



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

SAR EVALUATION REPORT

FOR

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

MODEL NUMBER: SM-T387V, SM-T387VK

FCC ID: A3LSMT387V

REPORT NUMBER: 4788481138-S1V3

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Prepared for
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TL-637

Revision History



Rev.	Date	Revisions	Revised By
V1	6/27/2018	Initial Issue	Sunghoon Kim
V2	7/3/2018	Sec.12. Replaced "<0.04" to "≤ 0.04" in Conclusion.	Sunghoon Kim
V3	7/6/2018	Sec.1, Sec.4.3, Sec.6.3, Sec.6.6.1, Sec.7.1, Sec.8, Sec.9 Sec.10.5, Sec.10.7, Sec.11, Sec.12 and Appendix B & C. -Revised SAR report due to change "Reduced target power" in LTE band 5, 13.	Sunghoon Kim

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1. Attestation of Test Results

Applicant Name	SAMSUNG ELECTRONICS CO.,LTD.			
FCC ID	A3LSMT387V			
Model Name	SM-T387V, SM-T387VK			
Applicable Standards	FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013			
SAR Limits (W/Kg)				
Exposure Category	Peak spatial-average(1g of tissue)			
General population / Uncontrolled exposure	1.6			
The Highest Reported SAR (W/kg)				
RF Exposure Conditions	Equipment Class			
	Licensed	DTS	U-NII	DSS(BT)
Standalone	1.39	0.85	0.89	0.34
Simultaneous TX	1.59	1.59	1.59	1.59
Date Tested	5/30/2018 to 6/25/2018 , 7/5/2018 to 7/6/2018			
Test Results	Pass			
<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>Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL 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:		
				
Justin Park Lead Test Engineer UL Korea, Ltd. Suwon Laboratory		Sunghoon Kim Associate Test 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 v02r02
- 447498 D01 General RF Exposure Guidance v06
- 616217 D04 SAR for laptop and tablets v01r02
- 690783 D01 SAR Listings on Grants v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02
- 941225 D01 3G SAR Procedures v03r01
- 941225 D05 SAR for LTE Devices v02r05
- 941225 D05A LTE Rel.10 KDB Inquiry Sheet v01r02
- 941225 D06 Hotspot Mode v02r01

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

- [TCB workshop](#) October, 2016; Page 7, RF Exposure Procedures (Bluetooth Duty Factor)

Additional Guidance: KDB inquiry

- Additional SAR test of corner side – KDB guidance to identify that SAR test when sensor and antenna is located near corner side.

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

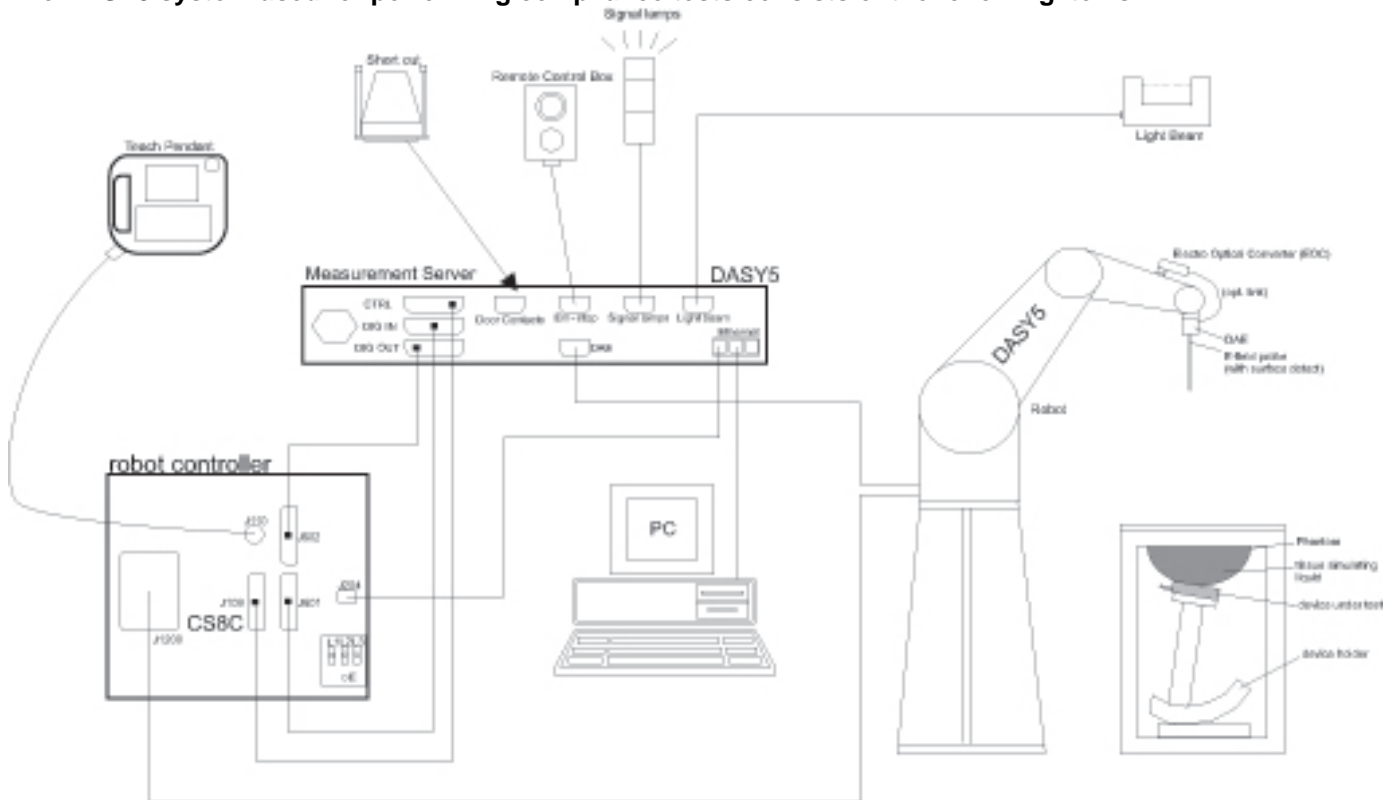
UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637.

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

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 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: Δx_{Area} , Δy_{Area}	≤ 2 GHz: ≤ 15 mm $2 - 3$ GHz: ≤ 12 mm	$3 - 4$ GHz: ≤ 12 mm $4 - 6$ GHz: ≤ 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

		≤ 3 GHz	> 3 GHz	
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}, \Delta y_{Zoom}$		≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm *	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*	
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm	
	graded grid	$\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm	
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. * When zoom scan is required and the <i>reported</i> SAR from the area scan based <i>1-g SAR estimation</i> procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

Step 5: Z-Scan (FCC only)

The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation the extrapolated distance should not be larger than the step size in Z-direction.

4.3. Test Equipment

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

Dielectric Property Measurements

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Network Analyzer	Agilent	E5071C	MY46522054	8-8-2018
Dielectric Assessment Kit	SPEAG	DAK-3.5	1196	8-2-2018
Dielectric Assessment Kit	SPEAG	DAK-3.5	1046	4-17-2019
Shorting block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	LKM	DTM3000	3424	8-11-2018
Thermometer	Lutron	MHB-382SD	AH.91478	8-10-2018

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
MXG Analog Signal Generator	Agilent	N5181A	MY50145882	8-7-2018
Power Sensor	Agilent	U2000A	MY54260010	8-8-2018
Power Sensor	Agilent	U2000A	MY54260007	8-8-2018
Power Amplifier	EXODUS	1410025-AMP2027-10003	10003	8-8-2018
Directional Coupler	Agilent	772D	MY52180193	8-7-2018
Directional Coupler	Agilent	778D	MY52180432	8-7-2018
Low Pass Filter	MICROLAB	LA-15N	03943	8-7-2018
Low Pass Filter	FILTRON	L14012FL	1410003S	8-7-2018
Low Pass Filter	MICROLAB	LA-60N	03942	8-7-2018
Attenuator	Agilent	8491B/003	MY39269292	8-7-2018
Attenuator	Agilent	8491B/010	MY39269315	8-7-2018
Attenuator	Agilent	8491B/020	MY39269298	8-7-2018
E-Field Probe (SAR1)	SPEAG	EX3DV4	7376	8-22-2018
E-Field Probe (SAR1)	SPEAG	EX3DV4	7330	1-22-2019
E-Field Probe (SAR2)	SPEAG	EX3DV4	7330	1-22-2019
E-Field Probe (SAR2)	SPEAG	EX3DV4	7313	2-20-2019
E-Field Probe (SAR3)	SPEAG	EX3DV4	7314	9-28-2018
Data Acquisition Electronics (SAR1)	SPEAG	DAE4	1468	8-22-2018
Data Acquisition Electronics (SAR2)	SPEAG	DAE4	1447	3-15-2019
Data Acquisition Electronics (SAR3)	SPEAG	DAE4	1494	7-20-2018
System Validation Dipole	SPEAG	D750V3	1122	2-19-2019
System Validation Dipole	SPEAG	D835V2	4d194	7-19-2018
System Validation Dipole	SPEAG	D1750V2	1125	2-16-2019
System Validation Dipole	SPEAG	D1900V2	5d190	9-20-2018
System Validation Dipole	SPEAG	D2450V2	939	9-19-2018
System Validation Dipole	SPEAG	D2600V2	1097	1-17-2019
System Validation Dipole	SPEAG	D5GHzV2	1209	2-15-2019
Thermometer (SAR1)	Lutron	MHB-382SD	AH.91463	8-10-2018
Thermometer (SAR2)	Lutron	MHB-382SD	AH.50215	2-9-2019
Thermometer (SAR3)	Lutron	MHB-382SD	AH.50213	8-16-2018

Others

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Base Station Simulator	R & S	CMW500	150313	12-08-2018
Base Station Simulator	R & S	CMW500	150314	12-05-2018
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	8-7-2018

5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be $\leq 30\%$, for a confidence interval of $k = 2$. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

6. Device Under Test (DUT) Information

6.1. DUT Description

Device Dimension	Overall (Length x Width): 206.6 mm x 126.7 mm Overall Diagonal: 234.0 mm Display Diagonal: 203.1 mm																																	
Back Cover	<input checked="" type="checkbox"/> The Back Cover is not removable.																																	
Battery Options	<input checked="" type="checkbox"/> The rechargeable battery is not user accessible.																																	
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 GHz, Ch.149, Ch.151)																																	
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 GHz, Ch.149)																																	
Test Sample Information	<table border="1"> <thead> <tr> <th>No.</th> <th>S/N</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>R32K400HHKP</td> <td>Main Conducted</td> </tr> <tr> <td>2</td> <td>R32K400HFNH</td> <td>Main Conducted</td> </tr> <tr> <td>3</td> <td>R32K500LRXW</td> <td>Main Conducted</td> </tr> <tr> <td>4</td> <td>R32K400HC9R</td> <td>Wi-Fi Conducted</td> </tr> <tr> <td>5</td> <td>R32K400HJ1M</td> <td>SAR</td> </tr> <tr> <td>6</td> <td>R32K400HGBT</td> <td>SAR</td> </tr> <tr> <td>7</td> <td>R32K400HGZE</td> <td>SAR</td> </tr> <tr> <td>8</td> <td>R32K500LY6E</td> <td>SAR</td> </tr> <tr> <td>9</td> <td>R32K400HC9R</td> <td>SAR</td> </tr> <tr> <td>10</td> <td>R32K500M1AY</td> <td>SAR</td> </tr> </tbody> </table>	No.	S/N	Notes	1	R32K400HHKP	Main Conducted	2	R32K400HFNH	Main Conducted	3	R32K500LRXW	Main Conducted	4	R32K400HC9R	Wi-Fi Conducted	5	R32K400HJ1M	SAR	6	R32K400HGBT	SAR	7	R32K400HGZE	SAR	8	R32K500LY6E	SAR	9	R32K400HC9R	SAR	10	R32K500M1AY	SAR
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6	R32K400HGBT	SAR																																
7	R32K400HGZE	SAR																																
8	R32K500LY6E	SAR																																
9	R32K400HC9R	SAR																																
10	R32K500M1AY	SAR																																

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 (Release.7) HSUPA (Release.6) HSPA+(Release 9)	100%
LTE	FDD Band 2 FDD Band 4 FDD Band 5 FDD Band 7 FDD Band 13	QPSK 16QAM Rel. 10 Carrier Aggregation (1 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)	99.7% (802.11b) 98.2% (802.11g) 98.1% (802.11n 20MHz BW)
	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40)	98.2% (802.11a) 98.1% (802.11n 20MHz BW) 96.1% (802.11n 40MHz BW)
	Does this device support bands 5.60 ~ 5.65 GHz? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
	Does this device support Band gap channel(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Bluetooth	2.4 GHz	Version 4.2 LE	76.9% (DH5)

Notes:

- The Bluetooth protocol is considered source-based averaging. Bluetooth GFSK (DH5) was verified to have the highest duty cycle of 76.9% and was considered and used for SAR Testing.
- Duty cycle for Wi-Fi is referenced from the DTS and UNII report.

6.3. Nominal and Maximum Output Power

KDB 447498 sec.4.1. 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

RF Air interface	Antenna	Mode	Max. RF Output Power (dBm)	Reduced. RF Output Power (dBm)
W-CDMA Band II	Ant.1	R99	24.5	11.0
		HSDPA	23.5	10.0
		HSUPA	23.5	9.0
W-CDMA Band V	Ant.1	R99	25.0	19.0
		HSDPA	24.5	18.5
		HSUPA	24.0	18.5

RF Air interface	Antenna	Mode	Max. RF Output Power (dBm)	Reduced. RF Output Power (dBm)
LTE Band 2	Ant.1	QPSK	24.5	13.0
LTE Band 4	Ant.1	QPSK	24.5	13.5
LTE Band 5	Ant.1	QPSK	25.2	16.0
LTE Band 7	Ant.2	QPSK	23.0	12.0
LTE Band 13	Ant.1	QPSK	25.0	16.0

RF Air interface	Mode	Max. RF Output Power (dBm)	Reduced. RF Output Power (dBm)
WiFi 2.4 GHz (Ch.1)	802.11b	21.0	14.0
	802.11g	14.0	14.0
	802.11n HT20	14.0	14.0
WiFi 2.4 GHz (Ch.2)	802.11b	21.0	14.0
	802.11g	18.0	14.0
	802.11n HT20	17.0	14.0
WiFi 2.4 GHz (Ch.3 - Ch.10)	802.11b	21.0	14.0
	802.11g	19.0	14.0
	802.11n HT20	18.0	14.0
WiFi 2.4 GHz (Ch.11)	802.11b	19.0	14.0
	802.11g	12.0	12.0
	802.11n HT20	12.0	12.0
WiFi 5.2 GHz (U-NII 1)	802.11a	17.0	10.0
	802.11n HT20	16.0	10.0
	802.11n HT40	12.0	10.0
WiFi 5.3 GHz (U-NII 2A)	802.11a	17.0	10.0
	802.11n HT20	16.0	10.0
	802.11n HT40	12.0	10.0
WiFi 5.5 GHz (U-NII 2C)	802.11a	15.0	10.0
	802.11n HT20	15.0	10.0
	802.11n HT40	11.0	10.0
WiFi 5.8 GHz (U-NII 3)	802.11a	17.0	10.0
	802.11n HT20	16.0	10.0
	802.11n HT40	12.0	10.0
Bluetooth		10.0	
Bluetooth LE		7.0	

Notes:

1. LTE QPSK configuration has the highest maximum average output power per 3GPP standard.

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 7	Frequency range: 2500 - 2570 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	20850 2510	20825 2507.5	20800 2505	20775 2502.5		
	Mid	21100 2535	21100 2535	21100 2535	21100 2535		
	High	21350 2560	21375 2562.5	21400 2565	21425 2567.5		
	Band 13	Frequency range: 777 - 787 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
Low				23205/ 779.5			
Mid			23230/ 782	23230/ 782			
High				23255/ 784.5			

General LTE SAR Test and Reporting Considerations (Continued)

Item	Description																																																														
LTE transmitter and antenna implementation	Refer to Appendix A.																																																														
Maximum power reduction (MPR)	<p align="center">Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3</p> <table border="1"> <thead> <tr> <th rowspan="2">Modulation</th> <th colspan="6">Channel bandwidth / Transmission bandwidth (N_{RB})</th> <th rowspan="2">MPR (dB)</th> </tr> <tr> <th>1.4 MHz</th> <th>3.0 MHz</th> <th>5 MHz</th> <th>10 MHz</th> <th>15 MHz</th> <th>20 MHz</th> </tr> </thead> <tbody> <tr> <td>QPSK</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 3</td> </tr> <tr> <td>256 QAM</td> <td colspan="6" style="text-align: center;">≥ 1</td> <td>≤ 5</td> </tr> </tbody> </table> <p>MPR Built-in by design The manufacturer MPR values are always within the 3GPP maximum MPR allowance but may not follow the default MPR values. A-MPR (additional MPR) was disabled during SAR testing</p>	Modulation	Channel bandwidth / Transmission bandwidth (N _{RB})						MPR (dB)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1	16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2	64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2	64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3	256 QAM	≥ 1						≤ 5
Modulation	Channel bandwidth / Transmission bandwidth (N _{RB})						MPR (dB)																																																								
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz																																																									
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1																																																								
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1																																																								
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2																																																								
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2																																																								
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3																																																								
256 QAM	≥ 1						≤ 5																																																								
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.																																																														

Note(s):

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

6.5. LTE Carrier Aggregation

DL Inter-Bnad (2CC max)

E-UTRA CA configuration (BCS)	E-UTRA Band	Bandwidth						Max Aggregated BW	Reverse Y/N
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz		
CA_2A-4A (1)	Band 2			Yes	Yes			20 MHz	Y
	Band 4			Yes	Yes				
CA_2A-5A (1)	Band 2			Yes	Yes			20 MHz	Y
	Band 5			Yes	Yes				
CA_2A-13A (1)	Band 2			Yes	Yes			20 MHz	Y
	Band 13				Yes				
CA_4A-5A (0)	Band 4			Yes	Yes			20 MHz	Y
	Band 5			Yes	Yes				
CA_4A-13A (1)	Band 4			Yes	Yes			20 MHz	Y
	Band 13				Yes				

DL Intra-Band Non-Contiguous

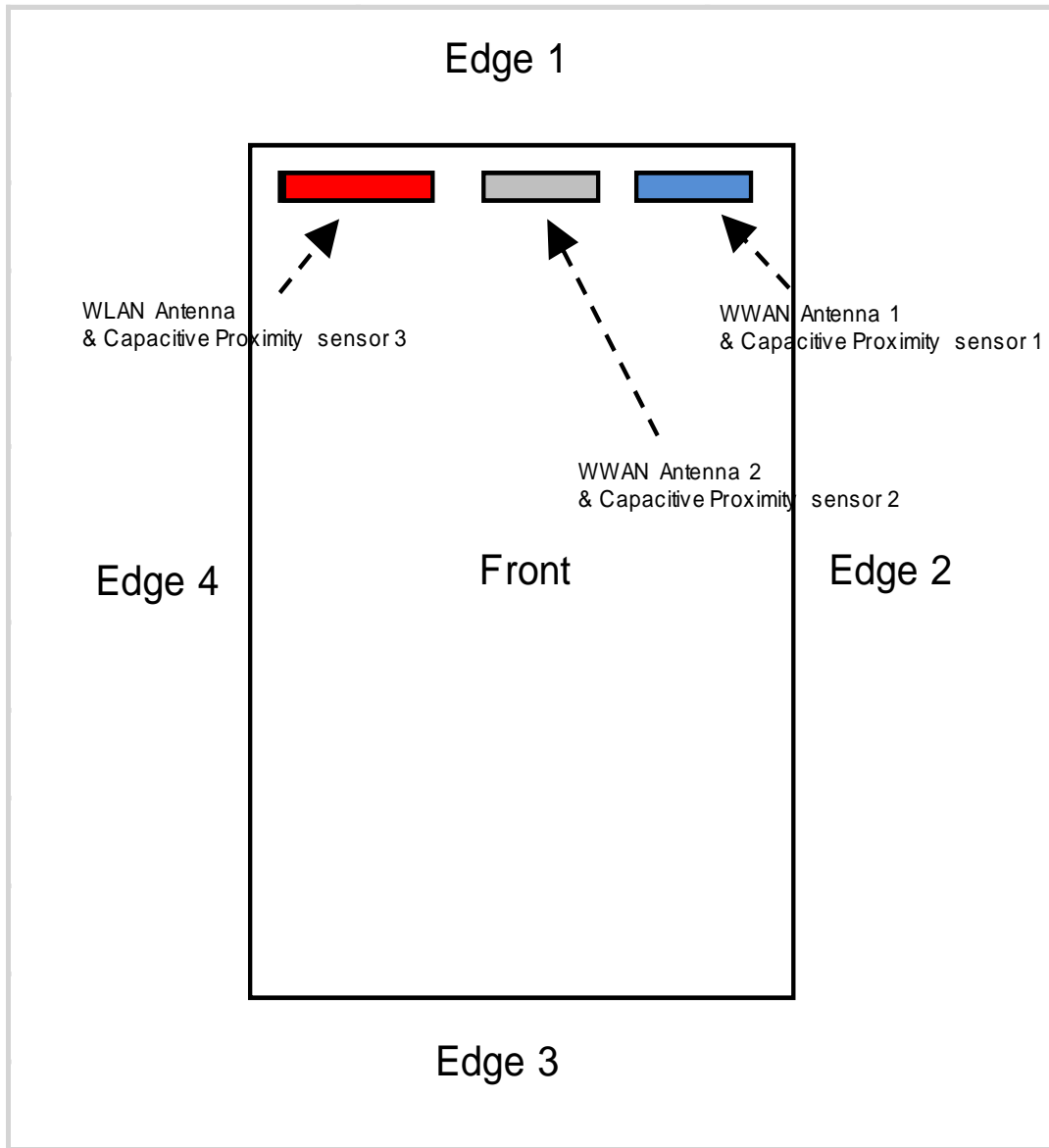
E-UTRA CA configuration (BCS)	E-UTRA Band	Allowed Channel BW Per Carrier (MHz)			Max Aggregated BW
		1st Carrier	2nd Carrier	3rd Carrier	
CA_4A-4A (1)	Band 4	5, 10	5, 10		20MHz

Note(s):

For supported channels, please refer to §6.4

6.6 Proximity sensor feature

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

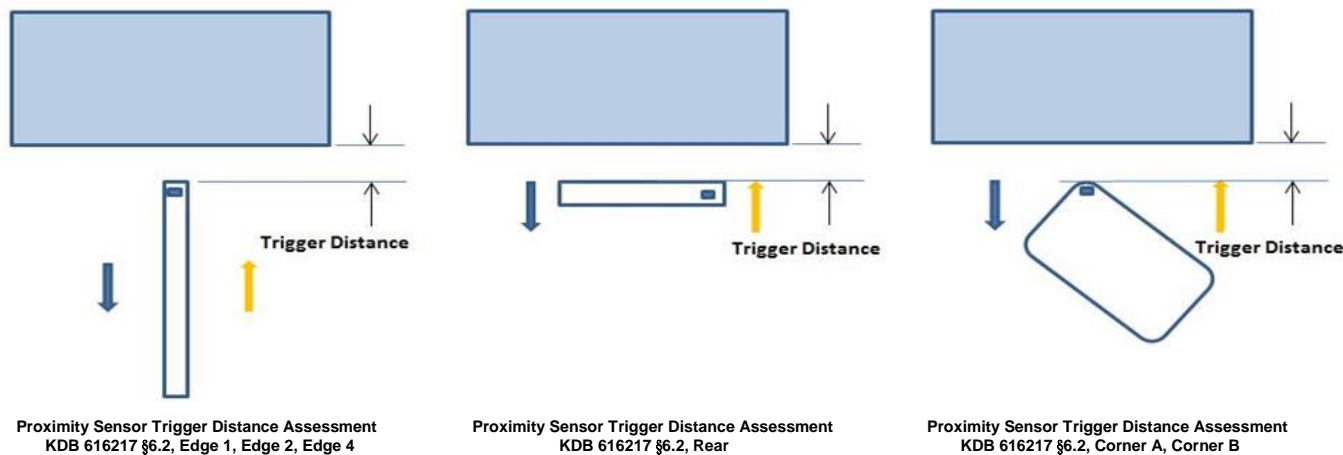


6.6.1 Proximity Sensor Triggering Distance (KDB 616217 §6.2)

Rear, Edge 1, Edge 2, Edge 4, Corner A (Side of between Edge 1 and Edge 2), Corner B (Side of between Edge 1 and Edge 4) 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 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

