



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-T387W

FCC ID: A3LSMT387W

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1. Attestation of Test Results

Applicant Name	SAMSUNG ELECTRONICS CO.,LTD.			
FCC ID	A3LSMT387W			
Model Name	SM-T387W			
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	1.29	0.77	1.09	0.30
Simultaneous TX	1.59	1.59	1.59	1.59
Date Tested	10/5/2018 to 10/29/2018			
Test Results	Pass			
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. 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.				
Approved & Released By:		Prepared By:		
				
Justin Park Lead Test Engineer UL Korea, Ltd. Suwon Laboratory		Eunji Choi 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, 2014; Page 36, RF Exposure Procedures Update (Overlapping LTE Bands)
- [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

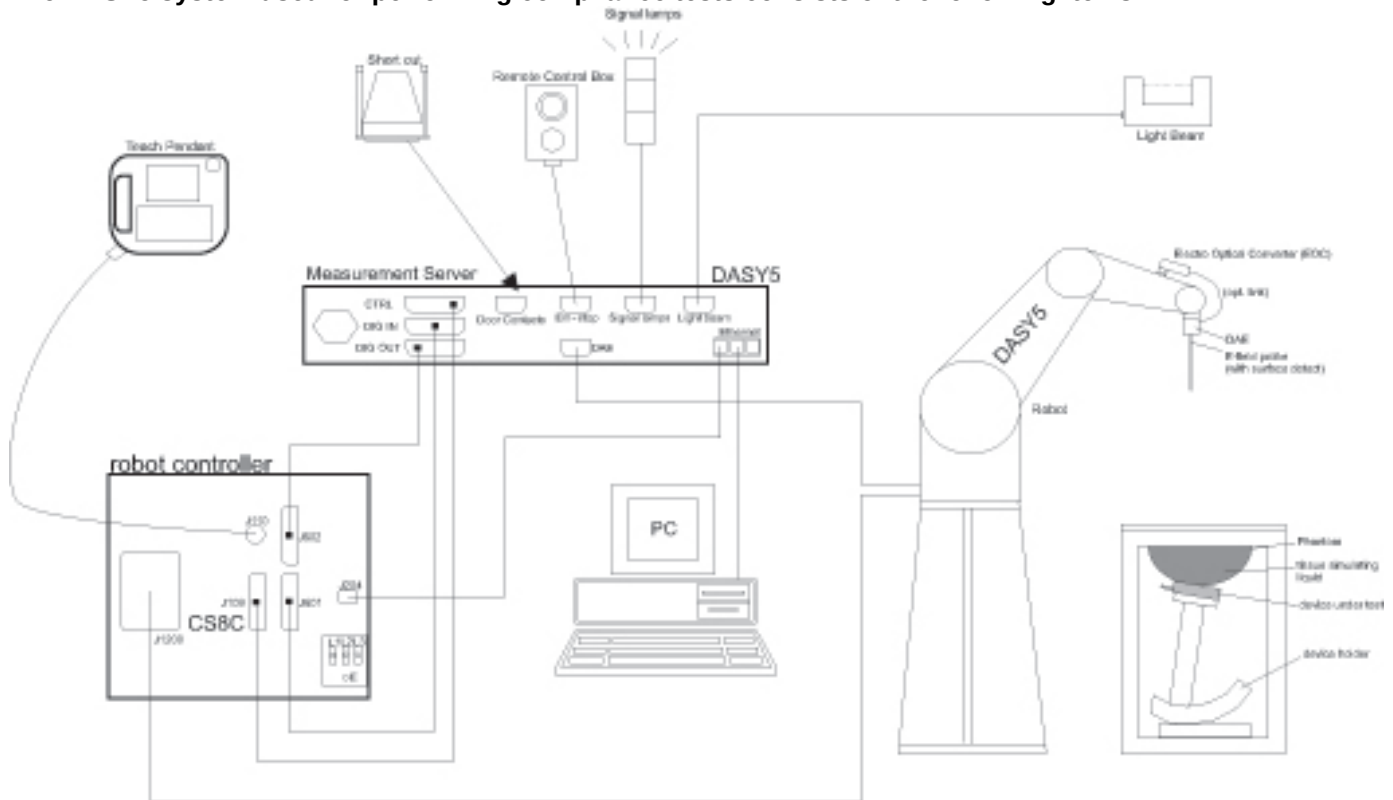
UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637.

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: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$	≤ 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: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$			≤ 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: $\Delta z_{\text{Zoom}}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{\text{Zoom}}(1)$: 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
		$\Delta z_{\text{Zoom}}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$	
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	8-7-2019
Dielectric Assessment Kit	SPEAG	DAK-3.5	1196	6-26-2019
Shorting block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	LKM	DTM3000	3424	8-9-2019
Thermometer	Lutron	MHB-382SD	AH.91478	8-8-2019

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
MXG Analog Signal Generator	Agilent	N5181A	MY50145882	8-7-2019
Power Sensor	Agilent	U2000A	MY54260010	8-7-2019
Power Sensor	Agilent	U2000A	MY54260007	8-7-2019
Power Amplifier	EXODUS	1410025-AMP2027-10003	10003	8-8-2019
Directional Coupler	Agilent	772D	MY52180193	8-7-2019
Directional Coupler	Agilent	778D	MY52180432	8-7-2019
Low Pass Filter	MICROLAB	LA-15N	03943	8-7-2019
Low Pass Filter	FILTRON	L14012FL	1410003S	8-7-2019
Low Pass Filter	MICROLAB	LA-60N	03942	8-7-2019
Attenuator	Agilent	8491B/003	MY39269292	8-7-2019
Attenuator	Agilent	8491B/010	MY39269315	8-7-2019
Attenuator	Agilent	8491B/020	MY39269298	8-7-2019
E-Field Probe (SAR1)	SPEAG	EX3DV4	7330	1-22-2019
E-Field Probe (SAR2)	SPEAG	EX3DV4	7313	2-20-2019
E-Field Probe (SAR3)	SPEAG	EX3DV4	7314	8-30-2019
Data Acquisition Electronics (SAR1)	SPEAG	DAE4	1494	7-23-2019
Data Acquisition Electronics (SAR2)	SPEAG	DAE4	1447	3-15-2019
Data Acquisition Electronics (SAR3)	SPEAG	DAE4	1468	8-22-2019
System Validation Dipole	SPEAG	D750V3	1122	2-19-2019
System Validation Dipole	SPEAG	D835V2	4d194	7-24-2019
System Validation Dipole	SPEAG	D1750V2	1125	2-16-2019
System Validation Dipole	SPEAG	D1900V2	5d199	3-15-2019
System Validation Dipole	SPEAG	D2300V2	1049	2-21-2018
System Validation Dipole	SPEAG	D2450V2	960	3-20-2019
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	8-8-2019
Thermometer (SAR2)	Lutron	MHB-382SD	AH.50215	2-9-2019
Thermometer (SAR3)	Lutron	MHB-382SD	AH.50213	8-14-2019

Others

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Base Station Simulator	R & S	CMW500	150313	8-9-2019
Base Station Simulator	R & S	CMW500	150314	8-9-2019
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	8-7-2019

Note(s):

Refer to Appendix F that mentioned about justification for Extended SAR Dipole Calibrations (D2300, SN : 1049)

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	☒ The Back Cover is not removable.		
Battery Options	☒ 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. ☒ Mobile Hotspot (Wi-Fi 2.4 GHz) ☒ Mobile Hotspot (Wi-Fi 5 GHz, Ch.149, Ch.151)		
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other ☒ Wi-Fi Direct (Wi-Fi 2.4 GHz) ☒ Wi-Fi Direct (Wi-Fi 5 GHz, Ch.149, Ch.151)		
Test Sample Information	No.	S/N	Notes
	1	R32K90004ZX	Main Conducted
	2	R32K90005DV	Wi-Fi Conducted
	3	R32K90005SW	SAR
	4	R32K90005QZ	SAR

6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode	Duty Cycle used for SAR testing
W-CDMA (UMTS)	Band II Band IV 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 12 FDD Band 17 FDD Band 29 (Rx only) FDD Band 30 FDD Band 66	QPSK 16QAM Rel. 10 Carrier Aggregation (1 Uplink and 2 Downlinks)	100% (FDD)
Does this device support SV-LTE (1xRTT-LTE)? ☐ Yes ☒ 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? ☒ Yes ☐ No		
	Does this device support Band gap channel(s)? ☐ Yes ☒ No		
Bluetooth	2.4 GHz	Version 4.2 LE	76.9% (DH5)

Notes:

1. 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.
2. 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 IV	Ant.1	R99	24.5	14.0
		HSDPA	23.5	13.5
		HSUPA	23.5	13.5
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	12.0
LTE Band 4	Ant.1	QPSK	24.5	13.0
LTE Band 5	Ant.1	QPSK	25.2	16.0
LTE Band 7	Ant.2	QPSK	23.0	12.0
LTE Band 12	Ant.1	QPSK	25.0	17.0
LTE Band 17	Ant.1	QPSK	25.0	18.0
LTE Band 30	Ant.2	QPSK	23.0	14.0
LTE Band 66	Ant.1	QPSK	24.5	14.0

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 12	Frequency range: 699 – 716 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low			23060/ 704	23035/ 701.5	23025/ 700.5	23017/ 699.7
	Mid			23095/ 707.5	23095/ 707.5	23095/ 707.5	23095/ 707.5
	High			23130/ 711	23155/ 713.5	23165/ 714.5	23173/ 715.3
	Band 17	Frequency range: 704 - 716 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low			23780/ 709	23755/ 706.5		
	Mid			23790/ 710	23790/ 710		
	High			23800/ 711	23825/ 713.5		

General LTE SAR Test and Reporting Considerations (Continued)

Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 30	Frequency range: 2305 - 2315 MHz																																																																			
		Channel Bandwidth																																																																			
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz																																																														
	Low				27685/ 2307.5																																																																
	Mid			27710/ 2310	27710/ 2310																																																																
	High				27735/ 2312.5																																																																
	Band 66	Frequency range: 1710 - 1780 MHz																																																																			
		Channel Bandwidth																																																																			
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz																																																														
	Low	132072/ 1720	132047/ 1717.5	132022/ 1715	131997/ 1712.5	131987/ 1711.5	131979/ 1710.7																																																														
	Mid	132322/ 1745	132322/ 1745	132322/ 1745	132322/ 1745	132322/ 1745	132322/ 1745																																																														
	High	132572/ 1770	132597/ 1772.5	132622/ 1775	132647/ 1777.5	132657/ 1778.5	132665/ 1779.3																																																														
LTE transmitter and antenna implementation	Refer to Appendix A.																																																																				
Maximum power reduction (MPR)	Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3 <table> <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> <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">≥ 1</td><td>≤ 5</td></tr> </table> 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							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.																																																																				

Notes:

- 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)

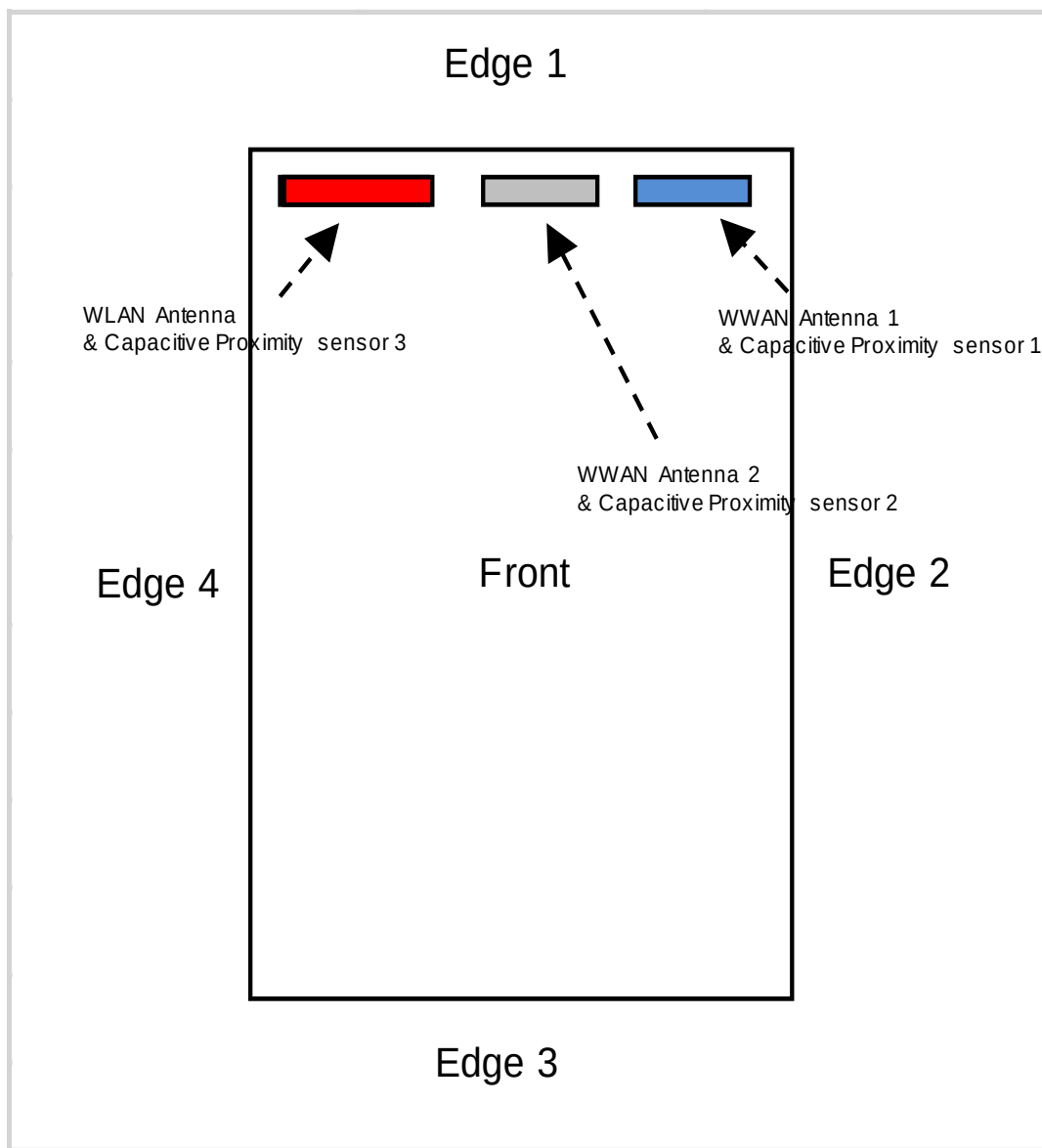
E-UTRA CA configuration (BCS)	E-UTRA Band	Bandwidth						Max Aggregated BW	Reverse Y/N
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz		
CA_2A-4A (1)	Band 2			Yes	Yes			20 MHz	Yes
	Band 4			Yes	Yes				
CA_2A-12A (2)	Band 2			Yes	Yes			20 MHz	Yes
	Band 12			Yes	Yes				
CA_2A-29A (0)(1)	Band 2			Yes	Yes			20 MHz	No
	Band 29		Yes	Yes	Yes				
	Band 2			Yes	Yes			20 MHz	
	Band 29			Yes	Yes				
CA_4A-5A (0)	Band 4			Yes	Yes			20 MHz	Yes
	Band 5			Yes	Yes				
CA_4A-12A (0)(3)	Band 4	Yes	Yes	Yes	Yes			20 MHz	No
	Band 12			Yes	Yes				
	Band 4			Yes	Yes			20 MHz	
	Band 12			Yes	Yes				
CA_4A-17A (0)	Band 4			Yes	Yes			20 MHz	No
	Band 17			Yes	Yes				
CA_4A-29A (0)(1)	Band 4			Yes	Yes			20 MHz	No
	Band 29			Yes	Yes				
	Band 4		Yes	Yes	Yes			20 MHz	
	Band 29			Yes	Yes				

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.

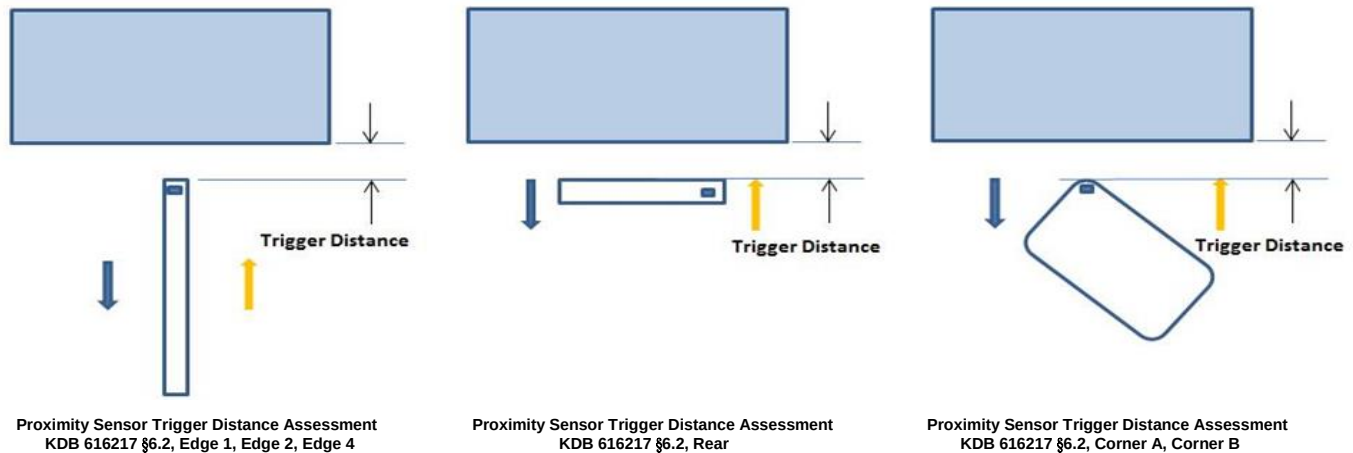


6.6.1 Proximity Sensor Triggering Distance (KDB 616217 §6.2)

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

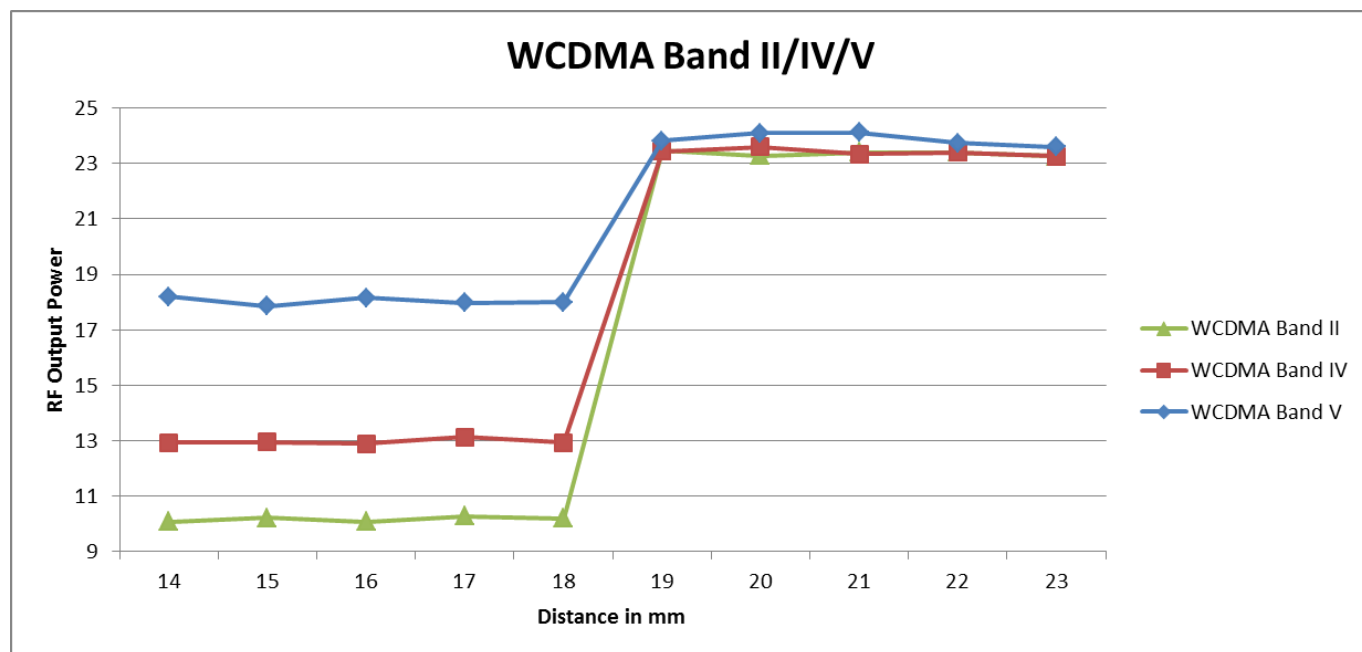
Summary of Trigger Distances

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	2300 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
	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/IV/V**

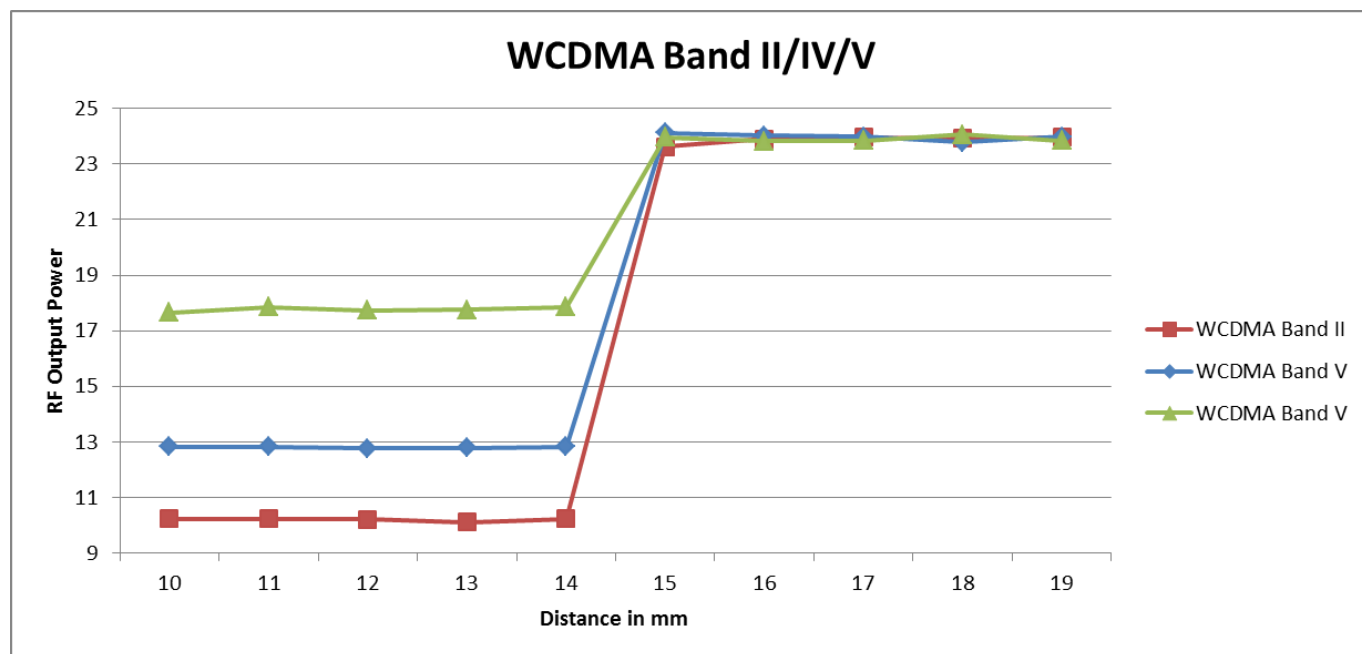
Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	14	15	16	17	18	19	20	21	22	23
WCDMA Band II	10.1	10.2	10.1	10.3	10.2	23.5	23.3	23.4	23.4	23.3
WCDMA Band IV	12.9	13.0	12.9	13.1	12.9	23.4	23.6	23.3	23.4	23.3
WCDMA Band V	18.2	17.9	18.2	18.0	18.0	23.8	24.1	24.1	23.7	23.6



