Bluetooth		9.0	<b>9.5</b>
Bluetooth LE		6.5	<b>7.0</b>

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

Item	Description						
Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 2	Frequency range: 1850 - 1910 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	18700 /1860	18675/ 1857.5	18650/ 1855	18625/ 1852.5	18615/ 1851.5	18607/ 1850.7
	Mid	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880
	High	19100/ 1900	19125/ 1902.5	19150/ 1905	19175/ 1907.5	19185/ 1908.5	19193/ 1909.3
	Band 4	Frequency range: 1710 - 1755 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	20050/ 1720	20025/ 1717.5	20000/ 1715	19975/ 1712.5	19965/ 1711.5	19957/ 1710.7
	Mid	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5
	High	20300/ 1745	20325/ 1747.5	20350/ 1750	20375/ 1752.5	20385/ 1753.5	20393/ 1754.3
	Band 5	Frequency range: 824 - 849 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low			20450/ 829	20425/ 826.5	20415/ 825.5	20407/ 824.7
	Mid			20525/ 836.5	20525/ 836.5	20525/ 836.5	20525/ 836.5
	High			20600/ 844	20625/ 846.5	20635/ 847.5	20643/ 848.3
	Band 12	Frequency range: 699 – 716 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low			23060/ 704	23035/ 701.5	23025/ 700.5	23017/ 699.7
	Mid			23095/ 707.5	23095/ 707.5	23095/ 707.5	23095/ 707.5
	High			23130/ 711	23155/ 713.5	23165/ 714.5	23173/ 715.3
	Band 17	Frequency range: 704 - 716 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low			23780/ 709	23755/ 706.5		
Mid			23790/ 710	23790/ 710			
High			23800/ 711	23825/ 713.5			
Band 30	Frequency range: 2305 - 2315 MHz						
	Channel Bandwidth						
	20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz	
Low				27685/ 2307.5			
Mid			27710/ 2310	27710/ 2310			
High				27735/ 2312.5			

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

	Primary Channel Bandwidth(MHz)		Secondary Channel Bandwidth(MHz)																																							
	Carrier Aggregation Combinations	Band 2	10	Band17	10																																					
	Band 2	20	Band 29	10																																						
	Band 2	20	Band 5	10																																						
	Band 2	20	Band 12	10																																						
	Band 2	20	Band 30	10																																						
	Band 4	10	Band 17	10																																						
	Band 4	20	Band 29	10																																						
	Band 4	10, 20	Band 5	10																																						
	Band 4	20	Band 12	10																																						
	Band 4	20	Band 30	10																																						
	Band 5	10	Band 2	20																																						
	Band 5	10	Band 4	10, 20																																						
	Band 5	10	Band 30	10																																						
	Band 12	10	Band 30	10																																						
	Band 12	10	Band 2	20																																						
	Band 17	10	Band 2	10																																						
	Band 30	10	Band 29	10																																						
	Band 30	10	Band 2	20																																						
	Band 30	10	Band 5	10																																						
	Band 30	10	Band 12	10																																						
LTE transmitter and antenna implementation	LTE Bands 2,4,5,12,17, 30 have one (1)Tx/Rx antenna LTE Bands 2,4,5, 12, 17, 29, 30 have one (1) Rx antenna Refer to Appendix A..																																									
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	Yes																																									
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.																																									

## 6.5. Power Reduction by Proximity Sensing

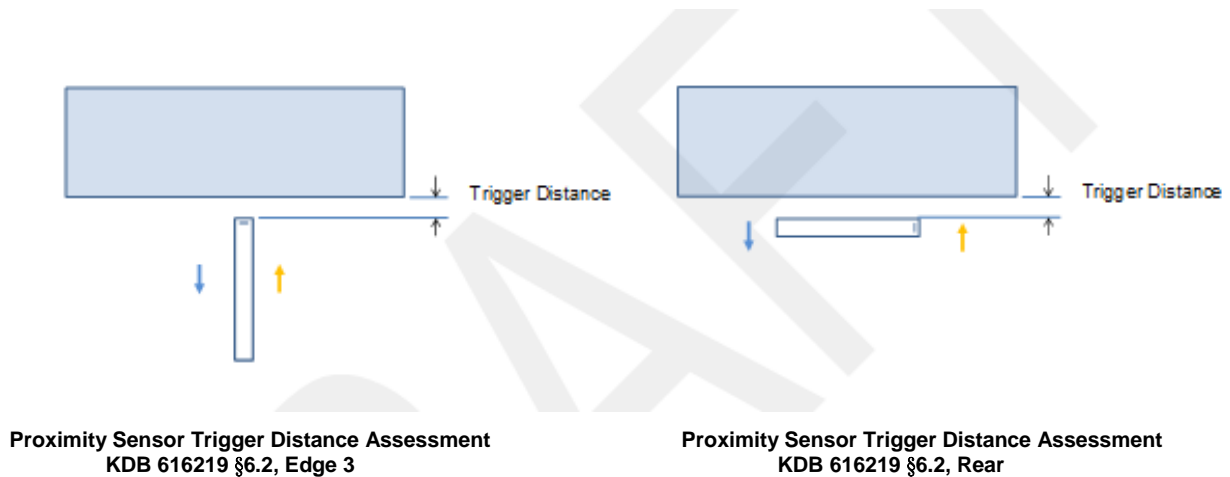
### 6.5.1. Proximity Sensor Triggering Distance (KDB 616217 §6.2)

Rear 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 surface of Edge3.

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.



**LEGEND**

- Direction of DUT travel for determination of power reduction triggering point
- ← Direction of DUT travel for determination of full power resumption triggering point

### Summary of Trigger Distances

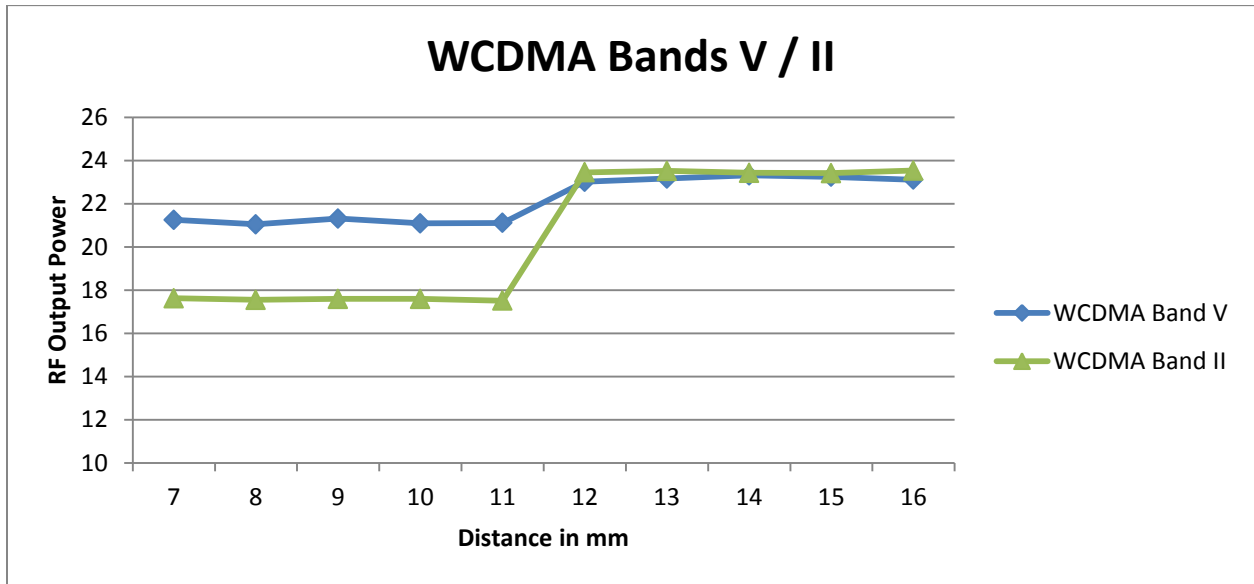
Tissue simulating liquid	Trigger distance - Edge 3		Trigger distance - Rear	
	Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom
750 muscle	9 mm	9 mm	11 mm	11 mm
850 muscle	9 mm	9 mm	11 mm	11 mm
1700 muscle	9 mm	9 mm	11 mm	11 mm
1900 muscle	9 mm	9 mm	11 mm	11 mm
2300 muscle	9 mm	9 mm	11 mm	11 mm
2450 muscle	N/A	N/A	N/A	N/A
5000 muscle	N/A	N/A	N/A	N/A

**Proximity Sensor Triggering Distance Measurement Results**

**WCDMA Bands V & II**

Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

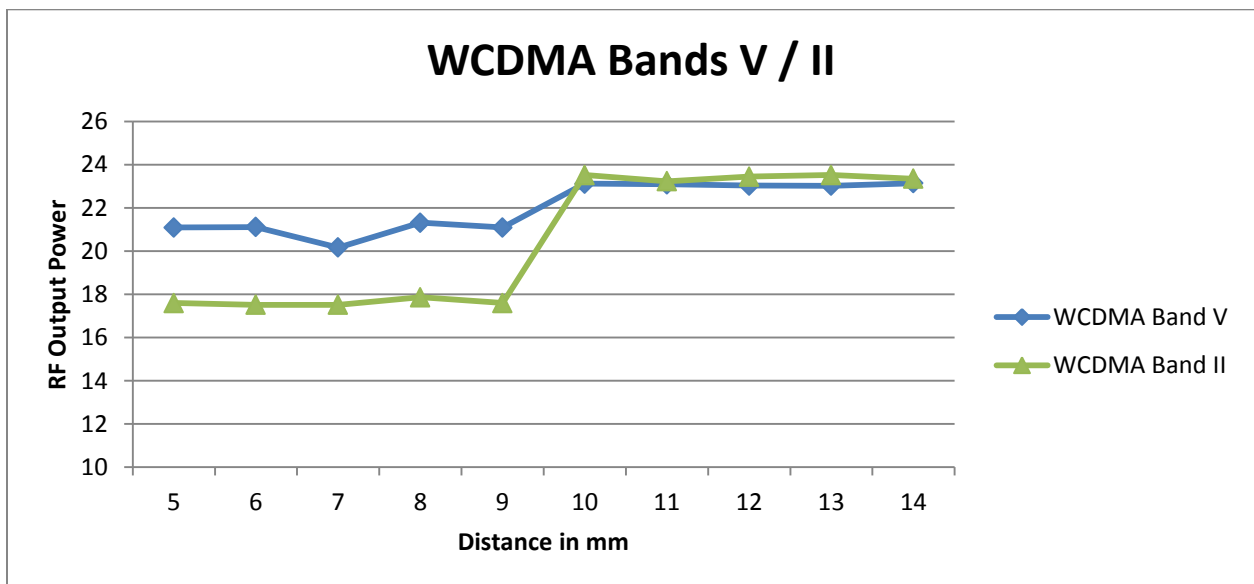
Distance to DUT vs. Output Power in dBm										
Distance (mm)	7	8	9	10	11	12	13	14	15	16
WCDMA Band V	21.3	21.0	21.3	21.1	21.1	23.0	23.2	23.3	23.2	23.1
WCDMA Band II	17.6	17.6	17.6	17.6	17.5	23.5	23.5	23.4	23.4	23.5



**WCDMA Bands V & II**

Edge 3, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

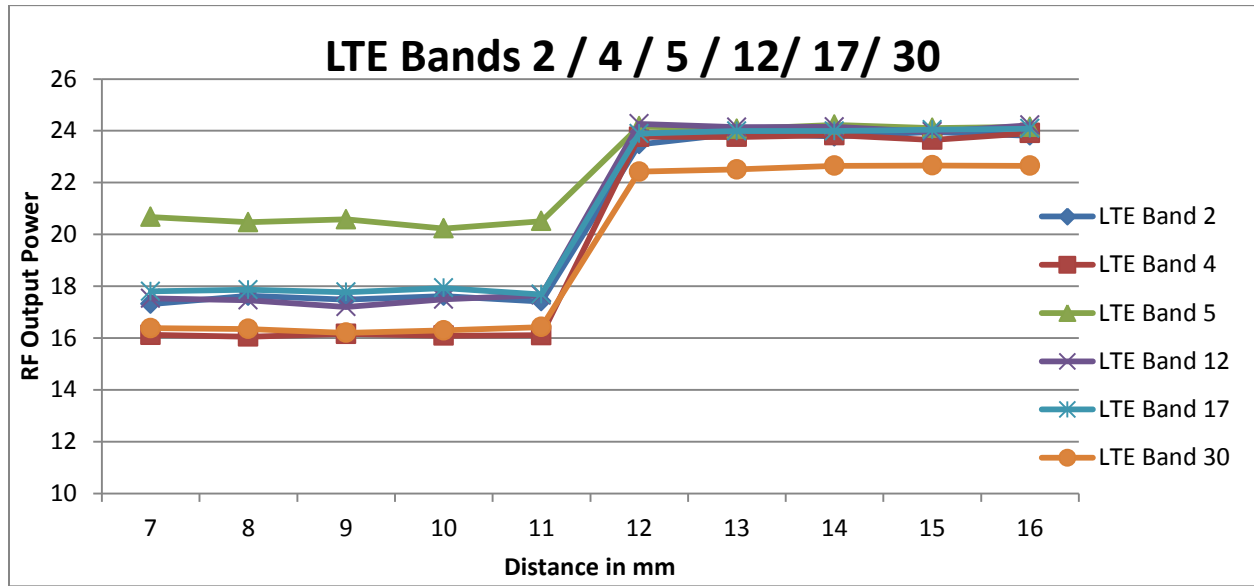
Distance to DUT vs. Output Power in dBm										
Distance (mm)	5	6	7	8	9	10	11	12	13	14
WCDMA Band V	21.1	21.1	20.2	21.3	21.1	23.1	23.1	23.0	23.0	23.1
WCDMA Band II	17.6	17.5	17.5	17.9	17.6	23.5	23.2	23.4	23.5	23.4