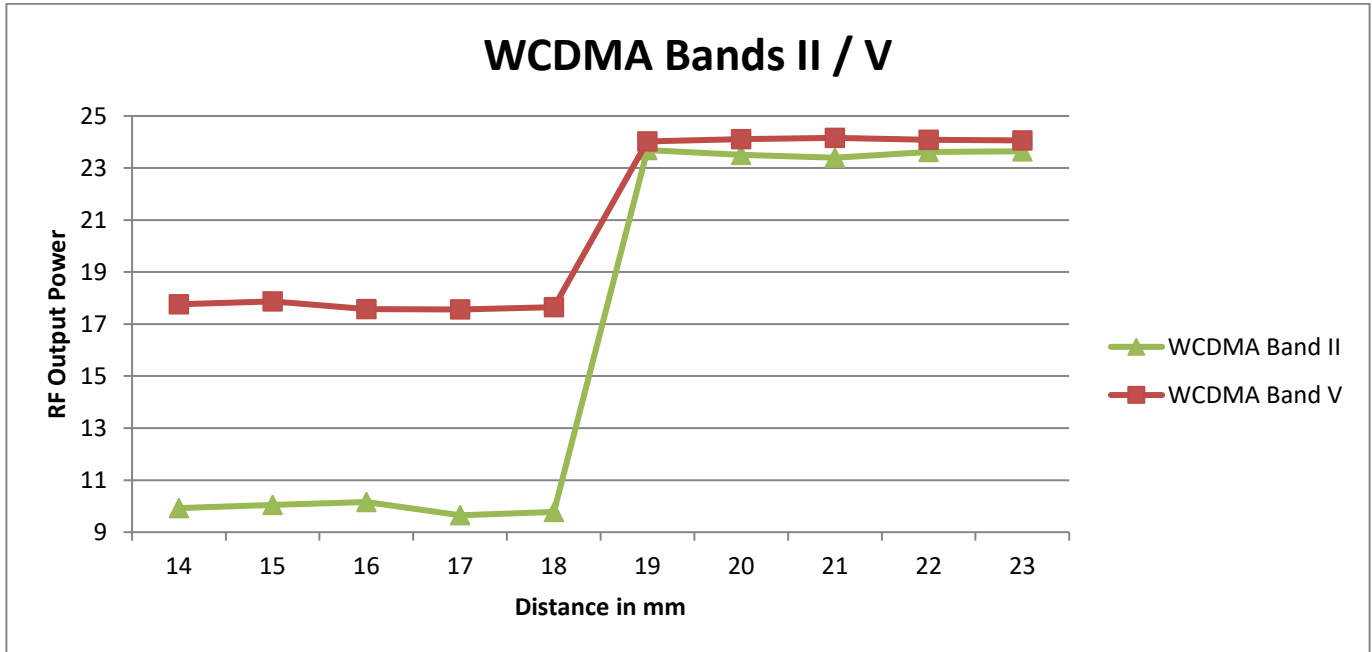
Antenna	Tissue simulating liquid	Trigger distance - Rear		Trigger distance - Edge 1		Trigger distance - Edge 2		Trigger distance - Edge 4		Trigger distance - Corner A		Trigger distance - Corner B	
		Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom
WWAN Ant.1	750 muscle	18 mm	18 mm	14 mm	14 mm	6 mm	6 mm	N/A	N/A	11 mm	11 mm	N/A	N/A
	850 muscle	18 mm	18 mm	14 mm	14 mm	6 mm	6 mm	N/A	N/A	11 mm	11 mm	N/A	N/A
	1750 muscle	18 mm	18 mm	14 mm	14 mm	6 mm	6 mm	N/A	N/A	11 mm	11 mm	N/A	N/A
	1900 muscle	18 mm	18 mm	14 mm	14 mm	6 mm	6 mm	N/A	N/A	11 mm	11 mm	N/A	N/A
WWAN Ant.2	2600 muscle	15 mm	15 mm	11 mm	11 mm	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WLAN Ant.	2450 muscle	12 mm	12 mm	9 mm	9 mm	N/A	N/A	7 mm	7 mm	N/A	N/A	7 mm	7 mm
	5000 muscle	12 mm	12 mm	9 mm	9 mm	N/A	N/A	7 mm	7 mm	N/A	N/A	7 mm	7 mm

Proximity Sensor Triggering Distance Measurement Results

WCDMA Band II/V

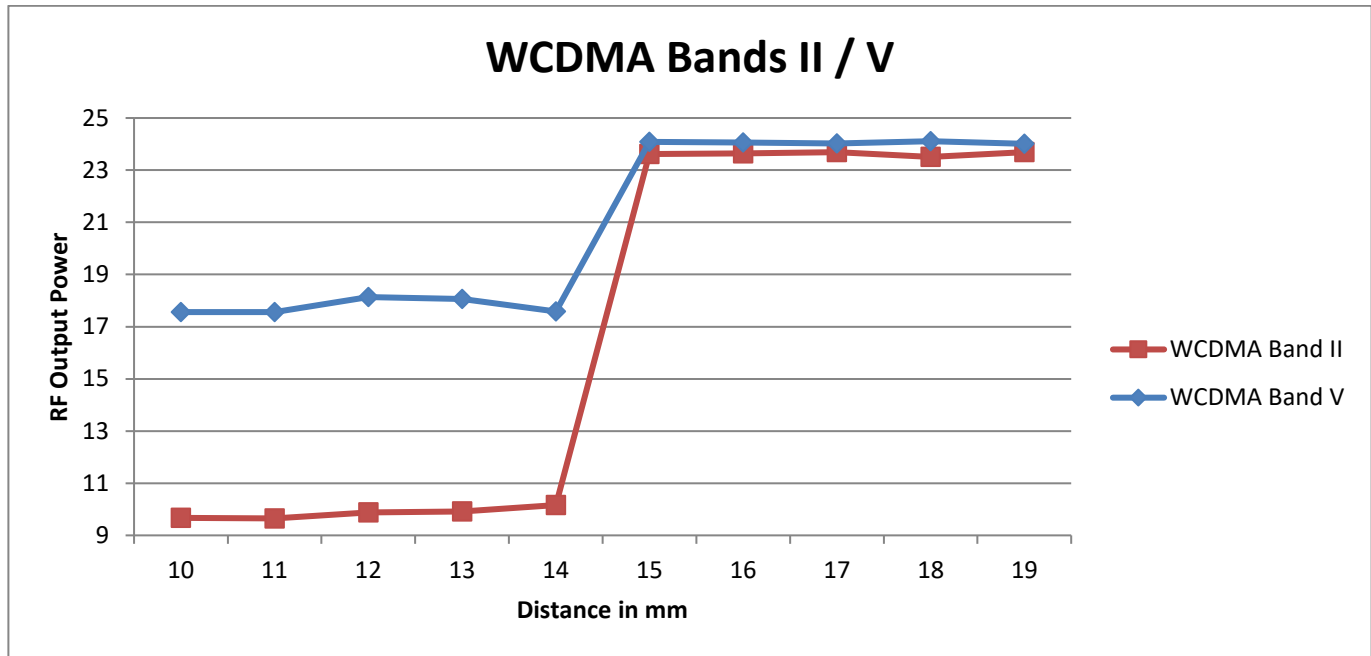
Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	14	15	16	17	18	19	20	21	22	23
WCDMA Band II	9.9	10.1	10.2	9.7	9.8	23.7	23.5	23.4	23.6	23.6
WCDMA Band V	17.8	17.9	17.6	17.6	17.7	24.0	24.1	24.2	24.1	24.1



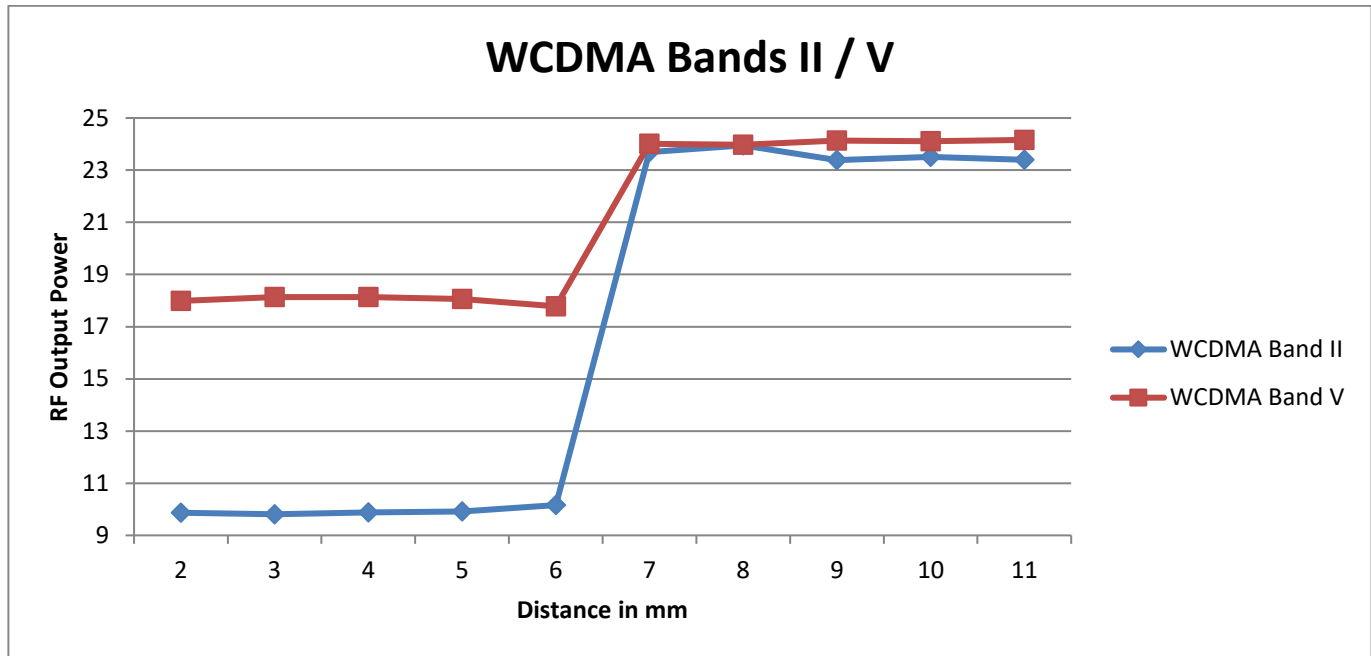
Edge 1, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	10	11	12	13	14	15	16	17	18	19
WCDMA Band II	9.7	9.7	9.9	9.9	10.2	23.6	23.6	23.7	23.5	23.7
WCDMA Band V	17.6	17.6	18.1	18.1	17.6	24.1	24.1	24.0	24.1	24.0



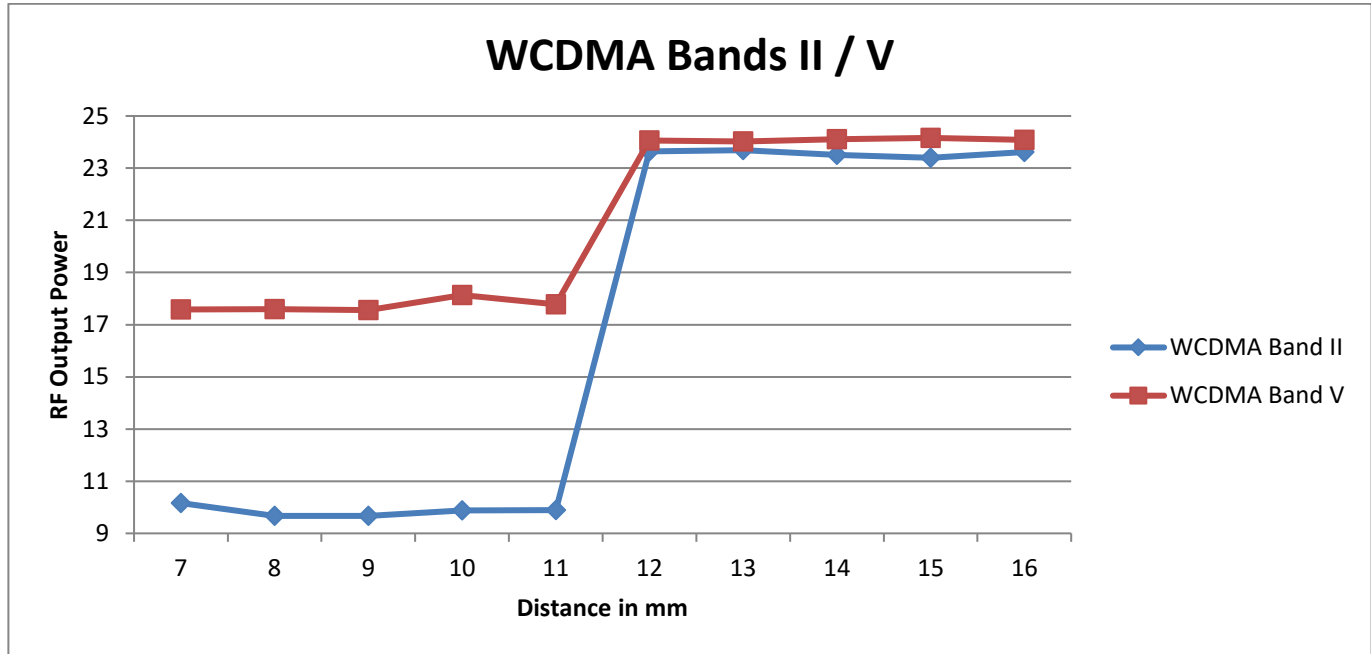
Edge 2, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	2	3	4	5	6	7	8	9	10	11
WCDMA Band II	9.9	9.8	9.9	9.9	10.2	23.7	24.0	23.4	23.5	23.4
WCDMA Band V	18.0	18.1	18.1	18.1	17.8	24.0	24.0	24.1	24.1	24.2



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

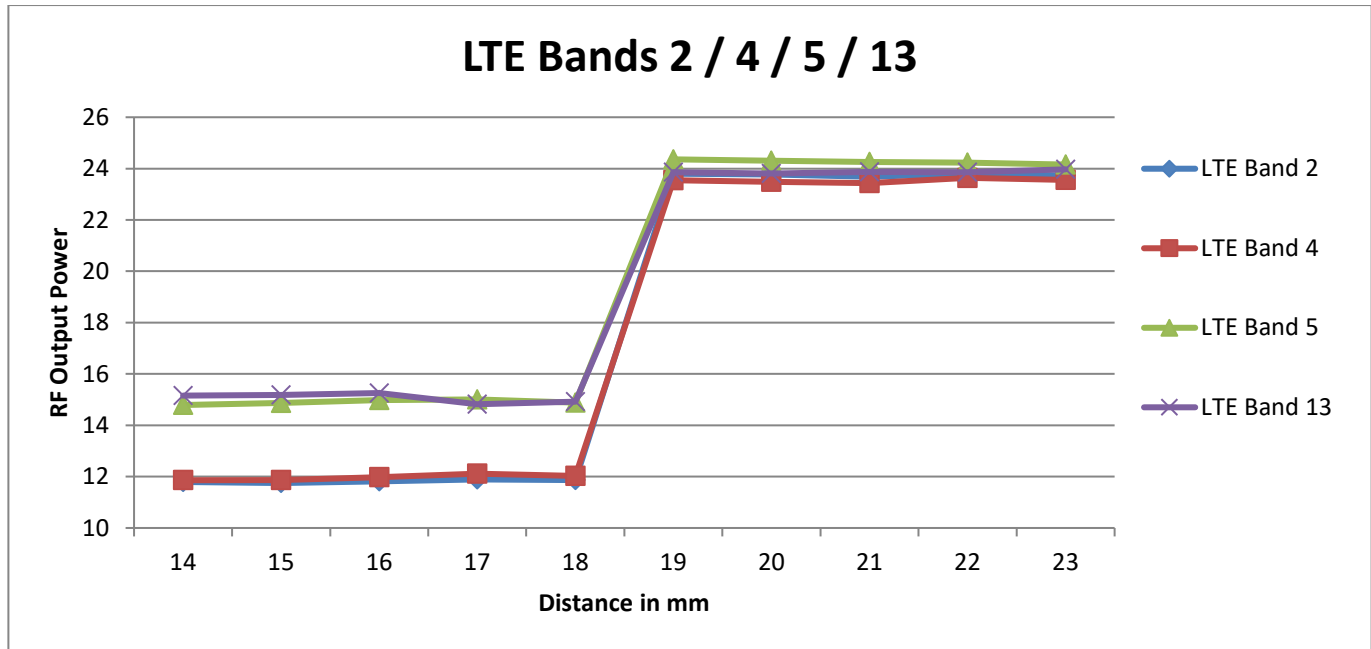
Distance to DUT vs. Output Power in dBm										
Distance (mm)	7	8	9	10	11	12	13	14	15	16
WCDMA Band II	10.2	9.7	9.7	9.9	9.9	23.6	23.7	23.5	23.4	23.6
WCDMA Band V	17.6	17.6	17.6	18.1	17.8	24.1	24.0	24.1	24.2	24.1



LTE Band 2/ 4/ 5/ 13

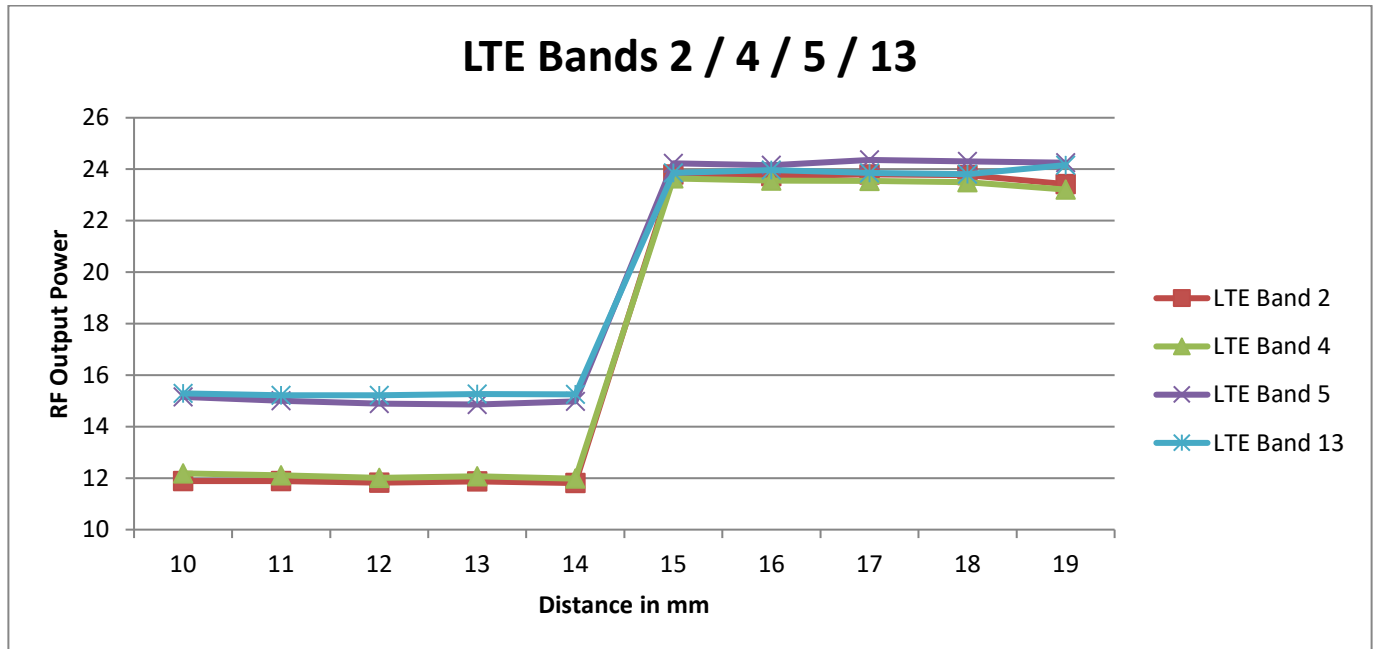
Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	14	15	16	17	18	19	20	21	22	23
LTE Band 2	11.8	11.8	11.8	11.9	11.9	23.8	23.8	23.7	23.8	23.7
LTE Band 4	11.9	11.9	12.0	12.1	12.0	23.6	23.5	23.4	23.6	23.6
LTE Band 5	14.8	14.9	15.0	15.0	14.9	24.4	24.3	24.3	24.2	24.2
LTE Band 13	15.2	15.2	15.3	14.8	14.9	23.9	23.8	23.9	23.9	24.0



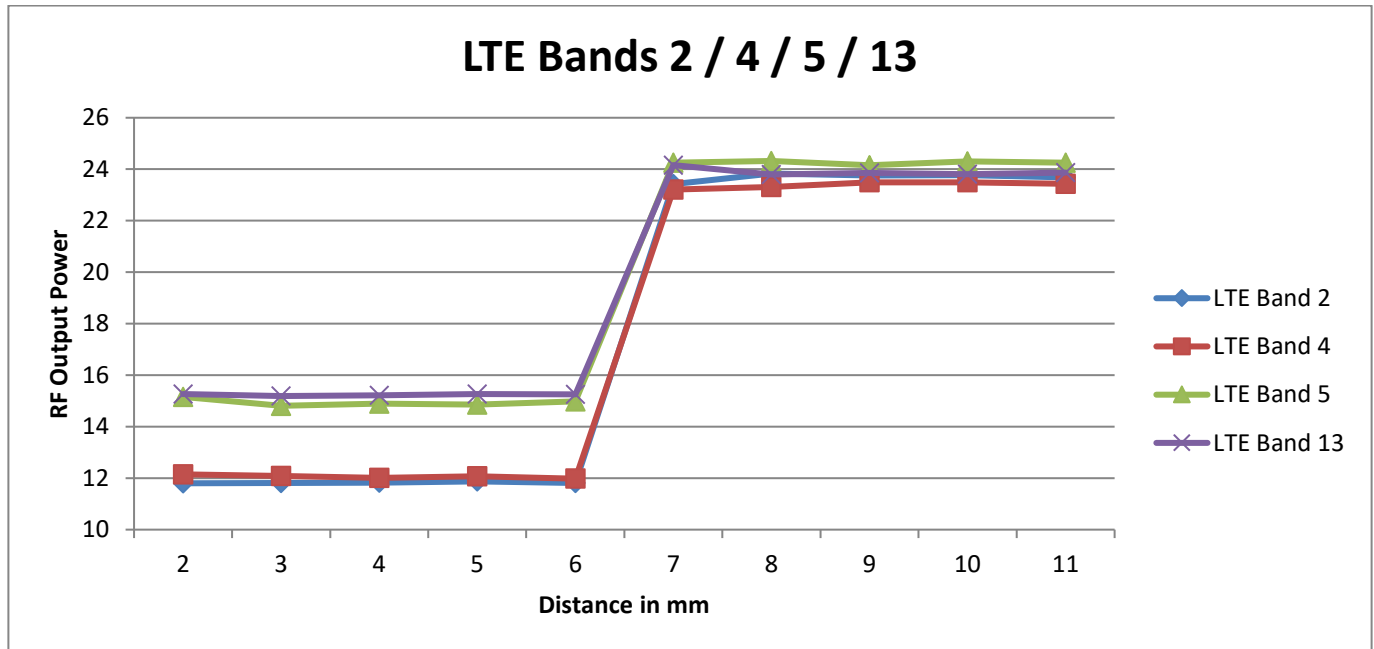
Edge 1, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	10	11	12	13	14	15	16	17	18	19
LTE Band 2	11.9	11.9	11.8	11.9	11.8	23.8	23.7	23.8	23.8	23.4
LTE Band 4	12.2	12.1	12.0	12.1	12.0	23.6	23.6	23.6	23.5	23.2
LTE Band 5	15.2	15.0	14.9	14.9	15.0	24.2	24.2	24.4	24.3	24.3
LTE Band 13	15.3	15.2	15.2	15.3	15.3	23.9	24.0	23.9	23.8	24.2



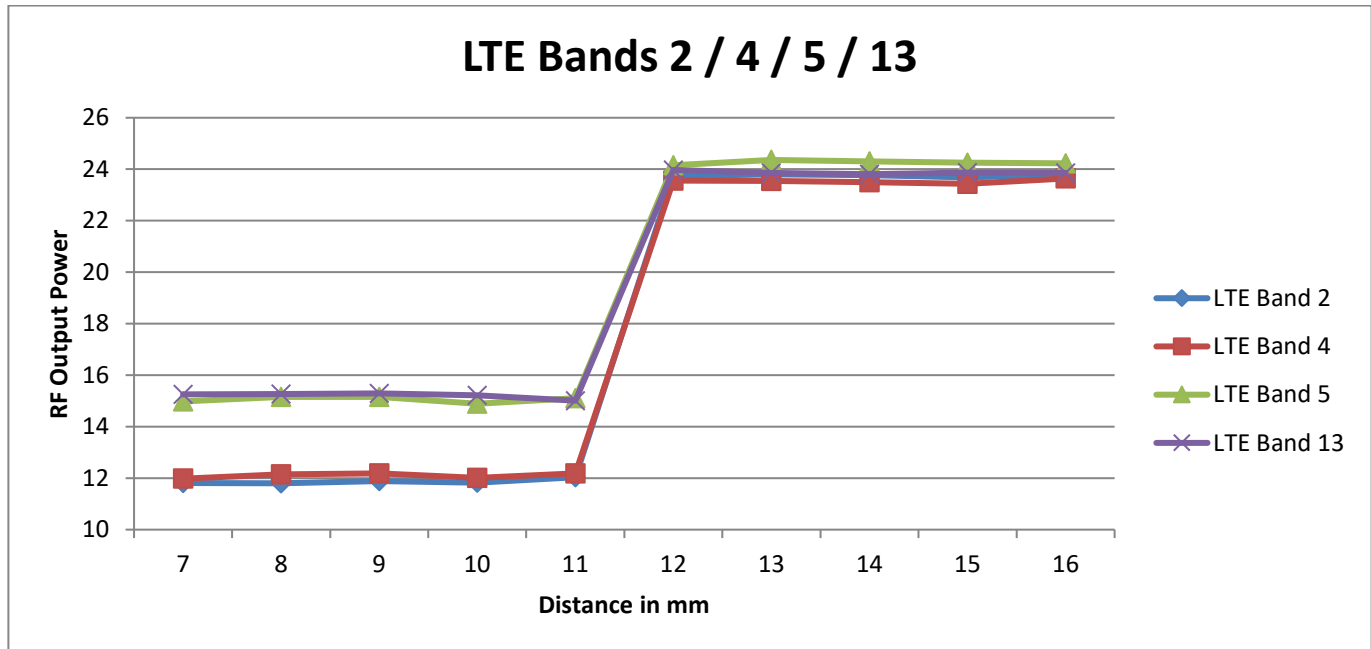
Edge 2, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	2	3	4	5	6	7	8	9	10	11
LTE Band 2	11.8	11.8	11.8	11.9	11.8	23.4	23.8	23.8	23.8	23.7
LTE Band 4	12.2	12.1	12.0	12.1	12.0	23.2	23.3	23.5	23.5	23.4
LTE Band 5	15.2	14.8	14.9	14.9	15.0	24.3	24.3	24.2	24.3	24.3
LTE Band 13	15.3	15.2	15.2	15.3	15.3	24.2	23.8	23.9	23.8	23.9