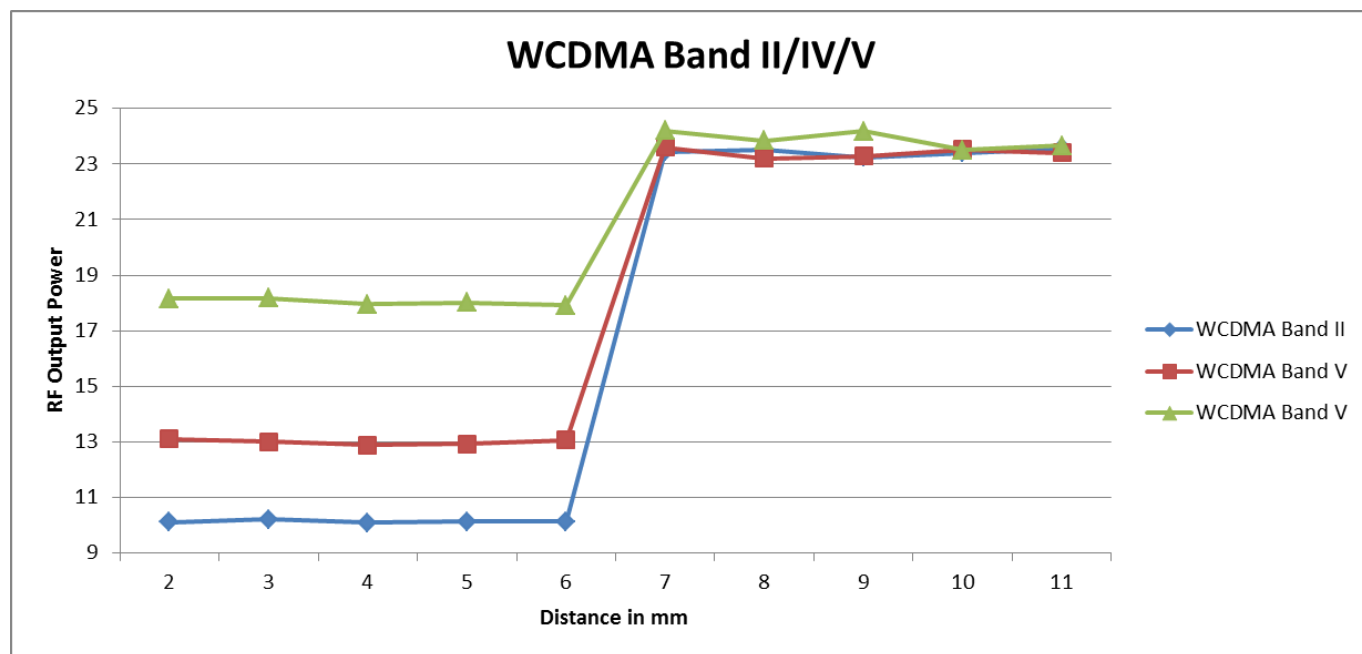
Edge 1, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	10	11	12	13	14	15	16	17	18	19
WCDMA Band II	10.2	10.2	10.2	10.1	10.2	23.6	23.9	24.0	23.9	24.0
WCDMA Band V	12.8	12.8	12.8	12.8	12.8	24.1	24.0	24.0	23.8	24.0
WCDMA Band V	17.7	17.9	17.7	17.8	17.9	24.0	23.8	23.8	24.1	23.8



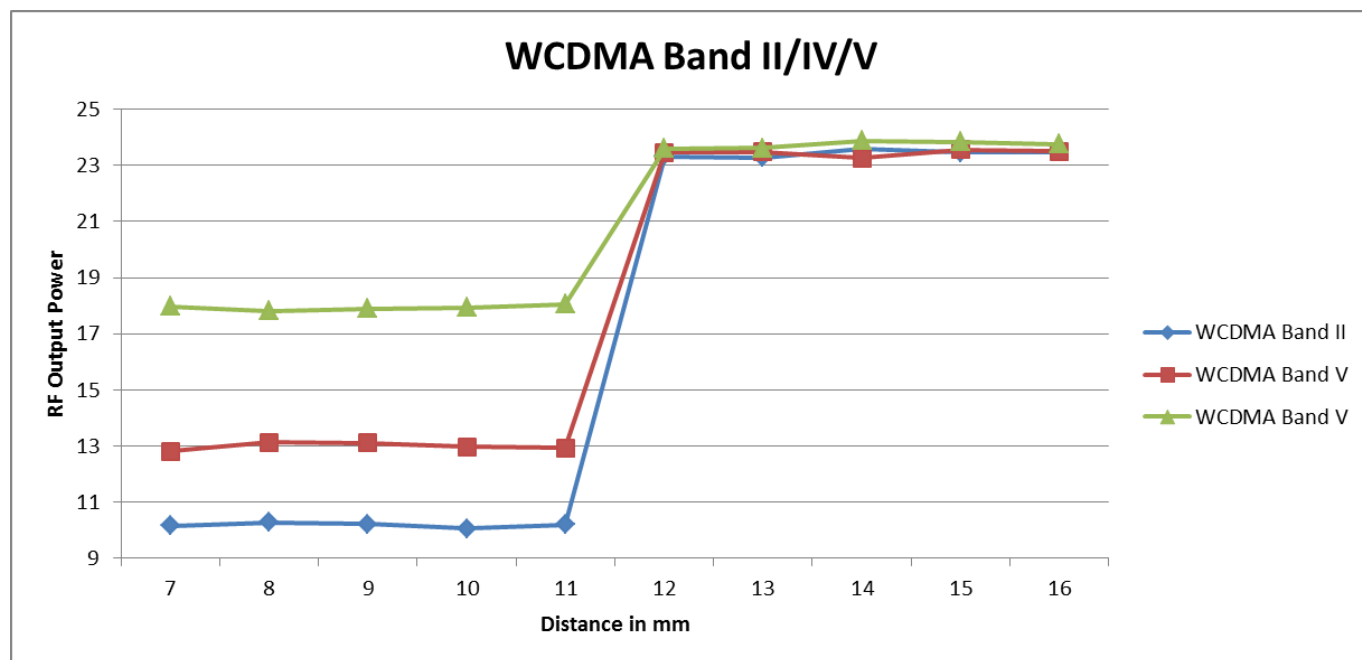
Edge 2, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	2	3	4	5	6	7	8	9	10	11
WCDMA Band II	10.1	10.2	10.1	10.1	10.1	23.4	23.5	23.2	23.4	23.6
WCDMA Band V	13.1	13.0	12.9	12.9	13.1	23.6	23.2	23.3	23.5	23.4
WCDMA Band V	18.2	18.2	18.0	18.0	17.9	24.2	23.8	24.2	23.5	23.7



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

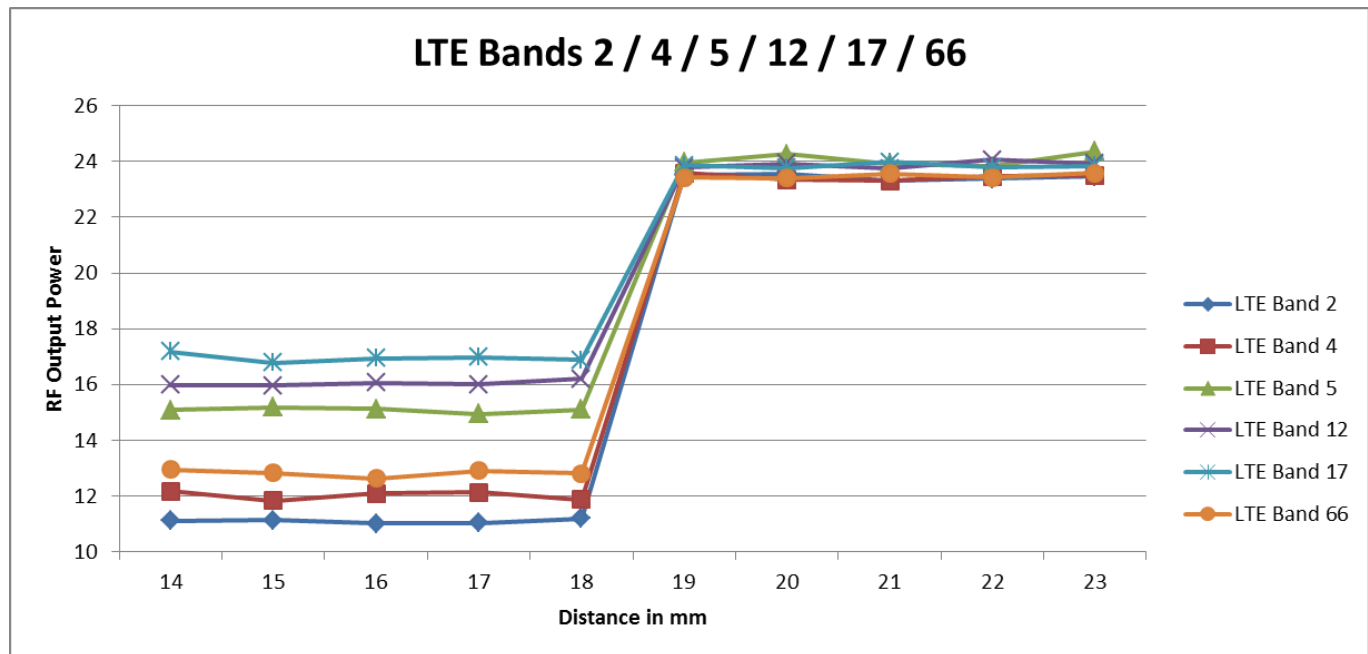
Distance to DUT vs. Output Power in dBm										
Distance (mm)	7	8	9	10	11	12	13	14	15	16
WCDMA Band II	10.2	10.3	10.2	10.1	10.2	23.3	23.3	23.6	23.5	23.5
WCDMA Band V	12.8	13.1	13.1	13.0	12.9	23.5	23.5	23.3	23.6	23.5
WCDMA Band V	18.0	17.8	17.9	17.9	18.1	23.6	23.6	23.9	23.8	23.8



LTE Band 2/ 4/ 5/ 12 /17 /66

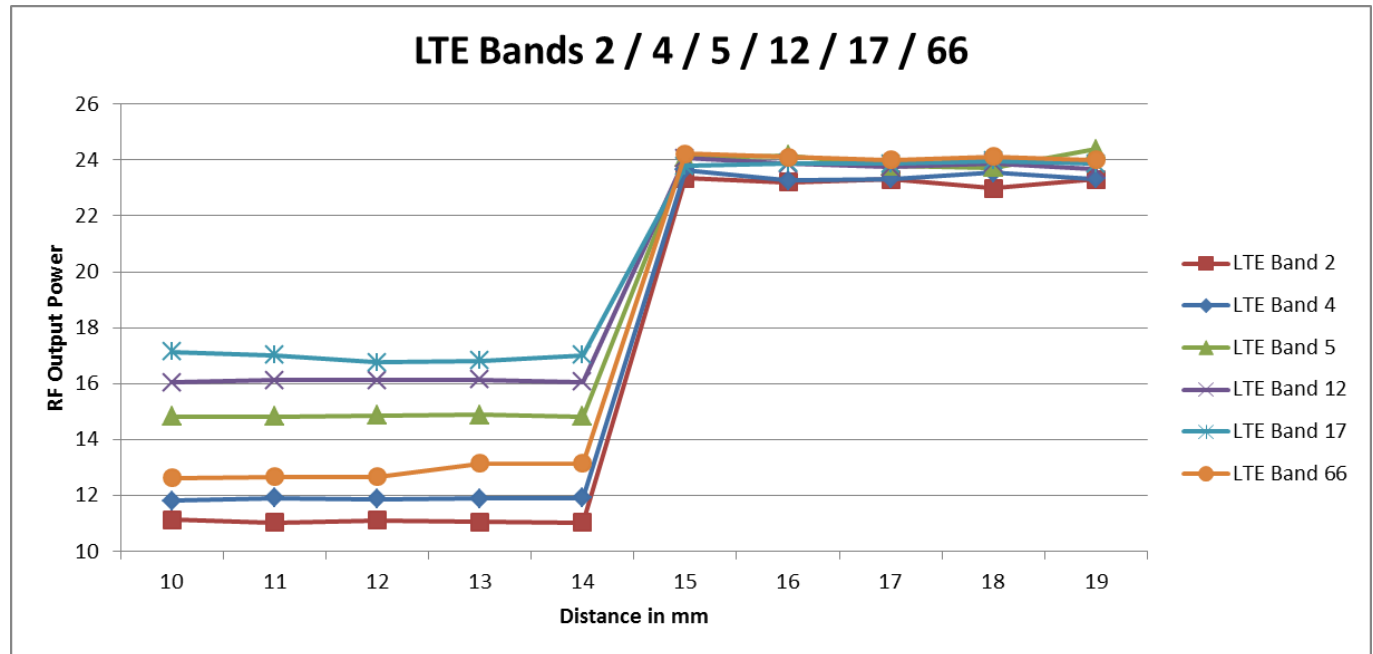
Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	14	15	16	17	18	19	20	21	22	23
LTE Band 2	11.1	11.1	11.0	11.0	11.2	23.5	23.6	23.3	23.4	23.5
LTE Band 4	12.2	11.8	12.1	12.1	11.9	23.6	23.3	23.3	23.5	23.5
LTE Band 5	15.1	15.2	15.1	14.9	15.1	24.0	24.3	23.9	23.8	24.4
LTE Band 12	16.0	16.0	16.1	16.0	16.2	23.8	23.9	23.8	24.1	23.9
LTE Band 17	17.2	16.8	16.9	17.0	16.9	23.9	23.8	24.0	23.8	23.8
LTE Band 66	12.9	12.8	12.6	12.9	12.8	23.4	23.4	23.6	23.4	23.6



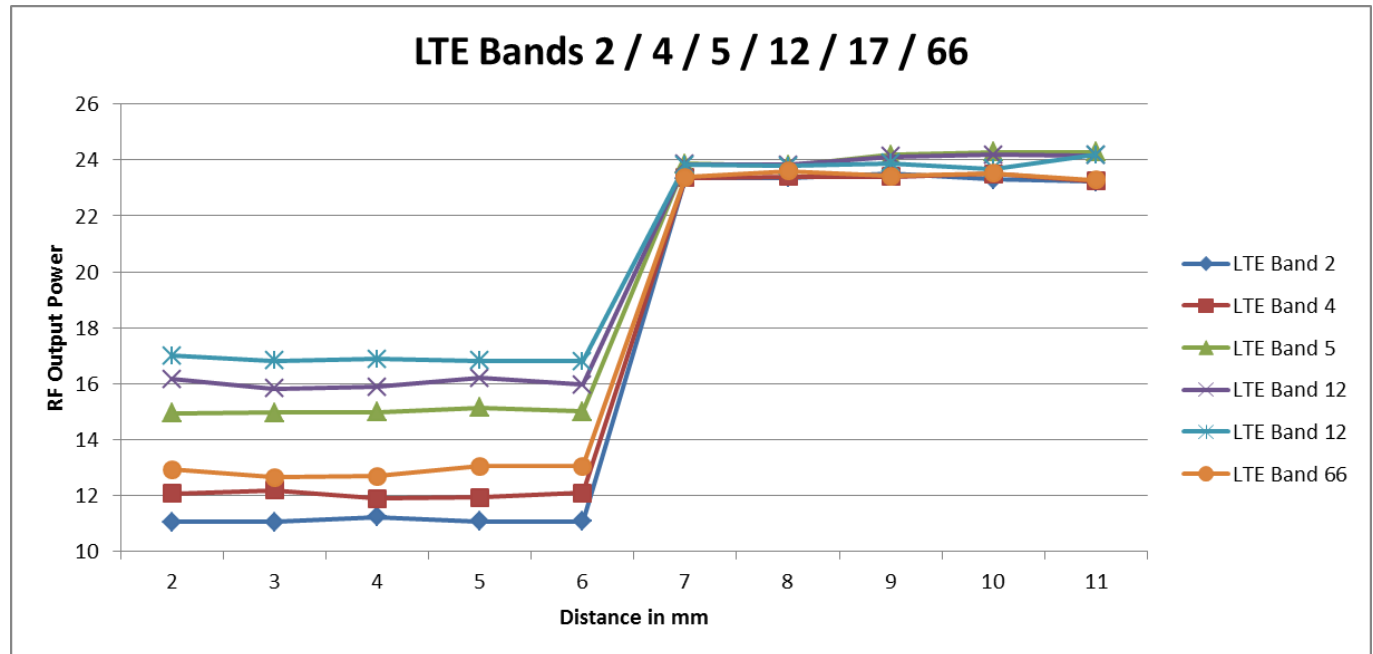
Edge 1, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	10	11	12	13	14	15	16	17	18	19
LTE Band 2	11.1	11.0	11.1	11.1	11.0	23.4	23.2	23.3	23.0	23.3
LTE Band 4	11.8	11.9	11.9	11.9	11.9	23.7	23.3	23.3	23.5	23.3
LTE Band 5	14.8	14.8	14.9	14.9	14.8	24.1	24.2	23.8	23.7	24.4
LTE Band 12	16.0	16.1	16.1	16.2	16.1	24.1	23.9	23.7	23.9	23.7
LTE Band 17	17.1	17.0	16.8	16.8	17.0	23.8	23.9	23.9	24.0	23.9
LTE Band 66	12.6	12.7	12.7	13.2	13.2	24.2	24.1	24.0	24.1	24.0



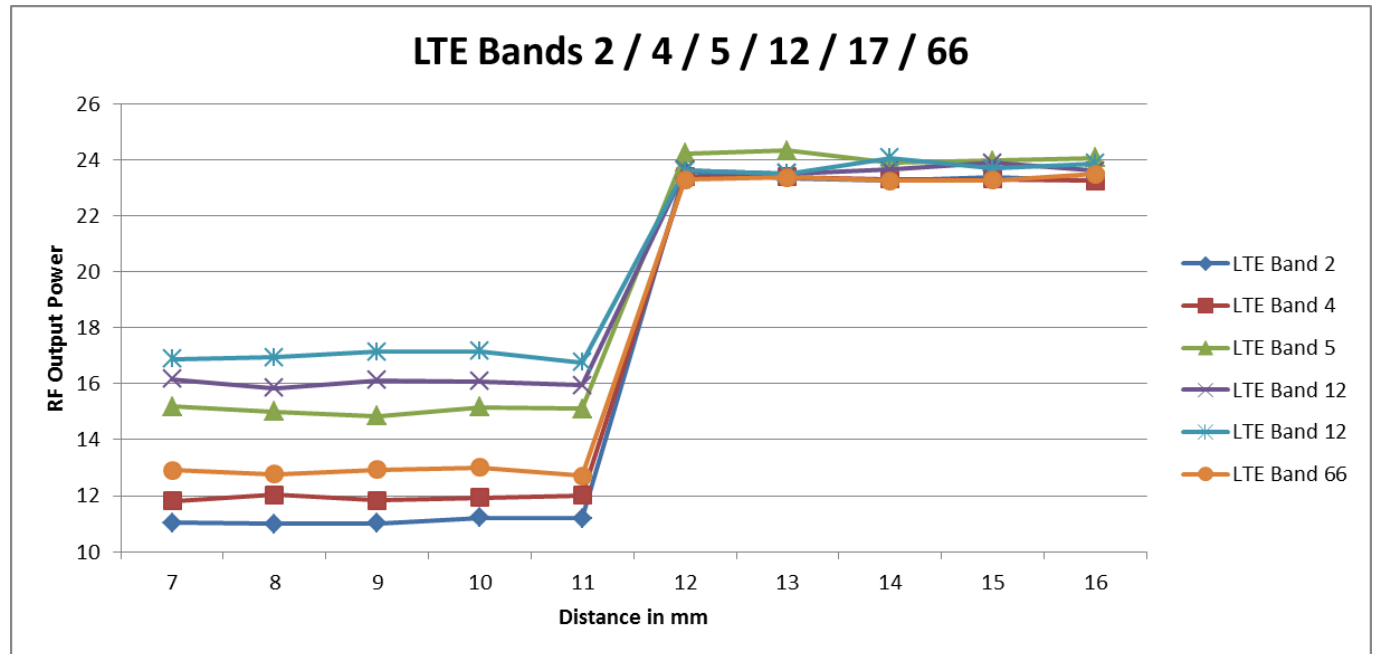
Edge 2, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	2	3	4	5	6	7	8	9	10	11
LTE Band 2	11.1	11.1	11.2	11.1	11.1	23.3	23.4	23.5	23.3	23.2
LTE Band 4	12.1	12.2	11.9	11.9	12.1	23.4	23.4	23.4	23.5	23.2
LTE Band 5	14.9	15.0	15.0	15.1	15.0	23.9	23.8	24.2	24.3	24.3
LTE Band 12	16.2	15.8	15.9	16.2	16.0	23.9	23.8	24.1	24.2	24.2
LTE Band 12	17.0	16.8	16.9	16.8	16.8	23.8	23.8	23.9	23.7	24.2
LTE Band 66	12.9	12.6	12.7	13.0	13.1	23.4	23.6	23.4	23.5	23.3



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

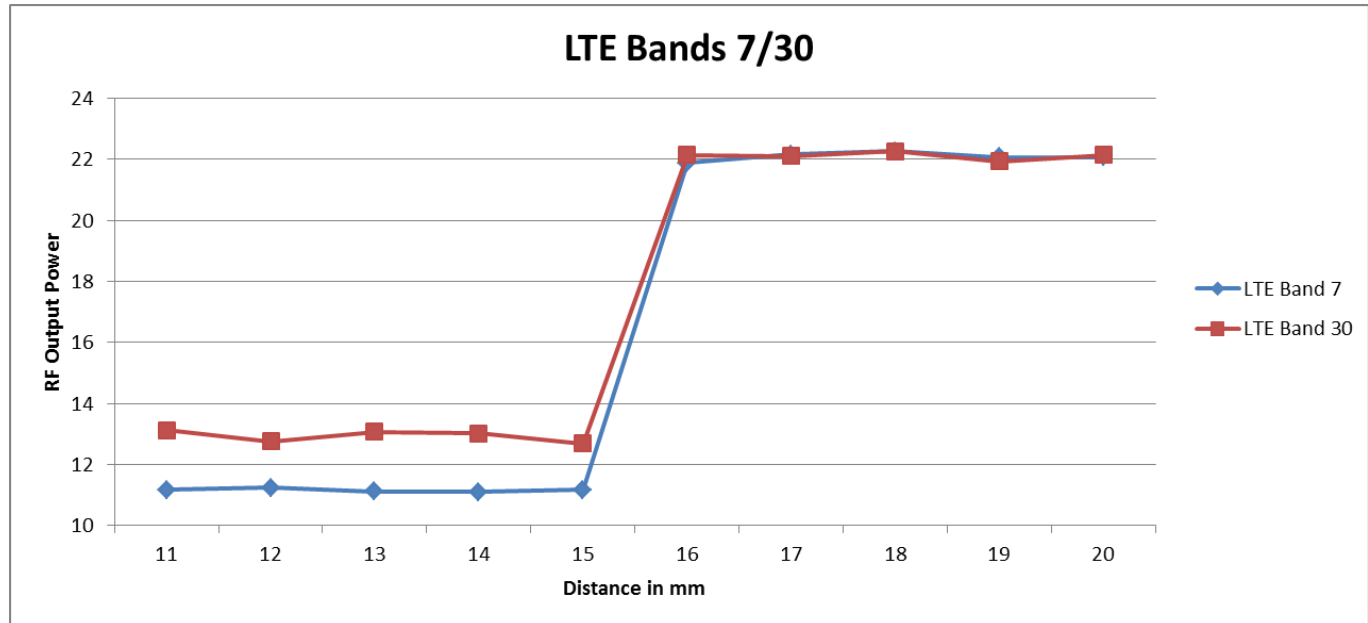
Distance to DUT vs. Output Power in dBm										
Distance (mm)	7	8	9	10	11	12	13	14	15	16
LTE Band 2	11.0	11.0	11.0	11.2	11.2	23.6	23.4	23.3	23.4	23.3
LTE Band 4	11.8	12.0	11.8	11.9	12.0	23.4	23.4	23.3	23.3	23.3
LTE Band 5	15.2	15.0	14.9	15.2	15.1	24.2	24.3	23.9	24.0	24.1
LTE Band 12	16.2	15.8	16.1	16.1	15.9	23.6	23.5	23.7	23.9	23.6
LTE Band 12	16.9	16.9	17.1	17.2	16.8	23.6	23.5	24.1	23.7	23.9
LTE Band 66	12.9	12.8	12.9	13.0	12.7	23.3	23.4	23.3	23.3	23.5