**LTE Bands 2 / 4 / 5 / 12 / 17 / 30**

Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

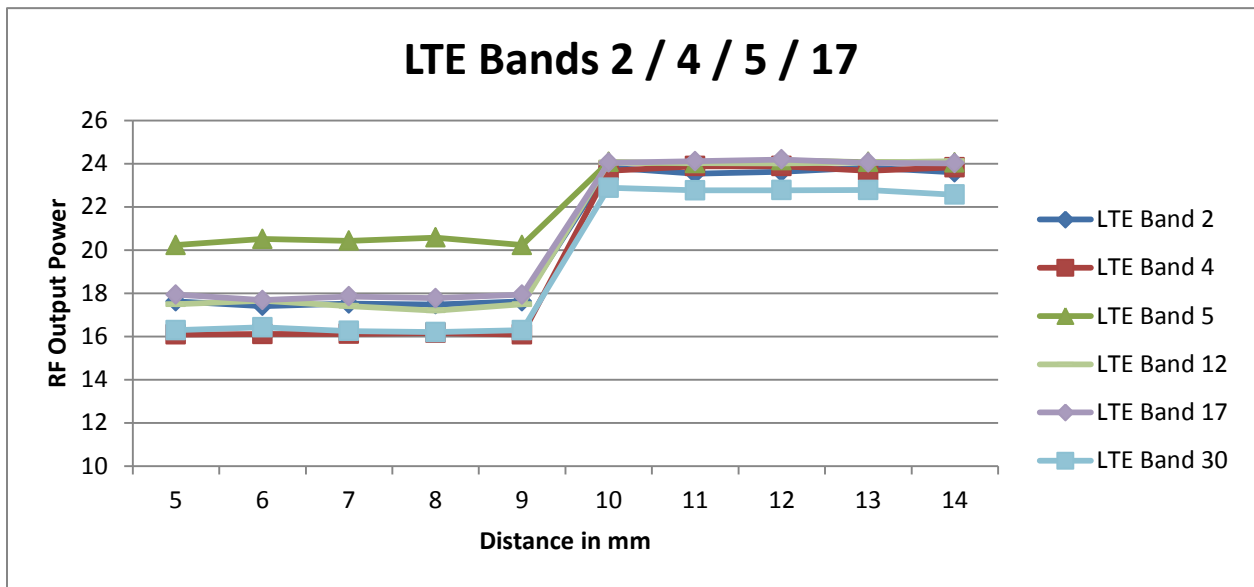
Distance to DUT vs. Output Power in dBm										
Distance (mm)	7	8	9	10	11	12	13	14	15	16
LTE Band 2	17.3	17.6	17.5	17.6	17.4	23.5	23.9	23.8	24.0	23.8
LTE Band 4	16.1	16.1	16.2	16.1	16.1	23.8	23.8	23.8	23.7	23.9
LTE Band 5	20.7	20.5	20.6	20.2	20.5	24.2	24.1	24.2	24.1	24.2
LTE Band 12	17.5	17.5	17.2	17.5	17.7	24.3	24.1	24.2	24.0	24.2
LTE Band 17	17.8	17.9	17.8	17.9	17.7	23.9	24.0	24.0	24.0	24.1
LTE Band 30	16.4	16.4	16.2	16.3	16.4	22.4	22.5	22.7	22.7	22.7



**LTE Bands 2 / 4 / 5 / 12 / 17 / 30**

Edge 3, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	5	6	7	8	9	10	11	12	13	14
LTE Band 2	17.6	17.4	17.5	17.5	17.6	23.8	23.5	23.6	23.8	23.6
LTE Band 4	16.1	16.1	16.1	16.2	16.1	23.7	23.9	23.9	23.7	23.8
LTE Band 5	20.2	20.5	20.4	20.6	20.2	24.1	24.0	24.2	24.1	24.1
LTE Band 12	17.5	17.7	17.4	17.2	17.5	24.1	24.0	24.0	24.1	24.1
LTE Band 17	17.9	17.7	17.9	17.8	17.9	24.0	24.1	24.2	24.0	24.0
LTE Band 30	16.3	16.4	16.3	16.2	16.3	22.9	22.8	22.8	22.8	22.6



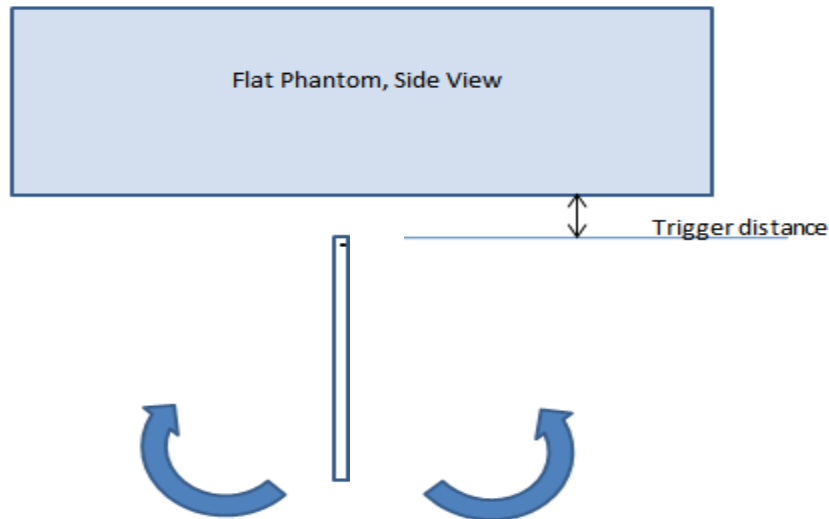
### 6.5.2. Proximity Sensor Coverage (KDB 616217 §6.3)

As there is no spatial offset between the antenna and the proximity sensor element, proximity sensor coverage did not need to be assessed.

### 6.5.3. 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 3 parallel to the base of the flat phantom for each band.

The EUT was rotated about Edge 3 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 3) KDB 616217 §6.4

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

Band (MHz)	Minimum trigger distance measured according to KDB 616217 §6.2	Minimum distance at which power reduction was maintained over +/-45°	Power reduction status										
			-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
750	9 mm	9 mm	On	On	On	On	On	On	On	On	On	On	On
850	9 mm	9 mm	On	On	On	On	On	On	On	On	On	On	On
1700	9 mm	9 mm	On	On	On	On	On	On	On	On	On	On	On
1900	9 mm	9 mm	On	On	On	On	On	On	On	On	On	On	On
2300	9 mm	9 mm	On	On	On	On	On	On	On	On	On	On	On

### 6.5.4. Resulting test positions for SAR measurements

Wireless technologies	Position	§6.2 Triggering Distance	§6.3 Coverage	§6.4 Tilt Angle	Worst case distance for SAR
WWAN	Rear	11 mm	N/A	N/A	10 mm
	Edge 3	9 mm	N/A	9 mm	8 mm

## 7. RF Exposure Conditions (Test Configurations)

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

### 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  $\leq 5$  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</b>																
Cellular	W-CDMA 2	1907.6	24.00	251	26	260.4	27	3.66	360.6		13.3	> 50 mm	12.8	69.3	> 50 mm	
Cellular	W-CDMA 5	846.6	23.50	224	26	260.4	27	3.66	360.6		-MEASURE- 7.9	> 50 mm	-MEASURE- 7.6	-MEASURE- 41.2	> 50 mm	
Cellular	LTE Band 2	1900	24.50	282	26	260.4	27	3.66	360.6		-MEASURE- 15	> 50 mm	-MEASURE- 14.4	-MEASURE- 77.7	> 50 mm	
Cellular	LTE Band 4	1745	24.50	282	26	260.4	27	3.66	360.6		-MEASURE- 14.3	> 50 mm	-MEASURE- 13.8	-MEASURE- 74.5	> 50 mm	
Cellular	LTE Band 5	844	24.50	282	26	260.4	27	3.66	360.6		-MEASURE- 10	> 50 mm	-MEASURE- 9.6	-MEASURE- 51.8	> 50 mm	
Cellular	LTE Band 12	711	24.50	282	26	260.4	27	3.66	360.6		-MEASURE- 9.1	> 50 mm	-MEASURE- 8.8	-MEASURE- 47.6	> 50 mm	
Cellular	LTE Band 17	710	24.50	282	26	260.4	27	3.66	360.6		-MEASURE- 9.1	> 50 mm	-MEASURE- 8.8	-MEASURE- 47.5	> 50 mm	
Cellular	LTE Band 30	2310	23.00	200	26	260.4	105.7	3.66	316.5		-MEASURE- 11.7	> 50 mm	> 50 mm	-MEASURE- 60.8	> 50 mm	
<b>Power Back-off, Proximity Sensor On</b>																
Cellular	W-CDMA 2	1907.6	18.00	63	26	260.4		3.66	360.6		3.3	> 50 mm		17.4	> 50 mm	
Cellular	W-CDMA 5	846.6	21.50	141	26	260.4		3.66	360.6		-MEASURE- 3	> 50 mm		-MEASURE- 25.3	> 50 mm	
Cellular	LTE Band 2	1900	18.00	63	26	260.4		3.66	360.6		-MEASURE- 3.3	> 50 mm		-MEASURE- 17.4	> 50 mm	
Cellular	LTE Band 4	1745	16.50	45	26	260.4		3.66	360.6		-EXEMPT- 2	> 50 mm		-MEASURE- 11.9	> 50 mm	
Cellular	LTE Band 5	844	21.00	126	26	260.4		3.66	360.6		-MEASURE- 4.5	> 50 mm		-MEASURE- 23.2	> 50 mm	
Cellular	LTE Band 12	711	18.20	66	26	260.4		3.66	360.6		-EXEMPT- 2	> 50 mm		-MEASURE- 11.1	> 50 mm	
Cellular	LTE Band 17	710	18.20	66	26	260.4		3.66	360.6		-EXEMPT- 2	> 50 mm		-MEASURE- 11.1	> 50 mm	
Cellular	LTE Band 30	2310	17.00	50	26	260.4		3.66	316.5		-EXEMPT- 3	> 50 mm		-MEASURE- 15.2	> 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**

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</b>																
Cellular	W-CDMA 2	1907.6	24.00	251	26	260.4	27	3.66	360.6		< 50 mm	2212.6 mW -EXEMPT-	< 50 mm	< 50 mm	3214.6 mW -EXEMPT-	
Cellular	W-CDMA 5	846.6	23.50	224	26	260.4	27	3.66	360.6		< 50 mm	1350.5 mW -EXEMPT-	< 50 mm	< 50 mm	1916.1 mW -EXEMPT-	
Cellular	LTE Band 2	1900	24.50	282	26	260.4	27	3.66	360.6		< 50 mm	2212.8 mW -EXEMPT-	< 50 mm	< 50 mm	3214.8 mW -EXEMPT-	
Cellular	LTE Band 4	1745	24.50	282	26	260.4	27	3.66	360.6		< 50 mm	2217.6 mW -EXEMPT-	< 50 mm	< 50 mm	3219.6 mW -EXEMPT-	
Cellular	LTE Band 5	844	24.50	282	26	260.4	27	3.66	360.6		< 50 mm	1347.1 mW -EXEMPT-	< 50 mm	< 50 mm	1910.9 mW -EXEMPT-	
Cellular	LTE Band 12	711	24.50	282	26	260.4	27	3.66	360.6		< 50 mm	1173.2 mW -EXEMPT-	< 50 mm	< 50 mm	1650.1 mW -EXEMPT-	
Cellular	LTE Band 17	710	24.50	282	26	260.4	27	3.66	360.6		< 50 mm	1173.9 mW -EXEMPT-	< 50 mm	< 50 mm	1648.2 mW -EXEMPT-	
Cellular	LTE Band 30	2310	23.00	200	26	260.4	105.7	3.66	316.5		< 50 mm	2202.7 mW -EXEMPT-	655.7 mW -EXEMPT-	< 50 mm	2763.7 mW -EXEMPT-	
<b>Power Back-off, Proximity Sensor On</b>																
Cellular	W-CDMA 2	1907.6	18.00	63	26	260.4		3.66	360.6		< 50 mm	2212.6 mW -EXEMPT-		< 50 mm	3214.6 mW -EXEMPT-	
Cellular	W-CDMA 5	846.6	21.50	141	26	260.4		3.66	360.6		< 50 mm	1350.5 mW -EXEMPT-		< 50 mm	1916.1 mW -EXEMPT-	
Cellular	LTE Band 2	1900	18.00	63	26	260.4		3.66	360.6		< 50 mm	2212.8 mW -EXEMPT-		< 50 mm	3214.8 mW -EXEMPT-	
Cellular	LTE Band 4	1745	16.50	45	26	260.4		3.66	360.6		< 50 mm	2217.6 mW -EXEMPT-		< 50 mm	3219.6 mW -EXEMPT-	
Cellular	LTE Band 5	844	21.00	126	26	260.4		3.66	360.6		< 50 mm	1347.1 mW -EXEMPT-		< 50 mm	1910.9 mW -EXEMPT-	
Cellular	LTE Band 12	711	18.20	66	26	260.4		3.66	360.6		< 50 mm	1173.2 mW -EXEMPT-		< 50 mm	1650.1 mW -EXEMPT-	
Cellular	LTE Band 17	710	18.20	66	26	260.4		3.66	360.6		< 50 mm	1173.9 mW -EXEMPT-		< 50 mm	1648.2 mW -EXEMPT-	
Cellular	LTE Band 30	2310	17.00	50	26	260.4		3.66	316.5		< 50 mm	2202.7 mW -EXEMPT-		< 50 mm	2763.7 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.