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

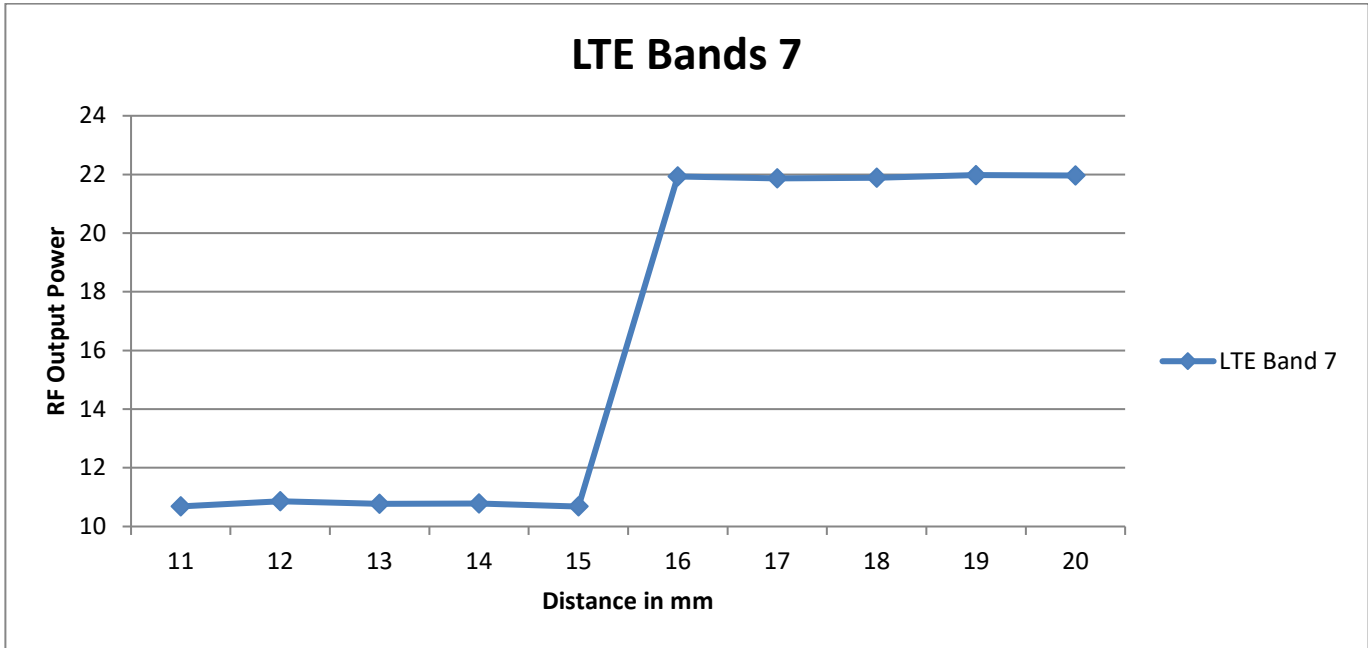
Distance to DUT vs. Output Power in dBm										
Distance (mm)	7	8	9	10	11	12	13	14	15	16
LTE Band 2	11.8	11.8	11.9	11.8	12.0	23.7	23.8	23.8	23.7	23.8
LTE Band 4	12.0	12.2	12.2	12.0	12.2	23.6	23.6	23.5	23.4	23.6
LTE Band 5	15.0	15.2	15.2	14.9	15.1	24.2	24.4	24.3	24.3	24.2
LTE Band 13	15.3	15.3	15.3	15.2	15.0	24.0	23.9	23.8	23.9	23.9



LTE Band 7

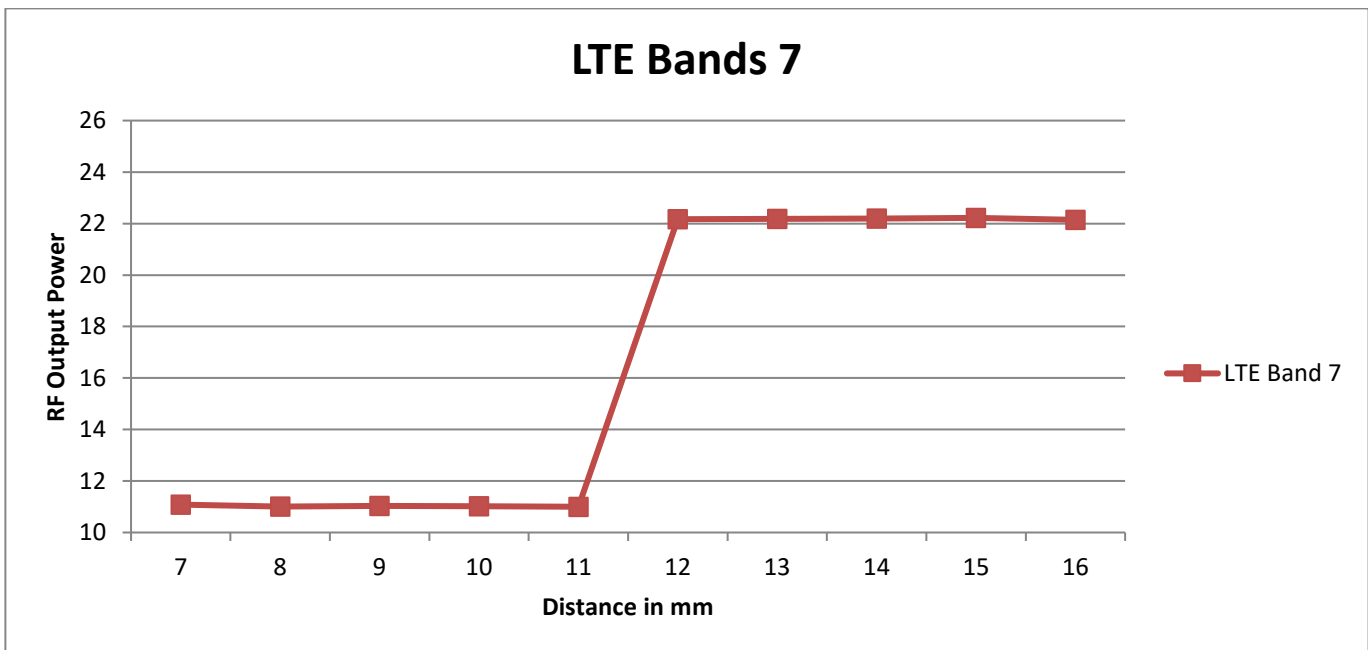
Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	11	12	13	14	15	16	17	18	19	20
LTE Band 7	10.7	10.9	10.8	10.8	10.7	21.9	21.9	21.9	22.0	22.0



Edge 1, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

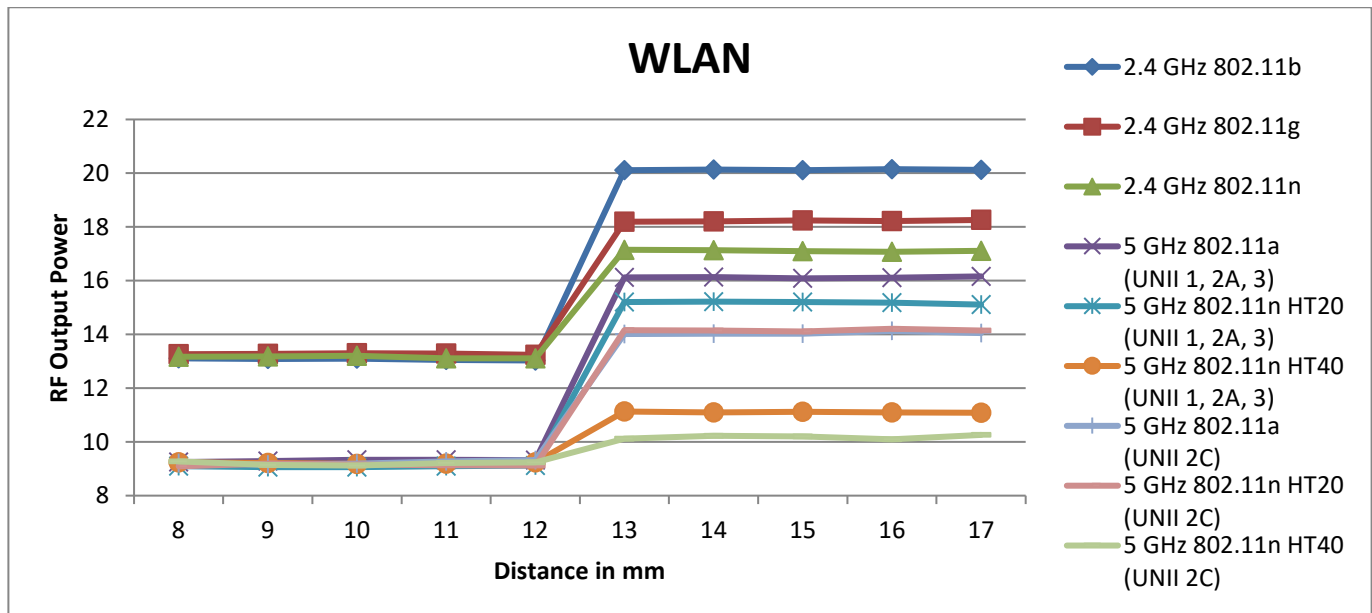
Distance to DUT vs. Output Power in dBm										
Distance (mm)	7	8	9	10	11	12	13	14	15	16
LTE Band 7	11.1	11.0	11.0	11.0	11.0	22.2	22.2	22.2	22.2	22.1



WLAN 2.4GHz and 5GHz

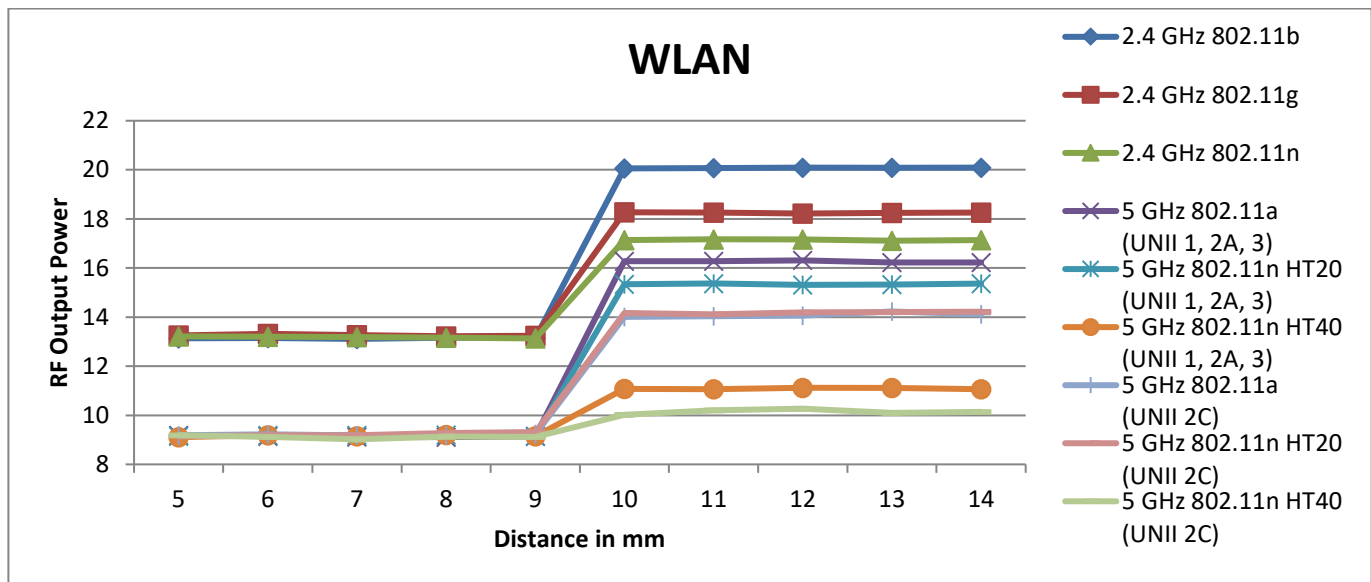
Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance	8	9	10	11	12	13	14	15	16	17
2.4 GHz 802.11b	13.1	13.1	13.1	13.1	13.0	20.1	20.1	20.1	20.2	20.1
2.4 GHz 802.11g	13.3	13.3	13.3	13.3	13.2	18.2	18.2	18.2	18.2	18.3
2.4 GHz 802.11n	13.2	13.2	13.2	13.1	13.1	17.2	17.1	17.1	17.1	17.1
5 GHz 802.11a (UNII 1, 2A, 3)	9.3	9.3	9.3	9.3	9.3	16.1	16.1	16.1	16.1	16.2
5 GHz 802.11n HT20 (UNII 1, 2A, 3)	9.1	9.1	9.1	9.1	9.1	15.2	15.2	15.2	15.2	15.1
5 GHz 802.11n HT40 (UNII 1, 2A, 3)	9.2	9.2	9.2	9.2	9.2	11.1	11.1	11.1	11.1	11.1
5 GHz 802.11a (UNII 2C)	9.2	9.2	9.2	9.3	9.3	14.0	14.0	14.0	14.1	14.1
5 GHz 802.11n HT20 (UNII 2C)	9.1	9.2	9.2	9.1	9.1	14.2	14.2	14.1	14.2	14.2
5 GHz 802.11n HT40 (UNII 2C)	9.3	9.1	9.1	9.2	9.2	10.1	10.2	10.2	10.1	10.3



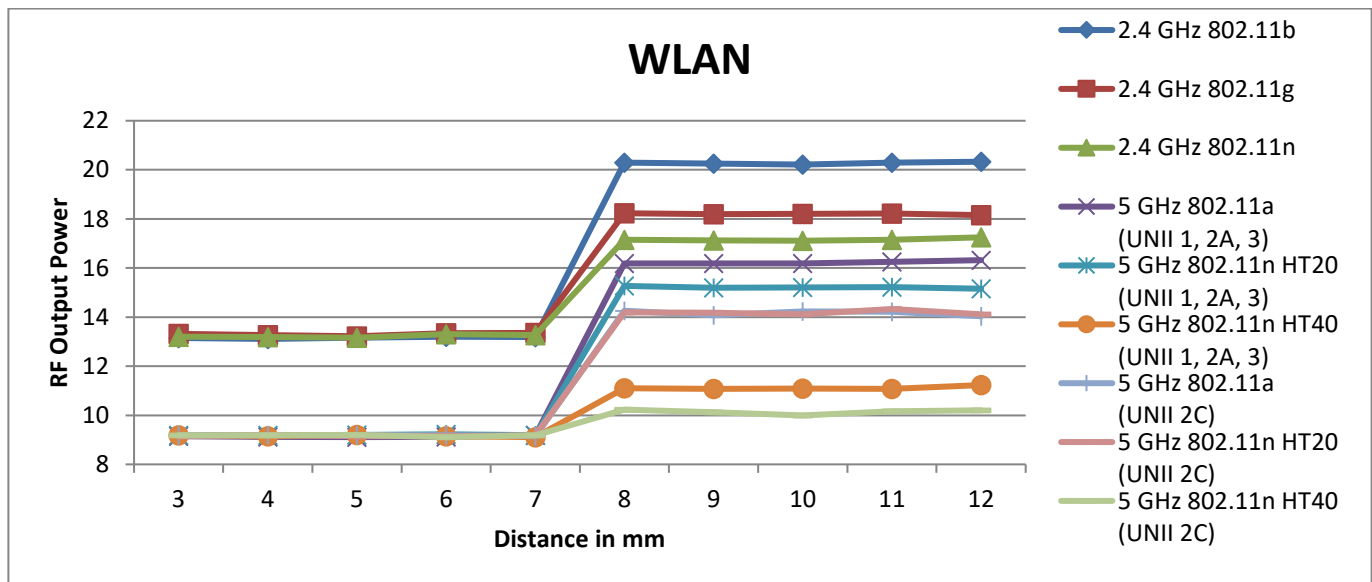
Edge 1, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	5	6	7	8	9	10	11	12	13	14
2.4 GHz 802.11b	13.1	13.2	13.1	13.2	13.2	20.1	20.1	20.1	20.1	20.1
2.4 GHz 802.11g	13.3	13.3	13.3	13.2	13.2	18.3	18.3	18.2	18.3	18.3
2.4 GHz 802.11n	13.2	13.2	13.2	13.2	13.1	17.1	17.2	17.2	17.1	17.1
5 GHz 802.11a (UNII 1, 2A, 3)	9.2	9.2	9.1	9.1	9.2	16.3	16.3	16.3	16.2	16.2
5 GHz 802.11n HT20 (UNII 1, 2A, 3)	9.2	9.2	9.2	9.2	9.1	15.3	15.4	15.3	15.3	15.4
5 GHz 802.11n HT40 (UNII 1, 2A, 3)	9.1	9.2	9.2	9.2	9.2	11.1	11.1	11.1	11.1	11.1
5 GHz 802.11a (UNII 2C)	9.2	9.2	9.2	9.2	9.2	14.0	14.0	14.1	14.2	14.1
5 GHz 802.11n HT20 (UNII 2C)	9.2	9.2	9.2	9.3	9.3	14.2	14.1	14.2	14.2	14.2
5 GHz 802.11n HT40 (UNII 2C)	9.2	9.1	9.0	9.1	9.1	10.0	10.2	10.3	10.1	10.1



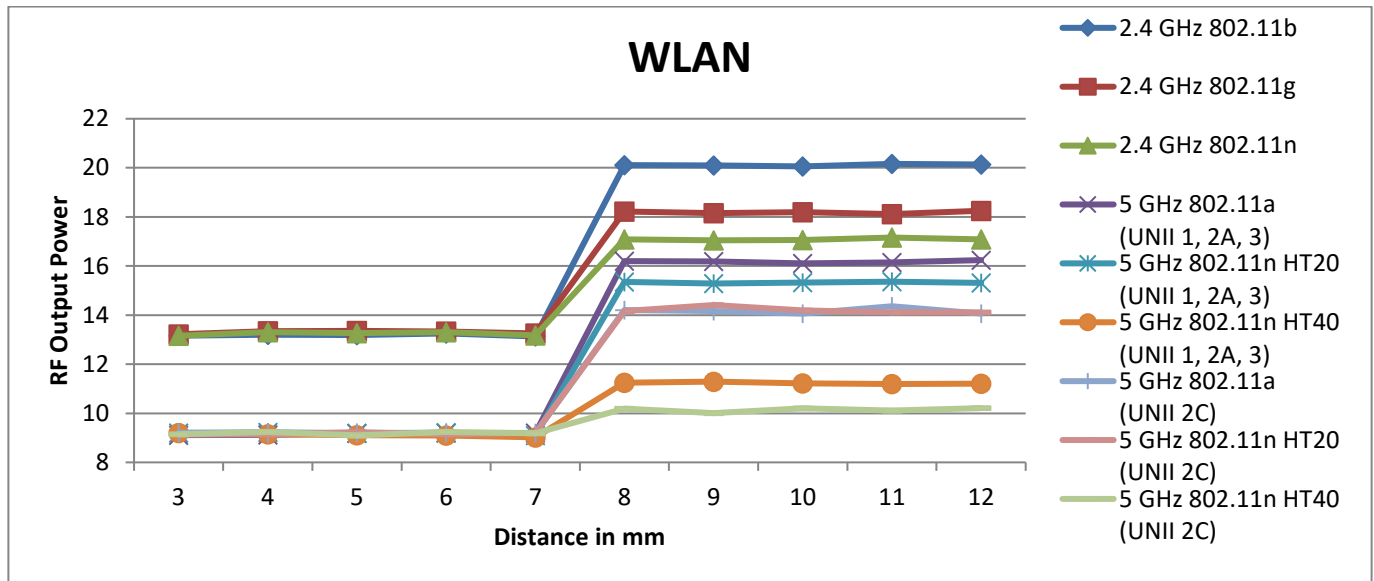
Edge 4, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	3	4	5	6	7	8	9	10	11	12
2.4 GHz 802.11b	13.2	13.1	13.2	13.2	13.2	20.3	20.3	20.2	20.3	20.3
2.4 GHz 802.11g	13.3	13.3	13.2	13.3	13.4	18.2	18.2	18.2	18.2	18.2
2.4 GHz 802.11n	13.2	13.2	13.2	13.3	13.3	17.2	17.1	17.1	17.2	17.3
5 GHz 802.11a (UNII 1, 2A, 3)	9.2	9.1	9.1	9.1	9.2	16.2	16.2	16.2	16.3	16.3
5 GHz 802.11n HT20 (UNII 1, 2A, 3)	9.2	9.2	9.2	9.2	9.2	15.3	15.2	15.2	15.2	15.2
5 GHz 802.11n HT40 (UNII 1, 2A, 3)	9.2	9.2	9.2	9.2	9.1	11.1	11.1	11.1	11.1	11.2
5 GHz 802.11a (UNII 2C)	9.2	9.2	9.2	9.2	9.2	14.3	14.1	14.2	14.2	14.0
5 GHz 802.11n HT20 (UNII 2C)	9.2	9.2	9.2	9.2	9.2	14.2	14.2	14.1	14.3	14.1
5 GHz 802.11n HT40 (UNII 2C)	9.2	9.2	9.2	9.1	9.2	10.2	10.1	10.0	10.2	10.2



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

Distance to DUT vs. Output Power in dBm										
Distance (mm)	3	4	5	6	7	8	9	10	11	12
2.4 GHz 802.11b	13.2	13.2	13.2	13.3	13.1	20.1	20.1	20.1	20.2	20.1
2.4 GHz 802.11g	13.2	13.3	13.4	13.3	13.3	18.2	18.2	18.2	18.1	18.3
2.4 GHz 802.11n	13.2	13.3	13.3	13.3	13.2	17.1	17.1	17.1	17.2	17.1
5 GHz 802.11a (UNII 1, 2A, 3)	9.1	9.1	9.2	9.2	9.2	16.2	16.2	16.1	16.2	16.2
5 GHz 802.11n HT20 (UNII 1, 2A, 3)	9.2	9.2	9.2	9.2	9.1	15.4	15.3	15.3	15.4	15.3
5 GHz 802.11n HT40 (UNII 1, 2A, 3)	9.2	9.2	9.1	9.1	9.0	11.3	11.3	11.2	11.2	11.2
5 GHz 802.11a (UNII 2C)	9.2	9.2	9.2	9.2	9.2	14.2	14.2	14.1	14.4	14.1
5 GHz 802.11n HT20 (UNII 2C)	9.1	9.2	9.2	9.2	9.2	14.2	14.4	14.2	14.1	14.1
5 GHz 802.11n HT40 (UNII 2C)	9.2	9.2	9.1	9.2	9.2	10.2	10.0	10.2	10.1	10.2



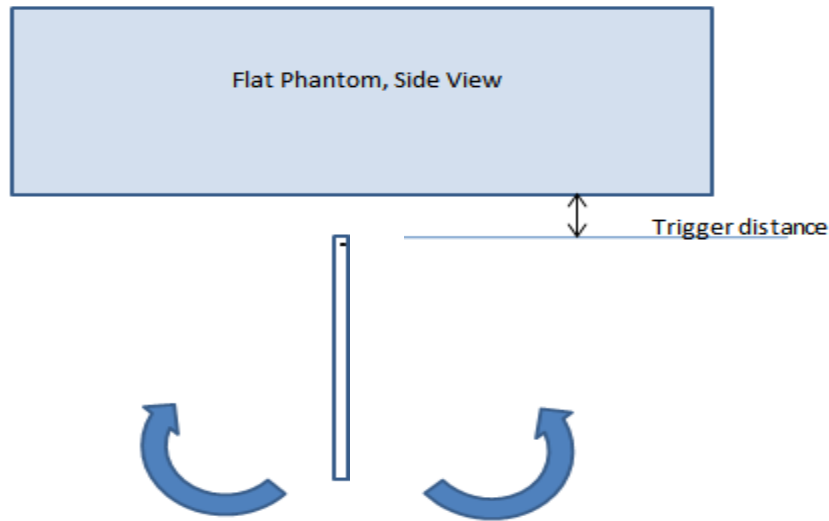
6.6.2 Proximity Sensor Coverage (KDB 616217 §6.3)

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

6.6.3 Proximity Sensor Tilt Angle Assessment (KDB 616217 §6.4)

The DUT was positioned directly below the flat phantom at the minimum measured trigger distance with Edge 1, Edge 2, Edge 4 parallel to the base of the flat phantom for each band.

The EUT was rotated about Edge 1, Edge 2, Edge 4 for angles up to +/- 45°. If the output power increased during the rotation the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up to +/- 45°.