LTE Band 7/ 30

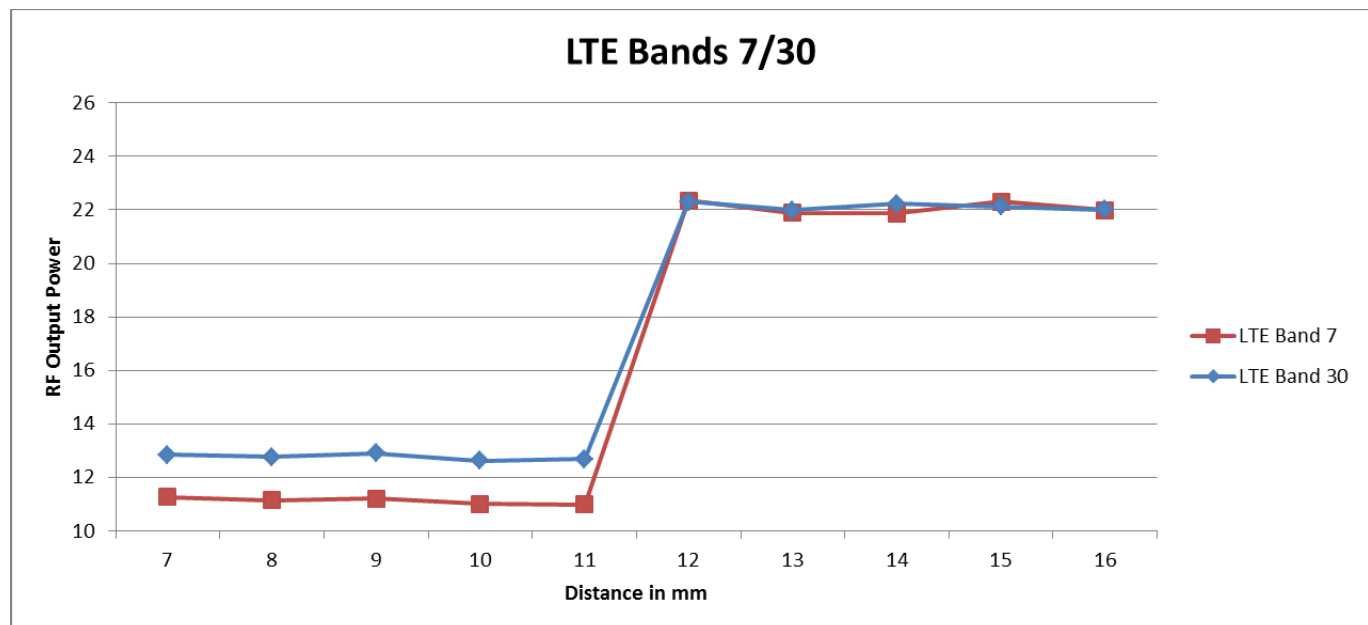
Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	11	12	13	14	15	16	17	18	19	20
LTE Band 7	11.2	11.2	11.1	11.1	11.2	21.9	22.2	22.3	22.1	22.1
LTE Band 30	13.1	12.8	13.1	13.0	12.7	22.2	22.1	22.3	21.9	22.2



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

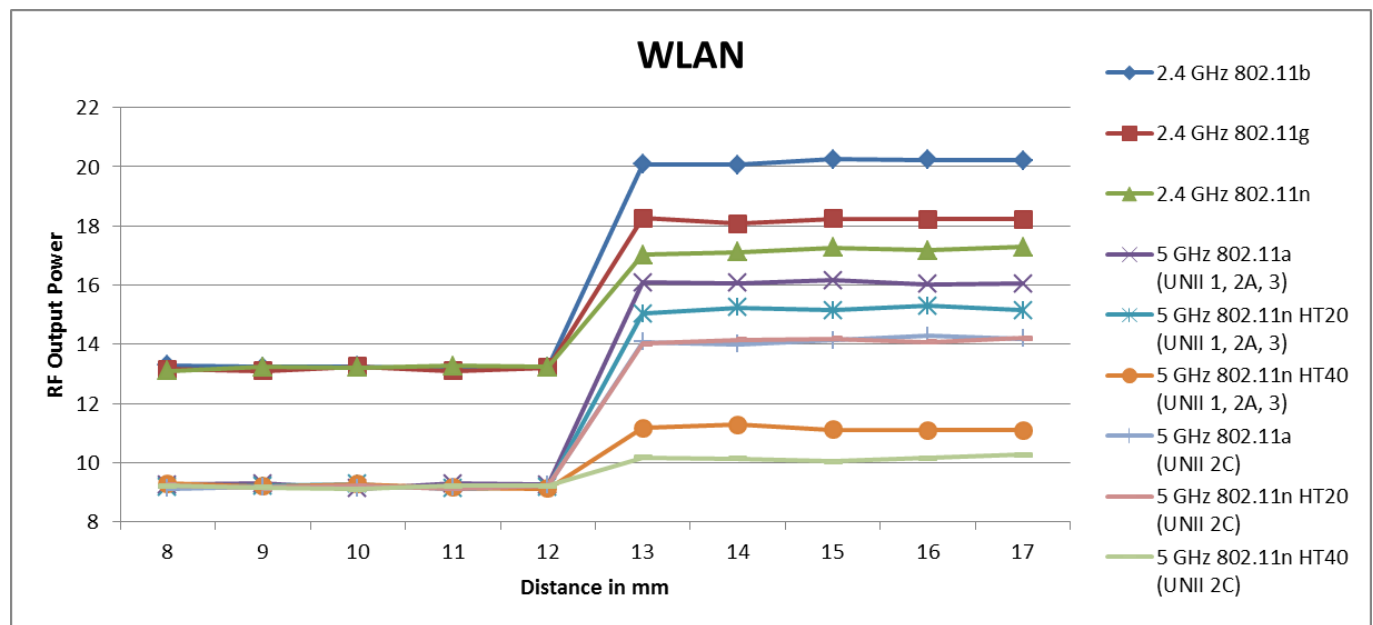
Distance to DUT vs. Output Power in dBm										
Distance (mm)	7	8	9	10	11	12	13	14	15	16
LTE Band 7	11.3	11.2	11.2	11.0	11.0	22.3	21.9	21.9	22.3	22.0
LTE Band 30	12.9	12.8	12.9	12.6	12.7	22.3	22.0	22.2	22.1	22.0



WLAN 2.4GHz and 5GHz

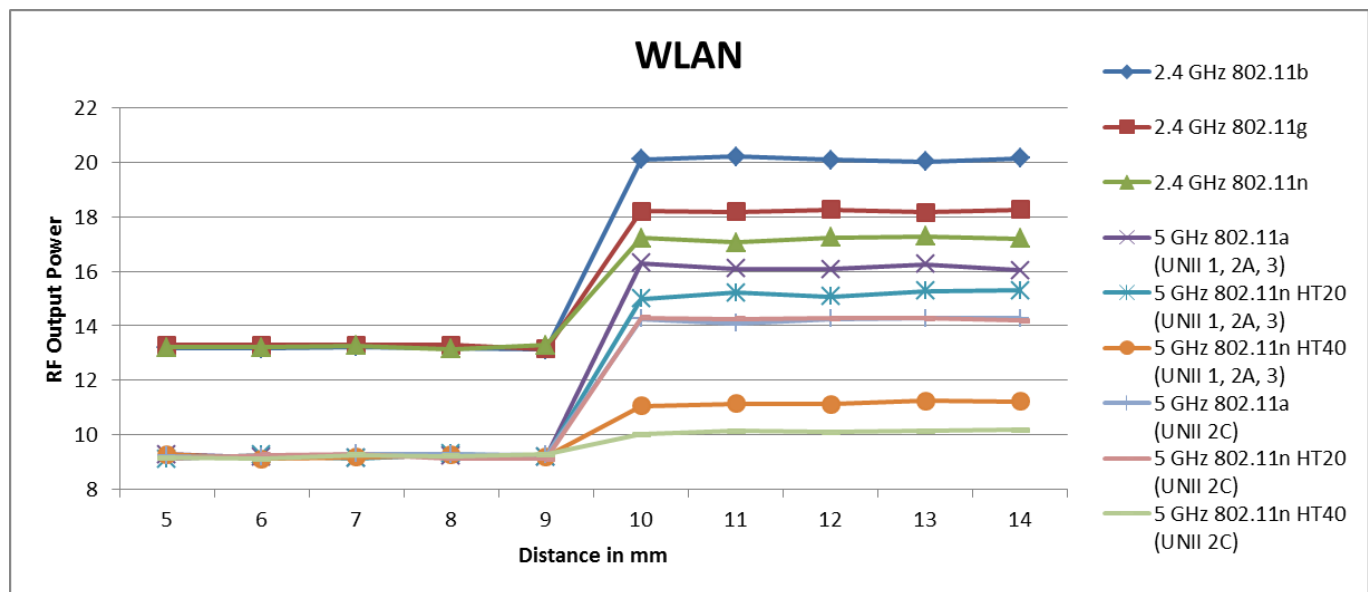
Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance	8	9	10	11	12	13	14	15	16	17
2.4 GHz 802.11b	13.3	13.2	13.3	13.2	13.2	20.1	20.1	20.3	20.2	20.2
2.4 GHz 802.11g	13.2	13.1	13.3	13.1	13.2	18.3	18.1	18.2	18.2	18.2
2.4 GHz 802.11n	13.1	13.2	13.2	13.3	13.2	17.0	17.1	17.3	17.2	17.3
5 GHz 802.11a (UNII 1, 2A, 3)	9.3	9.3	9.1	9.3	9.3	16.1	16.1	16.2	16.0	16.1
5 GHz 802.11n HT20 (UNII 1, 2A, 3)	9.2	9.2	9.3	9.1	9.2	15.0	15.3	15.2	15.3	15.1
5 GHz 802.11n HT40 (UNII 1, 2A, 3)	9.3	9.2	9.3	9.2	9.1	11.2	11.3	11.1	11.1	11.1
5 GHz 802.11a (UNII 2C)	9.1	9.2	9.1	9.2	9.2	14.1	14.0	14.1	14.3	14.2
5 GHz 802.11n HT20 (UNII 2C)	9.2	9.1	9.2	9.1	9.2	14.0	14.2	14.2	14.1	14.2
5 GHz 802.11n HT40 (UNII 2C)	9.2	9.2	9.1	9.2	9.2	10.2	10.1	10.0	10.2	10.3



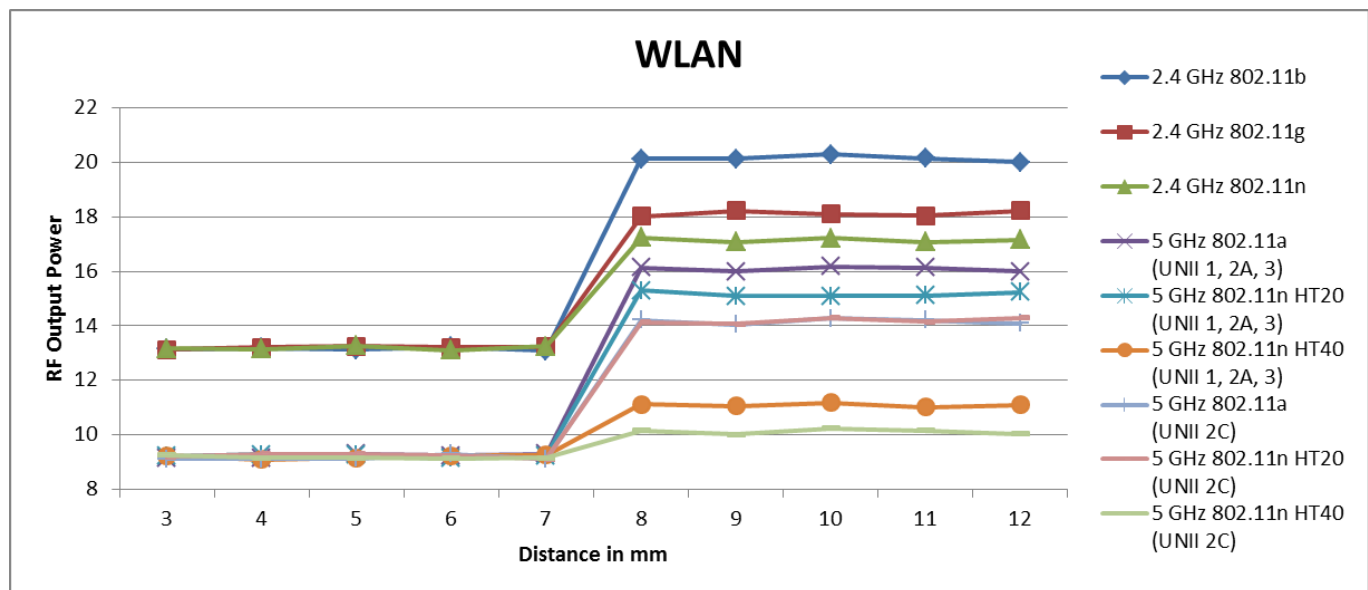
Edge 1, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

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	13.2	13.2	13.2	13.2	13.1	20.1	20.2	20.1	20.0	20.2
2.4 GHz 802.11g	13.3	13.3	13.3	13.3	13.1	18.2	18.2	18.3	18.2	18.3
2.4 GHz 802.11n	13.2	13.2	13.3	13.2	13.3	17.2	17.1	17.3	17.3	17.2
5 GHz 802.11a (UNII 1, 2A, 3)	9.3	9.2	9.2	9.2	9.2	16.3	16.1	16.1	16.3	16.0
5 GHz 802.11n HT20 (UNII 1, 2A, 3)	9.1	9.3	9.1	9.3	9.2	15.0	15.2	15.1	15.3	15.3
5 GHz 802.11n HT40 (UNII 1, 2A, 3)	9.3	9.1	9.2	9.3	9.2	11.1	11.2	11.1	11.2	11.2
5 GHz 802.11a (UNII 2C)	9.2	9.2	9.3	9.3	9.3	14.3	14.1	14.3	14.3	14.3
5 GHz 802.11n HT20 (UNII 2C)	9.1	9.3	9.3	9.1	9.1	14.3	14.3	14.3	14.3	14.2
5 GHz 802.11n HT40 (UNII 2C)	9.2	9.1	9.3	9.2	9.3	10.0	10.1	10.1	10.1	10.2



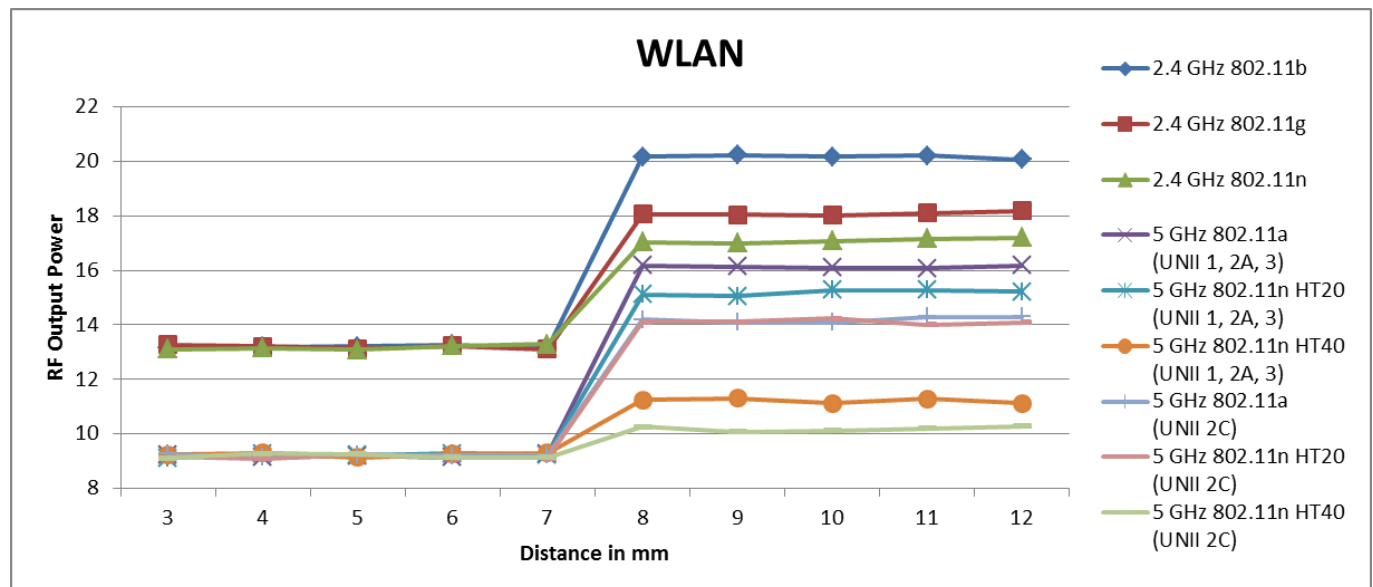
Edge 4, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

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	13.2	13.1	13.2	13.1	20.1	20.1	20.3	20.2	20.0
2.4 GHz 802.11g	13.1	13.2	13.3	13.2	13.2	18.0	18.2	18.1	18.1	18.2
2.4 GHz 802.11n	13.2	13.1	13.3	13.1	13.3	17.2	17.1	17.2	17.1	17.2
5 GHz 802.11a (UNII 1, 2A, 3)	9.2	9.2	9.3	9.2	9.3	16.1	16.0	16.2	16.1	16.0
5 GHz 802.11n HT20 (UNII 1, 2A, 3)	9.2	9.3	9.3	9.1	9.2	15.3	15.1	15.1	15.1	15.2
5 GHz 802.11n HT40 (UNII 1, 2A, 3)	9.2	9.1	9.2	9.2	9.3	11.1	11.1	11.2	11.0	11.1
5 GHz 802.11a (UNII 2C)	9.1	9.1	9.1	9.3	9.1	14.2	14.1	14.3	14.2	14.1
5 GHz 802.11n HT20 (UNII 2C)	9.2	9.3	9.3	9.2	9.1	14.1	14.1	14.3	14.2	14.3
5 GHz 802.11n HT40 (UNII 2C)	9.3	9.2	9.2	9.1	9.2	10.2	10.0	10.2	10.2	10.0



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	13.1	13.2	13.2	13.3	13.1	20.2	20.2	20.2	20.2	20.1
2.4 GHz 802.11g	13.3	13.2	13.1	13.2	13.1	18.1	18.0	18.0	18.1	18.2
2.4 GHz 802.11n	13.1	13.2	13.1	13.2	13.3	17.0	17.0	17.1	17.2	17.2
5 GHz 802.11a (UNII 1, 2A, 3)	9.2	9.1	9.2	9.1	9.3	16.2	16.1	16.1	16.1	16.2
5 GHz 802.11n HT20 (UNII 1, 2A, 3)	9.1	9.3	9.2	9.3	9.2	15.1	15.1	15.3	15.3	15.2
5 GHz 802.11n HT40 (UNII 1, 2A, 3)	9.2	9.3	9.1	9.3	9.3	11.2	11.3	11.1	11.3	11.1
5 GHz 802.11a (UNII 2C)	9.3	9.2	9.2	9.2	9.2	14.2	14.1	14.1	14.3	14.3
5 GHz 802.11n HT20 (UNII 2C)	9.2	9.1	9.2	9.1	9.1	14.1	14.1	14.2	14.0	14.1
5 GHz 802.11n HT40 (UNII 2C)	9.1	9.3	9.3	9.1	9.1	10.3	10.1	10.1	10.2	10.3



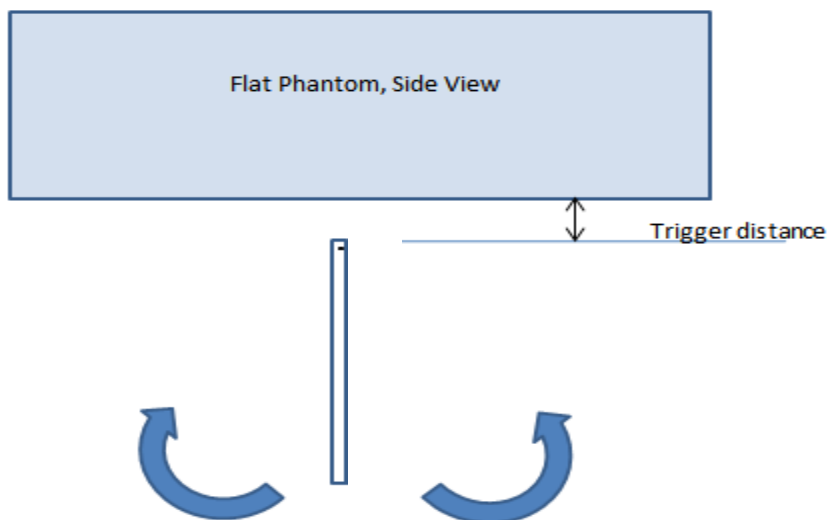
6.6.2 Proximity Sensor Coverage (KDB 616217 §6.3)

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 $\pm 45^\circ$. 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 $\pm 45^\circ$.