**SAR Test Exclusion Calculations for WLAN**

**Antennas < 50mm to adjacent edges**

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
Wi-Fi 2.4 GHz	2462	16.50	45	26	128	4	131	443		2.7 -EXEMPT-	> 50 mm	14.1 -MEASURE-	> 50 mm	> 50 mm	
Wi-Fi 5.2 GHz	5240	11.50	14	26	128	4	131	443		1.2 -EXEMPT-	> 50 mm	6.4 -MEASURE-	> 50 mm	> 50 mm	
Wi-Fi 5.3 GHz	5320	11.50	14	26	128	4	131	443		1.2 -EXEMPT-	> 50 mm	6.5 -MEASURE-	> 50 mm	> 50 mm	
Wi-Fi 5.5 GHz	5700	11.50	14	26	128	4	131	443		1.3 -EXEMPT-	> 50 mm	6.7 -MEASURE-	> 50 mm	> 50 mm	
Wi-Fi 5.8 GHz	5825	11.50	14	26	128	4	131	443		1.3 -EXEMPT-	> 50 mm	6.8 -MEASURE-	> 50 mm	> 50 mm	
Bluetooth	2480	9.50	9	26	128	4	131	443		0.5 -EXEMPT-	> 50 mm	2.8 -EXEMPT-	> 50 mm	> 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**

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
Wi-Fi 2.4 GHz	2462	16.50	45	26	128	4	131	443		< 50 mm	875.6 mW -EXEMPT-	< 50 mm	905.6 mW -EXEMPT-	4025.6 mW -EXEMPT-	
Wi-Fi 5.2 GHz	5240	11.50	14	26	128	4	131	443		< 50 mm	845.5 mW -EXEMPT-	< 50 mm	875.5 mW -EXEMPT-	3995.5 mW -EXEMPT-	
Wi-Fi 5.3 GHz	5320	11.50	14	26	128	4	131	443		< 50 mm	845 mW -EXEMPT-	< 50 mm	875 mW -EXEMPT-	3995 mW -EXEMPT-	
Wi-Fi 5.5 GHz	5700	11.50	14	26	128	4	131	443		< 50 mm	842.8 mW -EXEMPT-	< 50 mm	872.8 mW -EXEMPT-	3992.8 mW -EXEMPT-	
Wi-Fi 5.8 GHz	5825	11.50	14	26	128	4	131	443		< 50 mm	842.2 mW -EXEMPT-	< 50 mm	872.2 mW -EXEMPT-	3992.2 mW -EXEMPT-	
Bluetooth	2480	9.50	9	26	128	4	131	443		< 50 mm	875.3 mW -EXEMPT-	< 50 mm	905.3 mW -EXEMPT-	4025.3 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 test configurations required for this device according to the findings in Section 7.1:

Test Configurations	Pwr Back-off	Rear	Edge 1	Edge 2	Edge 3	Edge 4
			(Top Edge)	(Right Edge )	(Bottom Edge)	(Left Edge)
W-CDMA Band II	OFF	Yes	No	Yes	Yes	No
	ON	Yes	No	No	Yes	No
W-CDMA Band V	OFF	Yes	No	Yes	Yes	No
	ON	Yes	No	No	Yes	No
LTE Band 2	OFF	Yes	No	Yes	Yes	No
	ON	Yes	No	No	Yes	No
LTE Band 4	OFF	Yes	No	Yes	Yes	No
	ON	No	No	No	Yes	No
LTE Band 5	OFF	Yes	No	Yes	Yes	No
	ON	Yes	No	No	Yes	No
LTE Band 12	OFF	Yes	No	Yes	Yes	No
	ON	No	No	No	Yes	No
LTE Band 17	OFF	Yes	No	Yes	Yes	No
	ON	No	No	No	Yes	No
LTE Band 30	OFF	Yes	No	No	Yes	No
	ON	No	No	No	Yes	No
Wi-Fi 2.4 GHz	N/A	Yes	No	Yes	No	No
Wi-Fi 5 GHz	N/A	Yes	No	Yes	No	No
Bluetooth	N/A	No	No	No	No	No

### Note(s):

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

## 8. Dielectric Property Measurements & System Check

### 8.1. Dielectric Property Measurements

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

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

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

#### Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

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

#### IEEE Std 1528-2013

Refer to Table 3 within the IEEE Std 1528-2013

**Dielectric Property Measurements Results:****SAR 1 Room**

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
9-9-2015	Body 2250	e'	50.7900	Relative Permittivity ( $\epsilon_r$ ):	50.79	52.97	-4.12	5
		e"	14.3300	Conductivity ( $\sigma$ ):	1.79	1.76	2.08	5
	Body 2300	e'	50.6700	Relative Permittivity ( $\epsilon_r$ ):	50.67	52.90	-4.22	5
		e"	14.4300	Conductivity ( $\sigma$ ):	1.85	1.80	2.32	5
	Body 2350	e'	50.5200	Relative Permittivity ( $\epsilon_r$ ):	50.52	52.84	-4.39	5
		e"	14.5300	Conductivity ( $\sigma$ ):	1.90	1.85	2.58	5

**SAR 2 Room**

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
8-27-2015	Body 2450	e'	51.2000	Relative Permittivity ( $\epsilon_r$ ):	51.20	52.70	-2.85	5
		e"	14.8200	Conductivity ( $\sigma$ ):	2.02	1.95	3.53	5
	Body 2410	e'	51.2700	Relative Permittivity ( $\epsilon_r$ ):	51.27	52.76	-2.82	5
		e"	14.8600	Conductivity ( $\sigma$ ):	1.99	1.91	4.39	5
	Body 2475	e'	51.1400	Relative Permittivity ( $\epsilon_r$ ):	51.14	52.67	-2.90	5
		e"	14.9700	Conductivity ( $\sigma$ ):	2.06	1.99	3.78	5
9-6-2015	Body 2450	e'	50.5000	Relative Permittivity ( $\epsilon_r$ ):	50.50	52.70	-4.17	5
		e"	14.9400	Conductivity ( $\sigma$ ):	2.04	1.95	4.37	5
	Body 2410	e'	50.5400	Relative Permittivity ( $\epsilon_r$ ):	50.54	52.76	-4.21	5
		e"	14.8600	Conductivity ( $\sigma$ ):	1.99	1.91	4.39	5
	Body 2475	e'	50.4300	Relative Permittivity ( $\epsilon_r$ ):	50.43	52.67	-4.25	5
		e"	14.9800	Conductivity ( $\sigma$ ):	2.06	1.99	3.85	5
9-9-2015	Body 835	e'	55.7200	Relative Permittivity ( $\epsilon_r$ ):	55.72	55.20	0.94	5
		e"	21.8400	Conductivity ( $\sigma$ ):	1.01	0.97	4.54	5
	Body 820	e'	55.8300	Relative Permittivity ( $\epsilon_r$ ):	55.83	55.28	1.00	5
		e"	21.9200	Conductivity ( $\sigma$ ):	1.00	0.97	3.20	5
	Body 850	e'	55.6000	Relative Permittivity ( $\epsilon_r$ ):	55.60	55.16	0.80	5
		e"	21.7500	Conductivity ( $\sigma$ ):	1.03	0.99	4.14	5
9-15-2015	Body 750	e'	53.6100	Relative Permittivity ( $\epsilon_r$ ):	53.61	55.55	-3.49	5
		e"	23.3100	Conductivity ( $\sigma$ ):	0.97	0.96	0.93	5
	Body 700	e'	54.0900	Relative Permittivity ( $\epsilon_r$ ):	54.09	55.74	-2.96	5
		e"	23.8800	Conductivity ( $\sigma$ ):	0.93	0.96	-3.10	5
	Body 790	e'	53.1900	Relative Permittivity ( $\epsilon_r$ ):	53.19	55.39	-3.98	5
		e"	22.9200	Conductivity ( $\sigma$ ):	1.01	0.97	4.21	5

**SAR 3 Room**

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
8-28-2015	Body 5180	e'	47.5100	Relative Permittivity ( $\epsilon_r$ ):	47.51	49.05	-3.13	5
		e"	18.5700	Conductivity ( $\sigma$ ):	5.35	5.27	1.46	5
	Body 5200	e'	47.4900	Relative Permittivity ( $\epsilon_r$ ):	47.49	49.02	-3.12	5
		e"	18.6300	Conductivity ( $\sigma$ ):	5.39	5.29	1.74	5
	Body 5600	e'	46.8200	Relative Permittivity ( $\epsilon_r$ ):	46.82	48.48	-3.42	5
		e"	18.9500	Conductivity ( $\sigma$ ):	5.90	5.76	2.42	5
	Body 5800	e'	46.5000	Relative Permittivity ( $\epsilon_r$ ):	46.50	48.20	-3.53	5
		e"	19.1200	Conductivity ( $\sigma$ ):	6.17	6.00	2.77	5
	Body 5825	e'	46.4400	Relative Permittivity ( $\epsilon_r$ ):	46.44	48.20	-3.65	5
		e"	19.1500	Conductivity ( $\sigma$ ):	6.20	6.00	3.37	5
9-3-2015	Body 5180	e'	47.4900	Relative Permittivity ( $\epsilon_r$ ):	47.49	49.05	-3.17	5
		e"	18.4800	Conductivity ( $\sigma$ ):	5.32	5.27	0.97	5
	Body 5200	e'	47.4400	Relative Permittivity ( $\epsilon_r$ ):	47.44	49.02	-3.22	5
		e"	18.4900	Conductivity ( $\sigma$ ):	5.35	5.29	0.97	5
	Body 5600	e'	46.7900	Relative Permittivity ( $\epsilon_r$ ):	46.79	48.48	-3.48	5
		e"	18.8900	Conductivity ( $\sigma$ ):	5.88	5.76	2.10	5
	Body 5800	e'	46.4500	Relative Permittivity ( $\epsilon_r$ ):	46.45	48.20	-3.63	5
		e"	19.0900	Conductivity ( $\sigma$ ):	6.16	6.00	2.61	5
	Body 5825	e'	46.4200	Relative Permittivity ( $\epsilon_r$ ):	46.42	48.20	-3.69	5
		e"	19.1300	Conductivity ( $\sigma$ ):	6.20	6.00	3.27	5
9-14-2015	Body 1900	e'	51.8100	Relative Permittivity ( $\epsilon_r$ ):	51.81	53.30	-2.80	5
		e"	14.9000	Conductivity ( $\sigma$ ):	1.57	1.52	3.56	5
	Body 1850	e'	51.9500	Relative Permittivity ( $\epsilon_r$ ):	51.95	53.30	-2.53	5
		e"	14.8000	Conductivity ( $\sigma$ ):	1.52	1.52	0.16	5
	Body 1910	e'	51.7800	Relative Permittivity ( $\epsilon_r$ ):	51.78	53.30	-2.85	5
		e"	14.9200	Conductivity ( $\sigma$ ):	1.58	1.52	4.25	5
9-14-2015	Body 1750	e'	52.0900	Relative Permittivity ( $\epsilon_r$ ):	52.09	53.44	-2.53	5
		e"	14.7000	Conductivity ( $\sigma$ ):	1.43	1.49	-3.75	5
	Body 1710	e'	52.1700	Relative Permittivity ( $\epsilon_r$ ):	52.17	53.54	-2.57	5
		e"	14.7200	Conductivity ( $\sigma$ ):	1.40	1.46	-4.24	5
	Body 1755	e'	52.0900	Relative Permittivity ( $\epsilon_r$ ):	52.09	53.43	-2.50	5
		e"	14.7000	Conductivity ( $\sigma$ ):	1.43	1.49	-3.68	5

## 8.2. System Check

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

### System Performance Check Measurement Conditions:

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ±0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥ 10.0 cm for measurements > 3 GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.  
For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- Distance between probe sensors and phantom surface was set to 3 mm.  
For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was 100 mW.
- The results are normalized to 1 W input power.

**Reference Target SAR Values**

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

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	Target SAR Values (W/kg)		
				1g/10g	Head	Body
D750V3	1122	8-17-2015	750	1g	8.23	8.6
				10g	5.37	5.67
D835V2	4d159	11-19-2014	835	1g	9.19	9.64
				10g	5.99	6.35
D1750V2	1125	8-20-2015	1750	1g	36.7	37.2
				10g	19.5	20
D1900V2	5d199	2-6-2015	1900	1g	41	40.6
				10g	21.4	21.6
D2300V2	1049	2-5-2015	2300	1g	49.9	48.5
				10g	24	23.2
D2450V2	960	2-5-2015	2450	1g	53.3	50.8
				10g	24.8	23.6
D5GHzV2	1209	2-10-2015	5200	1g	78.2	74.0
				10g	22.2	20.6
			5600	1g	81.3	77.4
				10g	23.2	21.3
			5800	1g	79.6	74.9
				10g	22.5	20.5

**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 1 Room**

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta $\pm 10\%$	Plot No.	
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W				
9-9-2015	D2300V2	1049	Body	1g	5.11	51.10	48.50	5.36	1,2
				10g	2.46	24.60	23.20	6.03	

**SAR 2 Room**

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta $\pm 10\%$	Plot No.	
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W				
8-27-2015	D2450V2	960	Body	1g	5.53	55.30	50.80	8.86	3,4
				10g	2.56	25.60	23.60	8.47	
9-6-2015	D2450V2	960	Body	1g	5.23	52.30	50.8	2.95	
				10g	2.44	24.40	23.60	3.39	
9-9-2015	D835V2	4d159	Body	1g	1.01	10.10	9.64	4.77	5,6
				10g	0.67	6.66	6.35	4.88	
9-15-2015	D750V3	1122	Body	1g	0.88	8.75	8.60	1.74	7,8
				10g	0.58	5.82	5.67	2.65	

**SAR 3 Room**

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta $\pm 10\%$	Plot No.	
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W				
8-28-2015	D5GhzV2 (5200)	1209	Body	1g	8.02	80.20	74.00	8.38	
				10g	2.26	22.60	20.60	9.71	
8-28-2015	D5GhzV2 (5600)	1209	Body	1g	8.43	84.30	77.4	8.91	
				10g	2.33	23.30	21.30	9.39	
8-28-2015	D5GhzV2 (5800)	1209	Body	1g	7.52	75.20	74.9	0.40	
				10g	2.08	20.80	20.50	1.46	
9-3-2015	D5GhzV2 (5200)	1209	Body	1g	7.84	78.40	74	5.95	
				10g	2.22	22.20	20.60	7.77	
9-3-2015	D5GhzV2 (5600)	1209	Body	1g	8.42	84.20	77.4	8.79	9,10
				10g	2.34	23.40	21.30	9.86	
9-3-2015	D5GhzV2 (5800)	1209	Body	1g	8.04	80.40	74.9	7.34	
				10g	2.25	22.50	20.50	9.76	
9-14-2015	D1750V2	1125	Body	1g	3.42	34.20	37.2	-8.06	11,12
				10g	1.82	18.20	20.00	-9.00	
9-14-2015	D1900V2	5d199	Body	1g	3.92	39.20	40.60	-3.45	13,14
				10g	2.01	20.10	21.60	-6.94	

## 9. Conducted Output Power Measurements

### 9.1. W-CDMA

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

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

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

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

The following 4 Sub-tests were completed according to Release 7 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