Proximity sensor tilt angle assessment (Edge 1, Edge 2, Edge 4) KDB 616217 §6.4

Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering (Edge 1)

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	14 mm	14 mm	On	On	On	On	On	On	On	On	On	On	On
850	14 mm	14 mm	On	On	On	On	On	On	On	On	On	On	On
1750	14 mm	14 mm	On	On	On	On	On	On	On	On	On	On	On
1900	14 mm	14 mm	On	On	On	On	On	On	On	On	On	On	On
2450	9 mm	9 mm	On	On	On	On	On	On	On	On	On	On	On
2600	11 mm	11 mm	On	On	On	On	On	On	On	On	On	On	On
5000	9 mm	9 mm	On	On	On	On	On	On	On	On	On	On	On

Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering (Edge 2)

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	6 mm	6 mm	On	On	On	On	On	On	On	On	On	On	On
850	6 mm	6 mm	On	On	On	On	On	On	On	On	On	On	On
1750	6 mm	6 mm	On	On	On	On	On	On	On	On	On	On	On
1900	6 mm	6 mm	On	On	On	On	On	On	On	On	On	On	On

Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering (Edge 4)

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°
2450	7 mm	7 mm	On	On	On	On	On	On	On	On	On	On	On
5000	7 mm	7 mm	On	On	On	On	On	On	On	On	On	On	On

6.6.4 Resulting test positions for SAR measurements

Wireless technologies	Position	§6.6.1 Triggering Distance	§6.6.2 Coverage	§6.6.3 Tilt Angle	Worst case distance for SAR
WWAN (Ant.1)	Rear	18 mm	N/A	N/A	17 mm
	Edge 1	14 mm	N/A	14 mm	13 mm
	Edge 2	6 mm	N/A	6 mm	5 mm
	Corner A	11 mm	N/A	N/A	10 mm
WWAN (Ant.2)	Rear	15 mm	N/A	N/A	14 mm
	Edge 1	11 mm	N/A	11 mm	10 mm
WLAN	Rear	12 mm	N/A	N/A	11 mm
	Edge 1	9 mm	N/A	9 mm	8 mm
	Edge 4	7 mm	N/A	7 mm	6 mm
	Corner B	7 mm	N/A	N/A	6 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 ≤ 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
Full Power, Proximity Sensor Off																
Cellular	W-CDMA II	1907.6	24.50	282	0	2	2	185	82		77.9	77.9	77.9	> 50 mm	> 50 mm	
Cellular	W-CDMA V	846.6	25.00	316	0	2	2	185	82		58.2	58.2	58.2	> 50 mm	> 50 mm	
Cellular	LTE Band 2	1900	24.50	282	0	2	2	185	82		77.7	77.7	77.7	> 50 mm	> 50 mm	
Cellular	LTE Band 4	1732.5	24.50	282	0	2	2	185	82		74.2	74.2	74.2	> 50 mm	> 50 mm	
Cellular	LTE Band 5	836.5	25.20	331	0	2	2	185	82		60.5	60.5	60.5	> 50 mm	> 50 mm	
Cellular	LTE Band 7	2560	23.00	200	0	2	48	185	59		64	64	6.7	> 50 mm	> 50 mm	
Cellular	LTE Band 13	782	25.00	316	0	2	2	185	82		55.9	55.9	55.9	> 50 mm	> 50 mm	
Power Back-off, Proximity Sensor On																
Cellular	W-CDMA II	1907.6	11.00	13	0	2	2				3.6	3.6	3.6			
Cellular	W-CDMA V	846.6	19.00	79	0	2	2				14.5	14.5	14.5			
Cellular	LTE Band 2	1900	13.00	20	0	2	2				5.5	5.5	5.5			
Cellular	LTE Band 4	1732.5	13.50	22	0	2	2				5.8	5.8	5.8			
Cellular	LTE Band 5	836.5	16.00	40	0	2	2				7.3	7.3	7.3			
Cellular	LTE Band 7	2560	12.00	16	0	2					5.1	5.1				
Cellular	LTE Band 13	782	16.00	40	0	2	2				7.1	7.1	7.1			

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
Full Power, Proximity Sensor Off																
Cellular	W-CDMA II	1907.6	24.50	282	0	2	2	185	82		< 50 mm	< 50 mm	< 50 mm	1458.6 mW -EXEMPT-	428.6 mW -EXEMPT-	
Cellular	W-CDMA V	846.6	25.00	316	0	2	2	185	82		< 50 mm	< 50 mm	< 50 mm	925 mW -EXEMPT-	343.6 mW -EXEMPT-	
Cellular	LTE Band 2	1900	24.50	282	0	2	2	185	82		< 50 mm	< 50 mm	< 50 mm	1458.8 mW -EXEMPT-	428.8 mW -EXEMPT-	
Cellular	LTE Band 4	1732.5	24.50	282	0	2	2	185	82		< 50 mm	< 50 mm	< 50 mm	1464 mW -EXEMPT-	434 mW -EXEMPT-	
Cellular	LTE Band 5	836.5	25.20	331	0	2	2	185	82		< 50 mm	< 50 mm	< 50 mm	916.9 mW -EXEMPT-	342.5 mW -EXEMPT-	
Cellular	LTE Band 7	2560	23.00	200	0	2	48	185	59		< 50 mm	< 50 mm	< 50 mm	1443.8 mW -EXEMPT-	183.8 mW -MEASURE-	
Cellular	LTE Band 13	782	25.00	316	0	2	2	185	82		< 50 mm	< 50 mm	< 50 mm	873.4 mW -EXEMPT-	336.5 mW -EXEMPT-	
Power Back-off, Proximity Sensor On																
Cellular	W-CDMA II	1907.6	11.00	13	0	2	2				< 50 mm	< 50 mm	< 50 mm			
Cellular	W-CDMA V	846.6	19.00	79	0	2	2				< 50 mm	< 50 mm	< 50 mm			
Cellular	LTE Band 2	1900	13.00	20	0	2	2				< 50 mm	< 50 mm	< 50 mm			
Cellular	LTE Band 4	1732.5	13.50	22	0	2	2				< 50 mm	< 50 mm	< 50 mm			
Cellular	LTE Band 5	836.5	16.00	40	0	2	2				< 50 mm	< 50 mm	< 50 mm			
Cellular	LTE Band 7	2560	12.00	16	0	2					< 50 mm	< 50 mm				
Cellular	LTE Band 13	782	16.00	40	0	2	2				< 50 mm	< 50 mm	< 50 mm			

Note(s):

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

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	Corner A	Corner B	
			(Top Edge)	(Right Edge)	(Bottom Edge)	(Left Edge)	Note 2	Note 3	
W-CDMA Band II	OFF	Yes	Yes	Yes	No	No	Yes		
	ON	Yes	Yes	Yes	No	No	Yes		
W-CDMA Band V	OFF	Yes	Yes	Yes	No	No	Yes		
	ON	Yes	Yes	Yes	No	No	Yes		
LTE Band 2	OFF	Yes	Yes	Yes	No	No	Yes		
	ON	Yes	Yes	Yes	No	No	Yes		
LTE Band 4	OFF	Yes	Yes	Yes	No	No	Yes		
	ON	Yes	Yes	Yes	No	No	Yes		
LTE Band 5	OFF	Yes	Yes	Yes	No	No	Yes		
	ON	Yes	Yes	Yes	No	No	Yes		
LTE Band 7	OFF	Yes	Yes	Yes	No	Yes	No		
	ON	Yes	Yes	Yes	No	Yes	No		
LTE Band 13	OFF	Yes	Yes	Yes	No	No	Yes		
	ON	Yes	Yes	Yes	No	No	Yes		
Wi-Fi 2.4 GHz	OFF	Yes	Yes	No	No	Yes			Yes
	ON	Yes	Yes	No	No	Yes			Yes
Wi-Fi 5.3 GHz	OFF	Yes	Yes	No	No	Yes			Yes
	ON	Yes	Yes	No	No	Yes			Yes
Wi-Fi 5.5 GHz	OFF	Yes	Yes	No	No	Yes			Yes
	ON	Yes	Yes	No	No	Yes			Yes
Wi-Fi 5.8 GHz	OFF	Yes	Yes	No	No	Yes		Yes	
	ON	Yes	Yes	No	No	Yes		Yes	
Bluetooth	OFF	Yes	Yes	No	No	Yes		No	

Note(s):

1. Yes = Testing is required. No = Testing is not required..
2. Corner A side is located between Edge 1 and Edge 2.
3. Corner B side is located between Edge 1 and Edge 4.
4. For Corner A and Corner B, Additional Corner side tests are evaluated for bands that support reduced power due to proximity sensor operation.

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)	Body	
	ϵ_r	σ (S/m)
150	61.9	0.80
300	58.2	0.92
450	56.7	0.94
835	55.2	0.97
900	55.0	1.05
915	55.0	1.06
1450	54.0	1.30
1610	53.8	1.40
1800 – 2000	53.3	1.52
2450	52.7	1.95
3000	52.0	2.73
5000	49.3	5.07
5100	49.1	5.18
5200	49.0	5.30
5300	48.9	5.42
5400	48.7	5.53
5500	48.6	5.65
5600	48.5	5.77
5700	48.3	5.88
5800	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 ±(%)	
5-30-2018	Body 835	e'	53.2800	Relative Permittivity (ε _r):	53.28	55.20	-3.48	5
		e"	21.4400	Conductivity (σ):	1.00	0.97	2.62	5
	Body 820	e'	53.4200	Relative Permittivity (ε _r):	53.42	55.28	-3.36	5
		e"	21.5200	Conductivity (σ):	0.98	0.97	1.31	5
	Body 850	e'	53.1500	Relative Permittivity (ε _r):	53.15	55.16	-3.64	5
		e"	21.3700	Conductivity (σ):	1.01	0.99	2.32	5
6-7-2018	Body 2600	e'	51.7300	Relative Permittivity (ε _r):	51.73	52.51	-1.49	5
		e"	15.0300	Conductivity (σ):	2.17	2.16	0.56	5
	Body 2500	e'	51.9800	Relative Permittivity (ε _r):	51.98	52.64	-1.25	5
		e"	14.8100	Conductivity (σ):	2.06	2.02	1.90	5
	Body 2700	e'	51.4500	Relative Permittivity (ε _r):	51.45	52.38	-1.78	5
		e"	15.2600	Conductivity (σ):	2.29	2.30	-0.45	5
6-19-2018	Body 2450	e'	52.0900	Relative Permittivity (ε _r):	52.09	52.70	-1.16	5
		e"	14.3300	Conductivity (σ):	1.95	1.95	0.11	5
	Body 2400	e'	52.2600	Relative Permittivity (ε _r):	52.26	52.77	-0.97	5
		e"	14.2300	Conductivity (σ):	1.90	1.90	0.05	5
	Body 2480	e'	52.0000	Relative Permittivity (ε _r):	52.00	52.66	-1.26	5
		e"	14.4200	Conductivity (σ):	1.99	1.99	-0.19	5
6-21-2018	Body 2600	e'	51.2400	Relative Permittivity (ε _r):	51.24	52.51	-2.42	5
		e"	15.2000	Conductivity (σ):	2.20	2.16	1.69	5
	Body 2500	e'	51.5100	Relative Permittivity (ε _r):	51.51	52.64	-2.14	5
		e"	14.9200	Conductivity (σ):	2.07	2.02	2.66	5
	Body 2700	e'	50.9500	Relative Permittivity (ε _r):	50.95	52.38	-2.74	5
		e"	15.4400	Conductivity (σ):	2.32	2.30	0.72	5
7-5-2018	Body 835	e'	54.1800	Relative Permittivity (ε _r):	54.18	55.20	-1.85	5
		e"	21.6800	Conductivity (σ):	1.01	0.97	3.77	5
	Body 820	e'	54.3200	Relative Permittivity (ε _r):	54.32	55.28	-1.73	5
		e"	21.7600	Conductivity (σ):	0.99	0.97	2.44	5
	Body 850	e'	54.0500	Relative Permittivity (ε _r):	54.05	55.16	-2.01	5
		e"	21.5900	Conductivity (σ):	1.02	0.99	3.37	5

SAR 2 Room

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
2018-05-30	Body 1750	e'	53.2300	Relative Permittivity (ϵ_r):	53.23	53.44	-0.39	5
		e"	14.9100	Conductivity (σ):	1.45	1.49	-2.38	5
	Body 1710	e'	53.3300	Relative Permittivity (ϵ_r):	53.33	53.54	-0.40	5
		e"	14.9300	Conductivity (σ):	1.42	1.46	-2.87	5
	Body 1755	e'	53.2200	Relative Permittivity (ϵ_r):	53.22	53.43	-0.39	5
		e"	14.9000	Conductivity (σ):	1.45	1.49	-2.37	5
2018-05-30	Body 1900	e'	52.9100	Relative Permittivity (ϵ_r):	52.91	53.30	-0.73	5
		e"	14.9200	Conductivity (σ):	1.58	1.52	3.70	5
	Body 1850	e'	53.0300	Relative Permittivity (ϵ_r):	53.03	53.30	-0.51	5
		e"	14.9400	Conductivity (σ):	1.54	1.52	1.11	5
	Body 1910	e'	52.8900	Relative Permittivity (ϵ_r):	52.89	53.30	-0.77	5
		e"	14.9300	Conductivity (σ):	1.59	1.52	4.32	5
2018-06-04	Body 1750	e'	51.9300	Relative Permittivity (ϵ_r):	51.93	53.44	-2.83	5
		e"	14.7400	Conductivity (σ):	1.43	1.49	-3.49	5
	Body 1710	e'	52.0100	Relative Permittivity (ϵ_r):	52.01	53.54	-2.86	5
		e"	14.7100	Conductivity (σ):	1.40	1.46	-4.30	5
	Body 1755	e'	51.9300	Relative Permittivity (ϵ_r):	51.93	53.43	-2.80	5
		e"	14.7400	Conductivity (σ):	1.44	1.49	-3.41	5
2018-06-04	Body 1900	e'	51.5400	Relative Permittivity (ϵ_r):	51.54	53.30	-3.30	5
		e"	14.9300	Conductivity (σ):	1.58	1.52	3.77	5
	Body 1850	e'	51.6900	Relative Permittivity (ϵ_r):	51.69	53.30	-3.02	5
		e"	14.8600	Conductivity (σ):	1.53	1.52	0.56	5
	Body 1910	e'	51.5100	Relative Permittivity (ϵ_r):	51.51	53.30	-3.36	5
		e"	14.9500	Conductivity (σ):	1.59	1.52	4.46	5
2018-06-07	Body 1900	e'	53.4400	Relative Permittivity (ϵ_r):	53.44	53.30	0.26	5
		e"	14.9500	Conductivity (σ):	1.58	1.52	3.91	5
	Body 1850	e'	53.6000	Relative Permittivity (ϵ_r):	53.60	53.30	0.56	5
		e"	14.8300	Conductivity (σ):	1.53	1.52	0.36	5
	Body 1910	e'	53.4000	Relative Permittivity (ϵ_r):	53.40	53.30	0.19	5
		e"	14.9800	Conductivity (σ):	1.59	1.52	4.66	5

SAR 3 Room

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
6-4-2018	Body 750	e'	53.4800	Relative Permittivity (ϵ_r):	53.48	55.55	-3.72	5
		e"	23.1300	Conductivity (σ):	0.96	0.96	0.16	5
	Body 700	e'	54.0800	Relative Permittivity (ϵ_r):	54.08	55.74	-2.98	5
		e"	23.5000	Conductivity (σ):	0.91	0.96	-4.65	5
	Body 790	e'	53.0600	Relative Permittivity (ϵ_r):	53.06	55.39	-4.21	5
		e"	22.8300	Conductivity (σ):	1.00	0.97	3.80	5
6-7-2018	Body 835	e'	53.7100	Relative Permittivity (ϵ_r):	53.71	55.20	-2.70	5
		e"	21.6400	Conductivity (σ):	1.00	0.97	3.58	5
	Body 820	e'	53.8600	Relative Permittivity (ϵ_r):	53.86	55.28	-2.56	5
		e"	21.7300	Conductivity (σ):	0.99	0.97	2.30	5
	Body 850	e'	53.5900	Relative Permittivity (ϵ_r):	53.59	55.16	-2.84	5
		e"	21.5500	Conductivity (σ):	1.02	0.99	3.18	5
6-18-2018	Body 5250	e'	48.7300	Relative Permittivity (ϵ_r):	48.73	48.95	-0.45	5
		e"	17.9000	Conductivity (σ):	5.23	5.35	-2.39	5
	Body 5260	e'	48.7200	Relative Permittivity (ϵ_r):	48.72	48.94	-0.45	5
		e"	17.9100	Conductivity (σ):	5.24	5.36	-2.36	5
	Body 5600	e'	48.2900	Relative Permittivity (ϵ_r):	48.29	48.48	-0.39	5
		e"	18.1100	Conductivity (σ):	5.64	5.76	-2.12	5
	Body 5750	e'	48.1100	Relative Permittivity (ϵ_r):	48.11	48.27	-0.34	5
		e"	18.2100	Conductivity (σ):	5.82	5.94	-1.92	5
	Body 5825	e'	47.9900	Relative Permittivity (ϵ_r):	47.99	48.20	-0.44	5
		e"	18.2900	Conductivity (σ):	5.92	6.00	-1.27	5
6-21-2018	Body 5250	e'	49.0400	Relative Permittivity (ϵ_r):	49.04	48.95	0.18	5
		e"	18.3500	Conductivity (σ):	5.36	5.35	0.07	5
	Body 5260	e'	49.0200	Relative Permittivity (ϵ_r):	49.02	48.94	0.17	5
		e"	18.3600	Conductivity (σ):	5.37	5.36	0.10	5
	Body 5600	e'	48.5300	Relative Permittivity (ϵ_r):	48.53	48.48	0.11	5
		e"	18.5800	Conductivity (σ):	5.79	5.76	0.42	5
	Body 5750	e'	48.3000	Relative Permittivity (ϵ_r):	48.30	48.27	0.05	5
		e"	18.7100	Conductivity (σ):	5.98	5.94	0.78	5
	Body 5825	e'	48.1900	Relative Permittivity (ϵ_r):	48.19	48.20	-0.02	5
		e"	18.7900	Conductivity (σ):	6.09	6.00	1.43	5
7-5-2018	Body 750	e'	56.5500	Relative Permittivity (ϵ_r):	56.55	55.55	1.81	5
		e"	23.3400	Conductivity (σ):	0.97	0.96	1.06	5
	Body 700	e'	57.0500	Relative Permittivity (ϵ_r):	57.05	55.74	2.35	5
		e"	23.7700	Conductivity (σ):	0.93	0.96	-3.55	5
	Body 790	e'	56.1300	Relative Permittivity (ϵ_r):	56.13	55.39	1.33	5
		e"	23.0000	Conductivity (σ):	1.01	0.97	4.57	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 2.5 mm.
For 5 GHz band - Distance between probe sensors and phantom surface was set to 1.4 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	Body
D750V3	1122	2-19-2018	750	1g	8.63
				10g	5.72
D835V2	4d194	7-19-2017	835	1g	9.30
				10g	6.09
D1750V2	1125	2-16-2018	1750	1g	36.80
				10g	19.50
D1900V2	5d190	9-20-2017	1900	1g	40.00
				10g	21.10
D2450V2	939	9-19-2017	2450	1g	50.70
				10g	23.90
D2600V2	1097	1-17-2018	2600	1g	54.40
				10g	24.20
D5GHzV2	1209	2-15-2018	5250	1g	75.70
				10g	21.00
			5600	1g	79.00
				10g	21.90
			5750	1g	75.60
				10g	20.80

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				
5-30-2018	D835V2	4d194	Body	1g	0.96	9.61	9.30	3.33	
				10g	0.63	6.32	6.09	3.78	
6-7-2018	D2600V2	1097	Body	1g	5.49	54.90	54.40	0.92	1, 2
				10g	2.40	24.00	24.20	-0.83	
6-19-2018	D2450V2	939	Body	1g	4.82	48.20	50.70	-4.93	3, 4
				10g	2.21	22.10	23.90	-7.53	
6-21-2018	D2600V2	1097	Body	1g	5.47	54.70	54.40	0.55	
				10g	2.40	24.00	24.20	-0.83	
7-5-2018	D835V2	4d194	Body	1g	1.00	9.95	9.30	6.99	5, 6
				10g	0.65	6.54	6.09	7.39	

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				
5-30-2018	D1750V2	1125	Body	1g	3.81	38.10	36.80	3.53	
				10g	2.03	20.30	19.50	4.10	
5-30-2018	D1900V2	5d190	Body	1g	4.04	40.40	40.00	1.00	
				10g	2.02	20.20	21.10	-4.27	
6-4-2018	D1750V2	1125	Body	1g	3.81	38.10	36.80	3.53	7, 8
				10g	1.96	19.60	19.50	0.51	
6-4-2018	D1900V2	5d190	Body	1g	4.21	42.10	40.00	5.25	
				10g	2.12	21.20	21.10	0.47	
6-7-2018	D1900V2	5d190	Body	1g	4.22	42.20	40.00	5.50	9, 10
				10g	2.16	21.60	21.10	2.37	

SAR 3 Room

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.	
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W				
6-4-2018	D750V3	1122	Body	1g	0.85	8.54	8.63	-1.04	11, 12
				10g	0.57	5.68	5.72	-0.70	
6-7-2018	D835V2	4d194	Body	1g	1.01	10.10	9.30	8.60	13, 14
				10g	0.66	6.63	6.09	8.87	
6-18-2018	D5GHzV2 (5250)	1209	Body	1g	7.68	76.80	75.70	1.45	
				10g	2.14	21.40	21.00	1.90	
6-18-2018	D5GHzV2 (5600)	1209	Body	1g	8.45	84.50	79.00	6.96	15, 16
				10g	2.31	23.10	21.90	5.48	
6-18-2018	D5GHzV2 (5750)	1209	Body	1g	7.38	73.80	75.60	-2.38	
				10g	2.04	20.40	20.80	-1.92	
6-21-2018	D5GHzV2 (5250)	1209	Body	1g	7.76	77.60	75.70	2.51	
				10g	2.16	21.60	21.00	2.86	
6-21-2018	D5GHzV2 (5600)	1209	Body	1g	8.42	84.20	79.00	6.58	
				10g	2.32	23.20	21.90	5.94	
6-21-2018	D5GHzV2 (5750)	1209	Body	1g	7.61	76.10	75.60	0.66	
				10g	2.10	21.00	20.80	0.96	
7-5-2018	D750V3	1122	Body	1g	0.85	8.53	8.63	-1.16	17, 18
				10g	0.57	5.67	5.72	-0.87	

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
	β_c/β_d	8/15

HSDPA Setup Procedures used to establish the test signals

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

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

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

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

	Mode	HSPA				
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2 kbps RMC				
	HSDPA FRC	H-Set 1				
	HSUPA Test	HSPA				
	Power Control Algorithm	Algorithm 2				Algorithm 1
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	0
	β_{ec}	209/225	12/15	30/15	2/15	5/15
	β_c/β_d	11/15	6/15	15/9	2/15	-
	β_{hs}	22/15	12/15	30/15	4/15	5/15
	β_{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} = β_{hs}/β_c	30/15					
HSUPA Specific Settings	E-DPDCCH	6	8	8	5	0
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	12
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	67
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E-TFCIs	5	5	2	5	1
	Reference E-TFCI	11	11	11	11	67
	Reference E-TFCI PO	4	4	4	4	18
	Reference E-TFCI	67	67	92	67	67
	Reference E-TFCI PO	18	18	18	18	18
	Reference E-TFCI	71	71	71	71	71
	Reference E-TFCI PO	23	23	23	23	23
	Reference E-TFCI	75	75	75	75	75
	Reference E-TFCI PO	26	26	26	26	26
	Reference E-TFCI	81	81	81	81	81
Reference E-TFCI PO	27	27	27	27	27	
Maximum Channelization Codes	2xSF2				SF4	

HSPA+

Since 16QAM is not used for uplink, the uplink Category and release is same as HSUPA, i.e., Rel. 7 Therefore, the RF conducted power is not measured.

WCDMA Band II Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	Max. RF output power (dBm)		Reduced. RF output power (dBm)					
					MPR (dB)	Meas. Avg Pwr	MPR (dB)	Meas. Avg Pwr				
W-CDMA Band II	Rel 99	RMC, 12.2 kbps	9262	1852.4	N/A	23.0	N/A	9.3				
			9400	1880.0		23.4		10.1				
			9538	1907.6		23.4		9.4				
	HSDPA	Subtest 1		9262	1852.4	0	22.2	0	8.3			
				9400	1880.0		22.5		9.2			
				9538	1907.6		22.4		8.5			
		Subtest 2			9262	1852.4	0	22.2	0	8.3		
					9400	1880.0		22.5		9.1		
					9538	1907.6		22.4		8.4		
		Subtest 3			9262	1852.4	0.5	21.6	0	7.8		
					9400	1880.0		22.0		8.6		
					9538	1907.6		21.9		8.0		
		Subtest 4			9262	1852.4	0.5	21.6	0	7.8		
					9400	1880.0		21.9		8.6		
					9538	1907.6		21.9		8.0		
		HSUPA	Subtest 1				0	22.3	0	8.3		
								9400		1880.0	22.2	8.9
								9538		1907.6	22.3	8.5
	Subtest 2					2	21.1	0	6.9			
							9400		1880.0	21.0	8.2	
							9538		1907.6	21.0	7.4	
	Subtest 3					1	21.0	0	6.6			
							9400		1880.0	21.2	8.0	
							9538		1907.6	21.1	7.5	
	Subtest 4					2	21.5	0	7.9			
							9400		1880.0	21.4	8.7	
							9538		1907.6	21.5	8.1	
	Subtest 5					0	21.6	0	7.9			
							9400		1880.0	21.8	9.0	
							9538		1907.6	21.6	8.1	

WCDMA Band V Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Max. RF output power (dBm)	Reduced. RF output power (dBm)				
						Meas. Avg Pwr	Meas. Avg Pwr				
W-CDMA Band V	Rel 99	RMC, 12.2 kbps	4132	826.4	N/A	23.6	17.7				
			4183	836.6		23.6	17.8				
			4233	846.6		23.7	17.9				
	HSDPA	Subtest 1		4132	826.4	0	22.5	16.8			
				4183	836.6		22.6	16.8			
				4233	846.6		22.7	17.0			
		Subtest 2			4132	826.4	0	22.6	16.9		
					4183	836.6		22.6	16.9		
					4233	846.6		22.6	17.0		
		Subtest 3			4132	826.4	0.5	22.1	16.3		
					4183	836.6		22.1	16.2		
					4233	846.6		22.3	16.4		
		Subtest 4			4132	826.4	0.5	22.1	16.3		
					4183	836.6		22.1	16.3		
					4233	846.6		22.2	16.5		
	HSUPA	Subtest 1				0	22.3	16.8			
							4183	836.6	21.9	16.2	
							4233	846.6	22.5	16.7	
		Subtest 2					2	21.0	15.4		
								4183	836.6	21.5	15.8
								4233	846.6	21.2	15.5
		Subtest 3					1	20.8	15.1		
								4183	836.6	21.2	15.4
								4233	846.6	20.9	15.0
		Subtest 4					2	22.0	16.0		
								4183	836.6	21.9	16.0
								4233	846.6	21.5	16.4
Subtest 5						0	22.0	16.7			
							4183	836.6	22.0	16.5	
							4233	846.6	22.2	16.5	

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
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3	13	10	Table 6.2.4-2	Table 6.2.4-2
	6.6.3.3.2				
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23 ¹	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-