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 $\pm 45^\circ$	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
2300	11 mm	11 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	17	13	5	185	82		77.9 -MEASURE- 74.7	77.9 -MEASURE- 74.7	77.9 -MEASURE- 74.7	> 50 mm	> 50 mm	
Cellular	W-CDMA IV	1752.6	24.50	282	17	13	5	185	82		-MEASURE- 58.2	-MEASURE- 58.2	-MEASURE- 58.2	> 50 mm	> 50 mm	
Cellular	W-CDMA V	846.6	25.00	316	17	13	5	185	82		-MEASURE- 77.7	-MEASURE- 77.7	-MEASURE- 77.7	> 50 mm	> 50 mm	
Cellular	LTE Band 2	1900	24.50	282	17	13	5	185	82		-MEASURE- 74.2	-MEASURE- 74.2	-MEASURE- 74.2	> 50 mm	> 50 mm	
Cellular	LTE Band 4	1732.5	24.50	282	17	13	5	185	82		-MEASURE- 60.5	-MEASURE- 60.5	-MEASURE- 60.5	> 50 mm	> 50 mm	
Cellular	LTE Band 5	836.5	25.20	331	17	13	5	185	82		-MEASURE- 64	-MEASURE- 64	-MEASURE- 6.7	> 50 mm	> 50 mm	
Cellular	LTE Band 7	2560	23.00	200	14	10	0	185	59		-MEASURE- 53.3	-MEASURE- 53.3	-MEASURE- 53.3	> 50 mm	> 50 mm	
Cellular	LTE Band 12	711	25.00	316	17	13	5	185	82		-MEASURE- 53.3	-MEASURE- 53.3	-MEASURE- 53.3	> 50 mm	> 50 mm	
Cellular	LTE Band 17	711	25.00	316	17	13	5	185	82		-MEASURE- 60.8	-MEASURE- 60.8	-MEASURE- 6.3	> 50 mm	> 50 mm	
Cellular	LTE Band 30	2310	23.00	200	14	10	0	185	59		-MEASURE- 75	-MEASURE- 75	-MEASURE- 75	> 50 mm	> 50 mm	
Cellular	LTE Band 66	1770	24.50	282	17	13	5	185	82		-MEASURE- -MEASURE-	-MEASURE- -MEASURE-	-MEASURE- -MEASURE-	> 50 mm	> 50 mm	
Power Back-off, Proximity Sensor On																
Cellular	W-CDMA II	1907.6	11.00	13	0	0	0				3.6 -MEASURE-	3.6 -MEASURE-	3.6 -MEASURE-			
Cellular	W-CDMA IV	1752.6	14.00	25	0	0	0				6.6 -MEASURE-	6.6 -MEASURE-	6.6 -MEASURE-			
Cellular	W-CDMA V	846.6	19.00	79	0	0	0				14.5 -MEASURE-	14.5 -MEASURE-	14.5 -MEASURE-			
Cellular	LTE Band 2	1900	12.00	16	0	0	0				4.4 -MEASURE-	4.4 -MEASURE-	4.4 -MEASURE-			
Cellular	LTE Band 4	1732.5	13.00	20	0	0	0				5.3 -MEASURE-	5.3 -MEASURE-	5.3 -MEASURE-			
Cellular	LTE Band 5	836.5	16.00	40	0	0	0				7.3 -MEASURE-	7.3 -MEASURE-	7.3 -MEASURE-			
Cellular	LTE Band 7	2560	12.00	16	0	0					5.1 -MEASURE-	5.1 -MEASURE-				
Cellular	LTE Band 12	711	17.00	50	0	0	0				8.4 -MEASURE-	8.4 -MEASURE-	8.4 -MEASURE-			
Cellular	LTE Band 17	711	18.00	63	0	0	0				10.6 -MEASURE-	10.6 -MEASURE-	10.6 -MEASURE-			
Cellular	LTE Band 30	2310	14.00	25	0	0					7.6 -MEASURE-	7.6 -MEASURE-				
Cellular	LTE Band 66	1770	14.00	25	0	0	0				6.7 -MEASURE-	6.7 -MEASURE-	6.7 -MEASURE-			

Note(s):

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

Antennas > 50mm to adjacent edges

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Full Power, Proximity Sensor Off																
Cellular	W-CDMA II	1907.6	24.50	282	17	13	5	185	82		< 50 mm	< 50 mm	< 50 mm	1458.6 mW -EXEMPT-	428.6 mW -EXEMPT-	
Cellular	W-CDMA IV	1752.6	24.50	282	17	13	5	185	82		< 50 mm	< 50 mm	< 50 mm	1463.3 mW -EXEMPT-	433.3 mW -EXEMPT-	
Cellular	W-CDMA V	846.6	25.00	316	17	13	5	185	82		< 50 mm	< 50 mm	< 50 mm	925 mW -EXEMPT-	343.6 mW -EXEMPT-	
Cellular	LTE Band 2	1900	24.50	282	17	13	5	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	17	13	5	185	82		< 50 mm	< 50 mm	< 50 mm	1464 mW -EXEMPT-	434 mW -EXEMPT-	
Cellular	LTE Band 5	836.5	25.20	331	17	13	5	185	82		< 50 mm	< 50 mm	< 50 mm	916.9 mW -EXEMPT-	342.5 mW -EXEMPT-	
Cellular	LTE Band 7	2560	23.00	200	14	10	0	185	0		< 50 mm	< 50 mm	< 50 mm	1443.8 mW -EXEMPT-	183.8 mW -MEASURE-	
Cellular	LTE Band 12	711	25.00	316	17	13	5	185	82		< 50 mm	< 50 mm	< 50 mm	817.8 mW -EXEMPT-	329.6 mW -EXEMPT-	
Cellular	LTE Band 17	711	25.00	316	17	13	5	185	82		< 50 mm	< 50 mm	< 50 mm	817.8 mW -EXEMPT-	329.6 mW -EXEMPT-	
Cellular	LTE Band 30	2310	23.00	200	14	10	0	185	0		< 50 mm	< 50 mm	< 50 mm	1448.7 mW -EXEMPT-	188.7 mW -MEASURE-	
Cellular	LTE Band 66	1770	24.50	282	17	13	5	185	82		< 50 mm	< 50 mm	< 50 mm	1462.7 mW -EXEMPT-	432.7 mW -EXEMPT-	
Power Back-off, Proximity Sensor On																
Cellular	W-CDMA II	1907.6	11.00	13	0	0	0				< 50 mm	< 50 mm	< 50 mm			
Cellular	W-CDMA IV	1752.6	14.00	25	0	0	0				< 50 mm	< 50 mm	< 50 mm			
Cellular	W-CDMA V	846.6	19.00	79	0	0	0				< 50 mm	< 50 mm	< 50 mm			
Cellular	LTE Band 2	1900	12.00	16	0	0	0				< 50 mm	< 50 mm	< 50 mm			
Cellular	LTE Band 4	1732.5	13.00	20	0	0	0				< 50 mm	< 50 mm	< 50 mm			
Cellular	LTE Band 5	836.5	16.00	40	0	0	0				< 50 mm	< 50 mm	< 50 mm			
Cellular	LTE Band 7	2560	12.00	16	0	0					< 50 mm	< 50 mm				
Cellular	LTE Band 12	711	17.00	50	0	0	0				< 50 mm	< 50 mm	< 50 mm			
Cellular	LTE Band 17	711	18.00	63	0	0	0				< 50 mm	< 50 mm	< 50 mm			
Cellular	LTE Band 30	2310	14.00	25	0	0					< 50 mm	< 50 mm				
Cellular	LTE Band 66	1770	14.00	25	0	0	0				< 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.

SAR Test Exclusion Calculations for WLAN**Antennas < 50mm to adjacent edges**

Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
		dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Full Power, Proximity Sensor Off															
Wi-Fi 2.4 GHz	2462	21.00	126	11	8	87	185	6		39.5 -MEASURE-	39.5 -MEASURE-	> 50 mm	> 50 mm	39.5 -MEASURE-	
Wi-Fi 5.3 GHz	5320	17.00	50	11	8	87	185	6		23.1 -MEASURE-	23.1 -MEASURE-	> 50 mm	> 50 mm	23.1 -MEASURE-	
Wi-Fi 5.5 GHz	5700	15.00	32	11	8	87	185	6		15.3 -MEASURE-	15.3 -MEASURE-	> 50 mm	> 50 mm	15.3 -MEASURE-	
Wi-Fi 5.8 GHz	5825	17.00	50	11	8	87	185	6		24.1 -MEASURE-	24.1 -MEASURE-	> 50 mm	> 50 mm	24.1 -MEASURE-	
Bluetooth	2480	10.00	10	11	8	87	185	6		3.1 -MEASURE-	3.1 -MEASURE-	> 50 mm	> 50 mm	3.1 -MEASURE-	
Power Back-off, Proximity Sensor On															
Wi-Fi 2.4 GHz	2462	14.00	25	0	0			0		7.8 -MEASURE-	7.8 -MEASURE-			7.8 -MEASURE-	
Wi-Fi 5.3 GHz	5320	10.00	10	0	0			0		4.6 -MEASURE-	4.6 -MEASURE-			4.6 -MEASURE-	
Wi-Fi 5.5 GHz	5700	10.00	10	0	0			0		4.8 -MEASURE-	4.8 -MEASURE-			4.8 -MEASURE-	
Wi-Fi 5.8 GHz	5825	10.00	10	0	0			0		4.8 -MEASURE-	4.8 -MEASURE-			4.8 -MEASURE-	

Note(s):

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

Antennas > 50mm to adjacent edges

Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
		dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Full Power, Proximity Sensor Off															
Wi-Fi 2.4 GHz	2462	21.00	126	11	8	87	185	6		< 50 mm	< 50 mm	465.6 mW -EXEMPT-	1445.6 mW -EXEMPT-	< 50 mm	
Wi-Fi 5.3 GHz	5320	17.00	50	11	8	87	185	6		< 50 mm	< 50 mm	435 mW -EXEMPT-	1415 mW -EXEMPT-	< 50 mm	
Wi-Fi 5.5 GHz	5700	15.00	32	11	8	87	185	6		< 50 mm	< 50 mm	432.8 mW -EXEMPT-	1412.8 mW -EXEMPT-	< 50 mm	
Wi-Fi 5.8 GHz	5825	17.00	50	11	8	87	185	6		< 50 mm	< 50 mm	432.2 mW -EXEMPT-	1412.2 mW -EXEMPT-	< 50 mm	
Bluetooth	2480	10.00	10	11	8	87	185	6		< 50 mm	< 50 mm	465.3 mW -EXEMPT-	1445.3 mW -EXEMPT-	< 50 mm	
Power Back-off, Proximity Sensor On															
Wi-Fi 2.4 GHz	2462	14.00	25	0	0			0		< 50 mm	< 50 mm			< 50 mm	
Wi-Fi 5.3 GHz	5320	10.00	10	0	0			0		< 50 mm	< 50 mm			< 50 mm	
Wi-Fi 5.5 GHz	5700	10.00	10	0	0			0		< 50 mm	< 50 mm			< 50 mm	
Wi-Fi 5.8 GHz	5825	10.00	10	0	0			0		< 50 mm	< 50 mm			< 50 mm	

Note(s):

- 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 IV	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	No	No	No	No	
LTE Band 12	OFF	Yes	Yes	Yes	No	No	Yes	
	ON	Yes	Yes	Yes	No	No	Yes	
LTE Band 17	OFF	Yes	Yes	Yes	No	No	Yes	
	ON	Yes	Yes	Yes	No	No	Yes	
LTE Band 30	OFF	Yes	Yes	Yes	No	Yes	No	
	ON	Yes	Yes	No	No	NO	No	
LTE Band 66	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
	ON	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 ±(%)
10-8-2018	Body 1900	e'	53.6800	Relative Permittivity (ϵ_r):	53.68	53.30	0.71	5
		e''	14.6800	Conductivity (σ):	1.55	1.52	2.03	5
	Body 1850	e'	53.8500	Relative Permittivity (ϵ_r):	53.85	53.30	1.03	5
		e''	14.6100	Conductivity (σ):	1.50	1.52	-1.13	5
	Body 1910	e'	53.6200	Relative Permittivity (ϵ_r):	53.62	53.30	0.60	5
		e''	14.7000	Conductivity (σ):	1.56	1.52	2.71	5
10-10-2018	Body 1750	e'	54.6400	Relative Permittivity (ϵ_r):	54.64	53.44	2.24	5
		e''	14.9300	Conductivity (σ):	1.45	1.49	-2.25	5
	Body 1710	e'	54.7600	Relative Permittivity (ϵ_r):	54.76	53.54	2.27	5
		e''	14.9600	Conductivity (σ):	1.42	1.46	-2.68	5
	Body 1755	e'	54.6300	Relative Permittivity (ϵ_r):	54.63	53.43	2.25	5
		e''	14.9300	Conductivity (σ):	1.46	1.49	-2.17	5
10-15-2018	Body 2450	e'	50.9900	Relative Permittivity (ϵ_r):	50.99	52.70	-3.24	5
		e''	14.8000	Conductivity (σ):	2.02	1.95	3.39	5
	Body 2400	e'	51.1300	Relative Permittivity (ϵ_r):	51.13	52.77	-3.11	5
		e''	14.7000	Conductivity (σ):	1.96	1.90	3.35	5
	Body 2480	e'	50.8900	Relative Permittivity (ϵ_r):	50.89	52.66	-3.37	5
		e''	14.9000	Conductivity (σ):	2.05	1.99	3.14	5
10-15-2018	Body 2600	e'	50.5000	Relative Permittivity (ϵ_r):	50.50	52.51	-3.83	5
		e''	15.2700	Conductivity (σ):	2.21	2.16	2.16	5
	Body 2500	e'	50.8000	Relative Permittivity (ϵ_r):	50.80	52.64	-3.49	5
		e''	14.9500	Conductivity (σ):	2.08	2.02	2.87	5
	Body 2700	e'	50.2300	Relative Permittivity (ϵ_r):	50.23	52.38	-4.11	5
		e''	15.5600	Conductivity (σ):	2.34	2.30	1.51	5
10-29-2018	Body 2250	e'	51.7300	Relative Permittivity (ϵ_r):	51.73	52.97	-2.34	5
		e''	14.2600	Conductivity (σ):	1.78	1.76	1.58	5
	Body 2300	e'	51.5600	Relative Permittivity (ϵ_r):	51.56	52.90	-2.54	5
		e''	14.3600	Conductivity (σ):	1.84	1.80	1.83	5
	Body 2350	e'	51.3800	Relative Permittivity (ϵ_r):	51.38	52.84	-2.76	5
		e''	14.4600	Conductivity (σ):	1.89	1.85	2.09	5

SAR 2 Room

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
10-11-2018	Body 835	e'	53.7400	Relative Permittivity (ϵ_r):	53.74	55.20	-2.64	5
		e"	21.1900	Conductivity (σ):	0.98	0.97	1.42	5
	Body 820	e'	53.8500	Relative Permittivity (ϵ_r):	53.85	55.28	-2.58	5
		e"	21.2200	Conductivity (σ):	0.97	0.97	-0.10	5
	Body 850	e'	53.6000	Relative Permittivity (ϵ_r):	53.60	55.16	-2.82	5
		e"	21.1800	Conductivity (σ):	1.00	0.99	1.41	5

SAR 3 Room

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
10-11-2018	Body 750	e'	54.5800	Relative Permittivity (ϵ_r):	54.58	55.55	-1.74	5
		e''	23.0900	Conductivity (σ):	0.96	0.96	-0.02	5
	Body 700	e'	55.1100	Relative Permittivity (ϵ_r):	55.11	55.74	-1.13	5
		e''	23.5100	Conductivity (σ):	0.92	0.96	-4.60	5
	Body 790	e'	54.1400	Relative Permittivity (ϵ_r):	54.14	55.39	-2.26	5
		e''	22.8100	Conductivity (σ):	1.00	0.97	3.71	5
10-25-2018	Body 5250	e'	47.9900	Relative Permittivity (ϵ_r):	47.99	48.95	-1.96	5
		e''	18.6000	Conductivity (σ):	5.43	5.35	1.43	5
	Body 5260	e'	47.9600	Relative Permittivity (ϵ_r):	47.96	48.94	-2.00	5
		e''	18.6100	Conductivity (σ):	5.44	5.36	1.46	5
	Body 5600	e'	47.3900	Relative Permittivity (ϵ_r):	47.39	48.48	-2.24	5
		e''	18.9400	Conductivity (σ):	5.90	5.76	2.37	5
	Body 5750	e'	47.1300	Relative Permittivity (ϵ_r):	47.13	48.27	-2.37	5
		e''	19.1100	Conductivity (σ):	6.11	5.94	2.93	5
Body 5825	e'	47.0200	Relative Permittivity (ϵ_r):	47.02	48.20	-2.45	5	
	e''	19.1900	Conductivity (σ):	6.22	6.00	3.59	5	
10-29-2018	Body 5250	e'	50.1900	Relative Permittivity (ϵ_r):	50.19	48.95	2.53	5
		e''	17.9400	Conductivity (σ):	5.24	5.35	-2.17	5
	Body 5260	e'	50.1700	Relative Permittivity (ϵ_r):	50.17	48.94	2.52	5
		e''	17.9600	Conductivity (σ):	5.25	5.36	-2.08	5
	Body 5600	e'	49.6800	Relative Permittivity (ϵ_r):	49.68	48.48	2.48	5
		e''	18.3300	Conductivity (σ):	5.71	5.76	-0.93	5
	Body 5750	e'	49.4600	Relative Permittivity (ϵ_r):	49.46	48.27	2.46	5
		e''	18.5100	Conductivity (σ):	5.92	5.94	-0.30	5
Body 5825	e'	49.3500	Relative Permittivity (ϵ_r):	49.35	48.20	2.39	5	
	e''	18.6000	Conductivity (σ):	6.02	6.00	0.41	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	7-24-2018	835	1g	9.61
				10g	6.32
D1750V2	1125	2-16-2018	1750	1g	36.80
				10g	19.50
D1900V2	5d199	3-15-2018	1900	1g	39.60
				10g	20.80
D2300V2	1049	2-21-2017	2300	1g	48.00
				10g	23.10
D2450V2	960	3-20-2018	2450	1g	49.80
				10g	23.50
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

Note(s):

Refer to Appendix F that mentioned about justification for Extended SAR Dipole Calibrations (D2300, SN : 1049)

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			
10-8-2018	D1900V2	5d199	Body	1g	4.21	42.10	39.60	6.31
				10g	2.16	21.60	20.80	3.85
10-10-2018	D1750V2	1125	Body	1g	3.55	35.50	36.80	-3.53
				10g	1.84	18.40	19.50	-5.64
10-15-2018	D2450V2	960	Body	1g	5.02	50.20	49.80	0.80
				10g	2.31	23.10	23.50	-1.70
10-15-2018	D2600V2	1097	Body	1g	5.50	55.00	54.40	1.10
				10g	2.43	24.30	24.20	0.41
10-29-2018	D2300V2	1049	Body	1g	4.91	49.10	48.00	2.29
				10g	2.30	23.00	23.10	-0.43

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			
10-11-2018	D835V2	4d194	Body	1g	0.92	9.17	9.61	-4.58
				10g	0.61	6.08	6.32	-3.80

SAR 3 Room

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta $\pm 10\%$	Plot No.
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W			
10-11-2018	D750V3	1122	Body	1g	0.85	8.47	8.63	-1.85
				10g	0.57	5.66	5.72	-1.05
10-25-2018	D5GHzV2 (5250)	1209	Body	1g	7.79	77.90	75.70	2.91
				10g	2.18	21.80	21.00	3.81
10-25-2018	D5GHzV2 (5600)	1209	Body	1g	8.42	84.20	79.00	6.58
				10g	2.31	23.10	21.90	5.48
10-25-2018	D5GHzV2 (5750)	1209	Body	1g	7.82	78.20	75.60	3.44
				10g	2.17	21.70	20.80	4.33
10-29-2018	D5GHzV2 (5250)	1209	Body	1g	7.54	75.40	75.70	-0.40
				10g	2.09	20.90	21.00	-0.48
10-29-2018	D5GHzV2 (5600)	1209	Body	1g	8.38	83.80	79.00	6.08
				10g	2.29	22.90	21.90	4.57
10-29-2018	D5GHzV2 (5750)	1209	Body	1g	7.45	74.50	75.60	-1.46
				10g	2.06	20.60	20.80	-0.96

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
HSDPA Specific Settings	CM (dB)	1	3	2	3	1
	MPR (dB)	0	2	1	2	0
	DACK	8				0
	DNAK	8				0
	DCQI	8				0
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
HSUPA Specific Settings	CQI Repetition Factor (Table 5.2B.4)	2				
	$A_{hs} = \beta_{hs}/\beta_c$	30/15				
	E-DPDCCCH	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	23.2	N/A	10.1
			9400	1880.0		23.4		10.5
			9538	1907.6		23.6		10.3
	HSDPA	Subtest 1	9262	1852.4	0	22.4	0	9.2
			9400	1880.0		22.5		9.6
			9538	1907.6		22.6		9.3
		Subtest 2	9262	1852.4	0	22.4	0	9.1
			9400	1880.0		22.6		9.5
			9538	1907.6		22.6		9.3
		Subtest 3	9262	1852.4	0.5	21.9	0	8.6
			9400	1880.0		22.1		9.1
			9538	1907.6		22.1		8.8
		Subtest 4	9262	1852.4	0.5	21.8	0	8.6
			9400	1880.0		22.1		9.0
			9538	1907.6		22.1		8.8
	HSUPA	Subtest 1	9262	1852.4	0	22.4	0	9.0
			9400	1880.0		22.2		9.0
			9538	1907.6		22.4		8.9
		Subtest 2	9262	1852.4	2	20.9	0	7.7
			9400	1880.0		21.1		8.6
			9538	1907.6		21.2		7.9
		Subtest 3	9262	1852.4	1	20.7	0	7.2
			9400	1880.0		20.7		8.5
			9538	1907.6		21.3		7.7
		Subtest 4	9262	1852.4	2	21.5	0	8.1
			9400	1880.0		21.4		9.0
			9538	1907.6		21.4		8.3
		Subtest 5	9262	1852.4	0	21.9	0	8.7
			9400	1880.0		22.0		9.0
			9538	1907.6		21.9		8.9

WCDMA Band IV 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 IV	Rel 99	RMC, 12.2 kbps	1312	1712.4	N/A	22.9	13.0
			1413	1732.6		23.2	12.6
			1513	1752.6		23.4	13.5
	HSDPA	Subtest 1	1312	1712.4	0	21.9	12.1
			1413	1732.6		22.2	11.7
			1513	1752.6		22.3	12.6
		Subtest 2	1312	1712.4	0	21.9	12.0
			1413	1732.6		22.2	11.6
			1513	1752.6		22.3	12.5
		Subtest 3	1312	1712.4	0.5	21.4	11.6
			1413	1732.6		21.6	11.1
			1513	1752.6		21.7	12.0
		Subtest 4	1312	1712.4	0.5	21.4	11.5
			1413	1732.6		21.6	11.1
			1513	1752.6		21.7	12.0
	HSUPA	Subtest 1	1312	1712.4	0	21.4	12.0
			1413	1732.6		21.7	11.4
			1513	1752.6		21.6	12.5
		Subtest 2	1312	1712.4	2	20.9	10.7
			1413	1732.6		20.6	10.7
			1513	1752.6		21.1	11.1
		Subtest 3	1312	1712.4	1	20.8	10.4
			1413	1732.6		21.0	10.6
			1513	1752.6		20.9	10.9
		Subtest 4	1312	1712.4	2	20.9	11.3
			1413	1732.6		21.5	11.2
			1513	1752.6		21.4	11.5
		Subtest 5	1312	1712.4	0	21.5	11.6
			1413	1732.6		21.6	11.3
			1513	1752.6		21.8	12.2

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	23.5	17.6
			4183	836.6		23.7	17.8
			4233	846.6		23.4	17.6
	HSDPA	Subtest 1	4132	826.4	0	22.5	16.7
			4183	836.6		22.5	16.7
			4233	846.6		22.3	16.5
		Subtest 2	4132	826.4	0	22.4	16.7
			4183	836.6		22.6	16.7
			4233	846.6		22.3	16.5
		Subtest 3	4132	826.4	0.5	22.0	16.1
			4183	836.6		22.0	16.1
			4233	846.6		21.8	15.9
		Subtest 4	4132	826.4	0.5	22.0	16.1
			4183	836.6		22.0	16.1
			4233	846.6		21.8	16.0
	HSUPA	Subtest 1	4132	826.4	0	22.4	16.6
			4183	836.6		22.3	16.4
			4233	846.6		21.6	16.5
		Subtest 2	4132	826.4	2	21.1	15.4
			4183	836.6		21.0	15.7
			4233	846.6		21.2	15.3
		Subtest 3	4132	826.4	1	21.3	15.1
			4183	836.6		20.6	15.6
			4233	846.6		20.9	15.5
		Subtest 4	4132	826.4	2	21.3	16.0
			4183	836.6		21.3	16.2
			4233	846.6		21.5	15.5
		Subtest 5	4132	826.4	0	22.0	16.4
			4183	836.6		22.1	16.3
			4233	846.6		21.8	16.0