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

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

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

	Mode	HSPA				
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2 kbps RMC				
	HSDPA FRC	H-Set 1				
	HSUPA Test	HSPA				
	Power Control Algorithm	Algorithm 2				Algorithm 1
	$\beta_c$	11/15	6/15	15/15	2/15	15/15
	$\beta_d$	15/15	15/15	9/15	15/15	0
	$\beta_{ec}$	209/225	12/15	30/15	2/15	5/15
	$\beta_c/\beta_d$	11/15	6/15	15/9	2/15	15/1
	$\beta_{hs}$	22/15	12/15	30/15	4/15	5/15
	$\beta_{ed}$	1309/225	94/75	47/15	56/75	47/15
CM (dB)	1	3	2	3	1	
MPR (dB)	0	2	1	2	0	
HSDPA Specific Settings	DACK	8				0
	DNAK	8				0
	DCQI	8				0
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	$A_{hs} = \beta_{hs}/\beta_c$	30/15				
HSUPA Specific Settings	E-DPDCCH	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	5	5	2	5	1
	Reference E-TFCI	11	11	11	11	67
	Reference E-TFCI PO	4	4	4	4	18
	Reference E-TFCI	67	67	92	67	67
	Reference E-TFCI PO	18	18	18	18	18
	Reference E-TFCI	71	71	71	71	71
	Reference E-TFCI PO	23	23	23	23	23
	Reference E-TFCI	75	75	75	75	75
	Reference E-TFCI PO	26	26	26	26	26
	Reference E-TFCI	81	81	81	81	81
Reference E-TFCI PO	27	27	27	27	27	
Maximum Channelization Codes	2xSF2				SF4	

**WCDMA Band V Measured Results**

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Max. Pwr (dBm)	MPR (dB)	Reduced Pwr (dBm)	
W-CDMA Band V	Rel 99	RMC, 12.2 kbps	4132	826.4	N/A	23.2	N/A	21.5	
			4183	836.6	N/A	23.3	N/A	21.5	
			4233	846.6	N/A	23.1	N/A	21.5	
	HSDPA	Subtest 1	4132	826.4	0	23.2	0	21.4	
			4183	836.6	0	23.1	0	21.3	
			4233	846.6	0	23.0	0	21.5	
		Subtest 2	4132	826.4	0	23.1	0	20.8	
			4183	836.6	0	23.0	0	20.7	
			4233	846.6	0	22.8	0	20.9	
		Subtest 3	4132	826.4	0.5	22.3	0	20.7	
			4183	836.6	0.5	22.2	0	20.5	
			4233	846.6	0.5	22.2	0	20.6	
		Subtest 4	4132	826.4	0.5	21.8	0	20.5	
			4183	836.6	0.5	21.8	0	20.3	
			4233	846.6	0.5	21.7	0	20.6	
		HSUPA	Subtest 1	4132	826.4	0	22.1	0	20.4
				4183	836.6	0	22.2	0	20.5
				4233	846.6	0	22.2	0	20.4
	Subtest 2		4132	826.4	2	20.8	0	19.5	
			4183	836.6	2	20.8	0	19.6	
			4233	846.6	2	20.8	0	19.6	
	Subtest 3		4132	826.4	1	22.2	0	20.6	
			4183	836.6	1	22.3	0	20.5	
			4233	846.6	1	22.3	0	20.5	
	Subtest 4		4132	826.4	2	20.8	0	19.6	
			4183	836.6	2	20.8	0	19.6	
			4233	846.6	2	20.8	0	19.6	
	Subtest 5		4132	826.4	0	23.3	0	21.5	
			4183	836.6	0	23.4	0	21.5	
			4233	846.6	0	23.2	0	21.4	

**W-CDMA Band II Measured Results**

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Max. Pwr (dBm)	MPR (dB)	Reduced Pwr (dBm)
W-CDMA Band II	Rel 99	RMC, 12.2 kbps	9262	1852.4	N/A	23.4	N/A	18.0
			9400	1880.0	N/A	23.3	N/A	17.9
			9538	1907.6	N/A	23.2	N/A	18.0
	HSDPA	Subtest 1	9262	1852.4	0	23.1	0	17.8
			9400	1880.0	0	23.0	0	17.7
			9538	1907.6	0	22.7	0	17.9
		Subtest 2	9262	1852.4	0	23.1	0	17.7
			9400	1880.0	0	23.0	0	17.5
			9538	1907.6	0	23.0	0	17.7
		Subtest 3	9262	1852.4	0.5	22.5	0	17.6
			9400	1880.0	0.5	22.3	0	17.4
			9538	1907.6	0.5	22.3	0	17.6
		Subtest 4	9262	1852.4	0.5	22.4	0	17.4
			9400	1880.0	0.5	22.1	0	17.3
			9538	1907.6	0.5	21.9	0	17.5
	HSUPA	Subtest 1	9262	1852.4	0	22.2	0	16.8
			9400	1880.0	0	22.1	0	16.7
			9538	1907.6	0	21.8	0	17.0
		Subtest 2	9262	1852.4	2	20.9	0	18.0
			9400	1880.0	2	20.8	0	18.0
			9538	1907.6	2	20.5	0	18.0
		Subtest 3	9262	1852.4	1	22.1	0	18.0
			9400	1880.0	1	22.2	0	18.0
			9538	1907.6	1	22.3	0	18.0
		Subtest 4	9262	1852.4	2	20.9	0	18.0
			9400	1880.0	2	20.8	0	18.0
			9538	1907.6	2	20.5	0	18.0
		Subtest 5	9262	1852.4	0	23.5	0	17.9
			9400	1880.0	0	23.4	0	17.9
			9538	1907.6	0	23.3	0	18.0

## 9.2. LTE

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

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

**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 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 2 Measured Results**

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduced Avg Pwr (dBm)		
						1860 MHz	1880 MHz	1900 MHz		1860 MHz	1880 MHz	1900 MHz
LTE Band 2	20	QPSK	1	0	0	23.7	23.7	23.5	0	17.5	17.3	17.7
			1	49	0	23.9	23.8	23.5	0	17.6	17.5	17.8
			1	99	0	23.9	23.7	23.6	0	17.6	17.4	17.8
			50	0	1	22.5	22.3	22.3	1	16.3	16.1	16.6
			50	24	1	22.6	22.4	22.3	1	16.5	16.2	16.6
			50	50	1	22.6	22.3	22.3	1	16.4	16.2	16.5
			100	0	1	22.5	22.2	22.4	1	16.4	16.2	16.6
		16QAM	1	0	1	22.6	22.6	22.6	1	16.6	16.3	17.0
			1	49	1	22.6	22.7	22.6	1	16.5	16.3	17.0
			1	99	1	22.6	22.6	22.7	1	16.5	16.3	16.9
			50	0	2	21.5	21.3	21.2	2	15.4	15.2	15.6
			50	24	2	21.5	21.3	21.1	2	15.5	15.3	15.5
			50	50	2	21.5	21.3	21.1	2	15.4	15.3	15.5
			100	0	2	21.4	21.3	21.3	2	15.4	15.2	15.7
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduced Avg Pwr (dBm)		
						1857.5 MHz	1880 MHz	1902.5 MHz		1857.5 MHz	1880 MHz	1902.5 MHz
LTE Band 2	15	QPSK	1	0	0	23.8	23.6	23.5	0	17.6	17.3	17.7
			1	36	0	23.9	23.7	23.5	0	17.6	17.3	17.8
			1	74	0	23.8	23.6	23.6	0	17.5	17.3	17.7
			36	0	1	22.6	22.3	22.4	1	16.4	16.2	16.8
			36	18	1	22.6	22.4	22.3	1	16.4	16.2	16.7
			36	37	1	22.5	22.3	22.3	1	16.4	16.3	16.7
			75	0	1	22.5	22.2	22.3	1	16.4	16.2	16.8
		16QAM	1	0	1	22.8	22.6	22.5	1	16.6	16.1	16.8
			1	36	1	22.8	22.6	22.5	1	16.6	16.2	16.7
			1	74	1	22.8	22.6	22.4	1	16.6	16.2	16.8
			36	0	2	21.5	21.2	21.3	2	15.4	15.2	15.7
			36	18	2	21.5	21.3	21.2	2	15.3	15.3	15.7
			36	37	2	21.5	21.3	21.2	2	15.3	15.3	15.7
			75	0	2	21.4	21.2	21.3	2	15.4	15.2	15.7
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduced Avg Pwr (dBm)		
						1855 MHz	1880 MHz	1905 MHz		1855 MHz	1880 MHz	1905 MHz
LTE Band 2	10	QPSK	1	0	0	23.7	23.6	23.7	0	17.5	17.2	18.0
			1	25	0	23.8	23.7	23.7	0	17.6	17.3	18.0
			1	49	0	23.8	23.6	23.6	0	17.5	17.3	17.9
			25	0	1	22.6	22.2	22.4	1	16.5	16.1	16.8
			25	12	1	22.5	22.4	22.3	1	16.4	16.2	16.7
			25	25	1	22.4	22.3	22.2	1	16.4	16.3	16.8
			50	0	1	22.4	22.3	22.3	1	16.4	16.2	16.8
		16QAM	1	0	1	22.7	22.8	22.9	1	16.3	16.3	16.9
			1	25	1	22.8	22.7	22.9	1	16.2	16.3	16.9
			1	49	1	22.7	22.7	22.8	1	16.3	16.3	16.9
			25	0	2	21.4	21.2	21.3	2	15.4	15.2	15.8
			25	12	2	21.4	21.2	21.3	2	15.4	15.3	15.8
			25	25	2	21.4	21.3	21.3	2	15.4	15.3	15.8
			50	0	2	21.4	21.1	21.4	2	15.4	15.2	15.8

**LTE Band 2 Measured Results (continued)**

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduced Avg Pwr (dBm)		
						1852.5 MHz	1880 MHz	1907.5 MHz		1852.5 MHz	1880 MHz	1907.5 MHz
LTE Band 2	5	QPSK	1	0	0	23.9	23.8	23.6	0	17.6	17.4	17.8
			1	12	0	23.9	23.8	23.5	0	17.6	17.5	17.8
			1	24	0	23.9	23.9	23.6	0	17.6	17.5	17.8
			12	0	1	22.5	22.3	22.3	1	16.4	16.2	16.7
			12	6	1	22.5	22.3	22.2	1	16.3	16.2	16.7
			12	11	1	22.4	22.3	22.2	1	16.3	16.2	16.7
			25	0	1	22.5	22.2	22.2	1	16.3	16.1	16.7
		16QAM	1	0	1	23.0	22.8	22.3	1	16.7	16.3	16.7
			1	12	1	22.9	22.7	22.3	1	16.6	16.2	16.7
			1	24	1	23.0	22.8	22.3	1	16.7	16.3	16.7
			12	0	2	21.4	21.1	21.2	2	15.3	15.1	15.6
			12	6	2	21.4	21.1	21.1	2	15.2	15.1	15.6
			12	11	2	21.4	21.1	21.2	2	15.3	15.2	15.6
			25	0	2	21.4	21.1	21.1	2	15.3	15.2	15.7
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduced Avg Pwr (dBm)		
						1851.5 MHz	1880 MHz	1908.5 MHz		1851.5 MHz	1880 MHz	1908.5 MHz
LTE Band 2	3	QPSK	1	0	0	23.7	23.7	23.6	0	17.6	17.4	18.0
			1	7	0	23.7	23.7	23.5	0	17.6	17.4	17.9
			1	14	0	23.9	23.8	23.4	0	17.6	17.5	17.9
			8	0	1	22.5	22.3	22.3	1	16.5	16.2	16.7
			8	4	1	22.4	22.3	22.2	1	16.4	16.2	16.7
			8	7	1	22.3	22.3	22.1	1	16.4	16.2	16.7
			15	0	1	22.4	22.3	22.2	1	16.4	16.2	16.7
		16QAM	1	0	1	22.7	22.9	22.7	1	16.4	16.5	16.8
			1	7	1	22.7	22.8	22.8	1	16.3	16.5	16.8
			1	14	1	22.7	22.9	22.7	1	16.4	16.5	16.8
			8	0	2	21.4	21.0	21.2	2	15.4	15.0	15.7
			8	4	2	21.3	21.0	21.2	2	15.3	15.1	15.7
			8	7	2	21.3	21.1	21.1	2	15.2	15.1	15.7
			15	0	2	21.3	21.2	21.0	2	15.3	15.1	15.6
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduced Avg Pwr (dBm)		
						1850.7 MHz	1880 MHz	1909.3 MHz		1850.7 MHz	1880 MHz	1909.3 MHz
LTE Band 2	1.4	QPSK	1	0	0	23.9	23.7	23.5	0	17.6	17.4	17.9
			1	2	0	23.9	23.7	23.4	0	17.6	17.4	17.9
			1	5	0	23.9	23.7	23.5	0	17.6	17.5	17.9
			3	0	0	23.6	23.4	23.4	1	17.4	17.3	17.8
			3	1	0	23.6	23.4	23.3	1	17.4	17.2	17.8
			3	2	0	23.6	23.4	23.3	1	17.4	17.2	17.8
			6	0	1	22.5	22.3	22.2	1	16.4	16.2	16.8
		16QAM	1	0	1	23.0	22.8	22.7	1	16.6	16.4	17.0
			1	2	1	22.9	22.7	22.6	1	16.6	16.4	17.0
			1	5	1	22.9	22.8	22.7	1	16.7	16.4	17.0
			3	0	1	22.5	22.3	22.3	2	16.3	16.1	16.8
			3	1	1	22.5	22.2	22.3	2	16.4	16.2	16.8
			3	2	1	22.4	22.3	22.2	2	16.4	16.2	16.8
			6	0	2	21.5	21.1	21.1	2	15.5	15.0	15.7