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

LTE Band 2 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	1860 MHz	1880 MHz	1900 MHz	MPR	1860 MHz	1880 MHz	1900 MHz
LTE Band 2	20	QPSK	1	0	0	22.6	23.3	23.7	0	10.7	12.0	12.1
			1	49	0	23.5	23.4	23.4	0	11.5	12.2	12.4
			1	99	0	22.4	23.6	22.1	0	12.1	11.9	11.5
			50	0	1	23.1	21.8	23.3	0	11.0	12.1	12.3
			50	24	1	22.6	22.5	23.1	0	11.4	12.3	12.3
			50	50	1	21.8	23.2	23.2	0	11.4	11.9	11.6
		16QAM	100	0	1	22.5	23.0	23.4	0	11.3	11.9	12.0
			1	0	1	22.1	22.9	23.3	0	11.1	12.3	12.3
			1	49	1	22.4	23.0	23.2	0	11.8	12.7	12.7
			1	99	1	22.1	23.0	22.4	0	12.1	12.4	11.8
			50	0	2	22.3	20.7	22.3	0	11.0	11.9	12.3
			50	24	2	21.8	21.4	22.0	0	11.4	12.3	12.3
			50	50	2	21.0	22.4	22.4	0	11.5	11.9	11.6
			100	0	2	21.5	21.9	22.4	0	11.2	12.0	11.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	1857.5 MHz	1880 MHz	1902.5 MHz	MPR	1857.5 MHz	1880 MHz	1902.5 MHz
LTE Band 2	15	QPSK	1	0	0	22.3	23.4	23.6	0	11.0	12.4	12.5
			1	36	0	23.5	23.4	23.6	0	11.4	12.1	12.2
			1	74	0	22.9	23.6	22.6	0	11.4	11.9	11.8
			36	0	1	22.8	21.7	23.2	0	11.1	12.2	12.1
			36	18	1	22.7	22.4	22.8	0	11.5	12.2	12.1
			36	37	1	22.2	23.0	23.0	0	11.2	11.9	11.7
		16QAM	75	0	1	22.4	22.7	23.0	0	11.2	12.0	12.0
			1	0	1	21.4	22.7	23.2	0	11.4	12.0	12.7
			1	36	1	22.6	22.8	23.3	0	11.7	12.1	12.3
			1	74	1	21.9	23.2	22.3	0	11.8	11.9	12.0
			36	0	2	21.9	20.9	22.3	0	11.2	12.0	12.2
			36	18	2	21.8	21.4	21.9	0	11.5	12.3	12.0
			36	37	2	21.3	22.0	22.3	0	11.3	12.0	11.7
			75	0	2	21.5	21.5	22.1	0	11.3	12.0	12.0
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	1855 MHz	1880 MHz	1905 MHz	MPR	1855 MHz	1880 MHz	1905 MHz
LTE Band 2	10	QPSK	1	0	0	22.4	22.9	23.5	0	10.9	12.0	11.9
			1	25	0	23.2	23.2	23.2	0	11.4	12.1	11.8
			1	49	0	23.3	23.0	22.4	0	11.1	11.7	11.6
			25	0	1	22.3	21.8	22.9	0	11.2	12.2	11.7
			25	12	1	22.4	22.2	23.2	0	11.5	12.2	11.9
			25	25	1	22.3	22.7	22.5	0	11.3	12.0	11.8
		16QAM	50	0	1	22.5	22.3	22.7	0	11.2	12.0	11.7
			1	0	1	21.6	22.1	23.0	0	10.8	11.9	12.3
			1	25	1	22.4	22.3	23.1	0	11.3	12.3	12.0
			1	49	1	22.6	22.3	22.3	0	11.0	11.8	11.9
			25	0	2	21.2	21.0	22.0	0	11.2	12.1	11.7
			25	12	2	21.4	21.5	22.3	0	11.4	12.3	11.8
			25	25	2	21.3	21.9	21.7	0	11.3	12.1	11.8
			50	0	2	21.4	21.4	21.8	0	11.2	12.1	11.7

LTE Band 2 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	1852.5 MHz	1880 MHz	1907.5 MHz	MPR	1852.5 MHz	1880 MHz	1907.5 MHz
LTE Band 2	5	QPSK	1	0	0	23.1	23.1	23.5	0	11.5	12.2	11.7
			1	12	0	23.1	23.1	23.1	0	11.5	12.1	11.8
			1	24	0	23.5	23.1	23.1	0	11.5	12.1	12.1
			12	0	1	22.1	22.0	23.1	0	11.3	12.1	11.7
			12	6	1	22.2	22.2	23.0	0	11.4	12.2	11.9
			12	11	1	22.4	22.4	22.2	0	11.5	12.3	11.9
		16QAM	25	0	1	22.3	22.0	22.5	0	11.3	12.2	11.9
			1	0	1	22.7	22.2	22.9	0	11.6	12.2	12.3
			1	12	1	22.7	22.2	22.3	0	11.5	12.3	12.2
			1	24	1	23.2	22.3	22.4	0	11.6	12.2	12.2
			12	0	2	20.7	21.3	22.0	0	11.4	12.3	11.8
			12	6	2	20.8	21.4	21.5	0	11.5	12.3	12.1
			12	11	2	21.0	21.7	21.2	0	11.5	12.2	12.0
			25	0	2	21.4	21.3	21.4	0	11.4	12.2	12.0
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	1851.5 MHz	1880 MHz	1908.5 MHz	MPR	1851.5 MHz	1880 MHz	1908.5 MHz
LTE Band 2	3	QPSK	1	0	0	22.8	22.9	22.6	0	11.4	12.0	11.9
			1	7	0	22.9	22.9	22.5	0	11.4	12.1	12.0
			1	14	0	22.9	23.0	22.6	0	11.5	12.1	12.2
			8	0	1	22.2	22.2	22.4	0	11.4	12.2	12.0
			8	4	1	22.3	22.2	22.3	0	11.4	12.3	12.0
			8	7	1	22.4	22.3	21.9	0	11.4	12.2	12.0
		16QAM	15	0	1	22.2	22.1	22.0	0	11.4	12.2	12.0
			1	0	1	22.3	22.1	22.3	0	11.3	12.2	12.3
			1	7	1	22.2	22.1	22.2	0	11.3	12.3	12.3
			1	14	1	22.4	22.2	22.3	0	11.4	12.1	12.6
			8	0	2	21.5	20.8	21.6	0	11.5	12.3	12.1
			8	4	2	21.4	20.9	21.2	0	11.6	12.4	12.1
			8	7	2	21.4	21.1	21.0	0	11.6	12.3	12.1
			15	0	2	21.2	21.1	20.7	0	11.5	12.3	12.1
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	1850.7 MHz	1880 MHz	1909.3 MHz	MPR	1850.7 MHz	1880 MHz	1909.3 MHz
LTE Band 2	1.4	QPSK	1	0	0	23.3	23.1	22.4	0	11.2	12.1	11.7
			1	2	0	23.2	23.2	22.4	0	11.4	12.3	11.8
			1	5	0	23.2	23.2	22.3	0	11.2	12.1	11.8
			3	0	0	23.1	23.0	22.2	0	11.3	12.0	11.7
			3	1	0	23.1	23.1	22.2	0	11.4	12.2	11.8
			3	2	0	23.1	23.1	22.2	0	11.3	12.1	11.8
		16QAM	6	0	1	22.2	22.4	22.1	0	11.3	12.2	11.9
			1	0	1	22.3	22.1	22.0	0	11.5	12.2	11.7
			1	2	1	22.4	22.2	22.1	0	11.7	12.3	11.9
			1	5	1	22.3	22.2	22.0	0	11.5	12.1	11.9
			3	0	1	22.2	22.2	22.2	0	11.4	12.2	12.0
			3	1	1	22.2	22.2	22.2	0	11.5	12.3	12.0
			3	2	1	22.2	22.2	22.2	0	11.5	12.2	12.1
			6	0	2	21.3	21.6	21.1	0	11.2	12.4	12.1

LTE Band 4 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	1720 MHz	1732.5 MHz	1745 MHz	MPR	1720 MHz	1732.5 MHz	1745 MHz
LTE Band 4	20	QPSK	1	0	0		23.5		0		12.1	
			1	49	0		23.5		0		12.2	
			1	99	0		23.5		0		12.1	
			50	0	1		22.5		0		12.1	
			50	24	1		22.5		0		12.1	
			50	50	1		22.6		0		12.1	
		16QAM	100	0	1		22.5		0		12.0	
			1	0	1		22.3		0		12.5	
			1	49	1		22.4		0		12.7	
			1	99	1		22.4		0		12.5	
			50	0	2		21.4		0		12.1	
			50	25	2		21.5		0		12.3	
			50	50	2		21.6		0		12.1	
			100	0	2		21.5		0		12.0	
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	1717.5 MHz	1732.5 MHz	1747.5 MHz	MPR	1717.5 MHz	1732.5 MHz	1747.5 MHz
LTE Band 4	15	QPSK	1	0	0	23.4	23.5	23.8	0	12.7	12.3	12.5
			1	36	0	23.3	23.7	23.9	0	12.5	12.1	12.8
			1	74	0	23.5	23.6	23.8	0	12.2	12.3	13.0
			36	0	1	22.3	22.5	22.5	0	12.7	12.3	12.7
			36	18	1	22.3	22.5	22.5	0	12.6	12.1	12.8
			36	37	1	22.3	22.5	22.7	0	12.4	12.2	12.9
		16QAM	75	0	1	22.4	22.5	22.7	0	12.5	12.2	12.8
			1	0	1	22.9	22.2	22.8	0	13.0	12.6	12.3
			1	36	1	22.8	22.2	22.7	0	13.0	12.6	12.8
			1	74	1	23.1	22.2	22.9	0	12.6	12.6	12.8
			36	0	2	21.2	21.6	21.3	0	12.6	12.3	12.6
			36	18	2	21.2	21.5	21.4	0	12.7	12.3	12.9
			36	37	2	21.3	21.5	21.5	0	12.4	12.2	12.8
			75	0	2	21.3	21.4	21.6	0	12.5	12.2	12.7
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	1715 MHz	1732.5 MHz	1750 MHz	MPR	1715 MHz	1732.5 MHz	1750 MHz
LTE Band 4	10	QPSK	1	0	0	23.3	23.5	23.5	0	12.5	12.0	12.6
			1	25	0	23.4	23.5	23.7	0	12.8	12.2	13.3
			1	49	0	23.5	23.5	23.8	0	12.3	12.1	12.9
			25	0	1	22.3	22.5	22.8	0	12.7	12.2	12.8
			25	12	1	22.2	22.4	22.6	0	12.7	12.2	12.8
			25	25	1	22.3	22.6	22.9	0	12.7	12.2	12.9
		16QAM	50	0	1	22.3	22.5	22.7	0	12.6	12.2	12.8
			1	0	1	22.4	22.3	22.7	0	12.5	12.3	12.4
			1	25	1	22.3	22.1	22.9	0	12.8	12.7	12.9
			1	49	1	22.2	22.7	22.9	0	12.3	12.4	12.7
			25	0	2	21.4	21.5	21.8	0	12.8	12.3	12.7
			25	12	2	21.1	21.4	21.7	0	12.8	12.3	12.9
			25	25	2	21.6	21.6	21.9	0	12.7	12.2	12.9
			50	0	2	21.2	21.5	21.6	0	12.6	12.2	12.8

LTE Band 4 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	1712.5 MHz	1732.5 MHz	1752.5 MHz	MPR	1712.5 MHz	1732.5 MHz	1752.5 MHz
LTE Band 4	5	QPSK	1	0	0	22.9	23.0	23.5	0	13.1	12.6	13.1
			1	12	0	23.2	23.5	23.7	0	12.9	12.2	13.0
			1	24	0	23.1	23.2	23.6	0	13.0	12.5	13.2
			12	0	1	22.3	22.5	22.6	0	12.8	12.4	13.0
			12	6	1	22.2	22.4	22.7	0	12.8	12.2	13.0
			12	11	1	22.2	22.5	22.8	0	12.7	12.2	13.0
		16QAM	25	0	1	22.2	22.5	22.7	0	12.7	12.4	13.1
			1	0	1	22.0	22.0	21.8	0	13.0	13.1	13.2
			1	12	1	21.8	22.2	22.1	0	12.9	12.8	13.2
			1	24	1	21.9	22.0	22.3	0	12.9	13.0	13.2
			12	0	2	21.1	21.4	21.5	0	12.9	12.6	13.0
			12	6	2	21.0	21.4	21.6	0	12.8	12.5	13.1
			12	11	2	21.0	21.2	21.7	0	12.8	12.5	13.1
			25	0	2	21.1	21.4	21.5	0	12.7	12.4	13.0

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	1711.5 MHz	1732.5 MHz	1753.5 MHz	MPR	1711.5 MHz	1732.5 MHz	1753.5 MHz
LTE Band 4	3	QPSK	1	0	0	23.1	23.5	23.6	0	12.8	12.5	13.2
			1	7	0	23.4	23.4	23.6	0	12.7	12.2	13.1
			1	14	0	23.1	23.5	23.8	0	12.8	12.4	13.3
			8	0	1	22.2	22.4	22.7	0	12.7	12.2	13.0
			8	4	1	22.4	22.4	22.6	0	12.8	12.2	13.1
			8	7	1	22.2	22.4	22.6	0	12.8	12.2	13.1
		16QAM	15	0	1	22.1	22.5	22.6	0	12.7	12.2	13.1
			1	0	1	22.3	22.9	22.8	0	12.9	12.8	13.1
			1	7	1	22.4	22.7	22.7	0	12.8	12.7	13.0
			1	14	1	22.2	22.5	23.0	0	12.8	12.7	13.1
			8	0	2	21.1	21.5	21.8	0	12.8	12.4	13.2
			8	4	2	21.0	21.5	21.9	0	12.9	12.4	13.2
			8	7	2	21.0	21.5	21.7	0	12.8	12.4	13.2
			15	0	2	21.0	21.4	21.5	0	12.7	12.3	13.1

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	1710.7 MHz	1732.5 MHz	1754.3 MHz	MPR	1710.7 MHz	1732.5 MHz	1754.3 MHz
LTE Band 4	1.4	QPSK	1	0	0	23.2	23.2	23.4	0	12.5	12.0	12.9
			1	2	0	23.1	23.6	23.6	0	12.7	12.2	13.0
			1	5	0	23.3	23.3	23.5	0	12.6	12.0	12.9
			3	0	0	23.2	23.4	23.5	0	12.7	12.1	12.9
			3	1	0	23.3	23.5	23.6	0	12.7	12.2	13.0
			3	2	0	23.3	23.4	23.6	0	12.7	12.2	13.0
		16QAM	6	0	1	22.3	22.4	22.6	0	12.6	12.1	13.0
			1	0	1	22.3	23.1	22.3	0	12.6	12.5	13.0
			1	2	1	22.4	22.1	22.6	0	12.7	12.6	13.2
			1	5	1	22.3	21.9	22.4	0	12.7	12.5	13.1
			3	0	1	22.6	21.8	22.6	0	12.9	12.4	13.1
			3	1	1	22.6	22.4	22.3	0	12.9	12.5	13.1
			3	2	1	22.6	22.4	22.3	0	12.9	12.4	13.1
			6	0	2	21.1	21.5	21.2	0	12.9	12.1	13.2

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

LTE Band 5 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	829 MHz	836.5 MHz	844 MHz	MPR	829 MHz	836.5 MHz	844 MHz
LTE Band 5	10	QPSK	1	0	0		24.0		0		15.0	
			1	25	0		24.3		0		15.2	
			1	49	0		24.1		0		15.0	
			25	0	1		23.2		0		15.0	
			25	12	1		23.2		0		15.0	
			25	25	1		23.2		0		15.0	
		16QAM	50	0	1		23.1		0		14.9	
			1	0	1		23.2		0		14.6	
			1	25	1		22.9		0		15.0	
			1	49	1		22.8		0		15.0	
			25	0	2		22.2		0		14.9	
			25	12	2		22.4		0		15.1	
			25	25	2		22.4		0		15.0	
			50	0	2		22.2		0		14.9	
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	826.5 MHz	836.5 MHz	846.5 MHz	MPR	826.5 MHz	836.5 MHz	846.5 MHz
LTE Band 5	5	QPSK	1	0	0	24.1	23.9	24.1	0	15.0	14.8	15.0
			1	12	0	24.3	24.1	24.3	0	15.2	14.9	15.2
			1	24	0	23.9	23.8	24.1	0	14.9	14.6	15.0
			12	0	1	23.1	23.1	23.1	0	15.0	14.9	15.1
			12	6	1	23.1	23.0	23.1	0	15.1	15.0	15.0
			12	11	1	23.1	23.0	23.0	0	15.1	14.9	15.0
		16QAM	25	0	1	23.1	23.2	23.1	0	15.0	14.9	15.1
			1	0	1	22.9	23.0	22.5	0	14.3	14.5	14.8
			1	12	1	23.0	22.5	22.6	0	14.4	14.7	14.6
			1	24	1	22.7	22.5	22.3	0	14.2	14.6	14.0
			12	0	2	22.0	22.1	22.1	0	14.9	14.9	14.8
			12	6	2	22.0	22.1	22.0	0	15.0	14.9	14.9
			12	11	2	22.0	22.0	22.1	0	15.0	14.8	14.9
			25	0	2	22.1	22.1	22.3	0	15.0	15.0	15.1
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	825.5 MHz	836.5 MHz	847.5 MHz	MPR	825.5 MHz	836.5 MHz	847.5 MHz
LTE Band 5	3	QPSK	1	0	0	24.3	24.1	24.1	0	14.9	15.1	15.0
			1	7	0	24.2	23.9	24.2	0	15.0	15.2	15.2
			1	14	0	24.3	24.1	24.0	0	15.0	15.3	14.7
			8	0	1	23.1	23.1	23.0	0	15.0	14.9	15.0
			8	4	1	23.1	23.0	23.1	0	15.0	15.1	15.0
			8	7	1	23.2	23.0	23.1	0	14.8	15.0	14.9
		16QAM	15	0	1	23.1	23.1	23.1	0	15.0	15.0	15.0
			1	0	1	23.5	23.2	23.0	0	14.7	15.0	14.8
			1	7	1	23.1	23.0	23.4	0	14.6	15.0	15.1
			1	14	1	23.3	23.1	22.6	0	14.5	14.8	14.8
			8	0	2	22.4	22.1	22.1	0	15.0	14.9	14.7
			8	4	2	22.2	22.1	22.3	0	15.3	14.8	14.7
			8	7	2	22.1	21.9	22.0	0	15.1	14.7	14.7
			15	0	2	22.1	22.1	22.1	0	15.0	14.9	14.9

LTE Band 5 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	824.7 MHz	836.5 MHz	848.3 MHz	MPR	824.7 MHz	836.5 MHz	848.3 MHz
LTE Band 5	1.4	QPSK	1	0	0	24.2	23.9	23.8	0	15.1	14.9	14.8
			1	2	0	24.2	24.0	24.0	0	15.1	15.0	15.1
			1	5	0	24.0	24.0	23.9	0	14.9	15.0	14.9
			3	0	0	24.1	24.0	24.1	0	15.1	14.8	14.9
			3	1	0	24.3	24.1	24.0	0	15.2	14.9	15.0
			3	2	0	24.1	24.2	24.1	0	15.0	14.9	14.9
		16QAM	6	0	1	23.1	22.9	23.0	0	14.9	14.9	14.9
			1	0	1	23.0	23.0	22.6	0	15.0	14.9	14.6
			1	2	1	23.3	23.0	22.9	0	15.2	15.1	14.7
			1	5	1	22.8	22.9	23.0	0	15.0	14.9	14.6
			3	0	1	22.9	23.1	23.2	0	15.1	14.7	14.5
			3	1	1	23.1	23.1	23.1	0	15.1	15.0	14.6
			3	2	1	23.1	23.2	23.0	0	15.1	14.9	14.9
			6	0	2	21.9	22.2	21.8	0	15.1	14.9	14.7

Note(s):

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

LTE Band 7 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	2510 MHz	2535 MHz	2560 MHz	MPR	2510 MHz	2535 MHz	2560 MHz
LTE Band 7	20	QPSK	1	0	0	22.1	21.7	21.9	0	9.7	9.9	10.1
			1	49	0	22.2	22.2	22.0	0	10.2	10.8	10.7
			1	99	0	21.8	21.4	21.8	0	9.4	9.6	9.5
			50	0	1	21.2	21.1	21.1	0	10.1	10.6	10.3
			50	24	1	20.9	21.1	21.0	0	10.2	10.8	10.7
			50	50	1	20.8	20.9	20.9	0	10.0	10.4	10.4
		16QAM	100	0	1	20.8	21.0	21.0	0	10.0	10.5	10.3
			1	0	1	20.9	20.5	20.8	0	10.0	10.4	10.2
			1	49	1	20.8	21.2	21.5	0	10.6	10.7	11.0
			1	99	1	20.3	20.5	20.3	0	9.8	10.0	10.1
			50	0	2	20.0	20.1	20.0	0	10.1	10.7	10.4
			50	25	2	19.9	20.2	20.1	0	10.3	10.9	10.8
			50	50	2	19.6	19.8	19.8	0	10.1	10.5	10.5
			100	0	2	19.7	20.1	19.8	0	10.1	10.6	10.5
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	2507.5 MHz	2535 MHz	2562.5 MHz	MPR	2507.5 MHz	2535 MHz	2562.5 MHz
LTE Band 7	15	QPSK	1	0	0	21.8	22.0	22.2	0	10.0	10.2	10.4
			1	36	0	21.9	22.4	22.3	0	10.2	10.7	10.6
			1	74	0	21.9	22.0	22.1	0	9.7	10.0	9.8
			36	0	1	20.9	21.1	21.0	0	10.3	10.6	10.5
			36	18	1	20.9	21.1	21.0	0	10.2	10.8	10.7
			36	37	1	20.8	21.0	20.9	0	10.1	10.6	10.5
		16QAM	75	0	1	20.8	21.0	20.9	0	10.1	10.6	10.5
			1	0	1	21.5	20.4	21.2	0	10.3	10.6	10.0
			1	36	1	21.4	20.8	21.3	0	10.6	10.9	10.6
			1	74	1	21.3	20.4	21.0	0	10.0	10.4	9.8
			36	0	2	19.8	20.2	20.1	0	10.3	10.8	10.5
			36	18	2	19.6	20.3	20.0	0	10.3	10.9	10.8
			36	37	2	19.5	19.9	19.8	0	10.2	10.7	10.6
			75	0	2	19.8	19.9	20.0	0	10.2	10.7	10.5
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	2505 MHz	2535 MHz	2565 MHz	MPR	2505 MHz	2535 MHz	2565 MHz
LTE Band 7	10	QPSK	1	0	0	22.0	22.0	22.1	0	9.8	10.0	9.9
			1	25	0	22.1	22.2	22.3	0	10.4	10.8	10.6
			1	49	0	21.9	22.1	22.0	0	9.4	9.9	9.6
			25	0	1	20.9	21.1	21.0	0	10.3	10.7	10.5
			25	12	1	21.1	21.1	21.0	0	10.4	10.8	10.6
			25	25	1	20.8	20.9	20.9	0	10.1	10.6	10.4
		16QAM	50	0	1	20.8	21.1	20.9	0	10.2	10.6	10.4
			1	0	1	20.9	20.4	21.1	0	10.1	10.1	10.0
			1	25	1	21.1	21.5	21.4	0	10.9	10.8	10.7
			1	49	1	20.7	21.2	21.1	0	9.8	9.8	9.7
			25	0	2	20.1	20.2	20.1	0	10.4	10.7	10.7
			25	12	2	20.0	20.3	20.1	0	10.6	10.9	10.8
			25	25	2	19.9	20.1	19.9	0	10.2	10.7	10.5
			50	0	2	19.8	20.0	19.9	0	10.3	10.6	10.5

LTE Band 7 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)				
					MPR	2502.5 MHz	2535 MHz	2567.5 MHz	MPR	2502.5 MHz	2535 MHz	2567.5 MHz
LTE Band 7	5	QPSK	1	0	0	22.1	21.8	21.7	0	10.5	10.7	10.4
			1	12	0	22.2	22.1	22.1	0	10.5	10.7	10.4
			1	24	0	21.7	21.7	21.8	0	10.5	10.7	10.4
			12	0	1	20.9	21.0	20.7	0	10.5	10.7	10.4
			12	6	1	21.0	20.9	20.8	0	10.5	10.7	10.4
			12	11	1	21.0	21.0	20.7	0	10.4	10.7	10.4
		25	0	1	20.9	21.0	20.8	0	10.5	10.7	10.4	
		16QAM	1	0	1	20.6	21.0	20.3	0	10.5	10.7	10.4
			1	12	1	20.5	21.2	20.4	0	10.5	10.7	10.4
			1	24	1	20.5	20.8	20.2	0	10.5	10.7	10.4
			12	0	2	19.7	20.1	19.7	0	10.5	10.7	10.4
			12	6	2	19.9	20.0	19.7	0	10.5	10.7	10.4
			12	11	2	19.6	20.0	19.6	0	10.5	10.7	10.4
			25	0	2	19.8	20.0	20.0	0	10.5	10.7	10.4

LTE Band 13 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)				Reduction. Avg Pwr (dBm)			
					MPR		782 MHz		MPR		782 MHz	
LTE Band 13	10	QPSK	1	0	0		23.8		0		14.1	
			1	25	0		23.9		0		14.4	
			1	49	0		23.9		0		14.0	
			25	0	1		23.0		0		14.5	
			25	12	1		22.8		0		14.2	
			25	25	1		22.7		0		14.1	
		16QAM	50	0	1		22.9		0		14.1	
			1	0	1		23.0		0		14.2	
			1	25	1		23.1		0		14.1	
			1	49	1		23.3		0		14.1	
			25	0	2		22.0		0		14.4	
			25	12	2		21.9		0		14.3	
			25	25	2		21.8		0		14.2	
			50	0	2		22.0		0		14.2	

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)				Reduction. Avg Pwr (dBm)			
					MPR	779.5 MHz	782 MHz	784.5 MHz	MPR	779.5 MHz	782 MHz	784.5 MHz
LTE Band 13	5	QPSK	1	0	0		23.7		0		14.6	
			1	12	0		23.5		0		14.8	
			1	24	0		23.5		0		14.3	
			12	0	1		22.8		0		14.8	
			12	7	1		22.7		0		14.8	
			12	13	1		22.7		0		14.8	
		16QAM	25	0	1		22.7		0		14.8	
			1	0	1		22.9		0		14.6	
			1	12	1		22.4		0		14.5	
			1	24	1		22.7		0		14.7	
			12	0	2		21.8		0		14.3	
			12	7	2		21.6		0		14.2	
			12	13	2		21.6		0		14.2	
			25	0	2		21.9		0		14.1	

Note(s):

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

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.