9.2 LTE

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

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

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

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
64 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	22.7	23.7	24.1	0	10.1	11.2	11.3
			1	49	0	24.1	24.1	23.8	0	10.7	11.7	11.6
			1	99	0	22.3	23.9	23.6	0	10.8	11.6	11.0
			50	0	1	23.2	22.1	23.2	0	10.4	11.4	11.2
			50	24	1	23.1	22.7	23.1	0	10.6	11.2	11.6
			50	50	1	22.2	23.3	23.1	0	10.6	11.7	11.0
		16QAM	100	0	1	22.9	23.2	23.2	0	10.5	11.5	11.4
			1	0	1	22.2	23.1	23.3	0	10.3	11.7	11.8
			1	49	1	23.4	23.0	23.4	0	11.0	11.8	11.8
			1	99	1	22.0	22.9	22.6	0	11.2	11.9	11.4
			50	0	2	22.1	21.3	22.3	0	10.2	11.4	11.8
			50	24	2	22.0	21.9	21.9	0	10.7	11.8	11.6
LTE Band 2	15	QPSK	50	50	2	21.2	22.2	22.1	0	10.7	11.4	10.8
			100	0	2	21.8	22.1	22.3	0	10.6	11.3	11.2
		16QAM	1	0	1	21.7	23.2	23.5	0	10.5	11.9	11.7
			1	36	1	22.7	23.0	23.2	0	11.0	11.6	11.2
			1	74	1	22.3	23.5	22.7	0	10.9	11.9	11.2
			36	0	2	22.2	21.2	22.3	0	10.4	11.7	11.7
LTE Band 2	10	QPSK	36	18	2	21.9	21.6	22.2	0	10.7	11.9	11.4
			36	37	2	21.5	22.2	22.2	0	10.7	11.7	10.9
			75	0	2	21.9	21.7	22.1	0	10.7	11.5	11.3
		16QAM	1	0	1	22.0	22.4	23.4	0	10.1	11.5	11.3
			1	25	1	22.9	22.6	23.4	0	10.6	11.8	11.3
			1	49	1	22.9	22.4	22.7	0	10.4	11.4	11.5
LTE Band 2	5	QPSK	25	0	2	21.8	21.4	22.3	0	10.5	11.8	11.2
			25	12	2	21.9	21.8	22.4	0	10.8	11.9	11.1
			25	25	2	21.7	22.2	22.1	0	10.6	11.8	11.1
		16QAM	50	0	2	21.8	21.5	22.1	0	10.4	11.6	11.0
			1	0	0	22.8	23.1	24.0	0	10.5	11.4	10.9
			1	25	0	23.7	23.3	23.9	0	10.8	11.7	11.0
LTE Band 2	3	QPSK	1	49	0	23.6	23.1	23.0	0	10.6	11.5	11.3
			25	0	1	22.7	22.1	23.2	0	10.6	11.6	11.1
			25	12	1	22.8	22.7	23.2	0	10.7	11.8	11.0
			25	25	1	22.7	23.0	22.9	0	10.8	11.9	11.3
		16QAM	50	0	1	22.9	22.5	23.0	0	10.6	11.8	11.2
			1	0	1	22.0	22.4	23.4	0	10.1	11.5	11.3
LTE Band 2	1.4	QPSK	1	25	1	22.9	22.6	23.4	0	10.6	11.8	11.3
			1	49	1	22.9	22.4	22.7	0	10.4	11.4	11.5
			25	0	2	21.8	21.4	22.3	0	10.5	11.8	11.2
			25	12	2	21.9	21.8	22.4	0	10.8	11.9	11.1
			25	25	2	21.7	22.2	22.1	0	10.6	11.8	11.1
		16QAM	50	0	2	21.8	21.5	22.1	0	10.4	11.6	11.0

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	23.6	23.6	23.6	0	11.1	12.0	11.6
			1	12	0	23.5	23.5	23.1	0	10.6	11.9	12.0
			1	24	0	23.9	23.5	23.0	0	11.1	11.8	11.9
			12	0	1	22.6	22.5	23.3	0	10.9	12.0	11.3
			12	6	1	22.9	22.8	23.3	0	10.7	11.9	11.5
			12	11	1	23.1	23.0	22.9	0	10.7	11.9	11.5
		16QAM	25	0	1	22.9	22.5	22.9	0	10.8	11.8	11.4
			1	0	1	23.2	22.6	22.9	0	11.4	11.8	11.5
			1	12	1	23.0	22.5	22.8	0	11.2	12.0	11.7
			1	24	1	23.0	22.6	22.8	0	11.4	11.8	12.0
			12	0	2	21.2	21.6	22.3	0	10.8	11.8	11.9
			12	6	2	21.2	21.9	22.2	0	10.9	12.0	11.4
			12	11	2	21.5	22.0	21.8	0	10.8	12.0	11.4
			25	0	2	22.0	21.6	21.8	0	10.7	11.9	11.2
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	23.6	23.6	23.5	0	11.0	11.8	11.5
			1	7	0	23.5	23.4	23.3	0	10.7	11.7	11.4
			1	14	0	23.7	23.6	23.3	0	10.8	12.0	11.9
			8	0	1	22.9	22.8	23.2	0	10.7	11.8	11.4
			8	4	1	22.6	22.8	22.9	0	10.7	11.8	11.4
			8	7	1	23.0	22.9	22.5	0	10.7	11.9	11.5
		16QAM	15	0	1	22.8	22.6	22.5	0	10.7	11.8	11.4
			1	0	1	22.8	22.6	23.0	0	10.7	12.0	11.7
			1	7	1	22.9	22.5	22.9	0	10.6	11.8	11.8
			1	14	1	22.9	22.6	22.9	0	10.5	11.9	11.9
			8	0	2	22.1	21.5	22.2	0	10.9	11.9	11.4
			8	4	2	21.9	21.6	22.3	0	10.8	11.9	11.5
			8	7	2	22.2	21.6	21.6	0	10.8	11.9	11.6
			15	0	2	22.0	21.4	21.4	0	10.8	11.8	11.5
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	23.9	23.7	23.5	0	10.9	11.8	11.2
			1	2	0	24.0	23.8	23.5	0	11.0	11.9	11.5
			1	5	0	23.9	23.7	23.3	0	10.8	11.8	11.4
			3	0	0	23.9	23.8	23.2	0	11.0	11.7	11.4
			3	1	0	23.9	23.8	23.2	0	11.0	11.8	11.4
			3	2	0	23.9	23.8	23.2	0	11.0	11.8	11.5
		16QAM	6	0	1	22.9	22.7	22.8	0	11.0	11.8	11.5
			1	0	1	22.9	23.1	22.3	0	11.3	11.8	11.6
			1	2	1	23.0	23.0	22.4	0	11.4	12.0	11.8
			1	5	1	23.0	23.2	22.3	0	11.2	11.8	11.9
			3	0	1	23.2	23.1	22.3	0	11.2	11.8	11.8
			3	1	1	23.2	23.1	22.4	0	11.2	11.9	11.9
			3	2	1	23.2	23.0	22.4	0	11.1	11.8	11.9
			6	0	2	22.1	21.8	22.2	0	10.9	12.0	11.4

LTE Band 4 Measured Results

SAR for LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

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		24.2		0		15.2	
			1	25	0		24.1		0		15.1	
			1	49	0		24.1		0		15.0	
			25	0	1		23.1		0		15.2	
			25	12	1		23.1		0		15.0	
			25	25	1		23.1		0		14.9	
		16QAM	50	0	1		23.0		0		14.9	
			1	0	1		23.2		0		14.9	
			1	25	1		23.4		0		15.2	
			1	49	1		23.0		0		14.7	
			25	0	2		22.3		0		15.1	
			25	12	2		22.2		0		15.2	
LTE Band 5	5	QPSK	25	25	2		22.1		0		15.0	
			50	0	2		22.0		0		14.9	
		16QAM	1	0	1		22.7		0		14.4	
			1	12	1		22.8		0		14.4	
			1	24	1		22.5		0		14.3	
			12	0	2		21.9		0		14.7	
LTE Band 5	3	QPSK	12	6	2		22.0		0		14.7	
			12	11	2		22.0		0		14.7	
			12	11	2		22.0		0		15.1	
			25	0	2		21.9		0		14.9	
			25	0	2		21.9		0		15.0	
			25	0	2		21.9		0		14.8	
		16QAM	1	0	1		22.9		0		14.8	
			1	7	1		22.5		0		14.8	
			1	14	1		22.5		0		15.1	
			8	0	2		22.0		0		14.8	
			8	4	2		22.3		0		15.0	
			8	7	2		22.0		0		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	24.0	24.1	24.0	0	14.7	14.8	14.8
			1	2	0	24.2	24.1	24.1	0	14.9	15.0	14.9
			1	5	0	24.2	24.1	24.1	0	14.7	14.9	14.8
			3	0	0	24.1	24.0	24.0	0	14.7	14.9	15.0
			3	1	0	24.1	24.0	24.0	0	14.9	15.0	15.0
			3	2	0	24.1	24.1	24.1	0	14.8	15.0	15.0
			6	0	1	24.0	24.0	24.0	0	14.8	14.9	14.9
		16QAM	1	0	1	23.1	23.0	23.0	0	14.6	14.9	14.8
			1	2	1	23.1	23.1	23.1	0	14.6	14.9	15.1
			1	5	1	23.2	23.3	23.1	0	14.8	14.9	14.8
			3	0	1	23.1	23.2	23.1	0	14.5	14.9	14.6
			3	1	1	23.2	23.2	23.2	0	14.6	14.9	14.7
			3	2	1	23.1	23.2	23.1	0	14.6	14.7	14.7
			6	0	2	23.2	23.0	23.0	0	14.5	14.9	14.8

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	21.8	22.3	0	9.9	9.6	9.9
			1	49	0	22.4	22.2	22.4	0	10.4	10.6	10.6
			1	99	0	22.3	21.8	22.1	0	10.0	10.4	10.0
			50	0	1	21.1	21.2	21.3	0	10.4	10.4	9.9
			50	24	1	21.1	21.2	21.4	0	10.4	10.6	10.0
			50	50	1	21.1	21.2	21.4	0	10.0	10.3	10.7
		16QAM	100	0	1	21.2	21.3	21.3	0	10.3	10.4	10.5
			1	0	1	20.9	21.2	21.3	0	10.3	10.2	9.8
			1	49	1	21.2	21.3	21.5	0	10.8	11.2	11.0
			1	99	1	20.5	20.7	21.1	0	9.8	10.1	10.6
			50	0	2	20.4	20.4	20.2	0	10.4	10.6	10.1
			50	25	2	20.3	20.5	20.4	0	10.4	10.8	10.7
LTE Band 7	15	QPSK	1	0	0	22.3	22.1	22.4	0	10.2	10.0	10.0
			1	36	0	22.4	22.5	22.5	0	10.5	10.7	10.9
1	74		0	22.3	22.2	22.1	0	9.7	9.9	10.5		
36	0		1	21.1	21.1	21.2	0	10.5	10.5	10.4		
36	18		1	21.1	21.2	21.4	0	10.6	10.6	10.9		
36	37		1	21.0	21.2	21.1	0	10.3	10.5	10.8		
16QAM	75	0	1	21.0	21.2	21.1	0	10.3	10.5	10.6		
	1	0	1	21.3	21.7	21.2	0	10.6	10.0	10.2		
	1	36	1	21.4	21.7	21.3	0	10.8	10.7	11.1		
	1	74	1	21.3	21.7	20.6	0	10.1	10.0	10.9		
	36	0	2	20.1	20.3	20.4	0	10.7	10.7	10.4		
	36	18	2	20.1	20.4	20.5	0	10.6	10.8	11.0		
LTE Band 7	10	QPSK	36	37	2	20.2	20.2	20.3	0	10.3	10.6	11.0
			75	0	2	20.2	20.3	20.3	0	10.4	10.6	10.6
16QAM	1		0	1	21.1	21.3	21.3	0	10.0	10.0	10.3	
	1		25	1	21.6	21.5	21.4	0	10.5	10.9	11.0	
	1		49	1	21.3	21.1	21.4	0	9.6	9.9	10.7	
	25		0	2	20.2	20.5	20.4	0	10.6	10.7	10.8	
	25	12	2	20.1	20.5	20.4	0	10.8	10.9	11.0		
	25	25	2	20.1	20.3	20.4	0	10.4	10.7	11.0		
LTE Band 7	10	QPSK	50	0	2	20.1	20.2	20.2	0	10.5	10.6	10.9
			1	0	1	21.1	21.3	21.3	0	10.0	10.0	10.3
16QAM	1		25	1	21.6	21.5	21.4	0	10.5	10.9	11.0	
	1		49	1	21.3	21.1	21.4	0	9.6	9.9	10.7	
	25		0	2	20.2	20.5	20.4	0	10.6	10.7	10.8	
	25		12	2	20.1	20.5	20.4	0	10.8	10.9	11.0	
	25	25	2	20.1	20.3	20.4	0	10.4	10.7	11.0		
	50	0	2	20.1	20.2	20.2	0	10.5	10.6	10.9		

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	21.8	21.8	22.3	0	10.6	10.6	10.8
			1	12	0	22.2	22.3	22.2	0	10.7	10.7	10.9
			1	24	0	21.9	21.9	21.9	0	10.5	10.4	10.7
			12	0	1	21.0	21.1	20.9	0	10.6	10.5	10.9
			12	6	1	21.1	21.1	21.0	0	10.7	10.6	11.0
			12	11	1	21.0	21.1	21.0	0	10.6	10.6	10.9
		16QAM	25	0	1	21.0	21.1	21.0	0	10.5	10.6	10.9
			1	0	1	20.6	20.9	20.6	0	11.1	10.8	11.1
			1	12	1	20.9	20.8	20.8	0	11.2	10.9	11.1
			1	24	1	20.6	20.6	20.5	0	10.9	10.7	11.0
			12	0	2	20.0	19.9	20.1	0	10.8	10.8	11.1
			12	6	2	20.2	20.1	20.1	0	10.9	10.9	11.2
			12	11	2	20.0	19.9	20.0	0	10.7	10.9	11.2
			25	0	2	20.0	20.2	20.3	0	10.7	10.8	11.1

LTE Band 12 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)				Reduction. Avg Pwr (dBm)			
					MPR	704 MHz	707.5 MHz	711 MHz	MPR	704 MHz	707.5 MHz	711 MHz
LTE Band 12	10	QPSK	1	0	0		23.5		0		15.8	
			1	25	0		23.8		0		16.0	
			1	49	0		23.6		0		15.9	
			25	0	1		22.7		0		15.9	
			25	12	1		22.7		0		15.9	
			25	25	1		22.7		0		15.9	
		16QAM	50	0	1		22.6		0		15.9	
			1	0	1		22.4		0		15.7	
			1	25	1		22.4		0		16.0	
			1	49	1		22.3		0		15.7	
			25	0	2		21.8		0		16.2	
			25	12	2		21.8		0		15.9	
LTE Band 12	5	QPSK	25	25	2		21.8		0		15.8	
			50	0	2		21.6		0		15.8	
		16QAM	1	0	1		22.3		0		15.5	
			1	12	1		22.5		0		15.9	
			1	24	1		22.4		0		15.5	
			12	0	2		21.6		0		16.0	
LTE Band 12	3	QPSK	12	6	2		21.6		0		15.8	
			12	11	2		21.6		0		15.9	
			12	11	2		21.6		0		15.8	
			25	0	2		21.7		0		16.1	
			25	0	2		21.7		0		16.0	
			25	0	2		21.7		0		16.0	
		16QAM	1	0	1		22.7		0		15.8	
			1	7	1		22.8		0		16.0	
			1	14	1		22.6		0		15.9	
			8	0	2		21.5		0		16.4	
			8	4	2		21.6		0		16.1	
			8	7	2		21.4		0		15.8	

LTE Band 12 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)				Reduction. Avg Pwr (dBm)			
					MPR	699.7 MHz	707.5 MHz	715.3 MHz	MPR	699.7 MHz	707.5 MHz	715.3 MHz
LTE Band 12	1.4	QPSK	1	0	0	23.7	23.6	23.4	0	15.8	16.0	15.9
			1	2	0	23.8	23.7	23.6	0	16.0	16.2	15.9
			1	5	0	23.7	23.8	23.4	0	16.0	16.2	15.9
			3	0	0	23.6	23.7	23.5	0	15.9	16.1	15.8
			3	1	0	23.6	23.8	23.5	0	16.0	16.1	15.9
			3	2	0	23.8	24.0	23.5	0	15.9	16.0	15.9
		16QAM	6	0	1	22.6	22.6	22.3	0	16.0	16.0	15.8
			1	0	1	22.4	22.3	22.3	0	15.8	15.7	15.8
			1	2	1	22.7	22.4	22.6	0	16.0	16.2	15.7
			1	5	1	22.7	22.5	22.3	0	16.0	15.7	15.7
			3	0	1	22.9	22.3	22.1	0	16.2	15.4	15.7
			3	1	1	22.4	22.4	22.3	0	16.1	16.0	15.8
			3	2	1	22.9	22.5	22.1	0	16.2	16.0	15.8
			6	0	2	21.7	21.4	21.1	0	16.1	15.7	16.0

Note(s):

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

LTE Band 17 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)			Reduction. Avg Pwr (dBm)			
					MPR	709 MHz	711 MHz	711 MHz	MPR	710 MHz	
LTE Band 17	10	QPSK	1	0	0		23.3		0	17.1	
			1	25	0		23.2		0	17.1	
			1	49	0		22.8		0	16.7	
			25	0	1		22.2		0	17.0	
			25	12	1		22.1		0	16.9	
			25	25	1		22.0		0	16.8	
		16QAM	50	0	1		22.1		0	16.8	
			1	0	1		22.1		0	16.9	
			1	25	1		22.2		0	17.1	
			1	49	1		21.8		0	16.5	
			25	0	2		21.1		0	16.9	
			25	12	2		21.0		0	16.8	
LTE Band 17	5	QPSK	25	25	2		20.9		0	16.8	
			50	0	2		21.0		0	16.9	
		16QAM	1	0	1		21.7		0	16.5	
			1	12	1		21.7		0	16.4	
			1	24	1		21.5		0	16.0	
			12	0	2		21.1		0	16.8	
LTE Band 17	5	QPSK	12	6	1		22.1		0	16.8	
			12	11	1		22.1		0	16.9	
			25	0	1		22.2		0	16.8	
		16QAM	12	6	2		21.0		0	16.8	
			12	11	2		21.0		0	16.8	
			25	0	2		21.0		0	17.0	

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

LTE Band 30 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)				Reduction. Avg Pwr (dBm)			
					MPR		2310 MHz		MPR		2310 MHz	
LTE Band 30	10	QPSK	1	0	0		22.1		0		11.8	
			1	25	0		22.3		0		13.0	
			1	49	0		22.1		0		12.2	
			25	0	1		21.2		0		12.6	
			25	12	1		21.1		0		12.9	
			25	25	1		21.2		0		12.9	
		16QAM	50	0	1		21.1		0		12.7	
			1	0	1		21.1		0		12.1	
			1	25	1		21.2		0		13.3	
			1	49	1		21.3		0		12.6	
			25	0	2		20.2		0		12.6	
			25	12	2		20.1		0		12.9	
			25	25	2		20.1		0		12.9	
			50	0	2		20.0		0		12.7	
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)				Reduction. Avg Pwr (dBm)			
					MPR	2307.5 MHz	2310 MHz	2312.5 MHz	MPR	2307.5 MHz	2310 MHz	2312.5 MHz
LTE Band 30	5	QPSK	1	0	0		22.0		0		12.6	
			1	12	0		22.2		0		12.9	
			1	24	0		22.0		0		12.8	
			12	0	1		21.2		0		12.8	
			12	6	1		21.2		0		12.9	
			12	11	1		21.2		0		12.9	
		16QAM	25	0	1		21.2		0		12.8	
			1	0	1		20.7		0		13.1	
			1	12	1		20.6		0		13.4	
			1	24	1		20.7		0		13.3	
			12	0	2		20.1		0		13.0	
			12	6	2		20.0		0		13.0	
			12	11	2		20.1		0		13.0	
			25	0	2		20.1		0		12.8	

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

LTE Band 66 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)				Reduction. Avg Pwr (dBm)			
					MPR	1720 MHz	1745 MHz	1770 MHz	MPR	1720 MHz	1745 MHz	1770 MHz
LTE Band 66	20	QPSK	1	0	0	23.4	23.1	23.3	0	12.3	11.9	12.4
			1	49	0	23.2	23.5	23.5	0	12.7	12.9	12.3
			1	99	0	22.9	23.3	23.5	0	11.6	12.6	12.1
			50	0	1	22.4	22.5	22.2	0	12.5	12.3	12.2
			50	24	1	22.3	22.5	22.5	0	12.6	12.8	12.2
			50	50	1	22.3	22.4	22.3	0	12.1	12.8	11.9
			100	0	1	22.4	22.5	22.4	0	12.3	12.5	12.1
		16QAM	1	0	1	22.5	22.2	22.9	0	12.7	12.3	12.6
			1	49	1	22.5	22.6	22.0	0	13.1	13.4	12.5
			1	99	1	22.3	22.6	22.0	0	12.0	13.1	12.2
			50	0	2	21.3	21.5	21.5	0	12.5	12.3	12.1
			50	25	2	21.2	21.6	21.4	0	12.6	12.8	12.2
100	50	2	21.2	21.6	21.2	0	12.1	12.8	11.7			
100	0	2	21.3	21.5	21.4	0	12.3	12.6	12.0			
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)				Reduction. Avg Pwr (dBm)			
					MPR	1717.5 MHz	1745 MHz	1772.5 MHz	MPR	1717.5 MHz	1745 MHz	1772.5 MHz
LTE Band 66	15	QPSK	1	0	0	23.8	23.5	23.3	0	12.6	12.3	12.2
			1	36	0	23.4	23.4	23.4	0	12.8	12.9	12.0
			1	74	0	23.4	23.4	23.3	0	12.2	12.8	12.2
			36	0	1	22.4	22.6	22.4	0	12.6	12.5	12.2
			36	18	1	22.3	22.5	22.2	0	12.8	12.9	12.1
			36	37	1	22.3	22.5	22.3	0	12.4	12.9	12.1
			75	0	1	22.3	22.5	22.3	0	12.5	12.7	12.1
		16QAM	1	0	1	22.7	22.8	22.3	0	12.9	12.6	11.9
			1	36	1	22.8	22.9	22.5	0	13.1	13.2	11.8
			1	74	1	22.3	23.1	22.4	0	12.5	13.2	11.9
			36	0	2	21.4	21.5	21.6	0	12.5	12.5	12.1
			36	18	2	21.3	21.4	21.4	0	12.7	12.9	12.1
36	37	2	21.3	21.3	21.4	0	12.4	12.9	11.9			
75	0	2	21.4	21.5	21.4	0	12.5	12.7	12.0			
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)				Reduction. Avg Pwr (dBm)			
					MPR	1715 MHz	1745 MHz	1775 MHz	MPR	1715 MHz	1745 MHz	1775 MHz
LTE Band 66	10	QPSK	1	0	0	23.6	23.6	23.2	0	12.6	12.3	11.9
			1	25	0	23.3	23.4	23.1	0	12.9	12.9	12.0
			1	49	0	23.4	23.4	23.2	0	12.5	12.8	12.0
			25	0	1	22.3	22.4	22.2	0	12.8	12.5	12.0
			25	12	1	22.3	22.4	22.2	0	12.9	12.9	12.1
			25	25	1	22.3	22.4	22.2	0	12.7	12.9	12.1
			50	0	1	22.2	22.4	22.2	0	12.7	12.7	12.0
		16QAM	1	0	1	22.6	22.6	21.9	0	12.5	12.6	11.7
			1	25	1	22.7	22.4	21.9	0	12.9	13.3	11.9
			1	49	1	22.4	22.5	22.2	0	12.4	13.2	11.8
			25	0	2	21.3	21.5	21.3	0	12.7	12.6	11.8
			25	12	2	21.3	21.5	21.2	0	12.9	12.9	12.1
25	25	2	21.2	21.6	21.3	0	12.8	13.0	12.0			
50	0	2	21.3	21.4	21.1	0	12.6	12.7	11.9			