**LTE Band 4 Measured Results**

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduced Avg Pwr (dBm)		
						1720 MHz	1732.5 MHz	1745 MHz		1720 MHz	1732.5 MHz	1745 MHz
LTE Band 4	20	QPSK	1	0	0	23.5	23.7	23.6	0	16.3	16.2	16.2
			1	49	0	23.6	23.7	23.7	0	16.3	16.2	16.3
			1	99	0	23.5	23.8	23.8	0	16.3	16.3	16.3
			50	0	1	22.1	22.3	22.4	1	15.1	15.1	15.1
			50	24	1	22.3	22.4	22.4	1	15.2	15.2	15.2
			50	50	1	22.1	22.2	22.3	1	15.2	15.0	15.2
			100	0	1	22.1	22.2	22.4	1	15.1	15.0	15.1
		16QAM	1	0	1	22.4	22.4	22.8	1	15.3	15.2	15.2
			1	49	1	22.4	22.4	22.8	1	15.3	15.2	15.3
			1	99	1	22.4	22.4	22.9	1	15.3	15.2	15.3
			50	0	2	21.1	21.2	21.3	2	14.1	14.1	14.1
			50	25	2	21.2	21.2	21.3	2	14.2	14.1	14.1
			50	50	2	21.1	21.1	21.2	2	14.2	14.1	14.1
			100	0	2	21.1	21.1	21.3	2	14.1	14.0	14.2
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduced Avg Pwr (dBm)		
						1717.5 MHz	1732.5 MHz	1747.5 MHz		1717.5 MHz	1732.5 MHz	1747.5 MHz
LTE Band 4	15	QPSK	1	0	0	23.4	23.5	23.6	0	16.2	16.1	16.2
			1	36	0	23.6	23.6	23.7	0	16.2	16.2	16.2
			1	74	0	23.4	23.6	23.6	0	16.2	16.2	16.3
			36	0	1	22.1	22.2	22.3	1	15.0	15.0	15.1
			36	18	1	22.2	22.3	22.4	1	15.1	15.1	15.1
			36	37	1	22.2	22.3	22.3	1	15.1	15.1	15.1
			75	0	1	22.0	22.2	22.3	1	15.0	15.0	15.1
		16QAM	1	0	1	22.4	22.6	22.7	1	15.1	15.2	15.2
			1	36	1	22.5	22.6	22.6	1	15.2	15.2	15.2
			1	74	1	22.3	22.7	22.6	1	15.2	15.1	15.2
			36	0	2	21.0	21.2	21.2	2	14.1	14.1	14.2
			36	18	2	21.1	21.2	21.4	2	14.1	14.1	14.2
			36	37	2	21.1	21.2	21.4	2	14.1	14.1	14.1
			75	0	2	21.0	21.1	21.2	2	14.0	14.0	14.1
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduced Avg Pwr (dBm)		
						1715 MHz	1732.5 MHz	1750 MHz		1715 MHz	1732.5 MHz	1750 MHz
LTE Band 4	10	QPSK	1	0	0	23.7	23.5	23.6	0	16.3	16.1	16.2
			1	25	0	23.7	23.6	23.6	0	16.2	16.1	16.2
			1	49	0	23.6	23.6	23.6	0	16.2	16.1	16.3
			25	0	1	22.1	22.3	22.3	1	15.1	15.0	15.0
			25	12	1	22.2	22.3	22.4	1	15.1	15.0	15.2
			25	25	1	22.2	22.2	22.4	1	15.1	15.0	15.1
			50	0	1	22.1	22.2	22.3	1	15.1	15.0	15.1
		16QAM	1	0	1	22.5	22.6	22.8	1	15.2	15.3	15.2
			1	25	1	22.5	22.6	22.9	1	15.2	15.3	15.2
			1	49	1	22.5	22.6	22.9	1	15.2	15.3	15.2
			25	0	2	21.0	21.2	21.3	2	14.1	14.1	14.1
			25	12	2	21.1	21.2	21.4	2	14.2	14.1	14.1
			25	25	2	21.1	21.1	21.4	2	14.1	14.1	14.1
			50	0	2	21.0	21.1	21.3	2	14.1	14.0	14.1

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

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduced Avg Pwr (dBm)		
						1712.5 MHz	1732.5 MHz	1752.5 MHz		1712.5 MHz	1732.5 MHz	1752.5 MHz
LTE Band 4	5	QPSK	1	0	0	22.3	22.6	23.0	0	16.3	16.3	16.1
			1	12	0	22.3	22.7	23.0	0	16.4	16.3	16.2
			1	24	0	22.4	22.7	23.0	0	16.3	16.3	16.2
			12	0	1	21.1	21.2	21.7	0	15.1	15.0	15.1
			12	6	1	21.1	21.3	21.7	0	15.1	15.1	15.0
			12	11	1	21.1	21.3	21.7	0	15.1	15.1	15.1
			25	0	1	21.1	21.2	21.7	0	15.1	15.1	15.0
		16QAM	1	0	1	21.4	21.7	22.3	0	15.4	15.1	15.1
			1	12	1	21.4	21.7	22.2	0	15.4	15.1	15.1
			1	24	1	21.3	21.7	22.2	0	15.5	15.2	15.1
			12	0	2	20.0	20.2	20.7	0	14.1	14.0	14.0
			12	6	2	20.1	20.3	20.5	0	14.2	14.1	14.0
			12	11	2	20.1	20.2	20.5	0	14.2	14.0	14.0
			25	0	2	20.0	20.2	20.7	0	14.2	14.0	13.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduced Avg Pwr (dBm)		
						1711.5 MHz	1732.5 MHz	1753.5 MHz				
LTE Band 4	3	QPSK	1	0	0	22.6	22.6	23.4	0	16.3	16.2	16.3
			1	7	0	22.7	22.8	23.3	0	16.3	16.2	16.3
			1	14	0	22.7	22.8	23.4	0	16.3	16.1	16.3
			8	0	1	21.5	21.3	22.1	0	15.1	15.0	15.0
			8	4	1	21.5	21.4	22.1	0	15.2	15.1	15.1
			8	7	1	21.5	21.4	22.0	0	15.2	15.1	15.1
			15	0	1	21.5	21.4	22.1	0	15.2	15.0	15.1
		16QAM	1	0	1	21.9	22.0	22.9	0	15.1	15.2	15.3
			1	7	1	21.9	21.9	22.8	0	15.2	15.1	15.2
			1	14	1	21.8	21.9	22.8	0	15.2	15.1	15.3
			8	0	2	20.3	20.2	20.9	0	14.0	14.0	13.9
			8	4	2	20.3	20.3	20.9	0	14.1	14.0	13.9
			8	7	2	20.3	20.2	20.9	0	14.1	14.0	13.9
			15	0	2	20.3	20.3	20.9	0	14.1	14.0	14.0
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduced Avg Pwr (dBm)		
						1710.7 MHz	1732.5 MHz	1754.3 MHz				
LTE Band 4	1.4	QPSK	1	0	0	22.7	22.8	23.4	0	16.4	16.2	16.2
			1	2	0	22.6	22.8	23.3	0	16.4	16.3	16.2
			1	5	0	22.7	22.8	23.3	0	16.4	16.3	16.3
			3	0	0	22.6	22.6	23.2	0	16.1	16.1	16.2
			3	1	0	22.6	22.5	23.2	0	16.2	16.1	16.2
			3	2	0	22.5	22.6	23.2	0	16.2	16.1	16.2
			6	0	1	21.4	21.4	22.1	0	15.2	15.0	15.1
		16QAM	1	0	1	21.6	21.8	22.4	0	15.4	15.4	15.4
			1	2	1	21.7	21.8	22.4	0	15.3	15.3	15.4
			1	5	1	21.7	21.8	22.5	0	15.4	15.3	15.4
			3	0	1	21.4	21.6	22.1	0	15.2	15.0	15.0
			3	1	1	21.3	21.5	22.0	0	15.2	15.0	15.0
			3	2	1	21.3	21.5	22.1	0	15.2	15.0	15.0
			6	0	2	20.3	20.3	21.0	0	14.1	14.0	14.0

**LTE Band 5 Measured Results**

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduced 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	23.8	23.8	23.6	0	20.7	20.7	20.8
			1	25	0	23.9	23.7	23.6	0	20.7	20.7	20.7
			1	49	0	23.9	23.8	23.6	0	20.7	20.7	20.7
			25	0	1	22.5	22.3	22.3	1	19.5	19.4	19.5
			25	12	1	22.5	22.3	22.2	1	19.5	19.4	19.4
			25	25	1	22.4	22.2	22.2	1	19.5	19.4	19.5
			50	0	1	22.5	22.3	22.3	1	19.5	19.5	19.5
		16QAM	1	0	1	22.9	22.9	22.6	1	18.0	18.2	18.4
			1	25	1	22.8	22.8	22.6	1	18.0	18.1	18.5
			1	49	1	22.8	22.8	22.5	1	18.0	18.1	18.5
			25	0	2	21.4	21.3	21.2	2	18.4	18.5	18.5
			25	12	2	21.5	21.2	21.1	2	18.4	18.4	18.4
			25	25	2	21.4	21.2	21.1	2	18.4	18.4	18.4
			50	0	2	21.4	21.2	21.2	2	18.4	18.4	18.5
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduced Avg Pwr (dBm)		
						826.5 MHz	836.5 MHz	846.5 MHz		826.5 MHz	836.5 MHz	846.5 MHz
LTE Band 5	5	QPSK	1	0	0	24.0	23.8	23.5	0	20.9	20.8	20.6
			1	12	0	24.0	23.8	23.4	0	20.8	20.8	20.6
			1	24	0	24.0	23.7	23.3	0	20.8	20.8	20.6
			12	0	1	22.7	22.3	22.2	1	19.5	19.5	19.4
			12	6	1	22.5	22.3	22.1	1	19.5	19.5	19.4
			12	11	1	22.5	22.2	22.0	1	19.5	19.4	19.3
			25	0	1	22.5	22.3	22.1	1	19.5	19.4	19.3
		16QAM	1	0	1	23.0	22.6	22.2	1	18.3	18.1	18.5
			1	12	1	23.0	22.5	22.2	1	18.3	18.1	18.5
			1	24	1	23.0	22.5	22.1	1	18.3	18.1	18.5
			12	0	2	21.6	21.1	21.0	2	18.4	18.3	18.4
			12	6	2	21.5	21.1	21.0	2	18.4	18.3	18.3
			12	11	2	21.5	21.0	20.9	2	18.4	18.2	18.2
			25	0	2	21.6	21.1	20.9	2	18.5	18.3	18.1
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduced Avg Pwr (dBm)		
						825.5 MHz	836.5 MHz	847.5 MHz		825.5 MHz	836.5 MHz	847.5 MHz
LTE Band 5	3	QPSK	1	0	0	24.0	23.6	23.6	0	20.6	20.6	20.8
			1	7	0	24.0	23.6	23.4	0	20.7	20.6	20.7
			1	14	0	24.0	23.6	23.4	0	20.7	20.6	20.7
			8	0	1	22.6	22.3	22.2	1	19.5	19.5	19.5
			8	4	1	22.6	22.3	22.2	1	19.5	19.5	19.5
			8	7	1	22.6	22.3	22.1	1	19.4	19.4	19.4
			15	0	1	22.6	22.3	22.2	1	19.4	19.4	19.5
		16QAM	1	0	1	23.0	22.8	22.7	1	18.3	18.1	18.4
			1	7	1	23.0	22.6	22.6	1	18.3	18.1	18.4
			1	14	1	23.0	22.7	22.5	1	18.0	18.1	18.3
			8	0	2	21.6	21.1	21.2	2	18.4	18.3	18.2
			8	4	2	21.6	21.1	21.0	2	18.4	18.3	18.2
			8	7	2	21.6	21.1	21.0	2	18.3	18.3	18.2
			15	0	2	21.4	21.2	20.9	2	18.3	18.3	18.3

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

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduced 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	24.0	24.0	23.6	0	20.7	20.7	20.7
			1	2	0	24.0	24.0	23.5	0	20.7	20.7	20.7
			1	5	0	24.0	24.0	23.6	0	20.7	20.7	20.7
			3	0	0	23.8	22.6	23.5	0	20.5	20.5	20.7
			3	1	0	23.8	22.6	23.3	0	20.5	20.4	20.6
			3	2	0	23.7	22.6	23.3	0	20.5	20.4	20.6
		6	0	1	22.6	22.6	22.3	1	18.9	18.9	18.9	
		16QAM	1	0	1	23.0	23.0	22.9	1	18.1	18.4	18.3
			1	2	1	23.0	23.0	22.7	1	18.0	18.3	18.3
			1	5	1	23.0	23.0	22.7	1	18.1	18.3	18.4
			3	0	1	22.7	21.6	22.3	1	18.1	18.3	18.1
			3	1	1	22.8	21.6	22.3	1	18.0	18.3	18.1
			3	2	1	22.7	21.6	22.2	1	18.0	18.3	18.2
		6	0	2	21.6	21.4	21.2	2	17.7	17.7	17.9	