1) Max power results

E-UTRA CA configuration (BCS)	Bands		UL				DL						LTE Rel 8 Tx. Power [dBm]	LTE Rel 10 Tx. Power [dBm]	Delta
	PCC	SCC	PCC				PCC			SCC					
	1st	2nd	Mode	BW (MHz)	Freq. (MHz)	RB/Offset	BW (MHz)	Channel	Freq. (MHz)	BW (MHz)	Channel	Freq. (MHz)			
4A-4A	4A	4A	QPSK	10	1750.0	1/49	10	2350	2150.0	10	2000	2115.0	23.79	23.58	-0.21
2A-4A	2A	4A	QPSK	10	1905.0	1/0	10	1150	1985.0	10	2175	2132.5	23.54	23.55	0.01
	4A	2A	QPSK	10	1750.0	1/49	10	2350	2150.0	10	900	1960.0	23.79	23.60	-0.19
2A-5A	2A	5A	QPSK	10	1905.0	1/0	10	1150	1985.0	10	2525	881.5	23.54	23.51	-0.03
	5A	2A	QPSK	10	836.5	1/25	10	2525	881.5	10	900	1960.0	24.30	24.16	-0.14
2A-13A	2A	13A	QPSK	10	1905.0	1/0	10	1150	1985.0	10	5230	751.0	23.54	23.49	-0.05
	13A	2A	QPSK	10	782.0	1/25	10	5230	751.0	10	900	1960.0	23.87	23.63	-0.24
4A-5A	4A	5A	QPSK	10	1750.0	1/49	10	2350	2150.0	10	2525	881.5	23.79	23.63	-0.16
	5A	4A	QPSK	10	836.5	1/25	10	2525	881.5	10	2175	2132.5	24.30	24.18	-0.12
4A-13A	4A	13A	QPSK	10	1750.0	1/49	10	2350	2150.0	10	5230	751.0	23.79	23.65	-0.14
	13A	4A	QPSK	10	782.0	1/25	10	5230	751.0	10	2175	2132.5	23.87	23.85	-0.02

2) Reduction power results

E-UTRA CA configuration (BCS)	Bands		UL				DL						LTE Rel 8 Tx. Power [dBm]	LTE Rel 10 Tx. Power [dBm]	Delta
	PCC	SCC	PCC				PCC			SCC					
	1st	2nd	Mode	BW (MHz)	Freq. (MHz)	RB/Offset	BW (MHz)	Channel	Freq. (MHz)	BW (MHz)	Channel	Freq. (MHz)			
4A-4A	4A	4A	QPSK	10	1750.0	1/25	10	2350	2150.0	10	2000	2115.0	13.28	13.08	-0.20
2A-4A	2A	4A	16QAM	10	1905.0	1/0	10	1150	1985.0	10	2175	2132.5	12.29	12.27	-0.02
	4A	2A	QPSK	10	1750.0	1/25	10	2350	2150.0	10	900	1960.0	13.28	13.08	-0.20
2A-5A	2A	5A	16QAM	10	1905.0	1/0	10	1150	1985.0	10	2525	881.5	12.29	12.31	0.02
	5A	2A	QPSK	10	836.5	1/25	10	2525	881.5	10	900	1960.0	15.24	15.04	-0.20
2A-13A	2A	13A	16QAM	10	1905.0	1/0	10	1150	1985.0	10	5230	751.0	12.29	12.27	-0.02
	13A	2A	QPSK	10	782.0	25/0	10	5230	751.0	10	900	1960.0	14.48	14.24	-0.24
4A-5A	4A	5A	QPSK	10	1750.0	1/25	10	2350	2150.0	10	2525	881.5	13.28	13.20	-0.08
	5A	4A	QPSK	10	836.5	1/25	10	2525	881.5	10	2175	2132.5	15.24	15.19	-0.05
4A-13A	4A	13A	QPSK	10	1750.0	1/25	10	2350	2150.0	10	5230	751.0	13.28	13.17	-0.11
	13A	4A	QPSK	10	782.0	25/0	10	5230	751.0	10	2175	2132.5	14.48	14.20	-0.28

Note:

- Per KDB 941225 D05A LTE Rel. 10 KDB Inquiry Sheet: SAR is excluded for Carrier Aggregation when measured power does not exceed LTE Release 8 by more than a 1/4 dBm
- When the same frequency band is used for both contiguous and non-contiguous in DL CA Intra band, power was measured using the configuration with the largest aggregated bandwidth and maximum output power among the contiguous and non-contiguous in DL CA Intra band configurations.

9.3 Wi-Fi 2.4GHz (DTS Band)

Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Max Pwr.			Reduction Pwr.		
					Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)	Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)
2.4	802.11b	1 Mbps	1	2412	20.5	21.0	Yes	13.7	14	Yes
			6	2437	20.4	21.0		13.3	14	
			11	2462	18.6	19.0		13.6	14	
	802.11g	6 Mbps	1	2412	Not Require	14.0	No	13.7	14	No
			6	2437		19.0		13.3	14	
			11	2462		12.0		11.7	12	
	802.11n (HT20)	6.5 Mbps	1	2412	Not Require	14.0	No	13.7	14	No
			6	2437		18.0		13.2	14	
			11	2462		12.0		11.6	12	

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 ≤ 1.2 W/kg.

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

Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Max Pwr.			Reduction Pwr.			
					Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)	Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)	
5.3 (U-NII 2A)	802.11a	6 Mbps	52	5260	15.8	17.0	Yes	Not Required	10.0	No	
			56	5280	16.5						
			60	5300	16.1						
			64	5320	16.1						
	802.11n (HT20)	6.5 Mbps	52	5260	Not Required	16.0	No	Not Required	10.0	No	
			56	5280							
			60	5300							
	802.11n (HT40)	13.5 Mbps	54	5270	Not Required	12.0	No	9.6	10.0	Yes	
			62	5310				9.6			
5.5 (U-NII 2C)	802.11a	6 Mbps	100	5500	13.6	15.0	Yes	Not Required	10.0	No	
			120	5600	13.5						
			140	5700	14.0						
	802.11n (HT20)	6.5 Mbps	100	5500	Not Required	15.0	No	Not Required	10.0	No	
			120	5600							14.1
			140	5700							14.2
	802.11n (HT40)	13.5 Mbps	102	5510	Not Required	11.0	No	9.5	10.0	Yes	
			118	5590				9.7			
			134	5670				9.3			
5.8 (U-NII 3)	802.11a	6 Mbps	149	5745	16.5	17.0	Yes	Not Required	10.0	No	
			157	5785	16.4						
			165	5825	16.6						
	802.11n (HT20)	6.5 Mbps	149	5745	Not Required	16.0	No	Not Required	10.0	No	
			157	5785							
			165	5825							
	802.11n (HT40)	13.5 Mbps	151	5755	Not Required	12.0	No	9.3	10.0	Yes	
			159	5795				9.5			

Note(s):

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

9.5 Bluetooth

Average Power Measured Results

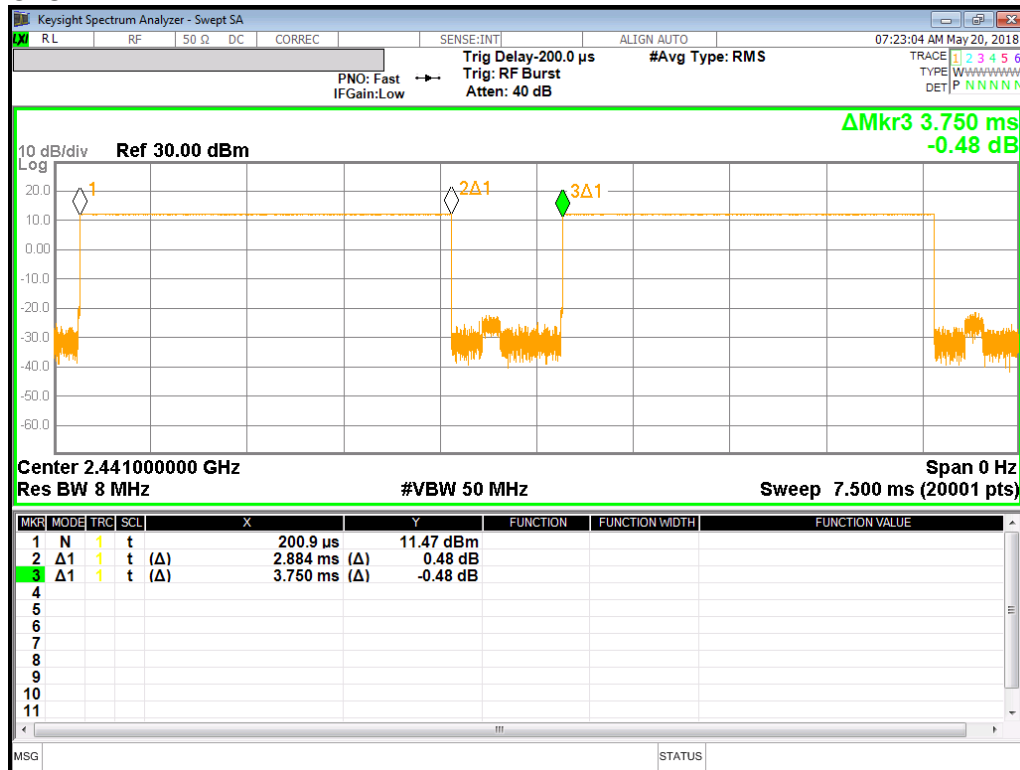
Band (GHz)	Mode	Ch #	Freq. (MHz)	Meas. Avg Pwr (dBm)
2.4	GFSK	0	2402	8.4
		39	2441	9.2
		78	2480	9.0
	EDR, $\pi/4$ DQPSK	0	2402	7.9
		39	2441	8.8
		78	2480	8.6
	EDR, 8-DPSK	0	2402	7.9
		39	2441	8.8
		78	2480	8.6
	LE, GFSK	0	2402	5.6
		19	2440	6.4
		39	2480	6.1

Duty Factor Measured Results

Mode	Type	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
GFSK	DH5	2.884	3.750	76.9%	1.30

Duty Cycle plots

GFSK



10 Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

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

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

KDB 447498 D01 General RF Exposure Guidance:

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

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

KDB 941225 D01 SAR test for 3G devices:

When the maximum output power and tune-up tolerance specified for production units in a secondary mode is $\leq \frac{1}{4}$ 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 ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode

KDB 941225 D05 SAR for LTE Devices:

SAR must be measured with the maximum TTI(transmit time interval) supported by the device in each LTE configuration.

SAR test reduction is applied using the following criteria:

- Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel.
- When the reported SAR is > 0.8 W/kg, testing for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel.
- Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are > 0.8 W/kg. Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation < 1.45 W/kg.
- Testing for 16-QAM modulation is not required because the reported SAR for QPSK is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of QPSK.
- Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.
- For LTE bands that do not support at least three non-overlapping channels in certain channel bandwidths, test the available non-overlapping channels instead. When a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing; therefore, the requirement for H, M and L channels may not fully apply.

KDB 248227 D01 SAR meas for 802.11:

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

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

- ≤ 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 ≤ 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 ≤ 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 ≤ 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 ≤ 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 II

RF Exposure Conditions	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	
Standalone	Rel 99 RMC	Off	17	Rear	9262	1852.4	24.5	23.0	0.821	1.157	1
					9400	1880.0	24.5	23.4	0.833	1.078	
					9538	1907.6	24.5	23.4	0.900	1.166	
			13	Edge 1	9262	1852.4	24.5	23.0	0.919	1.295	
					9400	1880.0	24.5	23.4	0.985	1.274	
					9538	1907.6	24.5	23.4	0.934	1.210	
			5	Edge 2	9262	1852.4	24.5	23.0	0.711	1.002	
					9400	1880.0	24.5	23.4	0.717	0.928	
					9538	1907.6	24.5	23.4	0.734	0.951	
	10	Corner A	9262	1852.4	24.5	23.0	0.810	1.142			
			9400	1880.0	24.5	23.4	0.804	1.040			
			9538	1907.6	24.5	23.4	0.853	1.105			
	Rel 99 RMC	On	0	Rear	9400	1880.0	11.0	10.1	0.548	0.672	
Edge 1				9400	1880.0	11.0	10.1	0.331	0.406		
Edge 2				9400	1880.0	11.0	10.1	0.085	0.104		
Corner A				9400	1880.0	11.0	10.1	0.135	0.166		

10.2 W-CDMA Band V

RF Exposure Conditions	Mode	Pwr back Off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
Standalone	Rel 99 RMC	Off	17	Rear	4183	836.6	25.0	23.6	0.515	0.704	
			13	Edge 1	4183	836.6	25.0	23.6	0.477	0.652	
			5	Edge 2	4183	836.6	25.0	23.6	0.526	0.719	
			10	Corner A	4183	836.6	25.0	23.6	0.078	0.106	
	Rel 99 RMC	On	0	Rear	4132	826.4	19.0	17.7	0.969	1.293	
					4183	836.6	19.0	17.8	0.932	1.221	
					4233	846.6	19.0	17.9	0.911	1.173	
				Edge 1	4183	836.6	19.0	17.8	0.383	0.502	
				Edge 2	4183	836.6	19.0	17.8	0.454	0.595	
				Corner A	4183	836.6	19.0	17.8	0.256	0.335	

10.3 LTE Band 2 (20MHz Bandwidth)

RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.	Meas.	Scaled	
Standalone	QPSK	Off	17	Rear	18700	1860.0	1	0	24.5	22.6	0.550	0.861	3
					18900	1880.0	1	0	24.5	23.3	0.627	0.823	
					19100	1900.0	1	0	24.5	23.7	0.703	0.852	
						50	0	23.5	23.3	0.591	0.613		
				Edge 1	18700	1860.0	1	0	24.5	22.6	0.636	0.996	
					18900	1880.0	1	0	24.5	23.3	0.702	0.921	
			19100		1900.0	1	0	24.5	23.7	0.722	0.875		
					50	0	23.5	23.3	0.548	0.569			
			Edge 2	19100	1900.0	1	0	24.5	23.7	0.534	0.647		
					50	0	23.5	23.3	0.436	0.452			
			Corner A	19100	1900.0	1	0	24.5	23.7	0.628	0.761		
					50	0	23.5	23.3	0.515	0.534			
	QPSK	On	0	Rear	19100	1900.0	1	49	13.0	12.4	0.589	0.680	
					50	24	13.0	12.3	0.563	0.661			
				Edge 1	19100	1900.0	1	49	13.0	12.4	0.271	0.313	
					50	24	13.0	12.3	0.274	0.322			
				Edge 2	19100	1900.0	1	49	13.0	12.4	0.092	0.106	
					50	24	13.0	12.3	0.096	0.112			
Corner A	19100	1900.0	1	49	13.0	12.4	0.188	0.217					
		50	24	13.0	12.3	0.200	0.235						

10.4 LTE Band 4 (20MHz Bandwidth)

RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.				
									Tune-up limit	Meas.	Meas.	Scaled					
Standalone	QPSK	Off	17	Rear	20175	1732.5	1	49	24.5	23.5	0.538	0.670	4				
							50	50	23.5	22.6	0.497	0.612					
			13	Edge 1			1	49	24.5	23.5	0.662	0.825					
							50	50	23.5	22.6	0.555	0.683					
			5	Edge 2			1	49	24.5	23.5	0.596	0.742					
							50	50	23.5	22.6	0.499	0.614					
			10	Corner A			1	49	24.5	23.5	0.485	0.604					
							50	50	23.5	22.6	0.378	0.465					
			QPSK	On			0	Rear	20175	1732.5	1	49		13.5	12.2	1.010	1.375
									50	50	13.5	12.1		1.000	1.368		
	100	0			13.5	12.0			0.996	1.392							
	Edge 1	20175			1732.5	1		49	13.5	12.2	0.608	0.828					
		50			50	13.5		12.1	0.623	0.852							
	Edge 2	20175			1732.5	1		49	13.5	12.2	0.191	0.260					
		50			50	13.5		12.1	0.197	0.270							
	Corner A	20175			1732.5	1		49	13.5	12.2	0.321	0.437					
			50	50	13.5	12.1	0.312	0.427									

10.5 LTE Band 5 (10MHz Bandwidth)

RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.	Meas.	Scaled	
Standalone	QPSK	Off	17	Rear	20525	836.5	1	25	25.2	24.3	0.534	0.656	5
							25	25	24.2	23.2	0.419	0.522	
			13	Edge 1	20525	836.5	1	25	25.2	24.3	0.397	0.488	
							25	25	24.2	23.2	0.304	0.379	
			5	Edge 2	20525	836.5	1	25	25.2	24.3	0.436	0.536	
							25	25	24.2	23.2	0.339	0.422	
			10	Corner A	20525	836.5	1	25	25.2	24.3	0.079	0.097	
							25	25	24.2	23.2	0.061	0.076	
	QPSK	On	0	Rear	20525	836.5	1	25	16.0	15.2	0.289	0.344	
							25	12	16.0	15.0	0.285	0.358	
				Edge 1	20525	836.5	1	25	16.0	15.2	0.106	0.126	
							25	12	16.0	15.0	0.106	0.133	
				Edge 2	20525	836.5	1	25	16.0	15.2	0.112	0.133	
							25	12	16.0	15.0	0.115	0.144	
				Corner A	20525	836.5	1	25	16.0	15.2	0.071	0.084	
							25	12	16.0	15.0	0.069	0.086	

10.6 LTE Band 7 (20MHz Bandwidth)

RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.		
									Tune-up limit	Meas.	Meas.	Scaled			
Standalone	QPSK	Off	14	Rear	20850	2510.0	1	49	23.0	22.2	0.702	0.838			
							50	0	22.0	21.2	0.566	0.685			
					21100	2535.0	1	49	23.0	22.1	0.666	0.810			
							21350	2560.0	1	49	23.0	22.0		0.650	0.822
					10	Edge 1	20850	2510.0	1	49	23.0	22.2	0.873	1.043	
									50	0	22.0	21.2	0.721	0.873	
			21100	2535.0			1	49	23.0	22.1	0.969	1.179			
							50	0	22.0	21.1	0.740	0.911			
			21350	2560.0			1	49	23.0	22.0	0.862	1.090			
							50	0	22.0	21.1	0.720	0.893			
			100	0	22.0	21.0	0.710	0.889							
			0	Edge 2	20850	2510.0	1	49	23.0	22.2	0.993	1.186	6		
							50	0	22.0	21.2	0.826	1.000			
					21100	2535.0	1	49	23.0	22.1	0.967	1.176			
							50	0	22.0	21.1	0.746	0.918			
					21350	2560.0	1	49	23.0	22.0	0.750	0.948			
							50	0	22.0	21.1	0.674	0.836			
			100	0	22.0	21.0	0.654	0.819							
			0	Edge 4	20850	2510.0	1	49	23.0	22.2	0.231	0.276			
							50	0	22.0	21.2	0.164	0.199			
			QPSK	On	0	Rear	21100	2535.0	1	49	12.0	10.8	0.488	0.648	
									50	24	12.0	10.8	0.477	0.629	
									1	49	12.0	10.8	0.255	0.339	
						Edge 1	21100	2535.0	1	49	12.0	10.8	0.255	0.339	
50	24	12.0							10.8	0.256	0.338				
1	49	12.0							10.8	0.255	0.339				

10.7 LTE Band 13 (10MHz Bandwidth)

RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.	Meas.	Scaled	
Standalone	QPSK	Off	17	Rear	23230	782.0	1	25	25.0	23.9	0.379	0.491	
							25	0	24.0	23.0	0.298	0.378	
			13	Edge 1	23230	782.0	1	25	25.0	23.9	0.365	0.473	
							25	0	24.0	23.0	0.285	0.361	
			5	Edge 2	23230	782.0	1	25	25.0	23.9	0.404	0.524	7
							25	0	24.0	23.0	0.311	0.394	
			10	Corner A	23230	782.0	1	25	25.0	23.9	0.051	0.066	
							25	0	24.0	23.0	0.040	0.050	
	QPSK	On	0	Rear	23230	782.0	1	25	16.0	14.4	0.286	0.413	
							25	0	16.0	14.5	0.283	0.401	
				Edge 1	23230	782.0	1	25	16.0	14.4	0.149	0.215	
							25	0	16.0	14.5	0.147	0.208	
				Edge 2	23230	782.0	1	25	16.0	14.4	0.146	0.211	
							25	0	16.0	14.5	0.142	0.201	
Corner A	23230	782.0	1	25	16.0	14.4	0.070	0.102					
			25	0	16.0	14.5	0.068	0.097					

10.8 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)	Duty Cycle (%)	Power (dBm)		1-g SAR (W/kg)		Note	Plot No.
										Tune-up limit	Meas.	Meas.	Scaled		
2.4GHz	802.11b 1 Mbps	Standalone	Off	11	Rear	1	2412.0	0.610	99.7	21.0	20.5	0.474	0.533	2	
					Edge 1	1	2412.0	0.203	99.7	21.0	20.5	0.162	0.182	4	
					Edge 4	1	2412.0	0.767	99.7	21.0	20.5	0.640	0.720		
					Corner B	1	2412.0	0.300	99.7	21.0	20.5				
			On	0	Rear	1	2412.0	1.090	99.7	14.0	13.7	0.792	0.851		8
						11	2462.0	1.020	99.7	14.0	13.6	0.771	0.848	3	
					Edge 1	1	2412.0	0.144	99.7	14.0	13.7	0.124	0.133	4	
					Edge 4	1	2412.0	0.574	99.7	14.0	13.7	0.525	0.564	2	
					Corner B	1	2412.0	0.148	99.7	14.0	13.7				

Note(s):

- Highest reported SAR is ≤ 0.4 or 1.0 W/kg (1-g or 10-g respectively). Therefore, further SAR measurements within this exposure condition are not required.
- Highest reported SAR is > 0.4 or 1.0 W/kg (1-g or 10-g respectively). Due to the highest reported SAR for this test position, other test positions in this exposure condition were evaluated until a SAR ≤ 0.8 or 2.0 W/kg (1-g or 10-g respectively) was reported.
- Testing for a second channel was required because the reported SAR for this test position was > 0.8 or 2.0 W/kg (1-g or 10-g respectively).
- Additional testing required in order satisfying FCC simultaneous transmission limit criteria.
- SAR testing is not required for OFDM mode(s) when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

10.9 Wi-Fi (U-NII Band)

Frequency Band	Mode	RF Exposure Conditions	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle (%)	Power (dBm)		1-g SAR (W/kg)		Note	Plot No.
										Tune-up limit	Meas.	Meas.	Scaled		
5.3 GHz U-NII 2A	802.11a 6 Mbps	Standalone	Off	11	Rear	56	5280.0	1.339	98.2	17.0	16.5	0.579	0.660	2	
				8	Edge 1	56	5280.0	1.621	98.2	17.0	16.5	0.697	0.794		9
				6	Edge 4	56	5280.0	0.794	98.2	17.0	16.5				
				6	Corner B	56	5280.0	1.035	98.2	17.0	16.5				
	802.11n 13.5 Mbps (HT40)		On	0	Rear	62	5310.0	1.258	96.1	10.0	9.6	0.611	0.694		
				0	Edge 1	62	5310.0	0.752	96.1	10.0	9.6				
				0	Edge 4	62	5310.0	0.409	96.1	10.0	9.6				
				0	Corner B	62	5310.0	0.765	96.1	10.0	9.6	0.367	0.417	2	
5.5 GHz U-NII 2C	802.11a 6 Mbps	Standalone	Off	11	Rear	140	5700.0	0.483	98.2	15.0	14.0				
				8	Edge 1	140	5700.0	0.566	98.2	15.0	14.0	0.290	0.369	2	
				6	Edge 4	140	5700.0	0.563	98.2	15.0	14.0				
				6	Corner B	140	5700.0	0.567	98.2	15.0	14.0	0.261	0.332		
	802.11n 13.5 Mbps (HT40)		On	0	Rear	102	5510.0	1.467	96.1	10.0	9.5	0.743	0.863	3	
				118		5590.0	1.579	96.1	10.0	9.7	0.798	0.890		10	
				0	Edge 1	118	5590.0	0.865	96.1	10.0	9.7	0.421	0.469	2	
				0	Edge 4	118	5590.0	0.649	96.1	10.0	9.7				
				0	Corner B	118	5590.0	0.799	96.1	10.0	9.7				
5.8 GHz U-NII 3	802.11a 6 Mbps	Standalone	Off	11	Rear	165	5825.0	1.175	98.2	17.0	16.6				
				8	Edge 1	165	5825.0	0.936	98.2	17.0	16.6				
				6	Edge 4	165	5825.0	1.427	98.2	17.0	16.6	0.647	0.715		
				6	Corner B	165	5825.0	1.412	98.2	17.0	16.6	0.720	0.796	2	
	802.11n 13.5 Mbps (HT40)		On	0	Rear	151	5755.0	1.535	96.1	10.0	9.3	0.682	0.830	3	
				159		5795.0	1.459	96.1	10.0	9.5	0.721	0.836		11	
				0	Edge 1	159	5795.0	0.784	96.1	10.0	9.5				
				0	Edge 4	159	5795.0	0.720	96.1	10.0	9.5				
				0	Corner B	159	5795.0	0.963	96.1	10.0	9.5	0.503	0.583	2	

Note(s):

- Highest reported SAR is ≤ 0.4 or 1.0 W/kg (1-g or 10-g respectively). Therefore, further SAR measurements within this exposure condition are not required.
- Highest reported SAR is > 0.4 or 1.0 W/kg (1-g or 10-g respectively). Due to the highest reported SAR for this test position, other test positions in this exposure condition were evaluated until a SAR ≤ 0.8 or 2.0 W/kg (1-g or 10-g respectively) was reported.
- Testing for a second channel was required because the reported SAR for this test position was > 0.8 or 2.0 W/kg (1-g or 10-g respectively).
- Additional testing required in order satisfying FCC simultaneous transmission limit criteria.