LTE Band 66 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)				Reduction. Avg Pwr (dBm)			
					MPR	1712.5 MHz	1745 MHz	1777.5 MHz	MPR	1712.5 MHz	1745 MHz	1777.5 MHz
LTE Band 66	5	QPSK	1	0	0	23.0	23.3	22.9	0	13.1	13.0	12.3
			1	12	0	23.4	23.5	23.0	0	13.0	13.0	12.2
			1	24	0	22.9	23.4	23.0	0	13.2	13.3	12.6
			12	0	1	22.3	22.4	22.1	0	13.0	12.8	12.2
			12	6	1	22.3	22.3	22.2	0	13.1	13.0	12.2
			12	11	1	22.2	22.3	22.2	0	13.0	13.1	12.3
			25	0	1	22.2	22.3	22.2	0	13.0	13.0	12.3
		16QAM	1	0	1	22.1	21.9	21.9	0	13.1	13.4	12.3
			1	12	1	21.8	21.8	22.0	0	13.1	13.2	12.3
			1	24	1	21.7	21.9	22.1	0	13.1	13.3	12.6
			12	0	2	21.1	21.5	21.1	0	12.9	12.9	12.2
			12	6	2	21.1	21.3	21.0	0	13.0	13.1	12.3
			12	11	2	21.1	21.4	21.2	0	13.0	13.2	12.4
			25	0	2	21.2	21.4	21.3	0	12.8	13.0	12.2
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)				Reduction. Avg Pwr (dBm)			
					MPR	1711.5 MHz	1745 MHz	1778.5 MHz	MPR	1711.5 MHz	1745 MHz	1778.5 MHz
LTE Band 66	3	QPSK	1	0	0	23.4	23.5	23.4	0	12.9	12.8	12.3
			1	7	0	23.4	23.4	23.3	0	12.9	12.9	12.3
			1	14	0	23.5	23.5	23.4	0	13.0	13.1	12.5
			8	0	1	22.4	22.4	22.3	0	12.9	12.9	12.2
			8	4	1	22.3	22.4	22.4	0	12.9	13.0	12.3
			8	7	1	22.4	22.4	22.4	0	12.9	13.0	12.3
			15	0	1	22.4	22.4	22.4	0	12.9	12.9	12.3
		16QAM	1	0	1	22.3	22.6	22.4	0	12.7	12.8	12.5
			1	7	1	22.6	22.6	22.4	0	12.8	13.0	12.6
			1	14	1	22.7	22.6	22.4	0	12.7	13.1	12.7
			8	0	2	21.4	21.4	21.3	0	13.0	12.9	12.2
			8	4	2	21.5	21.4	21.4	0	13.0	13.0	12.4
			8	7	2	21.6	21.3	21.2	0	13.0	13.0	12.4
			15	0	2	21.4	21.4	21.2	0	12.9	12.9	12.3
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Avg Pwr (dBm)				Reduction. Avg Pwr (dBm)			
					MPR	1710.7 MHz	1745 MHz	1779.3 MHz	MPR	1710.7 MHz	1745 MHz	1779.3 MHz
LTE Band 66	1.4	QPSK	1	0	0	23.2	23.1	23.2	0	12.6	12.8	12.3
			1	2	0	23.3	23.4	23.3	0	12.9	13.0	12.4
			1	5	0	23.3	23.2	23.2	0	12.7	12.9	12.3
			3	0	0	23.3	23.3	23.2	0	12.8	12.9	12.3
			3	1	0	23.5	23.4	23.2	0	12.9	13.0	12.4
			3	2	0	23.2	23.3	23.2	0	12.9	13.0	12.4
			6	0	1	22.4	22.2	22.2	0	12.8	12.9	12.4
		16QAM	1	0	1	22.4	21.9	22.1	0	12.7	13.1	12.3
			1	2	1	22.5	22.4	22.4	0	12.9	13.3	12.5
			1	5	1	22.4	22.4	22.3	0	12.8	13.2	12.4
			3	0	1	22.6	22.4	22.4	0	13.0	13.1	12.4
			3	1	1	22.7	22.3	22.3	0	13.0	13.1	12.4
			3	2	1	22.7	22.4	22.0	0	13.1	13.1	12.4
			6	0	2	21.4	21.3	21.5	0	13.0	12.8	12.5

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 configurat ion (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)	Channel	Freq. (MHz)	RB/Offset	BW (MHz)	Channel	Freq. (MHz)	BW (MHz)	Channel	Freq. (MHz)			
2A-4A	2A	4A	QPSK	10	19150	1905.0	1/0	10	1150	1985.0	10	2175	2132.5	24.02	23.90	-0.12
	4A	2A	QPSK	5	20175	1732.5	1/12	5	2175	2132.5	10	900	1960.0	23.77	23.90	0.13
2A-12A	2A	12A	QPSK	10	19150	1905.0	1/0	10	1150	1985.0	10	5095	737.5	24.02	23.70	-0.32
	12A	2A	QPSK	5	23095	707.5	1/12	5	5095	737.5	10	900	1960.0	23.87	23.98	0.11
2A-29A	2A	29A	QPSK	10	19150	1905.0	1/0	10	1150	1985.0	10	9715	722.5	24.02	23.78	-0.24
4A-5A	4A	5A	QPSK	5	20175	1732.5	1/12	5	2175	2132.5	10	2525	881.5	23.77	23.75	-0.02
	5A	4A	QPSK	5	20525	836.5	1/12	5	2525	881.5	10	2175	2132.5	24.25	24.30	0.05
4A-12A	4A	12A	QPSK	5	20175	1732.5	1/12	5	2175	2132.5	10	5095	737.5	23.77	23.89	0.12
4A-17A	4A	17A	QPSK	5	20175	1732.5	1/12	5	2175	2132.5	10	5790	740.0	23.77	23.89	0.12
4A-29A	4A	29A	QPSK	5	20175	1732.5	1/12	5	2175	2132.5	10	9715	722.5	23.77	23.81	0.04

2) Reduction power results

E-UTRA CA configurat ion (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)	Channel	Freq. (MHz)	RB/Offset	BW (MHz)	Channel	Freq. (MHz)	BW (MHz)	Channel				Freq. (MHz)
2A-4A	2A	4A	16QAM	5	18900	1880.0	12/13	5	900	1960.0	10	2175	2132.5	12.00	11.87	-0.13
	4A	2A	QPSK	5	20375	1752.5	1/0	5	2375	2152.5	10	900	1960.0	12.48	12.25	-0.23
2A-12A	2A	12A	16QAM	5	18900	1880.0	12/13	5	900	1960.0	10	5095	737.5	12.00	11.99	-0.01
	12A	2A	QPSK	5	23095	707.5	1/12	5	5095	737.5	10	900	1960.0	16.24	16.34	0.10
2A-29A	2A	29A	16QAM	5	18900	1880.0	12/13	5	900	1960.0	10	9715	722.5	12.00	12.03	0.03
4A-5A	4A	5A	QPSK	5	20375	1752.5	1/0	5	2375	2152.5	10	2525	881.5	12.48	12.27	-0.21
	5A	4A	QPSK	10	20525	836.5	25/0	10	2525	881.5	10	2175	2132.5	15.19	15.01	-0.18
4A-12A	4A	12A	QPSK	5	20375	1752.5	1/0	5	2375	2152.5	10	5095	737.5	12.48	12.10	-0.38
4A-17A	4A	17A	QPSK	5	20375	1752.5	1/0	5	2375	2152.5	10	5790	740.0	12.48	12.16	-0.32
4A-29A	4A	29A	QPSK	5	20375	1752.5	1/0	5	2375	2152.5	10	9715	722.5	12.48	12.10	-0.38

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	20.7	21.0	Yes	13.5	14	Yes
			6	2437	20.9	21.0		13.8	14	
			11	2462	19.0	19.0		13.7	14	
	802.11g	6 Mbps	1	2412	Not Require	14.0	No	13.6	14	No
			6	2437		19.0		13.8	14	
			11	2462		12.0		12.0	12	
	802.11n (HT20)	6.5 Mbps	1	2412	Not Require	14.0	No	13.7	14	No
			6	2437		18.0		13.8	14	
			11	2462		12.0		11.9	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	16.2	17.0	Yes	Not Required	10.0	No
			56	5280	16.6					
			60	5300	16.4					
			64	5320	16.4					
	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	9.1	10.0	Yes
			62	5310				9.1		
5.5 (U-NII 2C)	802.11a	6 Mbps	100	5500	14.2	15.0	Yes	Not Required	10.0	No
			120	5600	14.1					
			140	5700	14.5					
	802.11n (HT20)	6.5 Mbps	100	5500	14.0	15.0	No	Not Required	10.0	No
			120	5600	13.8					
			140	5700	14.5					
	802.11n (HT40)	13.5 Mbps	102	5510	Not Required	11.0	No	9.1	10.0	Yes
			118	5590				9.2		
			134	5670				9.1		
5.8 (U-NII 3)	802.11a	6 Mbps	149	5745	16.2	17.0	Yes	Not Required	10.0	No
			157	5785	16.1					
			165	5825	16.3					
	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				9.7		

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

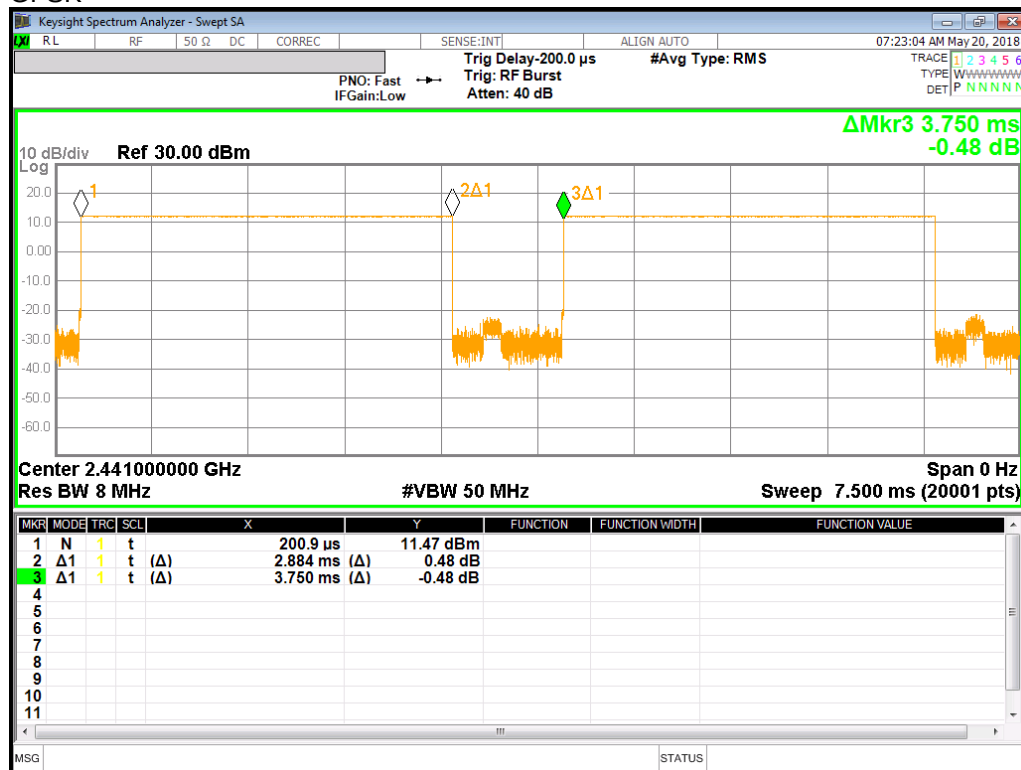
Band (GHz)	Mode	Ch #	Freq. (MHz)	Meas. Avg Pwr (dBm)
2.4	GFSK	0	2402	8.5
		39	2441	9.1
		78	2480	9.0
	EDR, $\pi/4$ DQPSK	0	2402	8.1
		39	2441	8.7
		78	2480	8.6
	EDR, 8-DPSK	0	2402	8.1
		39	2441	8.7
		78	2480	8.6
	LE, GFSK	0	2402	5.5
		19	2440	6.2
		39	2480	6.0

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	23.2	0.959	1.288	1
					9400	1880.0	24.5	23.4	0.877	1.130	
					9538	1907.6	24.5	23.6	0.973	1.200	
			13	Edge 1	9262	1852.4	24.5	23.2	0.855	1.148	
					9400	1880.0	24.5	23.4	0.855	1.102	
					9538	1907.6	24.5	23.6	0.961	1.185	
			5	Edge 2	9262	1852.4	24.5	23.2	0.743	0.998	
					9400	1880.0	24.5	23.4	0.705	0.908	
					9538	1907.6	24.5	23.6	0.809	0.998	
			10	Corner A	9262	1852.4	24.5	23.2	0.682	0.916	
					9400	1880.0	24.5	23.4	0.654	0.843	
					9538	1907.6	24.5	23.6	0.722	0.890	
	Rel 99 RMC	On	0	Rear	9400	1880.0	11.0	10.5	0.623	0.697	
				Edge 1	9400	1880.0	11.0	10.5	0.303	0.339	
				Edge 2	9400	1880.0	11.0	10.5	0.080	0.090	
				Corner A	9400	1880.0	11.0	10.5	0.130	0.145	

Note(s):

Adjusted SAR is not over 1.2 W/kg for HSDPA, HSUPA. So additional tests are not required.

10.2 W-CDMA Band IV

RF Exposure Conditions	Mode	Pwr back Off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
Standalone	Rel 99 RMC	Off	17	Rear	1312	1712.4	24.5	22.9	0.630	0.904	
					1413	1732.6	24.5	23.2	0.691	0.930	
					1513	1752.6	24.5	23.4	0.763	0.976	
			13	Edge 1	1312	1712.4	24.5	22.9	0.809	1.161	
					1413	1732.6	24.5	23.2	0.855	1.151	
					1513	1752.6	24.5	23.4	0.938	1.200	2
			5	Edge 2	1312	1712.4	24.5	22.9	0.800	1.148	
					1413	1732.6	24.5	23.2	0.879	1.183	
					1513	1752.6	24.5	23.4	0.931	1.191	
			10	Corner A	1312	1712.4	24.5	22.9	0.573	0.823	
					1413	1732.6	24.5	23.2	0.644	0.867	
					1513	1752.6	24.5	23.4	0.704	0.901	
	Rel 99 RMC	On	0	Rear	1312	1712.4	14.0	13.0	0.554	0.699	
					1413	1732.6	14.0	12.6	0.789	1.096	
					1513	1752.6	14.0	13.5	0.817	0.924	
				Edge 1	1513	1752.6	14.0	13.5	0.419	0.474	
				Edge 2	1513	1752.6	14.0	13.5	0.109	0.123	
				Corner A	1513	1752.6	14.0	13.5	0.186	0.210	

Note(s):

Adjusted SAR is not over 1.2 W/kg for HSDPA, HSUPA. So additional tests are not required.

10.3 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	23.7	0.589	0.799	3
			13	Edge 1	4183	836.6	25.0	23.7	0.382	0.518	
			5	Edge 2	4183	836.6	25.0	23.7	0.516	0.700	
			10	Corner A	4183	836.6	25.0	23.7	0.068	0.093	
	Rel 99 RMC	On	0	Rear	4183	836.6	19.0	17.8	0.603	0.793	
				Edge 1	4183	836.6	19.0	17.8	0.226	0.297	
				Edge 2	4183	836.6	19.0	17.8	0.293	0.386	
				Corner A	4183	836.6	19.0	17.8	0.148	0.195	

10.4 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	49	24.5	24.1	0.967	1.068	
					18900	1880.0	1	49	24.5	24.1	0.919	0.998	
							50	50	23.5	23.3	0.760	0.796	
					19100	1900.0	1	49	24.5	23.8	0.834	0.980	
			13	Edge 1	18700	1860.0	1	49	24.5	24.1	0.876	0.967	
							50	50	23.5	22.2	0.644	0.872	
					18900	1880.0	1	49	24.5	24.1	0.888	0.965	
							50	50	23.5	23.3	0.815	0.853	
							1	49	24.5	23.8	1.020	1.198	4
					19100	1900.0	50	50	23.5	23.1	0.817	0.900	
							100	0	23.5	23.2	0.860	0.914	
			5	Edge 2	18900	1880.0	1	49	24.5	24.1	0.636	0.691	
							50	50	23.5	23.3	0.610	0.639	
			10	Corner A	18900	1880.0	1	49	24.5	24.1	0.561	0.609	
							50	50	23.5	23.3	0.618	0.647	
	QPSK	On	0	Rear	18700	1860.0	1	49	12.0	10.7	0.577	0.782	
					18900	1880.0	1	49	12.0	11.7	0.782	0.829	
							50	50	12.0	11.7	0.713	0.771	
					19100	1900.0	1	49	12.0	11.6	0.546	0.605	
				Edge 1	18900	1880.0	1	49	12.0	11.7	0.402	0.426	
							50	50	12.0	11.7	0.348	0.376	
				Edge 2	18900	1880.0	1	49	12.0	11.7	0.098	0.104	
							50	50	12.0	11.7	0.104	0.112	
				Corner A	18900	1880.0	1	49	12.0	11.7	0.166	0.176	
							50	50	12.0	11.7	0.162	0.175	

10.5 LTE Band 4 (20MHz Bandwidth)

SAR for LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

10.6 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	0	25.2	24.2	0.557	0.699	5
							25	0	24.2	23.1	0.436	0.558	
			13	Edge 1	20525	836.5	1	0	25.2	24.2	0.454	0.570	
							25	0	24.2	23.1	0.349	0.447	
			5	Edge 2	20525	836.5	1	0	25.2	24.2	0.540	0.678	
							25	0	24.2	23.1	0.427	0.547	
			10	Corner A	20525	836.5	1	0	25.2	24.2	0.076	0.095	
							25	0	24.2	23.1	0.057	0.073	
	QPSK	On	0	Rear	20525	836.5	1	0	16.0	15.2	0.316	0.382	
							25	0	16.0	15.2	0.321	0.387	
				Edge 1	20525	836.5	1	0	16.0	15.2	0.115	0.139	
							25	0	16.0	15.2	0.112	0.135	
				Edge 2	20525	836.5	1	0	16.0	15.2	0.148	0.179	
							25	0	16.0	15.2	0.144	0.173	
				Corner A	20525	836.5	1	0	16.0	15.2	0.076	0.092	
							25	0	16.0	15.2	0.076	0.091	

10.7 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	21350	2560.0	1	49	23.0	22.4	0.681	0.781	
							50	50	22.0	21.4	0.555	0.636	
			10	Edge 1	20850	2510.0	1	49	23.0	22.4	0.788	0.904	
							50	50	22.0	21.1	0.603	0.741	
					21100	2535.0	1	49	23.0	22.2	0.869	1.046	6
							50	50	22.0	21.2	0.649	0.783	
					21350	2560.0	1	49	23.0	22.4	0.891	1.021	
							50	50	22.0	21.4	0.739	0.847	
							100	0	22.0	21.3	0.706	0.828	
			0	Edge 2	20850	2510.0	1	49	23.0	22.4	0.732	0.840	
					21100	2535.0	1	49	23.0	22.2	0.711	0.855	
					21350	2560.0	1	49	23.0	22.4	0.713	0.817	
			0	Edge 4	21100	2535.0	50	50	22.0	21.4	0.568	0.651	
							1	49	23.0	22.4	0.199	0.228	
							50	50	22.0	21.4	0.165	0.189	
							1	49	12.0	10.6	0.539	0.737	
	QPSK	On	0	Rear	21350	2560.0	50	50	12.0	10.7	0.522	0.708	
							1	49	12.0	10.6	0.261	0.357	
				Edge 1	21350	2560.0	50	50	12.0	10.7	0.253	0.343	
							1	49	12.0	10.6	0.253	0.343	

10.8 LTE Band 12 (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	23095	707.5	1	25	25.0	23.8	0.248	0.327	
							25	12	24.0	22.7	0.182	0.247	
			13	Edge 1	23095	707.5	1	25	25.0	23.8	0.226	0.298	
							25	12	24.0	22.7	0.163	0.221	
			5	Edge 2	23095	707.5	1	25	25.0	23.8	0.197	0.260	
							25	12	24.0	22.7	0.157	0.213	
			10	Corner A	23095	707.5	1	25	25.0	23.8	0.037	0.049	
							25	12	24.0	22.7	0.029	0.040	
	QPSK	On	0	Rear	23095	707.5	1	25	17.0	16.0	0.356	0.448	7
							25	12	17.0	15.9	0.345	0.445	
				Edge 1	23095	707.5	1	25	17.0	16.0	0.216	0.272	
							25	12	17.0	15.9	0.206	0.266	
				Edge 2	23095	707.5	1	25	17.0	16.0	0.158	0.199	
							25	12	17.0	15.9	0.148	0.191	
				Corner A	23095	707.5	1	25	17.0	16.0	0.081	0.101	
							25	12	17.0	15.9	0.080	0.103	

10.9 LTE Band 17 (10MHz Bandwidth)

RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.	Meas.	Scaled	
Standalone	QPSK	Off	17	Rear	23790	710.0	1	0	25.0	23.3	0.223	0.332	
							25	0	24.0	22.2	0.183	0.276	
			13	Edge 1	23790	710.0	1	0	25.0	23.3	0.200	0.298	
							25	0	24.0	22.2	0.162	0.244	
			5	Edge 2	23790	710.0	1	0	25.0	23.3	0.159	0.237	
							25	0	24.0	22.2	0.132	0.199	
			10	Corner A	23790	710.0	1	0	25.0	23.3	0.035	0.052	
							25	0	24.0	22.2	0.027	0.041	
	QPSK	On	0	Rear	23790	710.0	1	0	18.0	17.1	0.474	0.580	8
							25	0	18.0	17.0	0.455	0.578	
				Edge 1	23790	710.0	1	0	18.0	17.1	0.272	0.333	
							25	0	18.0	17.0	0.262	0.333	
				Edge 2	23790	710.0	1	0	18.0	17.1	0.179	0.219	
							25	0	18.0	17.0	0.178	0.226	
				Corner A	23790	710.0	1	0	18.0	17.1	0.103	0.126	
							25	0	18.0	17.0	0.097	0.123	

10.10 LTE Band 30 (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	14	Rear	27710	2310.0	1	25	23.0	22.3	0.252	0.297	
							25	25	22.0	21.2	0.196	0.234	
			10	Edge 1	27710	2310.0	1	25	23.0	22.3	0.261	0.307	
							25	25	22.0	21.2	0.199	0.238	
			0	Edge 2	27710	2310.0	1	25	23.0	22.3	0.232	0.273	
							25	25	22.0	21.2	0.177	0.211	
			0	Edge 4	27710	2310.0	1	25	23.0	22.3	0.078	0.092	
							25	25	22.0	21.2	0.059	0.071	
	QPSK	On	0	Rear	27710	2310.0	1	25	14.0	13.0	0.395	0.495	9
							25	25	14.0	12.9	0.334	0.430	
				Edge 1	27710	2310.0	1	25	14.0	13.0	0.159	0.199	
							25	25	14.0	12.9	0.127	0.164	

10.11 LTE Band 66 (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	132072	1720.0	1	49	24.5	23.2	0.744	0.998	
					132322	1745.0	1	49	24.5	23.5	0.780	0.989	
							50	24	23.5	22.5	0.621	0.784	
					132572	1770.0	1	49	24.5	23.5	0.854	1.088	
			13	Edge 1	132072	1720.0	1	49	24.5	23.2	0.807	1.083	
							50	24	23.5	22.3	0.650	0.862	
					132322	1745.0	1	49	24.5	23.5	0.818	1.037	
							50	24	23.5	22.5	0.672	0.848	
							100	0	23.5	22.5	0.680	0.851	
					132572	1770.0	1	49	24.5	23.5	0.894	1.139	
							50	24	23.5	22.5	0.773	0.983	
			5	Edge 2	132072	1720.0	1	49	24.5	23.2	0.738	0.990	
					132322	1745.0	1	49	24.5	23.5	0.751	0.952	
							50	24	23.5	22.5	0.599	0.756	
			10	Corner A	132572	1770.0	1	49	24.5	23.5	0.878	1.118	
							1	49	24.5	23.5	0.578	0.733	
					132322	1745.0	50	24	23.5	22.5	0.486	0.613	
	QPSK	On	0	Rear	132072	1720.0	1	49	14.0	12.7	0.653	0.888	
							50	24	14.0	12.6	0.641	0.886	
					132322	1745.0	1	49	14.0	12.9	0.757	0.969	
							50	24	14.0	12.8	0.782	1.034	
							100	0	14.0	12.8	0.744	0.991	
					132572	1770.0	1	49	14.0	12.3	0.806	1.196	
				Edge 1	132322	1745.0	50	24	14.0	12.2	0.827	1.243	10
							1	49	14.0	12.9	0.405	0.518	
				Edge 2	132322	1745.0	50	24	14.0	12.8	0.412	0.545	
							1	49	14.0	12.9	0.107	0.137	
				Corner A	132322	1745.0	50	24	14.0	12.8	0.106	0.140	
							1	49	14.0	12.9	0.183	0.234	
							50	24	14.0	12.8	0.179	0.237	

10.12 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	6	2437.0	0.700	99.7%	21.0	20.9	0.584	0.602	2	
				8	Edge 1	6	2437.0	0.199	99.7%	21.0	20.9	0.208	0.214	4	
				6	Edge 4	6	2437.0	0.973	99.7%	21.0	20.9	0.688	0.709		
				6	Corner B	6	2437.0	0.208	99.7%	21.0	20.9				
			On	0	Rear	6	2437.0	0.771	99.7%	14.0	13.8	0.727	0.772		11
					Edge 1	6	2437.0	0.101	99.7%	14.0	13.8	0.089	0.094	4	
					Edge 4	6	2437.0	0.348	99.7%	14.0	13.8	0.351	0.373	2	
					Corner B	6	2437.0	0.128	99.7%	14.0	13.8				

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.