**LTE Band 12 Measured Results**

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Max. Avg Pwr (dBm)		
						704 MHz	707.5 MHz	711 MHz		704 MHz	707.5 MHz	711 MHz
LTE Band 12	10	QPSK	1	0	0	24.1	23.9	24.1	0	18.1	18.0	18.1
			1	25	0	24.1	23.9	24.1	0	18.1	17.9	18.0
			1	49	0	24.1	23.9	23.9	0	18.1	17.9	18.0
			25	0	1	22.8	22.6	22.7	0	17.0	16.9	16.8
			25	12	1	22.7	22.6	22.6	0	17.0	16.8	16.8
			25	25	1	22.7	22.5	22.6	0	16.9	16.8	16.8
			50	0	1	22.8	22.6	22.8	1	16.9	16.8	16.8
		16QAM	1	0	1	23.0	23.0	23.2	1	15.6	15.5	15.6
			1	25	1	23.0	22.9	23.2	1	15.6	15.5	15.6
			1	49	1	22.9	22.9	23.1	1	15.5	15.4	15.5
			25	0	2	21.7	21.6	21.8	1	16.0	15.8	15.9
			25	12	2	21.7	21.5	21.6	1	15.9	15.7	15.8
			25	25	2	21.6	21.5	21.6	1	15.9	15.7	15.8
			50	0	2	21.6	21.5	21.7	2	15.9	15.8	15.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Max. Avg Pwr (dBm)		
						701.5 MHz	707.5 MHz	713.5 MHz		704 MHz	707.5 MHz	711 MHz
LTE Band 12	5	QPSK	1	0	0	24.1	24.1	24.0	0	18.0	18.1	18.0
			1	12	0	24.1	24.0	24.0	0	18.0	18.0	18.0
			1	24	0	24.0	24.0	24.0	0	18.1	18.0	18.0
			12	0	1	22.5	22.6	22.7	0	16.8	16.9	16.8
			12	7	1	22.6	22.5	22.7	0	16.9	16.7	16.9
			12	13	1	22.7	22.5	22.7	0	16.9	16.8	16.8
			25	0	1	22.6	22.6	22.7	1	16.9	16.9	16.8
		16QAM	1	0	1	23.3	23.0	22.9	1	15.7	15.4	15.3
			1	12	1	23.2	22.9	22.8	1	15.6	15.3	15.3
			1	24	1	23.3	23.0	22.8	1	15.7	15.4	15.3
			12	0	2	21.5	21.4	21.7	1	15.9	15.8	15.8
			12	7	2	21.6	21.3	21.7	1	15.9	15.7	15.8
			12	13	2	21.6	21.3	21.7	1	16.0	15.8	15.8
			25	0	2	21.6	21.5	21.6	2	15.9	15.7	15.7
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Max. Avg Pwr (dBm)		
						700.5 MHz	707.5 MHz	714.5 MHz		704 MHz	707.5 MHz	711 MHz
LTE Band 12	3	QPSK	1	0	0	24.1	23.9	24.1	0	18.0	17.9	18.0
			1	8	0	24.0	23.9	24.0	0	18.0	17.8	18.0
			1	14	0	24.1	23.9	24.0	0	18.0	17.9	18.0
			8	0	1	22.6	22.7	22.7	0	16.9	16.8	16.7
			8	4	1	22.7	22.6	22.9	0	17.0	16.8	16.8
			8	7	1	22.7	22.5	22.8	0	16.9	16.8	16.7
			15	0	1	22.6	22.5	22.8	1	16.9	16.8	16.7
		16QAM	1	0	1	23.3	23.1	23.5	1	15.3	15.6	15.8
			1	8	1	23.2	23.0	23.5	1	15.2	15.4	15.7
			1	14	1	23.3	23.0	23.5	1	15.3	15.5	15.7
			8	0	2	21.5	21.5	21.7	1	15.8	15.6	15.7
			8	4	2	21.6	21.3	21.8	1	15.7	15.5	15.8
			8	7	2	21.6	21.3	21.7	1	15.8	15.5	15.7
			15	0	2	21.6	21.5	21.6	2	15.7	15.8	15.7

**LTE Band 12 Measured Results (continued)**

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Max. Avg Pwr (dBm)		
						699.7 MHz	707.5 MHz	715.3 MHz		699.7 MHz	707.5 MHz	715.3 MHz
LTE Band 12	1.4	QPSK	1	0	0	24.2	23.9	24.1	0	18.2	18.1	17.9
			1	3	0	24.1	23.9	24.0	0	18.1	18.0	18.0
			1	5	0	24.2	24.0	23.9	0	18.1	18.0	17.9
			3	0	0	23.8	23.8	23.9	0	17.9	17.9	17.8
			3	1	0	23.9	23.7	23.8	0	18.0	17.9	17.8
			3	3	0	23.9	23.7	23.8	0	18.0	17.8	17.8
			6	0	1	22.7	22.6	22.8	1	16.4	16.3	16.3
		16QAM	1	0	1	23.4	23.1	23.4	1	15.7	15.6	15.6
			1	3	1	23.3	23.0	23.4	1	15.6	15.5	15.5
			1	5	1	23.4	23.1	23.3	1	15.6	15.6	15.6
			3	0	1	22.8	22.5	22.9	1	15.2	15.3	15.3
			3	1	1	22.8	22.5	22.8	1	15.3	15.2	15.3
			3	3	1	22.9	22.5	22.9	1	15.2	15.3	15.3
			6	0	2	21.7	21.4	21.6	2	15.3	15.1	15.2

**LTE Band 17 Measured Results**

SAR for LTE Band 17 is covered by LTE Band 12 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 30 Measured Results**

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Max. Avg Pwr (dBm)		
							2310 MHz				2310 MHz	
LTE Band 30	10	QPSK	1	0	0		22.7		0		16.7	
			1	25	0		22.9		0		16.6	
			1	49	0		23.0		0		16.7	
			25	0	1		21.6		0		15.5	
			25	12	1		21.7		0		15.7	
			25	25	1		21.8		0		15.8	
			50	0	1		21.7		1		15.6	
		16QAM	1	0	1		21.8		1		15.9	
			1	25	1		22.0		1		16.0	
			1	49	1		22.0		1		15.9	
			25	0	2		20.5		1		14.5	
			25	12	2		20.7		1		14.6	
			25	25	2		20.7		1		14.8	
			50	0	2		20.6		2		14.5	
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Max. Avg Pwr (dBm)		
						2307.5 MHz	2310 MHz	2312.5 MHz		2307.5 MHz	2310 MHz	2312.5 MHz
LTE Band 30	5	QPSK	1	0	0	22.8	22.6	22.9	0	16.7	16.7	16.6
			1	12	0	22.9	22.7	23.0	0	16.7	16.8	16.8
			1	24	0	23.0	22.9	23.0	0	16.8	17.0	16.9
			12	0	1	21.6	21.6	21.7	0	15.5	15.5	15.6
			12	7	1	21.7	21.7	21.7	0	15.6	15.6	15.6
			12	13	1	21.8	21.7	21.7	0	15.6	15.7	15.5
			25	0	1	21.6	21.6	21.7	1	15.6	15.6	15.5
		16QAM	1	0	1	22.0	21.9	22.0	1	15.8	15.7	15.6
			1	12	1	22.0	22.0	22.0	1	15.9	15.7	15.6
			1	24	1	22.0	22.0	22.0	1	16.0	15.9	15.8
			12	0	2	20.6	20.6	20.6	1	14.5	14.5	14.5
			12	7	2	20.7	20.7	20.7	1	14.6	14.6	14.6
			12	13	2	20.7	20.7	20.7	1	14.6	14.7	14.6
			25	0	2	20.7	20.7	20.7	2	14.6	14.6	14.6

## 9.2.1. LTE Rel. 10 Carrier Aggregation

### LTE Release 10 Carrier Aggregation

The following power measurements were performed with a single carrier uplink; CA for this particular project only supports one (1) uplink and two (2) downlinks.

LTE CA combinations PCC + SCC	PCC (UL)				SCC (DL)			LTE Rel 10 Tx. Max. Power [dBm]	LTE Rel 10 Tx. Reduce Power [dBm]
	Bandwidth (MHz)	Frequency (MHz)	Channel	RB / Offset	Bandwidth (MHz)	Frequency (MHz)	Channel		
B2 (PCC) + B17 (SCC)	10	1880	18900	1 / 49	10	710	23790	23.43	17.31
B2 (PCC) + B29 (SCC)	20	1880	18900	1 / 49	Downlink only			23.42	17.40
B2 (PCC) + B5 (SCC)	20	1880	18900	1 / 49	10	836.6	20525	23.43	17.50
B2 (PCC) + B12 (SCC)	20	1880	18900	1 / 49	10	707.5	23095	23.44	17.40
B2 (PCC) + B30 (SCC)	20	1880	18900	1 / 49	10	2310	27710	23.42	17.38
B4 (PCC) + B17 (SCC)	10	1732.5	20175	1 / 99	10	710	23790	23.65	16.10
B4 (PCC) + B29 (SCC)	20	1732.5	20175	1 / 99	Downlink only			23.66	16.20
B4 (PCC) + B5 (SCC)	10	1732.5	20175	1 / 99	10	836.6	20525	23.62	16.21
B4 (PCC) + B5 (SCC)	20	1732.5	20175	1 / 99	10	836.6	20525	23.60	16.30
B4 (PCC) + B12 (SCC)	20	1732.5	20175	1 / 99	10	707.5	23095	23.60	16.11
B4 (PCC) + B30 (SCC)	20	1732.5	20175	1 / 99	10	2310	27710	23.61	16.18
B5 (PCC) + B2 (SCC)	10	836.5	20525	1 / 49	20	1732.5	20175	23.62	20.55
B5 (PCC) + B4 (SCC)	10	836.5	20525	1 / 49	20	1732.5	20175	23.65	20.49
B5 (PCC) + B4 (SCC)	10	836.5	20525	1 / 49	10	1732.5	20175	23.66	20.66
B5 (PCC) + B30 (SCC)	10	836.5	20525	1 / 49	10	2310	27710	23.65	20.50
B12 (PCC) + B30 (SCC)	10	707.5	23095	1 / 0	10	2310	27710	23.65	17.84
B12 (PCC) + B2 (SCC)	10	707.5	23095	1 / 0	20	1880	18900	23.68	17.92
B17 (PCC) + B2 (SCC)	10	710	23790	1 / 49	10	1880	18900	23.80	16.57
B30 (PCC) + B2 (SCC)	10	2310	27710	1 / 49	20	1880	18900	22.80	16.50
B30 (PCC) + B5 (SCC)	10	2310	27710	1 / 49	10	836.6	20525	22.75	16.70
B30 (PCC) + B12 (SCC)	10	2310	27710	1 / 49	10	707.5	23095	22.70	16.72
B30 (PCC) + B29 (SCC)	10	2310	27710	1 / 49	Downlink only			22.80	16.58

#### Note:

SAR is excluded for Carrier Aggregation when measured power does not exceed LTE Release 8 by more than a  $1/4$  dB.

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

#### Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Max Pwr.			Note(s)
					Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)	
2.4	802.11b	1 Mbps	1	2412	16.1	16.5	Yes	
			6	2437	16.1			
			11	2462	16.3			
	802.11g	6 Mbps	1	2412	Not Required	14.5	No	1
			6	2437				
			11	2462				
	802.11n (HT20)	6.5 Mbps	1	2412	Not Required	13.5	No	1
			6	2437				
			11	2462				

#### Note(s):

- Output Power and SAR is not required for 802.11g/n HT20 channels when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is  $\leq 1.2$  W/kg.
- All Wi-Fi (DTS Band) SAR data- used in this report were taken from SAR report 15K21654-S1, submitted under FCC ID A3LSMT670. Both models share identical antennas and output power. Spot checks were performed on model SM-T670 to ensure SAR values were the same between both models

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

### Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)
5.2 (U-NII 1)	802.11a	6 Mbps	36 ~ 48	5180 ~ 5240	Not Required	11.5	No
	802.11n (HT20)	6.5 Mbps	36 ~ 48	5180 ~ 5240		11.5	No
	802.11n (HT40)	13.5 Mbps	38	5190	11.3	11.5	No
			46	5230	10.9		
	802.11ac (VHT20)	6.5 Mbps	36 ~ 48	5180 ~ 5240	Not Required	11.5	No
	802.11ac (VHT40)	13.5 Mbps	38 ~ 46	5190 ~ 5230		10.5	No
802.11ac (VHT80)	29.3 Mbps	42	5210	9.5		No	
5.3 (U-NII 2A)	802.11a	6 Mbps	52 ~ 64	5260 ~ 5320	Not Required	11.5	No
	802.11n (HT20)	6.5 Mbps	52 ~ 64	5260 ~ 5320		11.5	No
	802.11n (HT40)	13.5 Mbps	54	5270	11.2	11.5	Yes
			62	5310	11.2		
	802.11ac (VHT20)	6.5 Mbps	52 ~ 64	5260 ~ 5320	Not Required	11.5	No
	802.11ac (VHT40)	13.5 Mbps	54 ~ 62	5270 ~ 5310		10.5	No
802.11ac (VHT80)	29.3 Mbps	58	5290	9.5		No	
5.5 (U-NII 2C)	802.11a	6 Mbps	100 ~ 144	5500 ~ 5720	Not Required	11.5	No
	802.11n (HT20)	6.5 Mbps	100 ~ 144	5500 ~ 5720		11.5	No
	802.11n (HT40)	13.5 Mbps	102	5510	10.8	11.5	Yes
			118	5590	10.8		
			134	5670	11.2		
	802.11ac (VHT20)	6.5 Mbps	100 ~ 144	5500 ~ 5720	Not Required	11.5	No
802.11ac (VHT40)	13.5 Mbps	102 ~ 142	5510 ~ 5710	10.5		No	
802.11ac (VHT80)	29.3 Mbps	106 ~ 138	5530 ~ 5690	9.5		No	
5.8 (U-NII 3)	802.11a	6 Mbps	149 ~ 165	5745 ~ 5825	Not Required	11.5	No
	802.11n (HT20)	6.5 Mbps	149 ~ 165	5745 ~ 5825		11.5	No
	802.11n (HT40)	13.5 Mbps	151	5755	11.1	11.5	Yes
			159	5795	10.9		
	802.11ac (VHT20)	6.5 Mbps	149 ~ 165	5745 ~ 5825	Not Required	11.5	No
	802.11ac (VHT40)	13.5 Mbps	151 ~ 159	5755 ~ 5795		10.5	No
802.11ac (VHT80)	29.3 Mbps	155	5775	9.5		No	

### Note(s):

- Output Power and SAR measurement is not required for 802.11n/ac (V)HT20/(V)HT40/VHT80 channels when the specified tune-up tolerances for 802.11n/ac (V)HT20/(V)HT40/VHT80 are lower than 802.11a by more than ½ dB and the measured SAR is ≤ 1.2 W/Kg.
- When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac modes, the channel in the lower order/sequence 802.11 mode (i.e. a, g, n then ac) is selected.
- When the specified maximum output power is the same for both UNII band I and UNII band 2A, begin SAR measurement in UNII band 2A; and if the highest *reported* SAR for UNII band 2A is
  - ≤ 1.2 W/kg, SAR is not required for UNII band I
  - > 1.2 W/kg, both bands should be tested independently for SAR.
- All Wi-Fi (U-NII Band) SAR data- used in this report were taken from SAR report 15K21654-S1, submitted under FCC ID A3LSMT670. Both models share identical antennas and output power. Spot checks were performed on model SM-T670 to ensure SAR values were the same between both models

## 9.5. Bluetooth

Maximum tune-up tolerance limit is 9.5 dBm from the rated nominal maximum output power. This power level qualifies for exclusion of SAR testing.