10.10 Bluetooth

Frequency Band	Mode	RF Exposure Conditions	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle (%)	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.	Meas.	Scaled	
2.4GHz	GFSK	Standalone	N/A	0	Rear	39	2441.0	76.9	10.0	9.2	0.219	0.339	12
				0	Edge 1	39	2441.0	76.9	10.0	9.2	0.030	0.046	
				0	Edge 4	39	2441.0	76.9	10.0	9.2	0.115	0.178	

11 SAR Measurement Variability

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

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

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	First Repeated	
						Measured SAR (W/kg)	Largest to Smallest SAR Ratio
750	LTE Band 13	Standalone	Edge 2	No	0.404	N/A	N/A
850	WCDMA Band V	Standalone	Rear	Yes	0.969	0.97	1.00
	LTE Band 5	Standalone	Rear	No	0.534	N/A	N/A
1750	LTE Band 4	Standalone	Rear	Yes	1.010	1.010	1.00
1900	WCDMA Band II	Standalone	Edge 1	Yes	0.985	0.980	1.01
	LTE Band 2	Standalone	Edge 1	No	0.722	N/A	N/A
2400	Wi-Fi 802.11b/g/n	Standalone	Rear	No	0.792	N/A	N/A
	Bluetooth	Standalone	Rear	No	0.219	N/A	N/A
2600	LTE Band 7	Standalone	Edge 2	Yes	0.993	1.000	1.01
5300	Wi-Fi 802.11a/n/ac	Standalone	Edge 1	No	0.697	N/A	N/A
5500	Wi-Fi 802.11a/n/ac	Standalone	Rear	No	0.798	N/A	N/A
5800	Wi-Fi 802.11a/n/ac	Standalone	Rear	No	0.721	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:

SAR₁ 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

SAR₂ 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		
	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 and UNII supports Hotspot.
2. DTS and UNII supports Wi-Fi Direct.
3. W-CDMA and LTE supports Hotspot and VoIP.
4. DTS Radio cannot transmit simultaneously with Bluetooth Radio.
5. U-NII Radio cannot transmit simultaneously with Bluetooth Radio.
6. U-NII Radio cannot transmit simultaneously with DTS 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:
 - o When the separation distance from the antenna to an adjacent edge is ≤ 5 mm, a distance of 5 mm is applied for SAR estimation; this is the same between test exclusion and SAR estimation calculations.
 - o When the separation distance from the antenna to an adjacent edge is > 5 mm but ≤ 50 mm, the actual antenna-to-edge separation distance is applied for SAR estimation.
 - o 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
Full Power, Proximity Sensor Off																
Cellular	W-CDMA II	1907.6	24.50	282	0	2	2	185	82							
Cellular	W-CDMA V	846.6	25.00	316	0	2	2	185	82							
Cellular	LTE Band 2	1900	24.50	282	0	2	2	185	82							
Cellular	LTE Band 4	1732.5	24.50	282	0	2	2	185	82							
Cellular	LTE Band 5	836.5	25.20	331	0	2	2	185	82							
Cellular	LTE Band 7	2560	23.00	200	0	2	48	185	59							
Cellular	LTE Band 13	782	25.00	316	0	2	2	185	82							
Power Back-off, Proximity Sensor On																
Cellular	W-CDMA II	1907.6	11.00	13	0	2	2									
Cellular	W-CDMA V	846.6	19.00	79	0	2	2									
Cellular	LTE Band 2	1900	13.00	20	0	2	2									
Cellular	LTE Band 4	1732.5	13.50	22	0	2	2									
Cellular	LTE Band 5	836.5	16.00	40	0	2	2									
Cellular	LTE Band 7	2560	12.00	16	0	2										
Cellular	LTE Band 13	782	16.00	40	0	2	2									

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	
Full Power, Proximity Sensor Off																
Wi-Fi 2.4 GHz	2462	21.00	126	0	2	87	185	2								
Wi-Fi 5.3 GHz	5320	17.00	50	0	2	87	185	2								
Wi-Fi 5.5 GHz	5700	15.00	32	0	2	87	185	2								
Wi-Fi 5.8 GHz	5825	17.00	50	0	2	87	185	2								
Bluetooth	2480	10.00	10	0	2	87	185	2								
Power Back-off, Proximity Sensor On																
Wi-Fi 2.4 GHz	2462	14	25	0	2			2								
Wi-Fi 5.3 GHz	5320	10	10	0	2			2								
Wi-Fi 5.5 GHz	5700	10	10	0	2			2								
Wi-Fi 5.8 GHz	5825	10	10	0	2			2								

12.1 Sum of the SAR for WCDMA Band II & Wi-Fi & BT

Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)		
	WWAN ①	DTS ②	U-NII ③	BT ④	WWAN + DTS ① + ②	WWAN + U-NII ① + ③	WWAN + BT ① + ④
Rear	1.166	0.851	0.890	0.339	2.017	2.056	1.505
Edge 1	1.295	0.182	0.794	0.046	1.477	2.089	1.341
Edge 2	1.002	0.400	0.400	0.400	1.402	1.402	1.402
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.400	0.720	0.715	0.178	1.120	1.115	0.578
Corner A	1.142	0.400	0.400	0.400	1.542	1.542	1.542
Corner B	0.400	0.851	0.796		1.251	1.196	0.400

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure	
	① WWAN	② DTS	③ U-NII	④ BT						
Rear	1.166	0.851			① + ②	2.017	95.6	0.03	No	1
	1.166		0.890		① + ③	2.056	92.8	0.03	No	2
Edge 1	1.295		0.794		① + ③	2.089	80.5	0.04	No	3

12.2 Sum of the SAR for WCDMA Band V & Wi-Fi & BT

Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)		
	WWAN ①	DTS ②	U-NII ③	BT ④	WWAN + DTS ① + ②	WWAN + U-NII ① + ③	WWAN + BT ① + ④
Rear	1.293	0.851	0.890	0.339	2.144	2.183	1.632
Edge 1	0.652	0.182	0.794	0.046	0.834	1.446	0.698
Edge 2	0.719	0.400	0.400	0.400	1.119	1.119	1.119
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.400	0.720	0.715	0.178	1.120	1.115	0.578
Corner A	0.335	0.400	0.400	0.400	0.735	0.735	0.735
Corner B	0.400	0.851	0.796		1.251	1.196	0.400

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure	
	① WWAN	② DTS	③ U-NII	④ BT						
Rear	1.293	0.851			① + ②	2.144	86.3	0.04	No	4
	1.293		0.890		① + ③	2.183	83.8	0.04	No	5
	1.293			0.339	① + ④	1.632	83.9	0.02	No	6

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

Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)		
	WWAN ①	DTS ②	U-NII ③	BT ④	WWAN + DTS ① + ②	WWAN + U-NII ① + ③	WWAN + BT ① + ④
Rear	0.861	0.851	0.890	0.339	1.712	1.751	1.200
Edge 1	0.996	0.182	0.794	0.046	1.178	1.790	1.042
Edge 2	0.647	0.400	0.400	0.400	1.047	1.047	1.047
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.400	0.720	0.715	0.178	1.120	1.115	0.578
Corner A	0.761	0.400	0.400	0.400	1.161	1.161	1.161
Corner B	0.400	0.851	0.796		1.251	1.196	0.400

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure	
	① WWAN	② DTS	③ U-NII	④ BT						
Rear	0.861	0.851			① + ②	1.712	100.4	0.02	No	7
	0.861		0.890		① + ③	1.751	97.5	0.02	No	8
Edge 1	0.996		0.794		① + ③	1.790	82.0	0.03	No	9

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

Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)		
	WWAN ①	DTS ②	U-NII ③	BT ④	WWAN + DTS ① + ②	WWAN + U-NII ① + ③	WWAN + BT ① + ④
Rear	1.392	0.851	0.890	0.339	2.243	2.282	1.731
Edge 1	0.852	0.182	0.794	0.046	1.034	1.646	0.898
Edge 2	0.742	0.400	0.400	0.400	1.142	1.142	1.142
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.400	0.720	0.715	0.178	1.120	1.115	0.578
Corner A	0.604	0.400	0.400	0.400	1.004	1.004	1.004
Corner B	0.400	0.851	0.796		1.251	1.196	0.400

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure	
	① WWAN	② DTS	③ U-NII	④ BT						
Rear	1.392	0.851			① + ②	2.243	93.9	0.04	No	10
	1.392		0.890		① + ③	2.282	91.4	0.04	No	11
	1.392			0.339	① + ④	1.731	91.5	0.02	No	12
Edge 1	0.852		0.794		① + ③	1.646	80.5	0.03	No	13

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

Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)		
	WWAN	DTS	U-NII	BT	WWAN + DTS	WWAN + U-NII	WWAN + BT
	①	②	③	④	① + ②	① + ③	① + ④
Rear	0.656	0.851	0.890	0.339	1.507	1.546	0.995
Edge 1	0.488	0.182	0.794	0.046	0.670	1.282	0.534
Edge 2	0.536	0.400	0.400	0.400	0.936	0.936	0.936
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.400	0.720	0.715	0.178	1.120	1.115	0.578
Corner A	0.097	0.400	0.400	0.400	0.497	0.497	0.497
Corner B	0.400	0.851	0.796		1.251	1.196	0.400

12.6 Sum of the SAR for LTE Band 7 & Wi-Fi & BT

Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)		
	WWAN	DTS	U-NII	BT	WWAN + DTS	WWAN + U-NII	WWAN + BT
	①	②	③	④	① + ②	① + ③	① + ④
Rear	0.838	0.851	0.890	0.339	1.689	1.728	1.177
Edge 1	1.179	0.182	0.794	0.046	1.361	1.973	1.225
Edge 2	1.186	0.400	0.400	0.400	1.586	1.586	1.586
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.276	0.720	0.715	0.178	0.996	0.991	0.454
Corner A		0.400	0.400	0.400	0.400	0.400	0.400
Corner B	0.400	0.851	0.796		1.251	1.196	0.400

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure	
	① WWAN	② DTS	③ U-NII	④ BT						
Rear	0.838	0.851			① + ②	1.689	68.7	0.03	No	14
	0.838		0.890		① + ③	1.728	66.5	0.03	No	15
Edge 1	1.179		0.794		① + ③	1.973	78.4	0.04	No	16

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

Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)		
	WWAN	DTS	U-NII	BT	WWAN + DTS	WWAN + U-NII	WWAN + BT
	①	②	③	④	① + ②	① + ③	① + ④
Rear	0.491	0.851	0.890	0.339	1.342	1.381	0.830
Edge 1	0.473	0.182	0.794	0.046	0.655	1.267	0.519
Edge 2	0.524	0.400	0.400	0.400	0.924	0.924	0.924
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.400	0.720	0.715	0.178	1.120	1.115	0.578
Corner A	0.102	0.400	0.400	0.400	0.502	0.502	0.502
Corner B	0.400	0.851	0.796		1.251	1.196	0.400

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.

Figure (1)

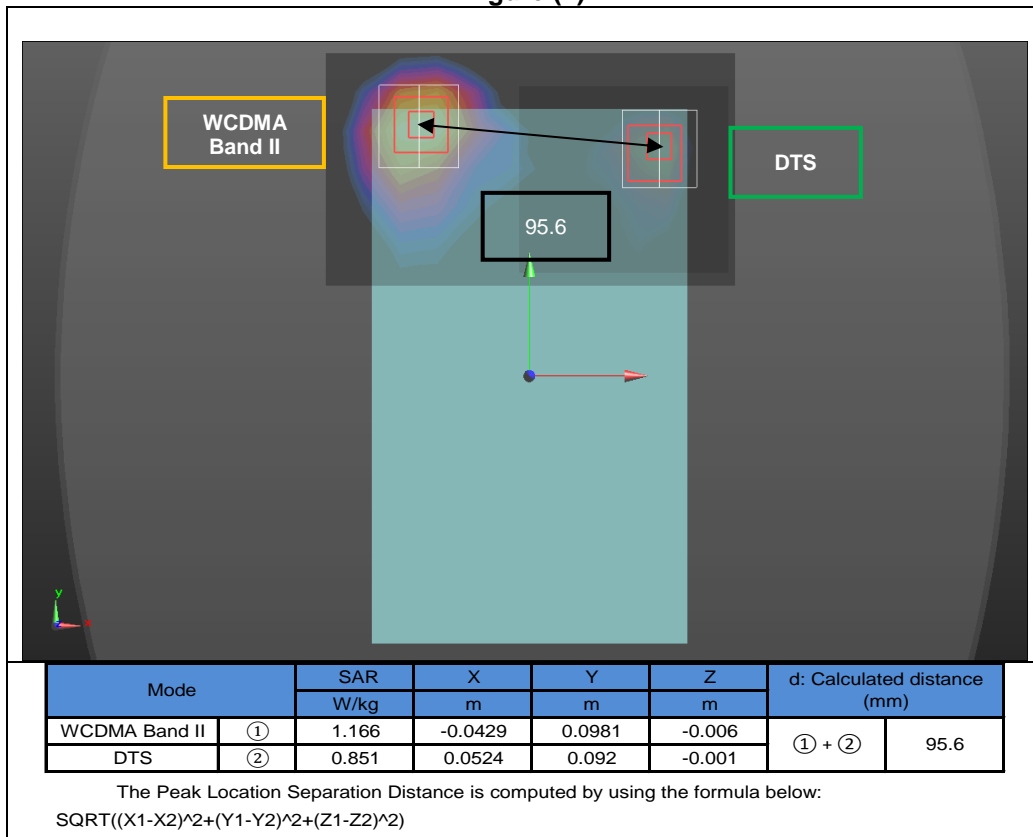


Figure (2)

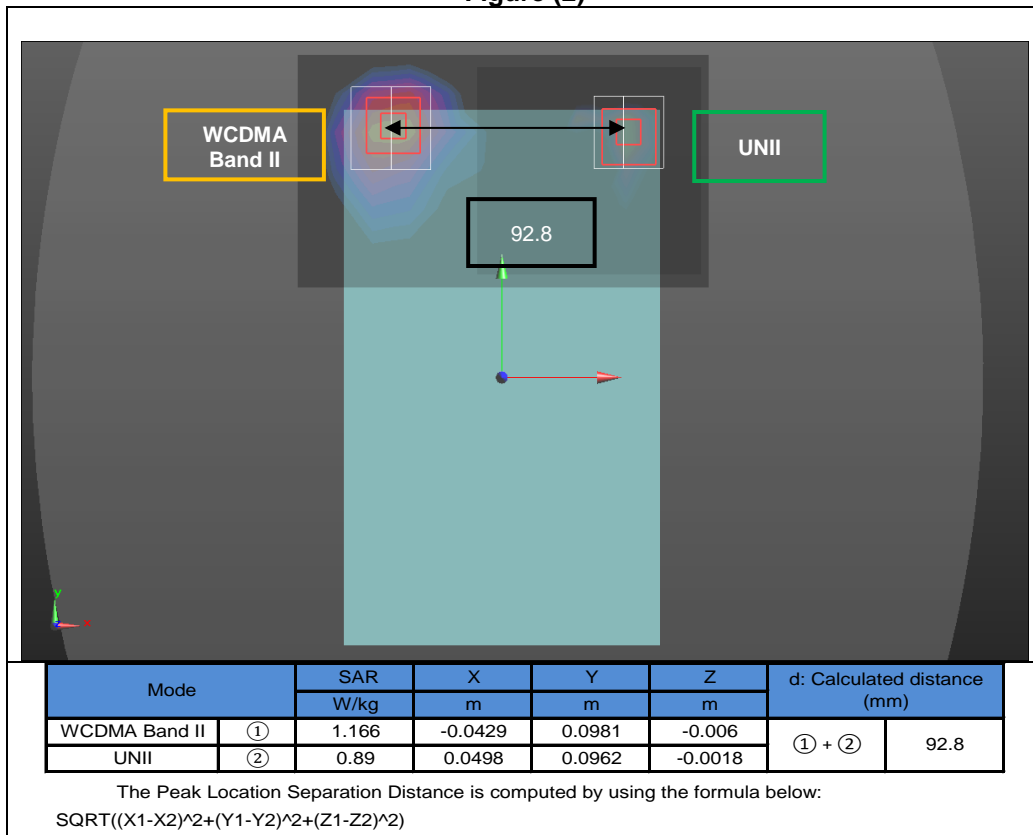


Figure (3)

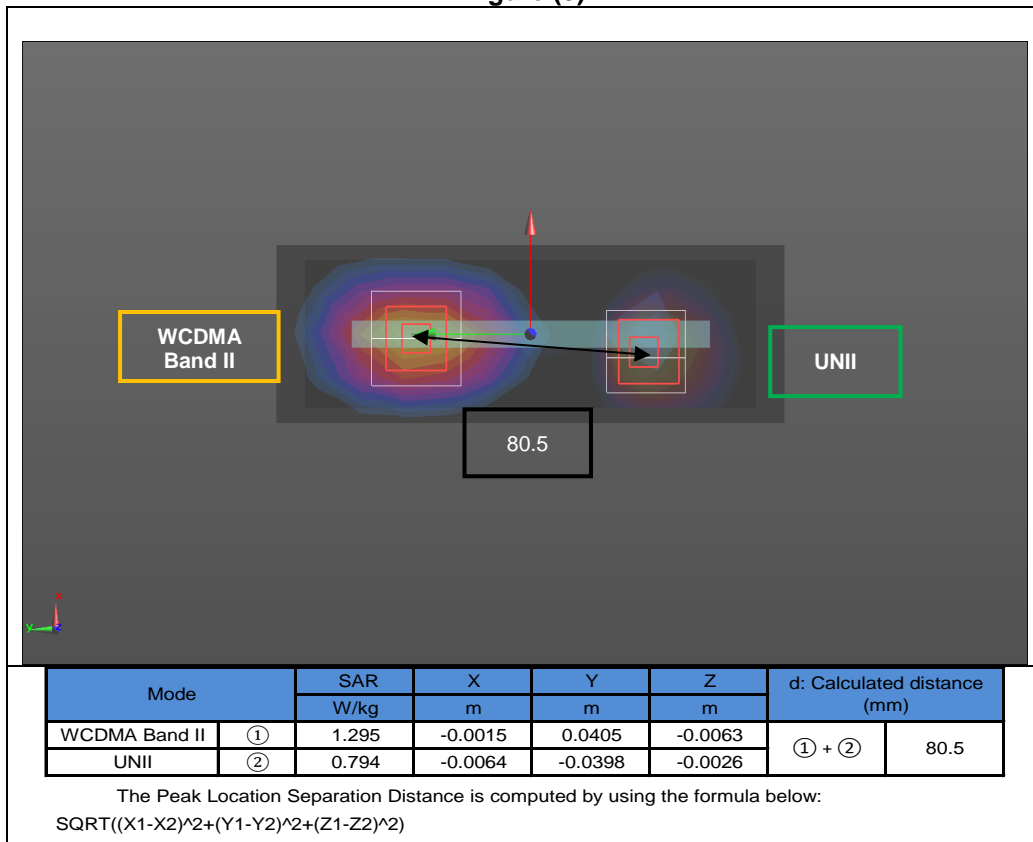


Figure (4)

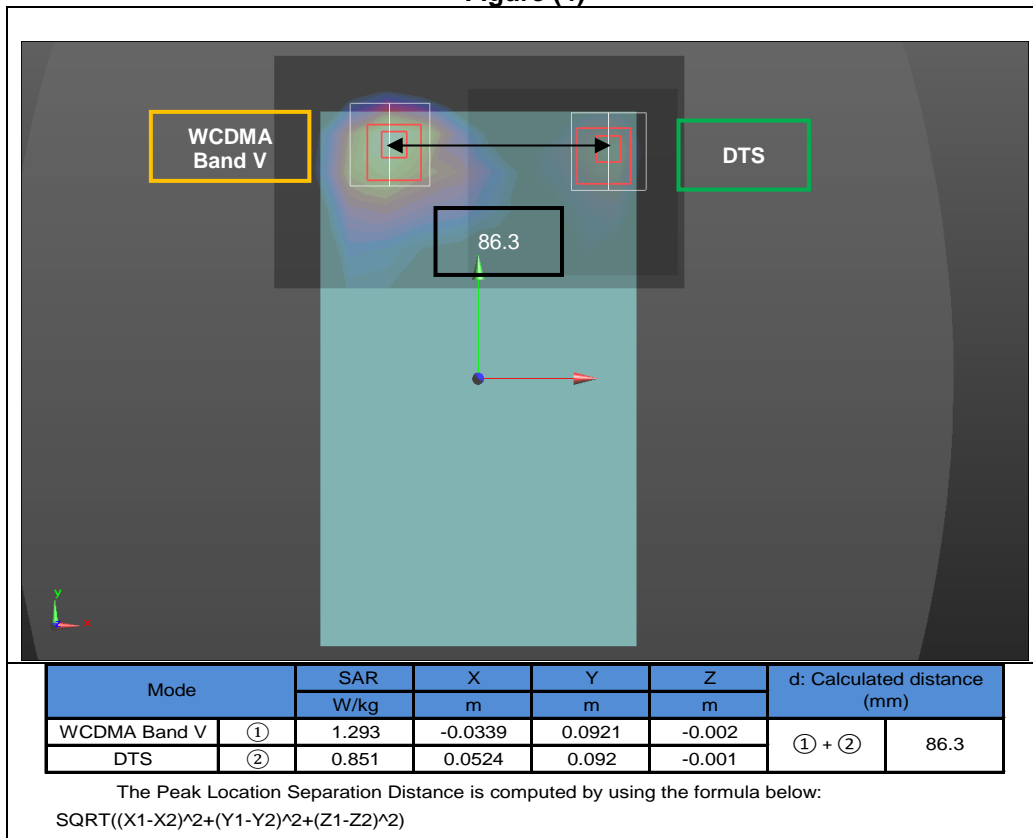


Figure (5)

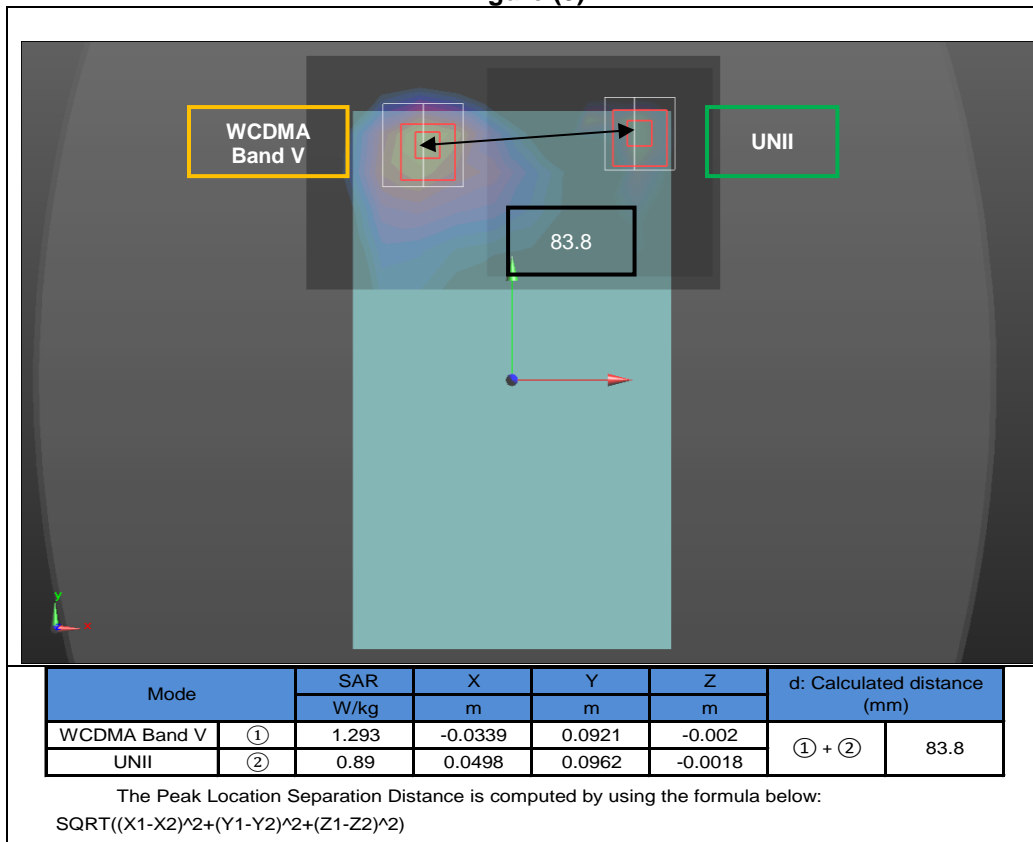


Figure (6)

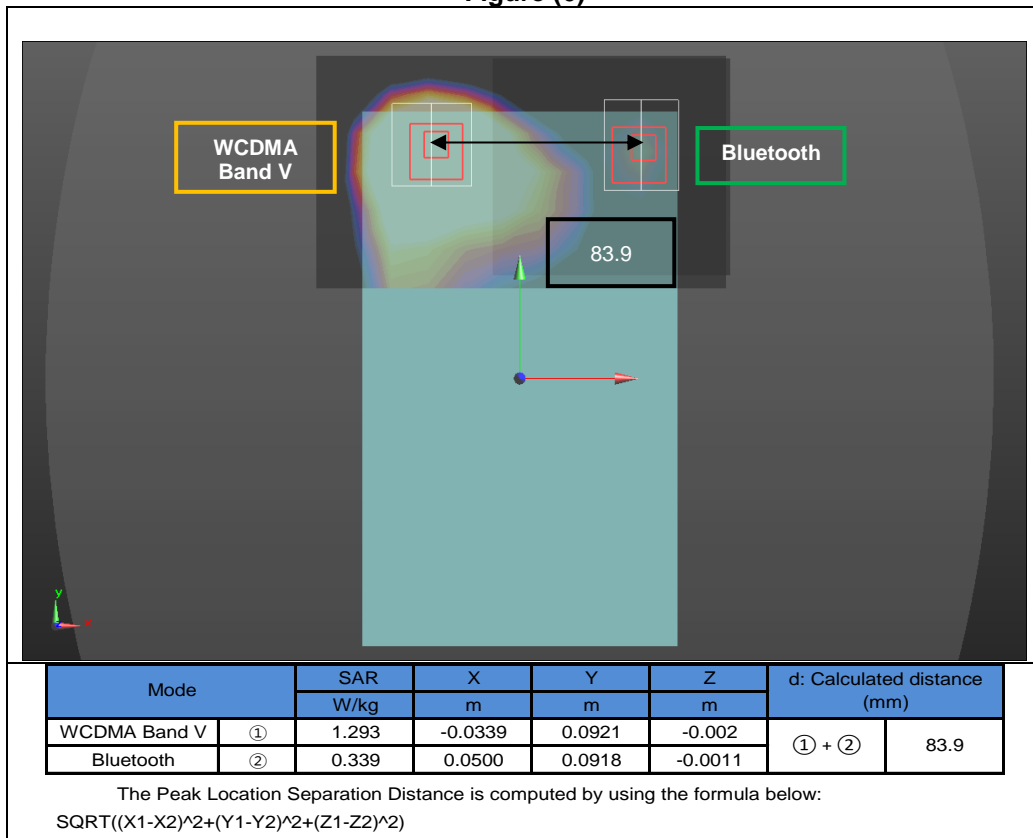


Figure (7)

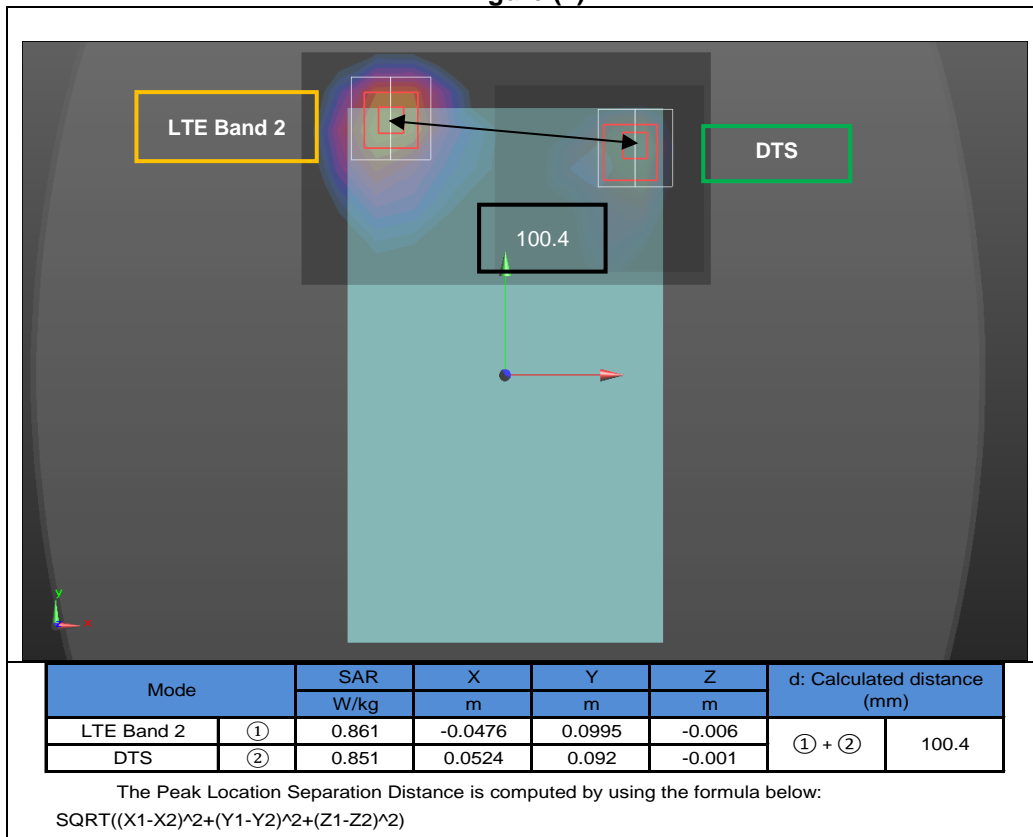


Figure (8)