10.13 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	9.1	0.186	0.295	12
				0	Edge 1	39	2441.0	76.9%	10.0	9.1	0.022	0.035	
				0	Edge 4	39	2441.0	76.9%	10.0	9.1	0.101	0.160	

10.14 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	1.300	98.2%	17.0	16.6	0.602	0.670	2	
				8	Edge 1	56	5280.0	1.625	98.2%	17.0	16.6	0.824	0.918		13
						64	5320.0	1.480	98.2%	17.0	16.4	0.761	0.887	3	
				6	Edge 4	56	5280.0	0.746	98.2%	17.0	16.6				
	6		Corner B	56	5280.0	1.270	98.2%	17.0	16.6						
	802.11n 13.5 Mbps (HT40)		On	0	Rear	54	5270.0	1.707	96.1%	10.0	9.1	0.607	0.782	3	
						62	5310.0	1.489	96.1%	10.0	9.1	0.633	0.812		
				0	Edge 1	62	5310.0	0.708	96.1%	10.0	9.1	0.511	0.656	2	
				0	Edge 4	62	5310.0	0.466	96.1%	10.0	9.1				
				0	Corner B	62	5310.0	0.563	96.1%	10.0	9.1				
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		
5.5 GHz U-NII 2C	802.11a 6 Mbps	Standalone	Off	11	Rear	140	5700.0	0.809	98.2%	15.0	14.5	0.361	0.411	2	
				8	Edge 1	140	5700.0	0.747	98.2%	15.0	14.5	0.381	0.434	4	
				6	Edge 4	140	5700.0	0.739	98.2%	15.0	14.5				
				6	Corner B	140	5700.0	0.825	98.2%	15.0	14.5	0.367	0.418		
	802.11n 13.5 Mbps (HT40)		On	0	Rear	102	5510.0	2.207	96.1%	10.0	9.1	0.780	0.994	3	
						118	5590.0	2.287	96.1%	10.0	9.2	0.801	1.013		14
				0	Edge 1	118	5590.0	0.792	96.1%	10.0	9.2	0.419	0.530	2	
				0	Edge 4	118	5590.0	0.654	96.1%	10.0	9.2				
				0	Corner B	118	5590.0	0.712	96.1%	10.0	9.2				
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		
5.8 GHz U-NII 3	802.11a 6 Mbps	Standalone	Off	11	Rear	149	5745.0	1.481	98.2%	17.0	16.2	0.671	0.825	3	
						165	5825.0	1.655	98.2%	17.0	16.3	0.714	0.860	2	
				8	Edge 1	165	5825.0	1.150	98.2%	17.0	16.3	0.455	0.548	4	
				6	Edge 4	165	5825.0	1.493	98.2%	17.0	16.3	0.644	0.775	2	
				6	Corner B	149	5745.0	1.366	98.2%	17.0	16.2	0.648	0.797	3	
						165	5825.0	1.666	98.2%	17.0	16.3	0.817	0.984		
	802.11n 13.5 Mbps (HT40)		On	0	Rear	151	5755.0	2.081	96.1%	10.0	9.3	0.884	1.090	3	15
						159	5795.0	2.453	96.1%	10.0	9.7	0.938	1.058		
				0	Edge 1	159	5795.0	1.083	96.1%	10.0	9.7	0.491	0.554	4	
				0	Edge 4	159	5795.0	1.049	96.1%	10.0	9.7				
				0	Corner B	159	5795.0	1.220	96.1%	10.0	9.7	0.664	0.749	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.

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 12	Standalone	Rear	No	0.356	N/A	N/A
	LTE Band 17	Standalone	Rear	No	0.474	N/A	N/A
850	WCDMA Band V	Standalone	Rear	No	0.603	N/A	N/A
	LTE Band 5	Standalone	Rear	No	0.557	N/A	N/A
1750	WCDMA Band IV	Standalone	Edge 1	Yes	0.938	0.942	1.00
	LTE Band 66	Standalone	Edge 1	No	0.894	N/A	N/A
1900	WCDMA Band II	Standalone	Rear	No	0.973	N/A	N/A
	LTE Band 2	Standalone	Edge 1	Yes	1.020	0.99	1.03
2300	LTE Band 30	Standalone	Rear	No	0.395	N/A	N/A
2400	Wi-Fi 802.11b/g/n	Standalone	Rear	No	0.727	N/A	N/A
	Bluetooth	Standalone	Rear	No	0.186	N/A	N/A
2600	LTE Band 7	Standalone	Edge 1	Yes	0.891	0.862	1.03
5300	Wi-Fi 802.11a/n	Standalone	Edge 1	Yes	0.824	0.825	1.00
5500	Wi-Fi 802.11a/n	Standalone	Rear	Yes	0.801	0.821	1.02
5800	Wi-Fi 802.11a/n	Standalone	Rear	Yes	0.938	0.935	1.00

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	
Standalone	1	W-CDMA	+ DTS
	2	W-CDMA	+ U-NII
	3	W-CDMA	+ BT
	4	LTE	+ DTS
	5	LTE	+ U-NII
	6	LTE	+ BT
Notes:			
1. DTS 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

- When standalone SAR test exclusion applies, standalone SAR must also be estimated to determine simultaneous transmission SAR test exclusion.
- Dedicated Host Approach criteria for SAR test exclusion is likewise applied to SAR estimation, with certain distinctions between test exclusion and SAR estimation:
 - When the separation distance from the antenna to an adjacent edge is ≤ 5 mm, a distance of 5 mm is applied for SAR estimation; this is the same between test exclusion and SAR estimation calculations.
 - When the separation distance from the antenna to an adjacent edge is > 5 mm but ≤ 50 mm, the actual antenna-to-edge separation distance is applied for SAR estimation.
 - When the minimum test separation distance is > 50 mm, the estimated SAR value is 0.4 W/kg
- 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	17	13	5	185	82		-MEASURE	-MEASURE	-MEASURE	0.400	0.400	
Cellular	W-CDMA IV	1752.6	24.50	282	17	13	5	185	82		-MEASURE	-MEASURE	-MEASURE	0.400	0.400	
Cellular	W-CDMA V	846.6	25.00	316	17	13	5	185	82		-MEASURE	-MEASURE	-MEASURE	0.400	0.400	
Cellular	LTE Band 2	1900	24.50	282	17	13	5	185	82		-MEASURE	-MEASURE	-MEASURE	0.400	0.400	
Cellular	LTE Band 4	1732.5	24.50	282	17	13	5	185	82		-MEASURE	-MEASURE	-MEASURE	0.400	0.400	
Cellular	LTE Band 5	836.5	25.20	331	17	13	5	185	82		-MEASURE	-MEASURE	-MEASURE	0.400	0.400	
Cellular	LTE Band 7	2560	23.00	200	14	10	0	185	59		-MEASURE	-MEASURE	-MEASURE	0.400	-MEASURE	
Cellular	LTE Band 12	711	25.00	316	17	13	5	185	82		-MEASURE	-MEASURE	-MEASURE	0.400	0.400	
Cellular	LTE Band 17	711	25.00	316	17	13	5	185	82		-MEASURE	-MEASURE	-MEASURE	0.400	0.400	
Cellular	LTE Band 30	2310	23.00	200	14	10	0	185	59		-MEASURE	-MEASURE	-MEASURE	0.400	-MEASURE	
Cellular	LTE Band 66	1770	24.50	282	17	13	5	185	82		-MEASURE	-MEASURE	-MEASURE	0.400	0.400	
Power Back-off, Proximity Sensor On																
Cellular	W-CDMA II	1907.6	11.00	13	0	0	0				-MEASURE	-MEASURE	-MEASURE			
Cellular	W-CDMA IV	1752.6	14.00	25	0	0	0				-MEASURE	-MEASURE	-MEASURE			
Cellular	W-CDMA V	846.6	19.00	79	0	0	0				-MEASURE	-MEASURE	-MEASURE			
Cellular	LTE Band 2	1900	12.00	16	0	0	0				-MEASURE	-MEASURE	-MEASURE			
Cellular	LTE Band 4	1732.5	13.00	20	0	0	0				-MEASURE	-MEASURE	-MEASURE			
Cellular	LTE Band 5	836.5	16.00	40	0	0	0				-MEASURE	-MEASURE	-MEASURE			
Cellular	LTE Band 7	2560	12.00	16	0	0					-MEASURE	-MEASURE				
Cellular	LTE Band 12	711	17.00	50	0	0	0				-MEASURE	-MEASURE	-MEASURE			
Cellular	LTE Band 17	711	18.00	63	0	0	0				-MEASURE	-MEASURE	-MEASURE			

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	11	8	87	185	6		-MEASURE	-MEASURE	0.400	0.400	-MEASURE	
Wi-Fi 5.3 GHz	5320	17.00	50	11	8	87	185	6		-MEASURE	-MEASURE	0.400	0.400	-MEASURE	
Wi-Fi 5.5 GHz	5700	15.00	32	11	8	87	185	6		-MEASURE	-MEASURE	0.400	0.400	-MEASURE	
Wi-Fi 5.8 GHz	5825	17.00	50	11	8	87	185	6		-MEASURE	-MEASURE	0.400	0.400	-MEASURE	
Bluetooth	2480	10.00	10	11	8	87	185	6		-MEASURE	-MEASURE	0.400	0.400	-MEASURE	
Power Back-off, Proximity Sensor On															
Wi-Fi 2.4 GHz	2462	14	25	0	0			0		-MEASURE	-MEASURE			-MEASURE	
Wi-Fi 5.3 GHz	5320	10	10	0	0			0		-MEASURE	-MEASURE			-MEASURE	
Wi-Fi 5.5 GHz	5700	10	10	0	0			0		-MEASURE	-MEASURE			-MEASURE	
Wi-Fi 5.8 GHz	5825	10	10	0	0			0		-MEASURE	-MEASURE			-MEASURE	

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	1.288	0.772	1.090	0.296	2.060	2.378	1.584
Edge 1	1.185	0.214	0.918	0.035	1.399	2.103	1.220
Edge 2	0.998	0.400	0.400	0.400	1.398	1.398	1.398
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.400	0.709	0.775	0.160	1.109	1.175	0.560
Corner A	0.916	0.400	0.400	0.400	1.316	1.316	1.316
Corner B	0.400	0.772	0.984		1.172	1.384	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	① + ②	① + ③				
Rear	1.288	0.772			① + ②	2.060	96.4	0.03	No	1
	1.288		1.090		① + ③	2.378	97.6	0.04	No	2
Edge 1	1.185		0.918		① + ③	2.103	81.1	0.04	No	3

12.2 Sum of the SAR for WCDMA Band IV & 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	1.096	0.772	1.090	0.296	1.868	2.186	1.392
Edge 1	1.200	0.214	0.918	0.035	1.414	2.118	1.235
Edge 2	1.191	0.400	0.400	0.400	1.591	1.591	1.591
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.400	0.709	0.775	0.160	1.109	1.175	0.560
Corner A	0.901	0.400	0.400	0.400	1.301	1.301	1.301
Corner B	0.400	0.772	0.984		1.172	1.384	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	① + ②	① + ③				
Rear	1.096	0.772			① + ②	1.868	87.2	0.03	No	4
	1.096		1.090		① + ③	2.186	88.4	0.04	No	5
Edge 1	1.200		0.918		① + ③	2.118	79.5	0.04	No	6

12.3 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	0.799	0.772	1.090	0.296	1.571	1.889	1.095
Edge 1	0.518	0.214	0.918	0.035	0.732	1.436	0.553
Edge 2	0.700	0.400	0.400	0.400	1.100	1.100	1.100
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.400	0.709	0.775	0.160	1.109	1.175	0.560
Corner A	0.195	0.400	0.400	0.400	0.595	0.595	0.595
Corner B	0.400	0.772	0.984		1.172	1.384	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	0.799		1.090		① + ③	1.889	88.4	0.03	No	7

12.4 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	1.068	0.772	1.090	0.296	1.840	2.158	1.364
Edge 1	1.198	0.214	0.918	0.035	1.412	2.116	1.233
Edge 2	0.691	0.400	0.400	0.400	1.091	1.091	1.091
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.400	0.709	0.775	0.160	1.109	1.175	0.560
Corner A	0.647	0.400	0.400	0.400	1.047	1.047	1.047
Corner B	0.400	0.772	0.984		1.172	1.384	0.400

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Standalone SAR (W/kg)				$\sum$ 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	1.068	0.772			① + ②	1.840	87.2	0.03	No	8
	1.068		1.090		① + ③	2.158	88.4	0.04	No	9
Edge 1	1.198		0.918		① + ③	2.116	79.5	0.04	No	10

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

SAR for LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

12.6 Sum of the SAR for LTE Band 5 & 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	0.699	0.772	1.090	0.296	1.471	1.789	0.995
Edge 1	0.570	0.214	0.918	0.035	0.784	1.488	0.605
Edge 2	0.678	0.400	0.400	0.400	1.078	1.078	1.078
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.400	0.709	0.775	0.160	1.109	1.175	0.560
Corner A	0.095	0.400	0.400	0.400	0.495	0.495	0.495
Corner B	0.400	0.772	0.984		1.172	1.384	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	① + ③	1.789				
Rear	0.699		1.090		① + ③	1.789	84.2	0.03	No	11

12.7 Sum of the SAR for LTE Band 7 & 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	0.781	0.772	1.090	0.296	1.553	1.871	1.077
Edge 1	1.045	0.214	0.918	0.035	1.259	1.963	1.080
Edge 2	0.855	0.400	0.400	0.400	1.255	1.255	1.255
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.400	0.709	0.775	0.160	1.109	1.175	0.560
Corner A	0.228	0.400	0.400	0.400	0.628	0.628	0.628
Corner B	0.400	0.772	0.984		1.172	1.384	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	① + ③	1.871				
Rear	0.781		1.090		① + ③	1.871	68.3	0.04	No	12
Edge 1	1.045		0.918		① + ③	1.963	78.7	0.03	No	13

12.8 Sum of the SAR for LTE Band 12 & 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	0.448	0.772	1.090	0.296	1.220	1.538	0.744
Edge 1	0.298	0.214	0.918	0.035	0.512	1.216	0.333
Edge 2	0.260	0.400	0.400	0.400	0.660	0.660	0.660
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.400	0.709	0.775	0.160	1.109	1.175	0.560
Corner A	0.103	0.400	0.400	0.400	0.503	0.503	0.503
Corner B	0.400	0.772	0.984		1.172	1.384	0.400

12.9 Sum of the SAR for LTE Band 17 & 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	0.580	0.772	1.090	0.296	1.352	1.670	0.876
Edge 1	0.333	0.214	0.918	0.035	0.547	1.251	0.368
Edge 2	0.237	0.400	0.400	0.400	0.637	0.637	0.637
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.400	0.709	0.775	0.160	1.109	1.175	0.560
Corner A	0.126	0.400	0.400	0.400	0.526	0.526	0.526
Corner B	0.400	0.772	0.984		1.172	1.384	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	① + ③	1.670				
Rear	0.580		1.090		① + ③	1.670	93.4	0.02	No	14

12.10 Sum of the SAR for LTE Band 30 & 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	0.495	0.772	1.090	0.296	1.267	1.585	0.791
Edge 1	0.307	0.214	0.918	0.035	0.521	1.225	0.342
Edge 2	0.273	0.400	0.400	0.400	0.673	0.673	0.673
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.400	0.709	0.775	0.160	1.109	1.175	0.560
Corner A	0.092	0.400	0.400	0.400	0.492	0.492	0.492
Corner B	0.400	0.772	0.984		1.172	1.384	0.400

12.11 Sum of the SAR for LTE Band 66 & 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	1.243	0.772	1.090	0.296	2.015	2.333	1.539
Edge 1	1.139	0.214	0.918	0.035	1.353	2.057	1.174
Edge 2	0.990	0.400	0.400	0.400	1.390	1.390	1.390
Edge 3	0.400	0.400	0.400	0.400	0.800	0.800	0.800
Edge 4	0.400	0.709	0.775	0.160	1.109	1.175	0.560
Corner A	0.733	0.400	0.400	0.400	1.133	1.133	1.133
Corner B	0.400	0.772	0.984		1.172	1.384	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	1.243	0.772			① + ②	2.015	90.4	0.03	No	15
	1.243		1.090		① + ③	2.333	91.7	0.04	No	16
Edge 1	1.139		0.918		① + ③	2.057	81.0	0.04	No	17

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)

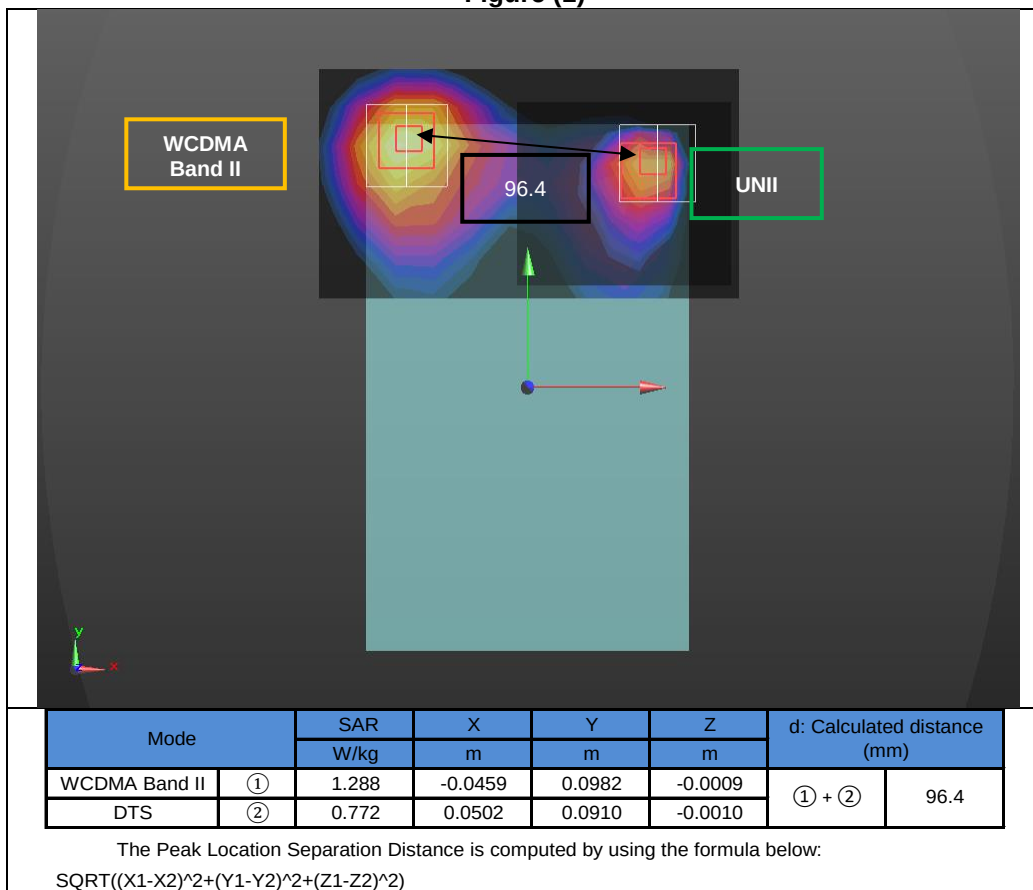


Figure (2)

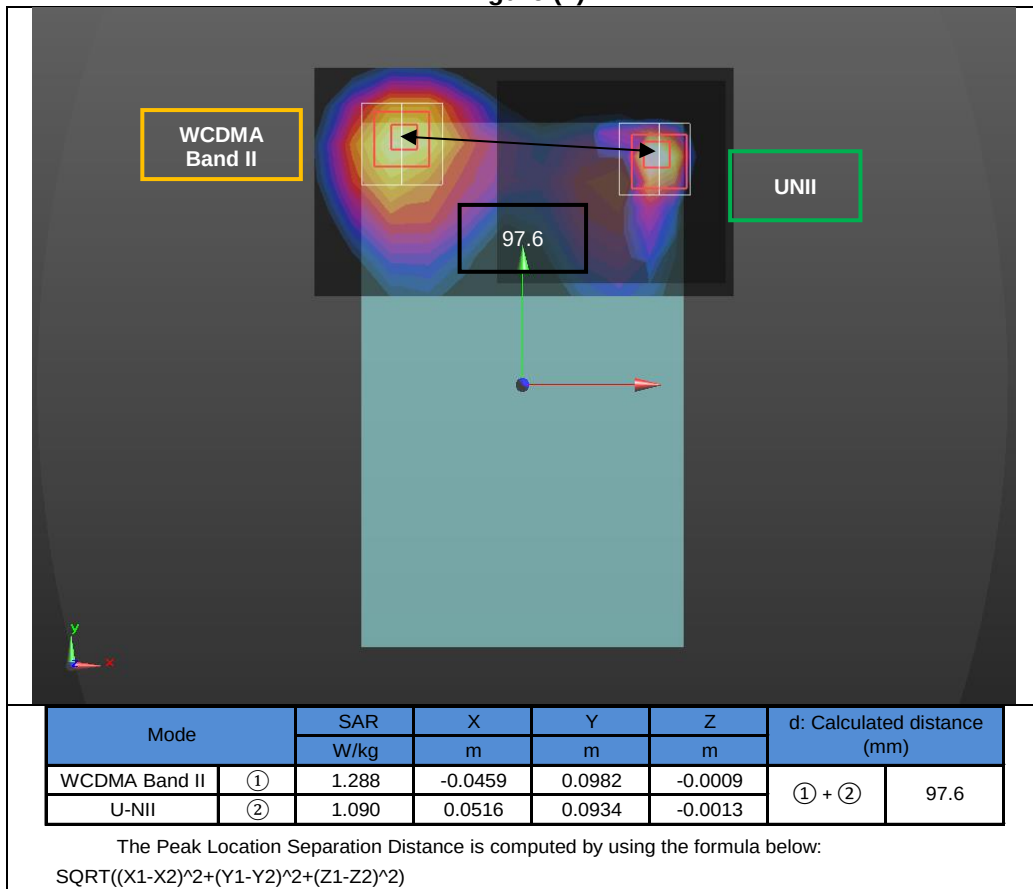


Figure (3)