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

SAR Test Reduction criteria are as follows:

### KDB 447498 D01 General RF Exposure Guidance:

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

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

When the maximum output power and tune-up tolerance specified for production units in a secondary mode is  $\leq \frac{1}{4}$  dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is  $\leq 1.2$  W/kg, SAR measurement is not required for the secondary mode

### KDB 941225 D05 SAR for LTE Devices:

SAR test reduction is applied using the following criteria:

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

### KDB 248227 D01 SAR meas for 802.11 v02v1:

SAR test reduction for 802.11 Wi-Fi transmission mode configurations are considered separately for DSSS and OFDM. An initial test position is determined to reduce the number of tests required for certain exposure configurations with multiple test positions. An initial test configuration is determined for each frequency band and aggregated band according to maximum output power, channel bandwidth, wireless mode configurations and other operating parameters to streamline the measurement requirements. For 2.4 GHz DSSS, either the initial test position or DSSS procedure is applied to reduce the number of SAR tests; these are mutually exclusive. For OFDM, an initial test position is only applicable to next to the ear, UMPC mini-tablet and hotspot mode configurations, which is tested using the initial test configuration to facilitate test reduction. For other exposure conditions with a fixed test position, SAR test reduction is determined using only the initial test configuration.

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

- $\leq 0.4$  W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.
- $> 0.4$  W/kg, SAR is repeated using the same wireless mode test configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position, on the highest maximum output power channel, until the reported SAR is  $\leq 0.8$  W/kg or all required test positions are tested.
  - For subsequent test positions with equivalent test separation distance or when exposure is dominated by coupling conditions, the position for maximum coupling condition should be tested.
  - When it is unclear, all equivalent conditions must be tested.

- For all positions/configurations tested using the *initial test position* and subsequent test positions, when the *reported* SAR is  $> 0.8$  W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the *reported* SAR is  $\leq 1.2$  W/kg or all required test channels are considered.
  - The additional power measurements required for this step should be limited to those necessary for identifying subsequent highest output power channels to apply the test reduction.
- When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is  $\leq 1.2$  W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.
- When the specified maximum output power is different between UNII 1 and UNII 2A, begin SAR with the band that has the higher specified maximum output. If the highest reported SAR for the band with the highest specified power is  $\leq 1.2$  W/kg, testing for the band with the lower specified output power is not required; otherwise test the remaining bands independently for SAR.

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

### 10.1. 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	ON	0	Rear	4183	836.6	21.5	21.5	0.554	0.554	1
			Edge 3	4183	836.6	21.5	21.5	0.246	0.246	
Rel 99 RMC	OFF	10	Rear	4183	836.6	23.5	23.3	0.050	0.052	
		0	Edge 2	4183	836.6	23.5	23.3	0.207	0.216	
		8	Edge 3	4183	836.6	23.5	23.3	0.156	0.163	

### 10.2. 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	ON	0	Rear	9400	1880.0	18.0	17.9	0.752	0.777	2
			Edge 3	9400	1880.0	18.0	17.9	0.222	0.229	
Rel 99 RMC	OFF	10	Rear	9400	1880.0	24.0	23.3	0.048	0.056	
		0	Edge 2	9400	1880.0	24.0	23.3	0.270	0.317	
		8	Edge 3	9400	1880.0	24.0	23.3	0.561	0.659	

### 10.3. LTE Band 2 (20MHz Bandwidth)

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	18700	1860.0	1	49	18.0	17.6	0.794	0.865	3
				18900	1880.0	1	49	18.0	17.5	0.785	0.884	
				19100	1900.0	1	49	18.0	17.8	0.692	0.729	
			Edge 3	18900	1880.0	1	49	18.0	17.5	0.315	0.355	
50	24	17.0		16.2	0.242	0.290						
QPSK	OFF	10	Rear	18900	1880.0	1	49	24.5	23.8	0.070	0.082	
						50	24	23.5	22.4	0.053	0.068	
		0	Edge 2	18900	1880.0	1	49	24.5	23.8	0.498	0.587	
						50	24	23.5	22.4	0.362	0.469	
		8	Edge 3	18900	1880.0	1	49	24.5	23.8	0.450	0.530	
						50	24	23.5	22.4	0.320	0.415	

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

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	20050	1720.0	1	99	16.5	16.3	0.732	0.774	4
				20175	1732.5	1	99	16.5	16.3	0.804	0.848	
				50	24	15.5	15.2	0.604	0.655			
			Edge 3	20300	1745.0	1	99	16.5	16.3	0.912	0.957	
20175	1732.5	1		99	16.5	16.3	0.161	0.170				
QPSK	OFF	10	Rear	20175	1732.5	1	99	24.5	23.8	0.041	0.048	
						50	24	23.5	22.4	0.036	0.047	
		0	Edge 2	20175	1732.5	1	99	24.5	23.8	0.462	0.549	
						50	24	23.5	22.4	0.282	0.363	
		8	Edge 3	20175	1732.5	1	99	24.5	23.8	0.427	0.507	
						50	24	23.5	22.4	0.261	0.336	

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

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	20525	836.5	1	49	21.0	20.7	0.552	0.591	5
						25	0	20.0	19.4	0.404	0.462	
			Edge 3	20525	836.5	1	49	21.0	20.7	0.247	0.265	
						25	0	20.0	19.4	0.172	0.197	
QPSK	OFF	10	Rear	20525	836.5	1	49	24.5	23.8	0.065	0.078	
						25	0	23.5	22.3	0.044	0.057	
		0	Edge 2	20525	836.5	1	49	24.5	23.8	0.236	0.280	
						25	0	23.5	22.3	0.198	0.259	
		8	Edge 3	20525	836.5	1	49	24.5	23.8	0.207	0.246	
						25	0	23.5	22.3	0.142	0.186	

### 10.6. LTE Band 12 (10MHz Bandwidth)

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	23095	707.5	1	0	18.2	18.0	0.558	0.585	6
						25	0	17.2	16.9	0.423	0.452	
			Edge 3	23095	707.5	1	0	18.2	18.0	0.071	0.075	
						25	0	17.2	16.9	0.056	0.059	
QPSK	OFF	10	Rear	23095	707.5	1	0	24.5	23.9	0.019	0.022	
						25	0	23.5	22.6	0.014	0.017	
		0	Edge 2	23095	707.5	1	0	24.5	23.9	0.044	0.051	
						25	0	23.5	22.6	0.035	0.043	
		8	Edge 3	23095	707.5	1	0	24.5	23.9	0.073	0.083	
						25	0	23.5	22.6	0.052	0.065	

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

SAR for LTE Band 17 is covered by LTE Band 12 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

### 10.8. LTE Band 30 (10MHz Bandwidth)

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	27710	2310.0	1	49	17.0	16.7	0.532	0.574	7
						25	25	16.0	15.8	0.455	0.481	
			Edge 3	27710	2310.0	1	49	17.0	16.7	0.168	0.181	
						25	25	16.0	15.8	0.127	0.134	
QPSK	OFF	10	Rear	27710	2310.0	1	49	23.0	23.0	0.021	0.021	
						25	25	22.0	21.8	0.013	0.014	
		0	Edge 2	27710	2310.0	1	49	23.0	23.0	0.062	0.062	
						25	25	22.0	21.8	0.043	0.045	
		8	Edge 3	27710	2310.0	1	49	23.0	23.0	0.220	0.220	
						25	25	22.0	21.8	0.158	0.165	

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

Frequency Band	Mode	RF Exposure Conditions	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.	Meas.	Scaled	
2.4GHz	802.11b	Body	Off	0	Rear(Top Touch)	11	2462.0	0.079	16.5	16.3			
					Rear(Bottom Touch)	11	2462.0	0.095	16.5	16.3	0.077	0.080	
					Rear	11	2462.0	0.023	16.5	16.3			
					Edge 2	11	2462.0	0.640	16.5	16.3	0.481	0.501	8

**Note(s):**

- Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.
- Highest reported SAR is > 0.4 W/kg. Due to the highest reported SAR for this test position, other test positions in Head exposure condition were evaluated until a SAR ≤ 0.8 W/kg was reported.
- Testing for a second channel was required because the reported SAR for this test position was >0.8 W/kg.
- Additional testing required in order satisfying FCC simultaneous transmission limit criteria.
- For Rear (Top Touch) and Rear (Bottom Touch), Please refer to Test-Photos in 15K21654 Appendix A.
- All Wi-Fi (DTS Band) SAR data- used in this report were taken from SAR report 15K21654-S1F, submitted under FCC ID A3LSMT670. Both models share identical antennas and output power. Spot checks were performed on model SM-T670 to ensure SAR values were the same between both models

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

Frequency Band	Mode	Antenna	RF Exposure Conditions	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Plot No.
										Tune-up limit	Meas.	Meas.	Scaled	
5.3 GHz U-NII 2A	802.11n (HT40)	SISO	Body	Off	0	Rear(Top Touch)	54	5270.0	0.050	11.5	11.2			
						Rear(Bottom Touch)	54	5270.0	0.133	11.5	11.2	0.063	0.067	
						Rear	54	5270.0	0.018	11.5	11.2			
						Edge 2	54	5270.0	1.342	11.5	11.2	0.857	0.910	
							62	5310.0	1.984	11.5	11.2	1.020	1.095	9
5.5 GHz U-NII 2C	802.11n (HT40)	SISO	Body	Off	0	Rear(Top Touch)	134	5670.0	0.066	11.5	11.2			
						Rear(Bottom Touch)	134	5670.0	0.087	11.5	11.2	0.052	0.055	
						Rear	134	5670.0	0.070	11.5	11.2			
						Edge 2	134	5670.0	1.480	11.5	11.2	0.745	0.791	10
5.8 GHz U-NII 3	802.11n (HT40)	SISO	Body	Off	0	Rear(Top Touch)	151	5755.0	0.015	11.5	11.1			
						Rear(Bottom Touch)	151	5755.0	0.076	11.5	11.1	0.048	0.053	
						Rear	151	5755.0	0.014	11.5	11.1			
						Edge 2	151	5755.0	1.121	11.5	11.1	0.638	0.703	11

**Note(s):**

- Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.
- Highest reported SAR is > 0.4 W/kg. Due to the highest reported SAR for this test position, other test positions in Head exposure condition were evaluated until a SAR ≤ 0.8 W/kg was reported.
- Testing for a second channel was required because the reported SAR for this test position was >0.8 W/kg.
- Additional testing required in order satisfying FCC simultaneous transmission limit criteria.
- For Rear (Top Touch) and Rear (Bottom Touch), Please refer to Test-Photos in 15K21654 Appendix A.
- All Wi-Fi (U-NII Band) SAR data- used in this report were taken from SAR report 15K21654-S1, submitted under FCC ID A3LSMT670. Both models share identical antennas and output power. Spot checks were performed on model SM-T670 to ensure SAR values were the same between both models

## 10.11. Bluetooth

### Standalone SAR Test Exclusion Considerations & Estimated SAR

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

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

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

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

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

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

### Body-worn Accessory Exposure Conditions

Max. tune-up tolerance limit		Min. test separation distance (mm)	Frequency (GHz)	SAR test exclusion Result*	Test Configuration	Estimated 1-g SAR (W/kg)
(dBm)	(mW)					
9.5	9	5	2.480	2.8	Rear/Front	0.378

### Conclusion:

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

## 11. SAR Measurement Variability

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

- 1) Repeated measurement is not required when the original highest measured SAR is  $< 0.80$  W/kg; steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is  $\geq 0.80$  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  $> 1.20$ .

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	Repeated Measured SAR (W/kg)	Largest to Smallest SAR Ratio
700	LTE Band 12	Standalone	Rear	No	0.558	N/A	N/A
850	WCDMA Band V	Standalone	Rear	No	0.554	N/A	N/A
	LTE Band 5	Standalone	Rear	No	0.552	N/A	N/A
1900	WCDMA Band II	Standalone	Rear	No	0.752	N/A	N/A
	LTE Band 2	Standalone	Rear	No	0.794	N/A	N/A
1700	LTE Band 4	Standalone	Rear	Yes	0.912	0.914	1.00
2300	LTE Band 30	Standalone	Rear	No	0.532	N/A	N/A
2400	Wi-Fi 802.11b/g/n	Body	Edge 2	No	0.481	N/A	N/A
5300	Wi-Fi 802.11a/n/ac	Body	Edge 2	Yes	1.02	0.998	1.02
5500	Wi-Fi 802.11a/n/ac	Body	Edge 2	No	0.745	N/A	N/A
5800	Wi-Fi 802.11a/n/ac	Body	Edge 2	No	0.638	N/A	N/A

### Note(s):

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

## 12. Simultaneous Transmission SAR Analysis

KDB 447498 D01 General RF Exposure Guidance introduces a new formula for calculating the SAR to Peak Location Ratio (SPLSR) between pairs of simultaneously transmitting antennas:

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

Where:

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

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

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

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

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

### Simultaneous Transmission Condition

RF Exposure Condition	Item	Capable Transmit Configurations		
Standalone	1	W-CDMA	+	DTS
	2	W-CDMA	+	U-NII
	3	W-CDMA	+	BT
	4	LTE	+	DTS
	5	LTE	+	U-NII
	6	LTE	+	BT

Notes:

1. DTS, U-NII supports Hotspot and Wi-Fi Direct.
2. W-CDMA and LTE support Hotspot.
3. VoIP is supported in W-CDMA and LTE.
4. DTS Radio cannot transmit simultaneously with Bluetooth Radio.
5. U-NII Radio cannot transmit simultaneously with Bluetooth Radio.

### 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. Please refer to Estimated SAR Tables to see which test positions 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.