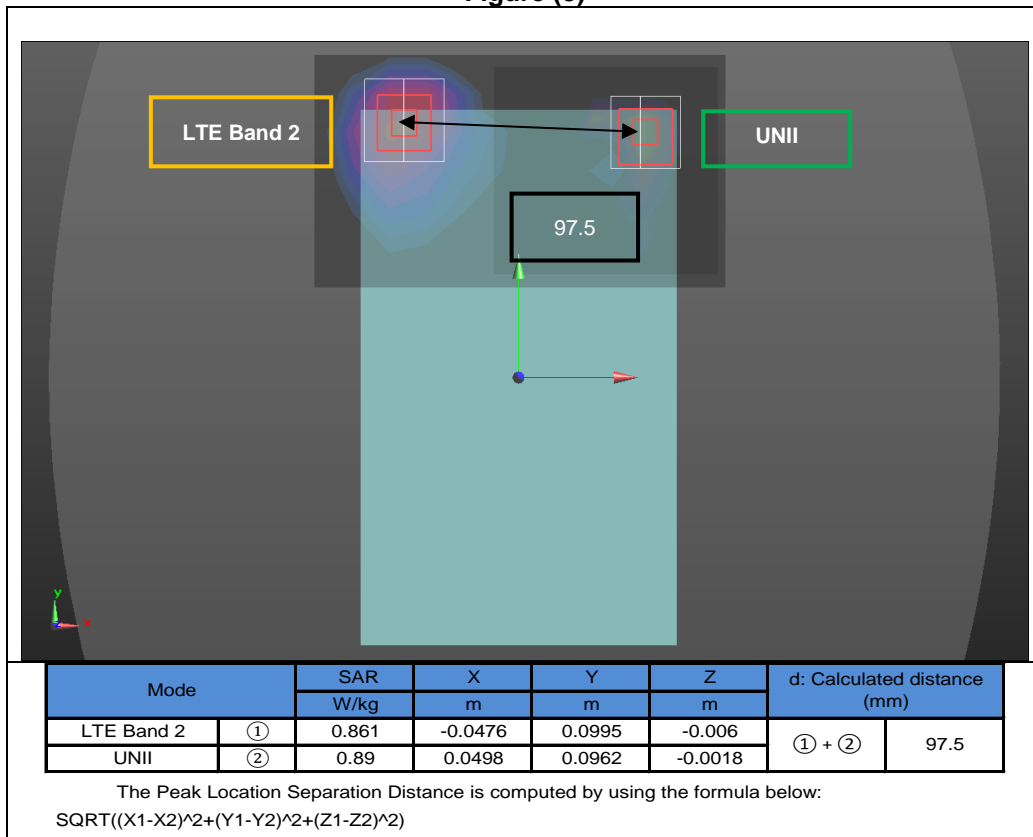


Figure (9)

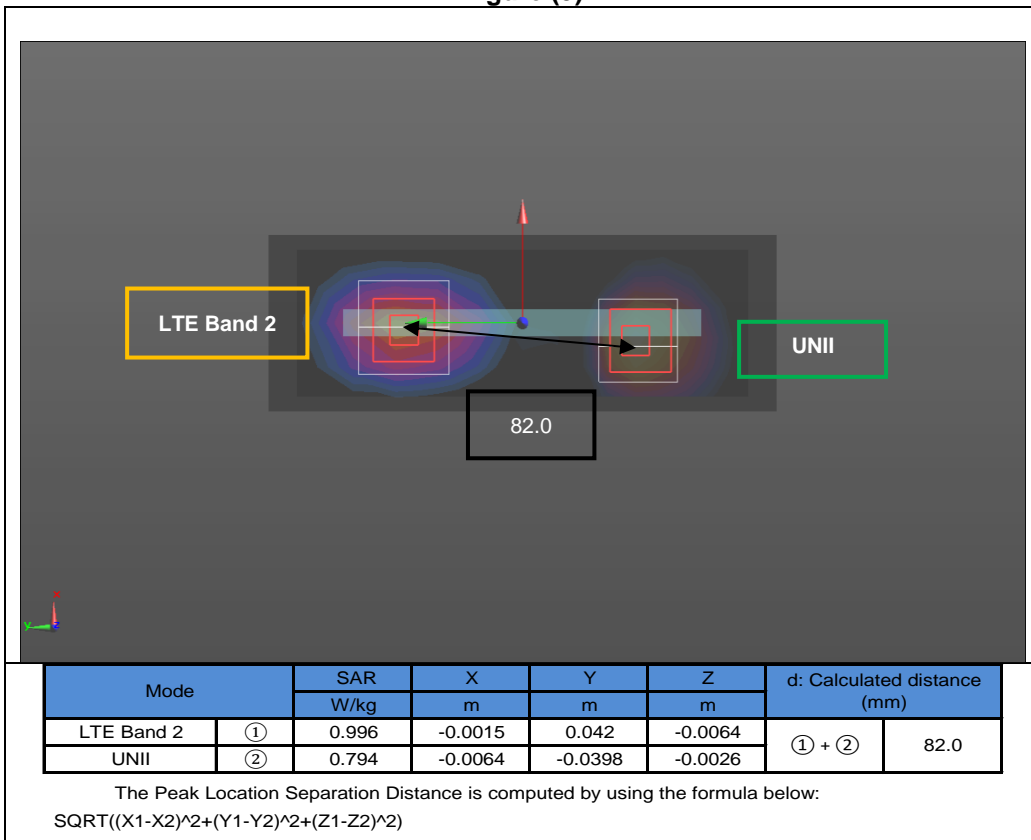


Figure (10)

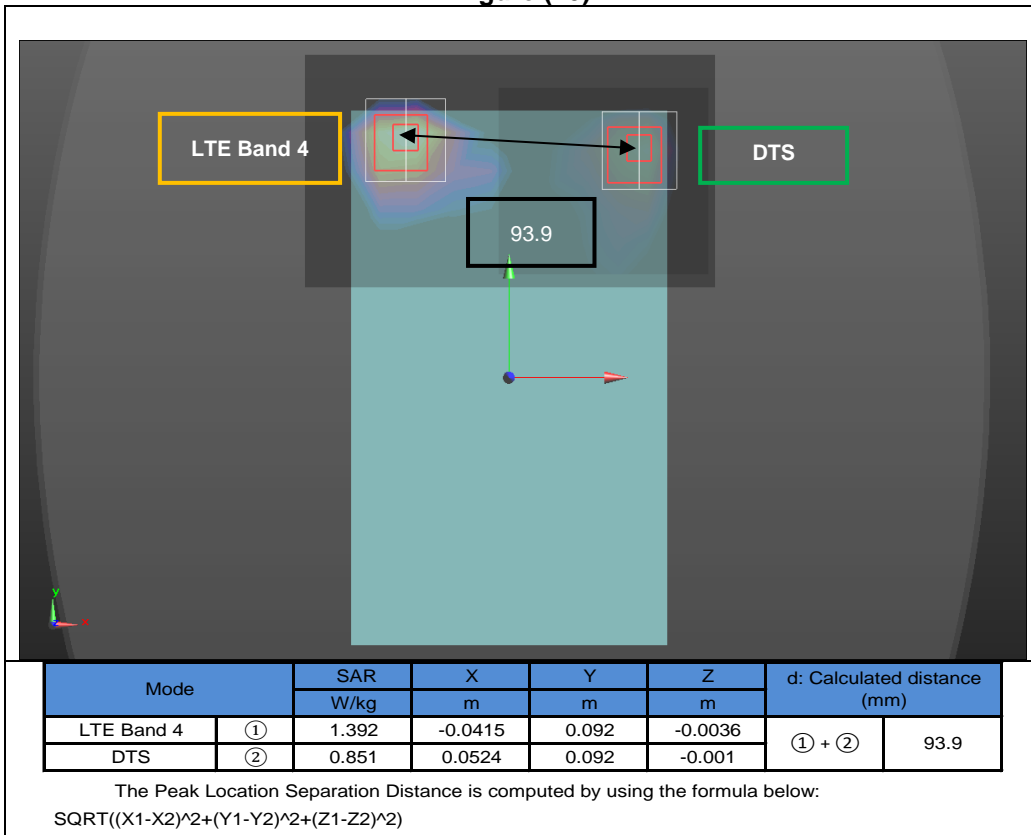


Figure (11)

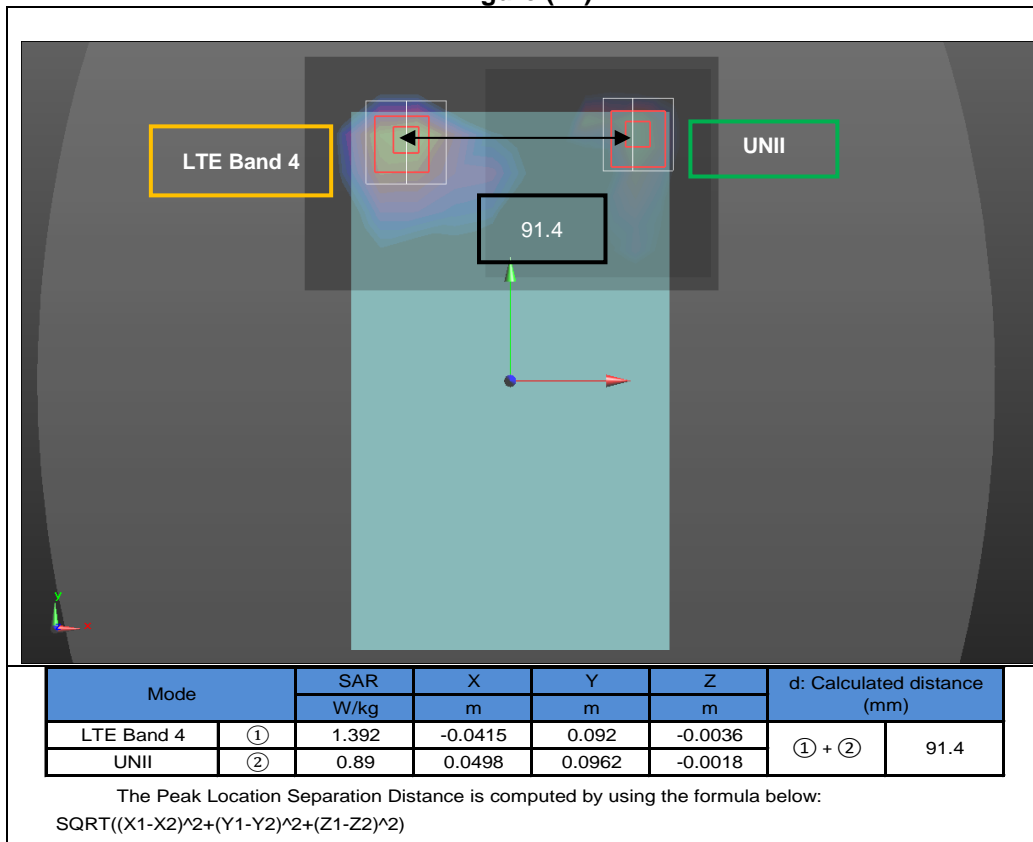


Figure (12)

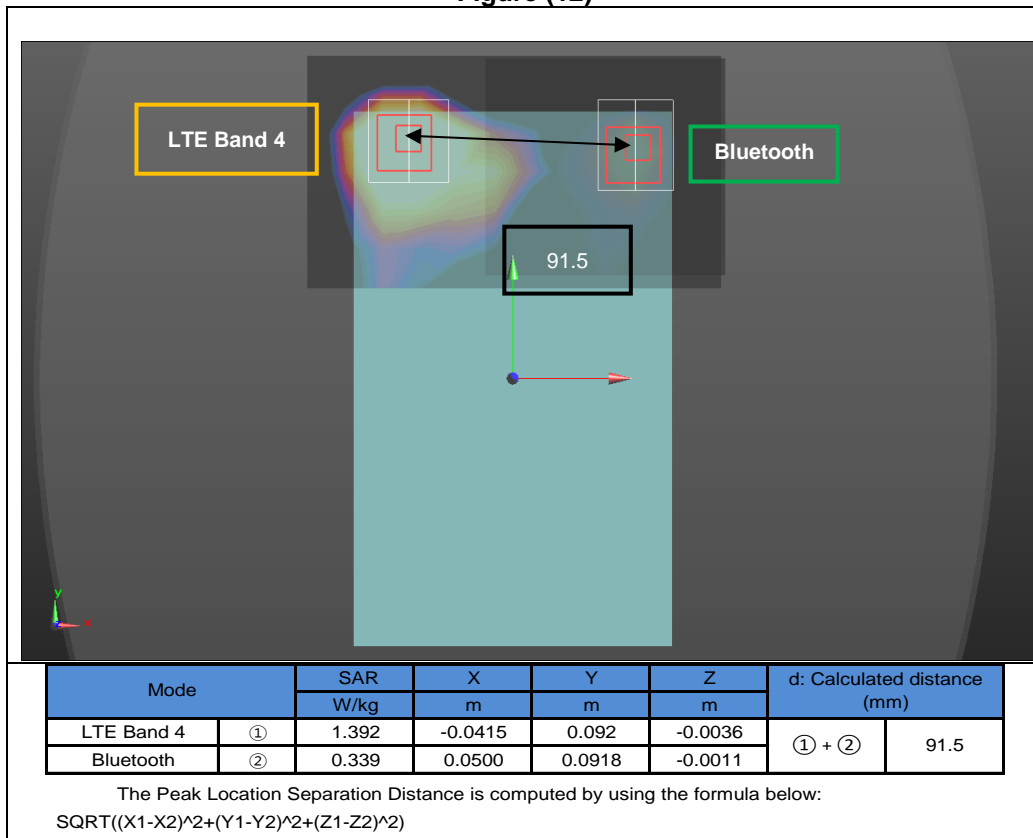


Figure (13)

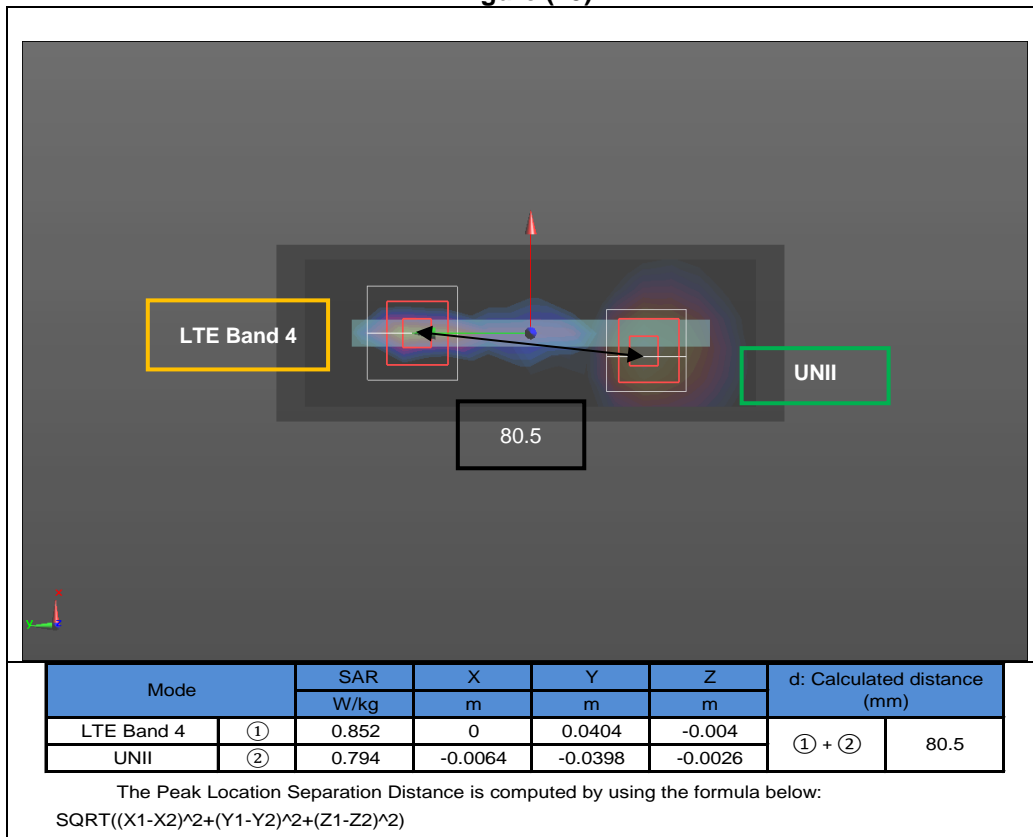


Figure (14)

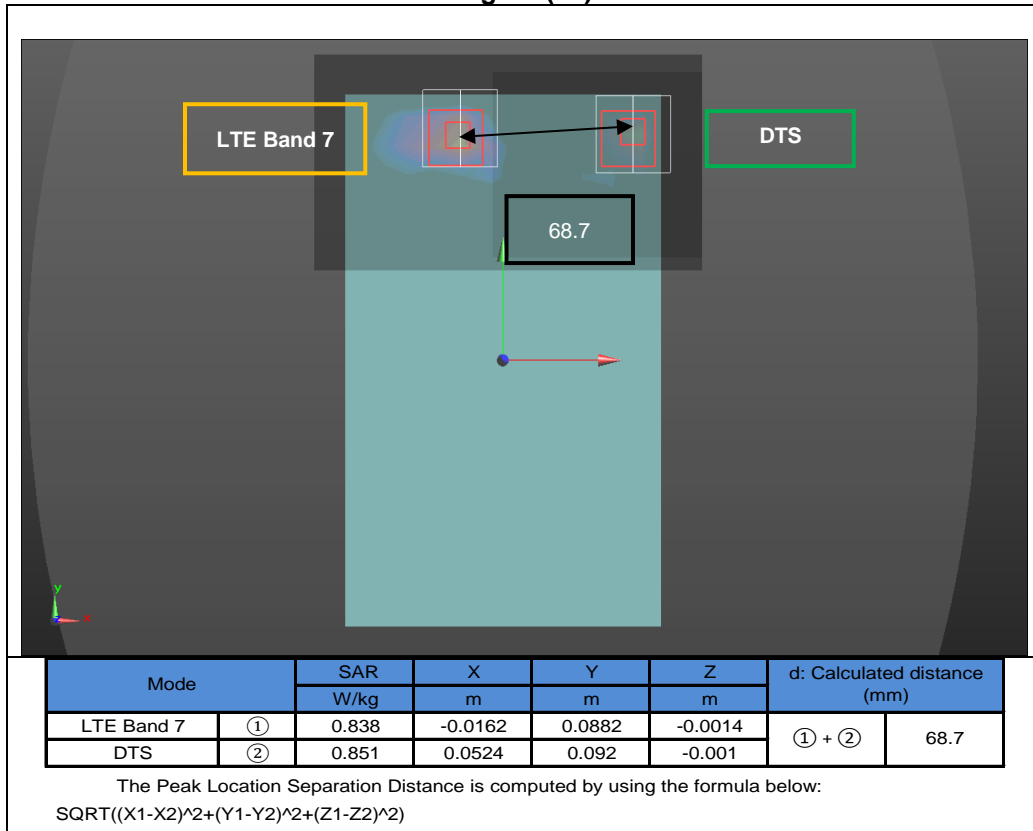


Figure (15)

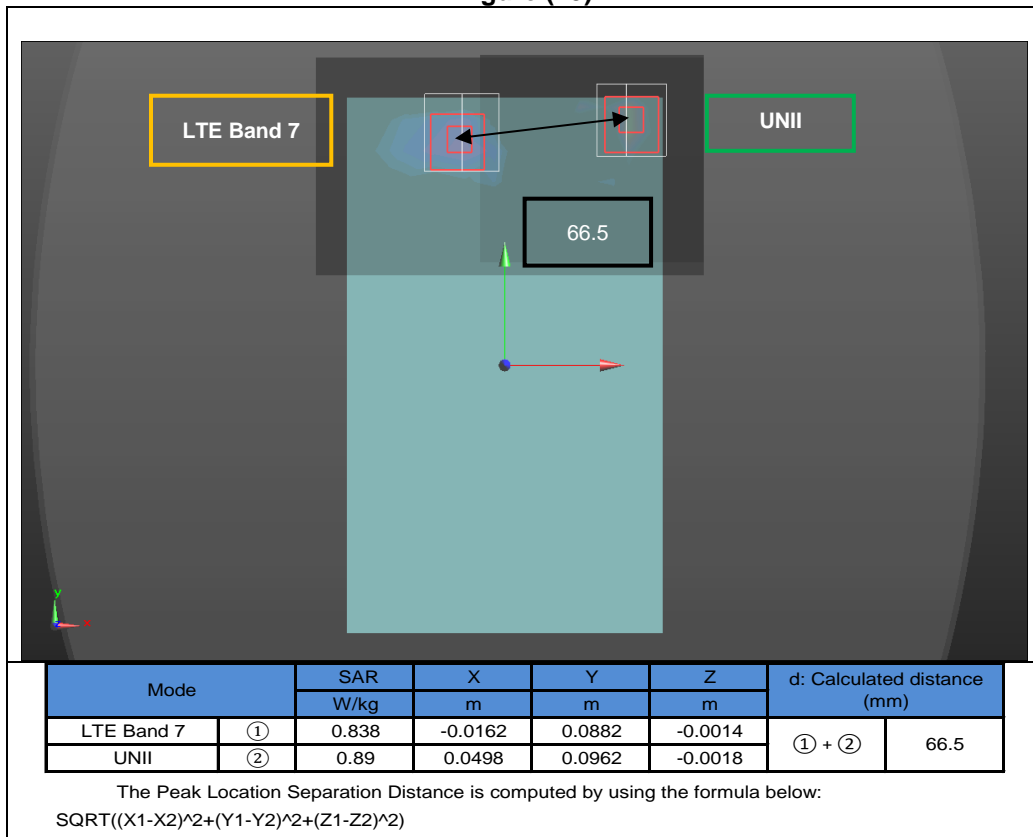
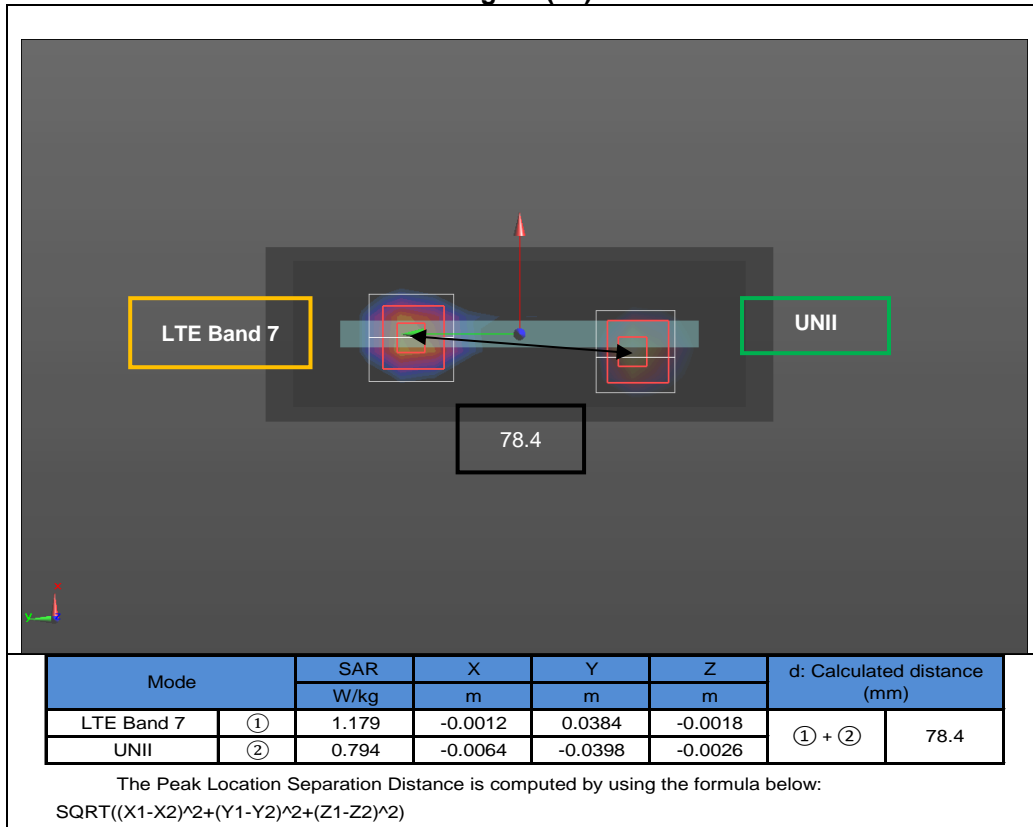


Figure (16)



Appendixes

Refer to separated files for the following appendixes.

4788481138-S1V3 FCC Report SAR_App A_Photos & Ant. Locations

4788481138-S1V3 FCC Report SAR_App B_Highest SAR Test Plots

4788481138-S1V3 FCC Report SAR_App C_System Check Plots

4788481138-S1V3 FCC Report SAR_App D_SAR Tissue Ingredients

4788481138-S1V3 FCC Report SAR_App E_Probe Cal. Certificates

4788481138-S1V3 FCC Report SAR_App F_Dipole Cal. Certificates

END OF REPORT