#### 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</b>																
Cellular	W-CDMA 2	1907.6	24.00	251	26	260.4	27	3.66	360.6			-MEA SURE	0.400	-MEA SURE	-MEA SURE	0.400
Cellular	W-CDMA 5	846.6	23.50	224	26	260.4	27	3.66	360.6			-MEA SURE	0.400	-MEA SURE	-MEA SURE	0.400
Cellular	LTE Band 2	1900	24.50	282	26	260.4	27	3.66	360.6			-MEA SURE	0.400	-MEA SURE	-MEA SURE	0.400
Cellular	LTE Band 4	1754.3	24.50	282	26	260.4	27	3.66	360.6			-MEA SURE	0.400	-MEA SURE	-MEA SURE	0.400
Cellular	LTE Band 5	844	24.50	282	26	260.4	27	3.66	360.6			-MEA SURE	0.400	-MEA SURE	-MEA SURE	0.400
Cellular	LTE Band 12	711	24.50	282	26	260.4	27	3.66	360.6			-MEA SURE	0.400	-MEA SURE	-MEA SURE	0.400
Cellular	LTE Band 17	710	24.50	282	26	260.4	27	3.66	360.6			-MEA SURE	0.400	-MEA SURE	-MEA SURE	0.400
Cellular	LTE Band 30	2310	23.00	200	26	260.4	105.7	3.66	316.5			-MEA SURE	0.400	0.400	-MEA SURE	0.400
<b>Power Back-off, Proximity Sensor On</b>																
Cellular	W-CDMA 2	1907.6	18.00	63	26	260.4		3.66	360.6			-MEA SURE	0.400		-MEA SURE	0.400
Cellular	W-CDMA 5	846.6	21.50	141	26	260.4		3.66	360.6			-MEA SURE	0.400		-MEA SURE	0.400
Cellular	LTE Band 2	1900	18.00	63	26	260.4		3.66	360.6			-MEA SURE	0.400		-MEA SURE	0.400
Cellular	LTE Band 4	1754.3	16.50	45	26	260.4		3.66	360.6			0.306	0.400		-MEA SURE	0.400
Cellular	LTE Band 5	844	21.00	126	26	260.4		3.66	360.6			-MEA SURE	0.400		-MEA SURE	0.400
Cellular	LTE Band 12	711	18.20	66	26	260.4		3.66	360.6			0.285	0.400		-MEA SURE	0.400
Cellular	LTE Band 17	710	18.20	66	26	260.4		3.66	360.6			0.285	0.400		-MEA SURE	0.400
Cellular	LTE Band 30	2310	17.00	50	26	260.4		3.66	316.5			0.390	0.400		-MEA SURE	0.400

#### Estimated SAR for WLAN

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
Wi-Fi 2.4 GHz	2462	16.50	45	26	128	4	131	443		0.362	0.400	-MEA SURE	0.400	0.400	
Wi-Fi 5.2 GHz	5240	11.50	14	26	128	4	131	443		0.164	0.400	-MEA SURE	0.400	0.400	
Wi-Fi 5.3 GHz	5320	11.50	14	26	128	4	131	443		0.166	0.400	-MEA SURE	0.400	0.400	
Wi-Fi 5.5 GHz	5700	11.50	14	26	128	4	131	443		0.171	0.400	-MEA SURE	0.400	0.400	
Wi-Fi 5.8 GHz	5825	11.50	14	26	128	4	131	443		0.173	0.400	-MEA SURE	0.400	0.400	
Bluetooth	2480	9.50	9	26	128	4	131	443		0.073	0.400	0.378	0.400	0.400	

### 12.1. Sum of the SAR for WCDMA Band V & Wi-Fi & BT

Test Position	①	②	③	④	① + ②		① + ③		① + ④	
	WWAN	DTS	U-NII	BT	WWAN + DTS		WWAN + U-NII		WWAN + BT	
					∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.554	0.080	0.067	0.073	0.634	No	0.621	No	0.627	No
Edge 2	0.216	0.501	1.095	0.378	0.717	No	1.311	No	0.594	No

**Note(s):**

All Wi-Fi and Bluetooth SAR values (measured or estimated) used in this report were taken from SAR report 15K21654-S1, submitted under FCC ID A3LSMT670

### 12.2. Sum of the SAR for WCDMA Band II & Wi-Fi & BT

Test Position	①	②	③	④	① + ②		① + ③		① + ④	
	WWAN	DTS	U-NII	BT	WWAN + DTS		WWAN + U-NII		WWAN + BT	
					∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.777	0.080	0.067	0.073	0.857	No	0.844	No	0.850	No
Edge 2	0.317	0.501	1.095	0.378	0.818	No	1.412	No	0.695	No

**Note(s):**

All Wi-Fi and Bluetooth SAR values (measured or estimated) used in this report were taken from SAR report 15K21654-S1, submitted under FCC ID A3LSMT670

### 12.3. Sum of the SAR for LTE Band 2 & Wi-Fi & BT

Test Position	①	②	③	④	① + ②		① + ③		① + ④	
	WWAN	DTS	U-NII	BT	WWAN + DTS		WWAN + U-NII		WWAN + BT	
					∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.884	0.080	0.067	0.073	0.964	No	0.951	No	0.957	No
Edge 2	0.587	0.501	1.095	0.378	1.088	No	1.682	Yes	0.965	No

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

Test Position	Worst-case combination		∑ 1-g SAR (mW/g)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS					
Edge 2	0.587	1.095	① + ③ 1.682	78.1	0.028	No	1

**Note(s):**

All Wi-Fi and Bluetooth SAR values (measured or estimated) used in this report were taken from SAR report 15K21654-S1, submitted under FCC ID A3LSMT670

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

Test Position	①	②	③	④	① + ②		① + ③		① + ④	
	WWAN	DTS	U-NII	BT	WWAN + DTS		WWAN + U-NII		WWAN + BT	
					∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.957	0.080	0.067	0.073	1.037	No	1.024	No	1.030	No
Edge 2	0.549	0.501	1.095	0.378	1.050	No	1.644	Yes	0.927	No

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

Test Position	Worst-case combination		∑ 1-g SAR (mW/g)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	①	②					
	WWAN	DTS	① + ③				
Edge 2	0.549	1.095	1.644	88.3	0.024	No	2

**Note(s):**

All Wi-Fi and Bluetooth SAR values (measured or estimated) used in this report were taken from SAR report 15K21654-S1, submitted under FCC ID A3LSMT670

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

Test Position	①	②	③	④	① + ②		① + ③		① + ④	
	WWAN	DTS	U-NII	BT	WWAN + DTS		WWAN + U-NII		WWAN + BT	
					∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.591	0.080	0.067	0.073	0.671	No	0.658	No	0.664	No
Edge 2	0.280	0.501	1.095	0.378	0.781	No	1.375	No	0.658	No

**Note(s):**

All Wi-Fi and Bluetooth SAR values (measured or estimated) used in this report were taken from SAR report 15K21654-S1, submitted under FCC ID A3LSMT670

**12.6. Sum of the SAR for LTE Band 12 & Wi-Fi & BT**

Test Position	①	②	③	④	① + ②		① + ③		① + ④	
	WWAN	DTS	U-NII	BT	WWAN + DTS		WWAN + U-NII		WWAN + BT	
					∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.585	0.080	0.067	0.073	0.665	No	0.652	No	0.658	No
Edge 2	0.051	0.501	1.095	0.378	0.552	No	1.146	No	0.429	No

**Note(s):**

All Wi-Fi and Bluetooth SAR values (measured or estimated) used in this report were taken from SAR report 15K21654-S1, submitted under FCC ID A3LSMT670

**12.7. Sum of the SAR for LTE Band 30 & Wi-Fi & BT**

Test Position	①	②	③	④	① + ②		① + ③		① + ④	
	WWAN	DTS	U-NII	BT	WWAN + DTS		WWAN + U-NII		WWAN + BT	
					∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.574	0.080	0.067	0.073	0.654	No	0.641	No	0.647	No
Edge 2	0.062	0.501	1.095	0.378	0.563	No	1.157	No	0.440	No

**Note(s):**

All Wi-Fi and Bluetooth SAR values (measured or estimated) used in this report were taken from SAR report 15K21654-S1, submitted under FCC ID A3LSMT670

Figure (1)

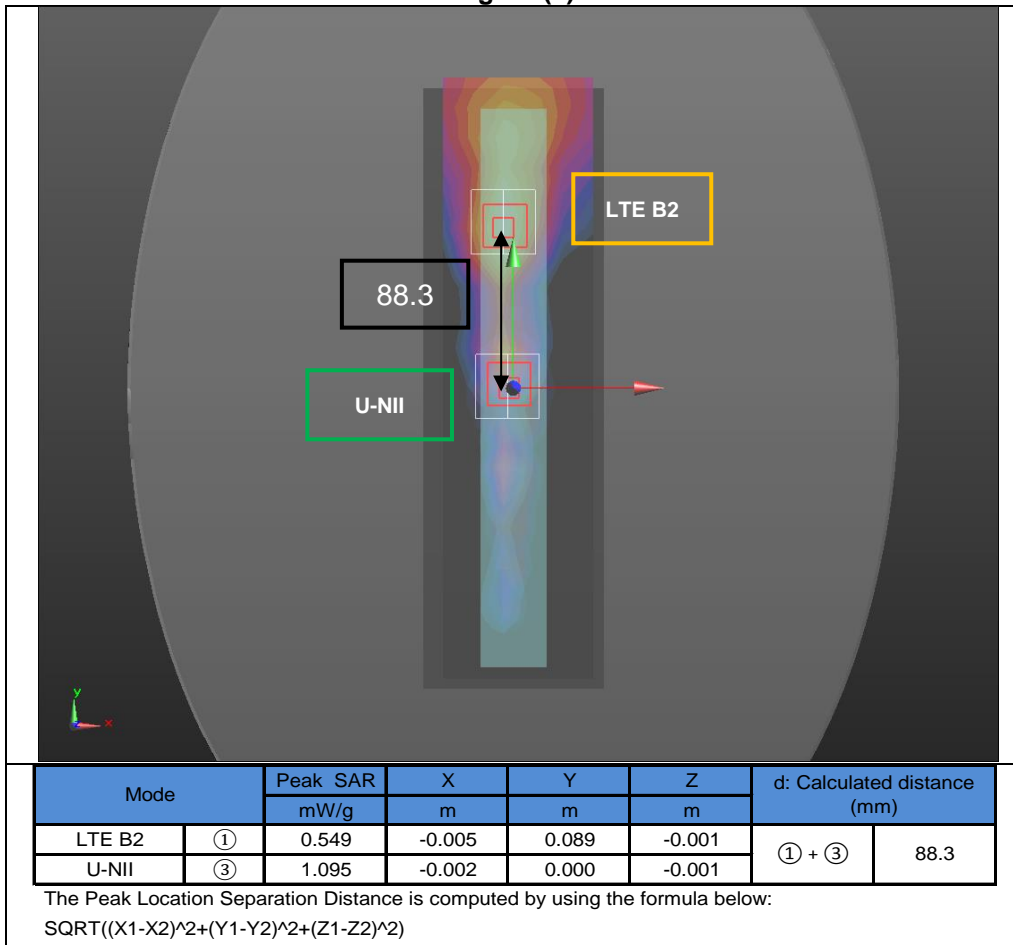
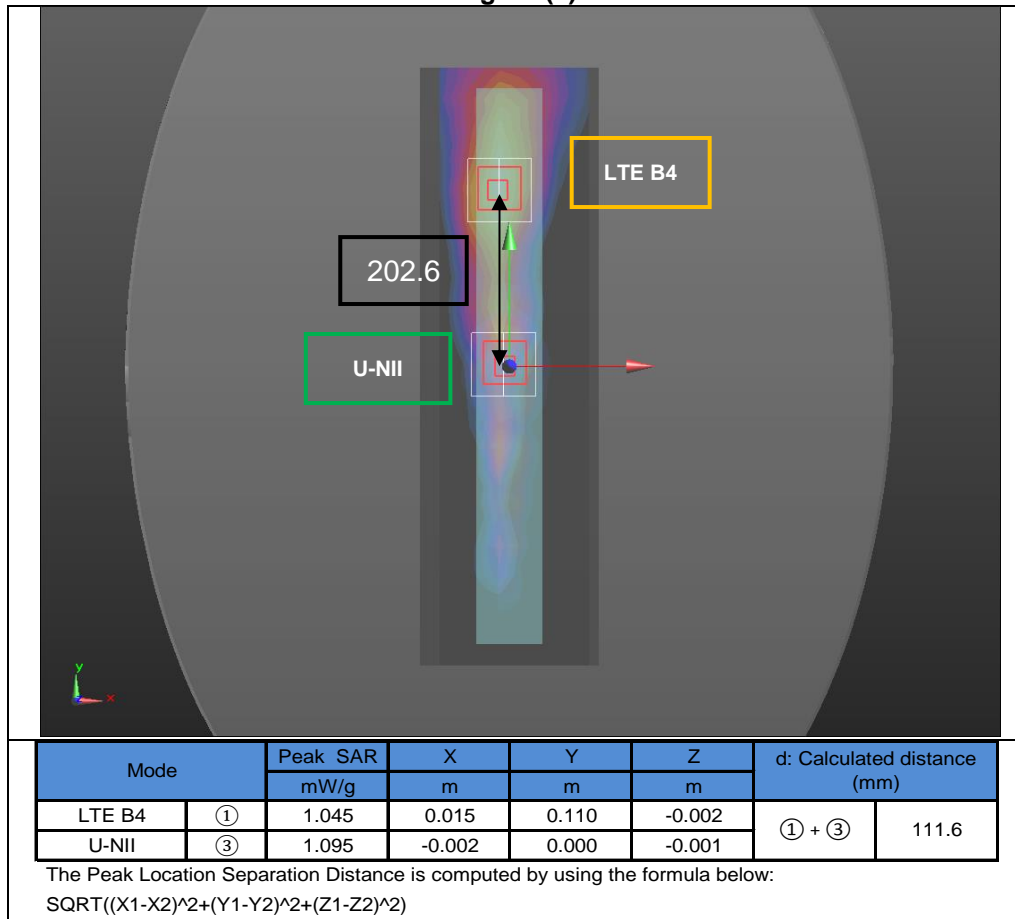


Figure (2)



**Conclusion:**

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

## **Appendixes**

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

**15K21698-S1V1 FCC Report SAR\_App A\_Photos & Ant. Locations**

**15K21698-S1V1 FCC Report SAR\_App B\_Highest SAR Test Plots**

**15K21698-S1V1 FCC Report SAR\_App C\_System Check Plots**

**15K21698-S1V1 FCC Report SAR\_App D\_SAR Tissue Ingredients**

**15K21698-S1V1 FCC Report SAR\_App E\_Probe Cal. Certificates**

**15K21698-S1V1 FCC Report SAR\_App F\_Dipole Cal. Certificates**

**END OF REPORT**