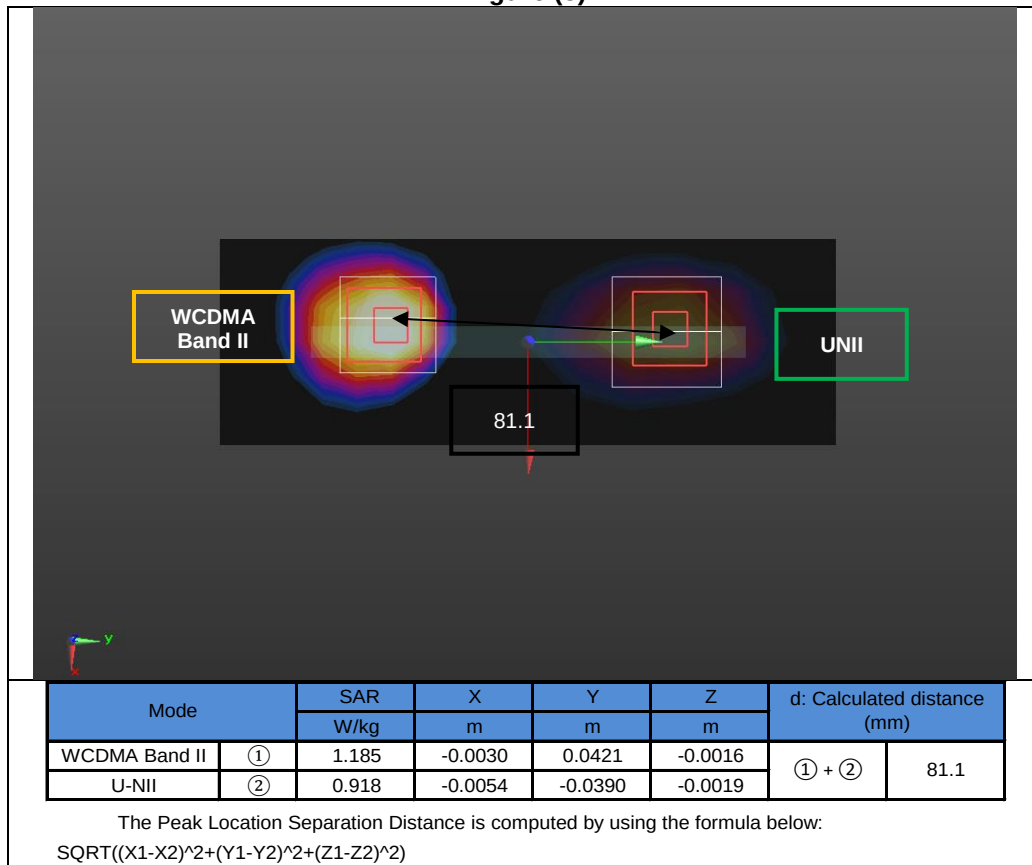


Figure (4)

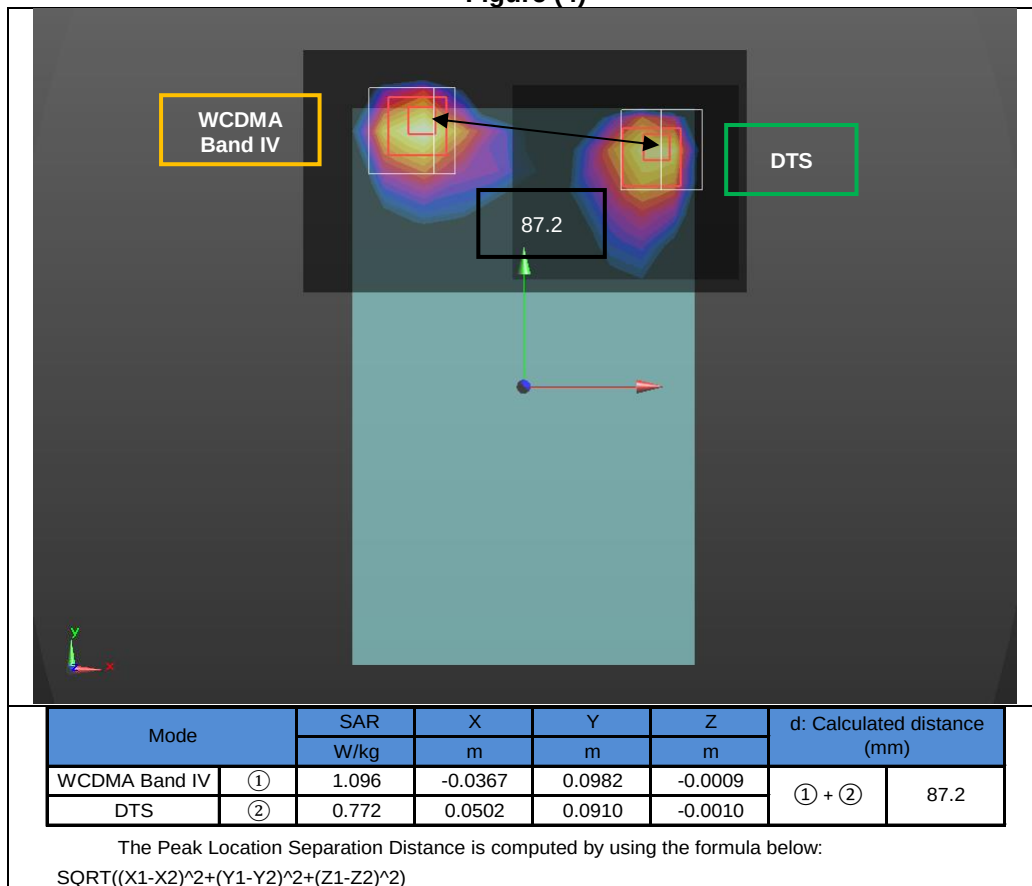


Figure (5)

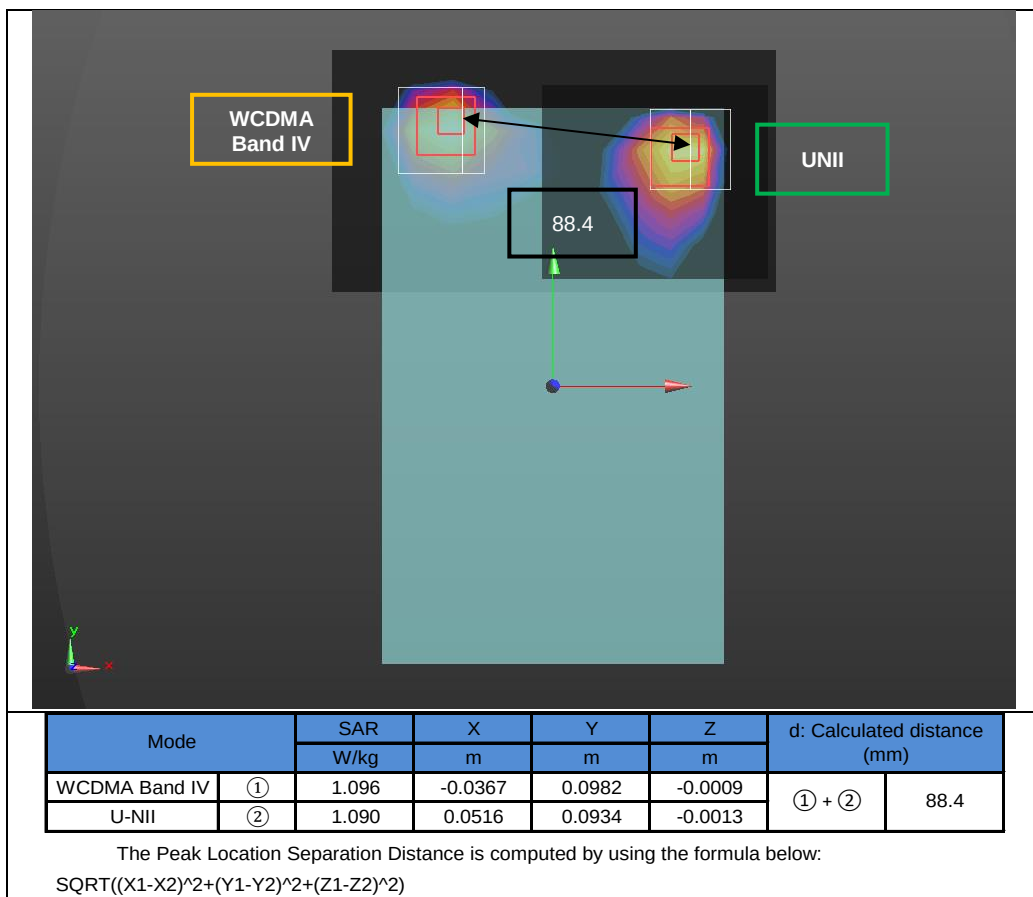


Figure (6)

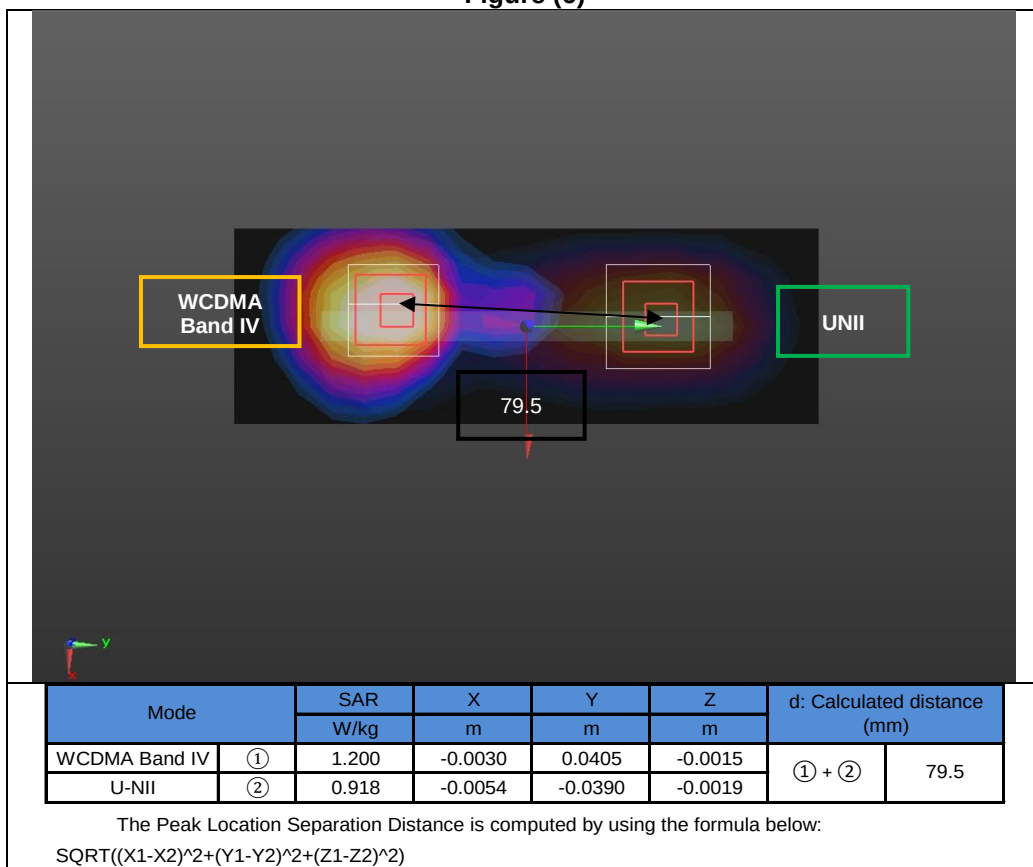


Figure (7)

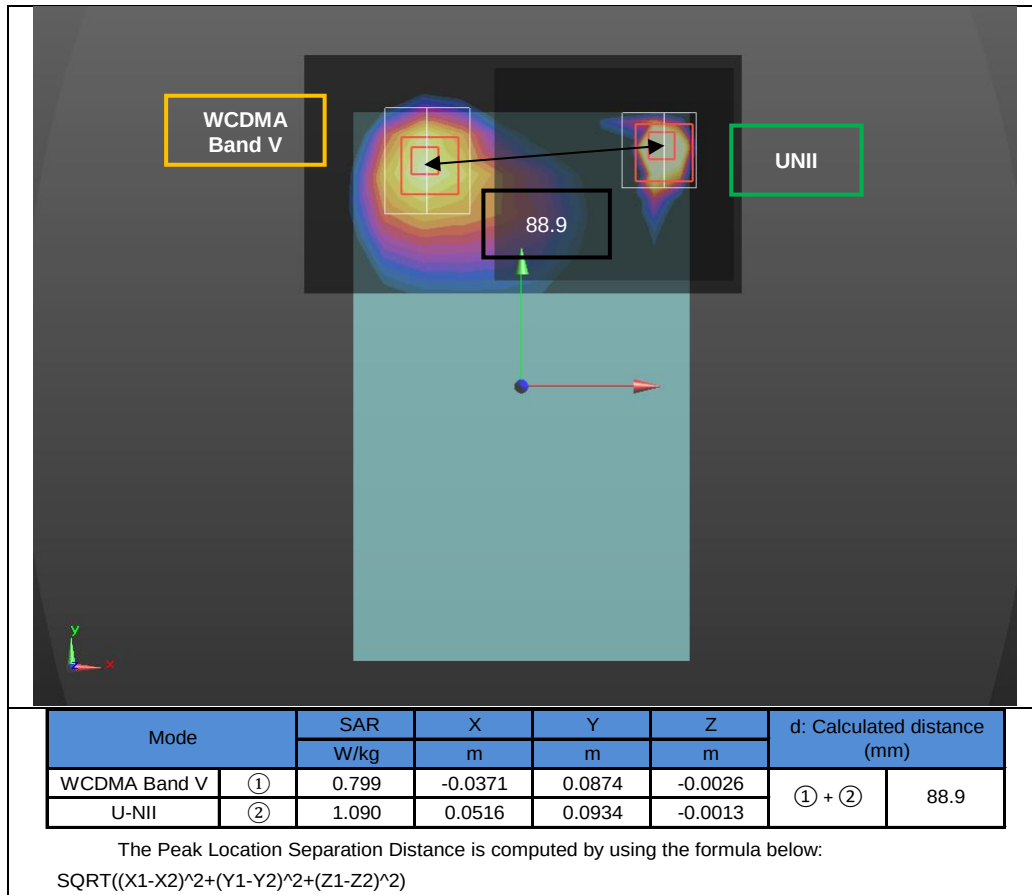


Figure (8)

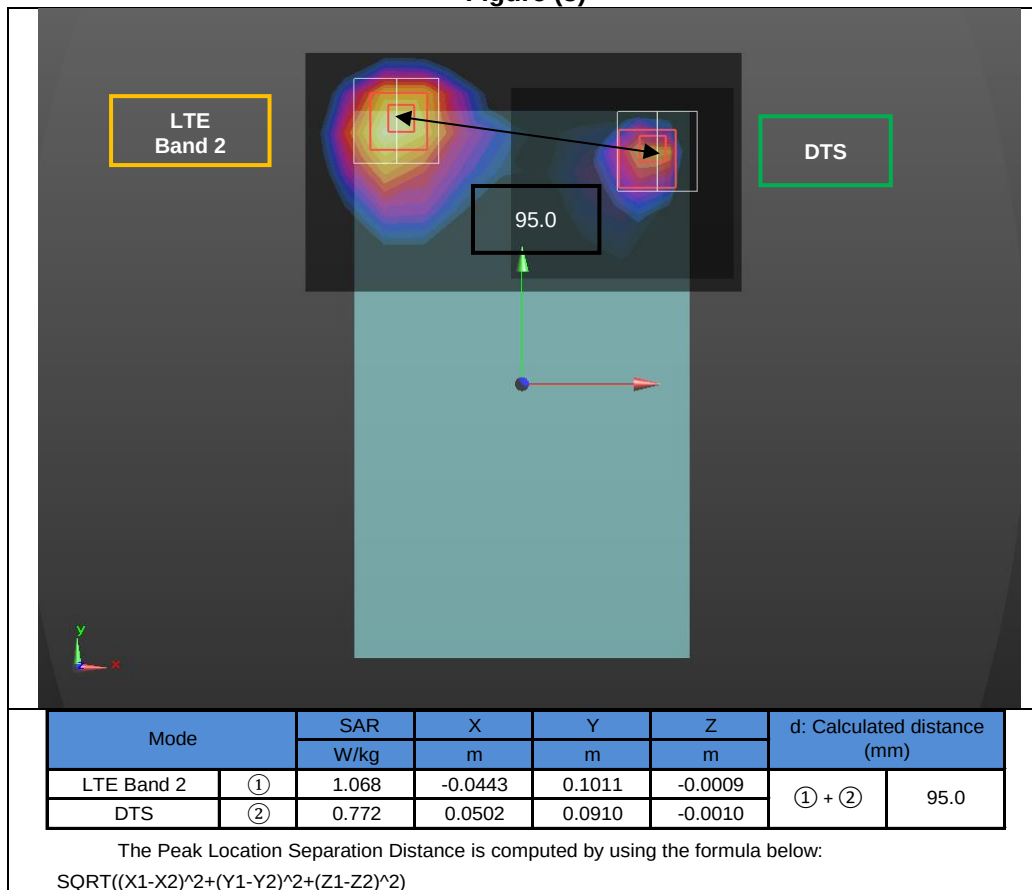


Figure (9)

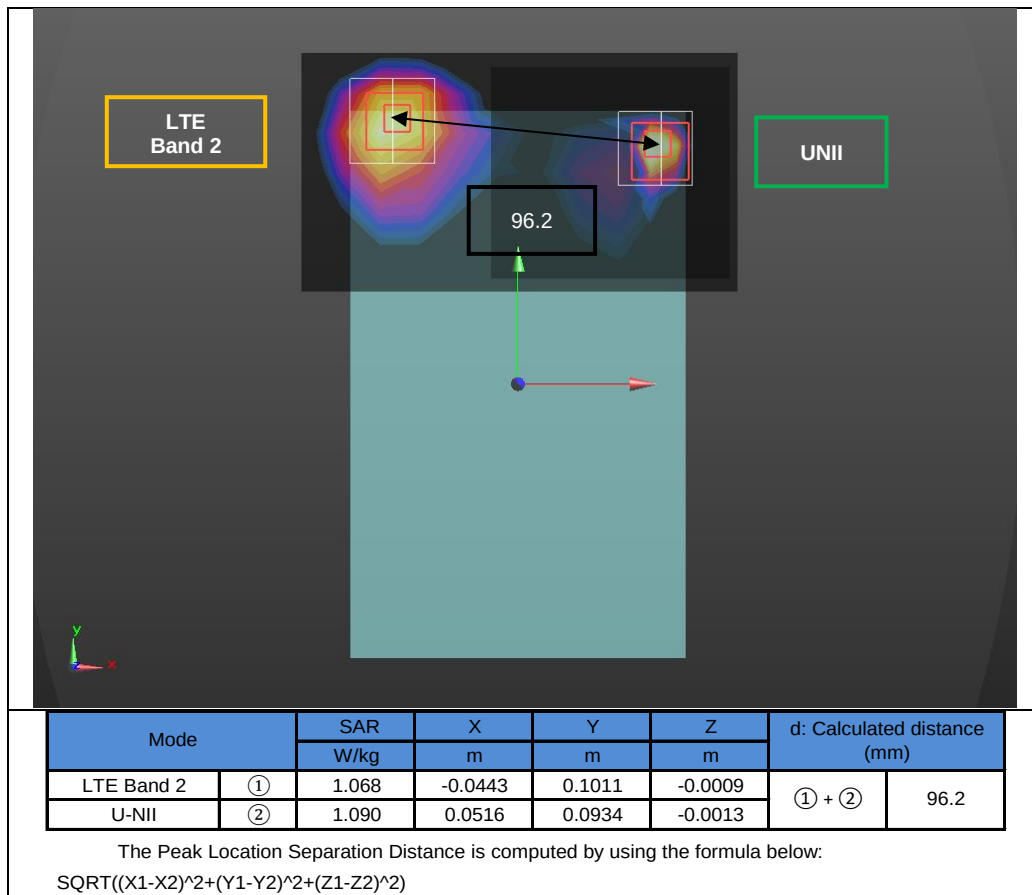


Figure (10)

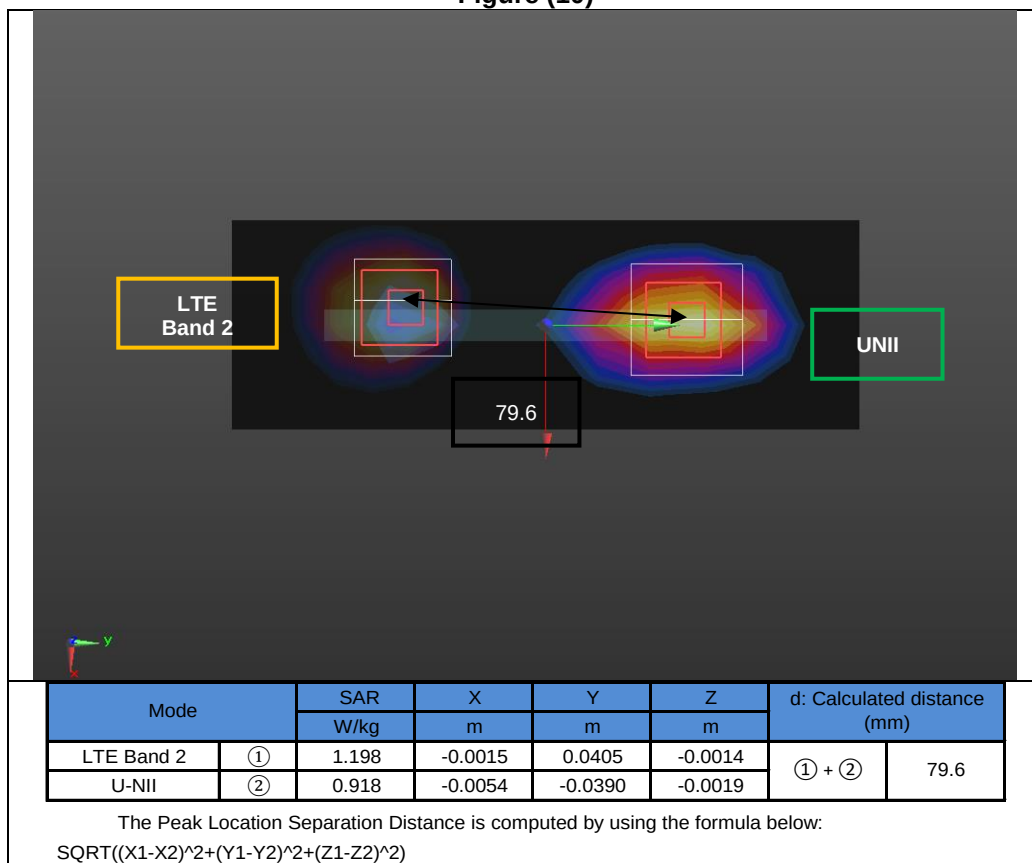


Figure (11)

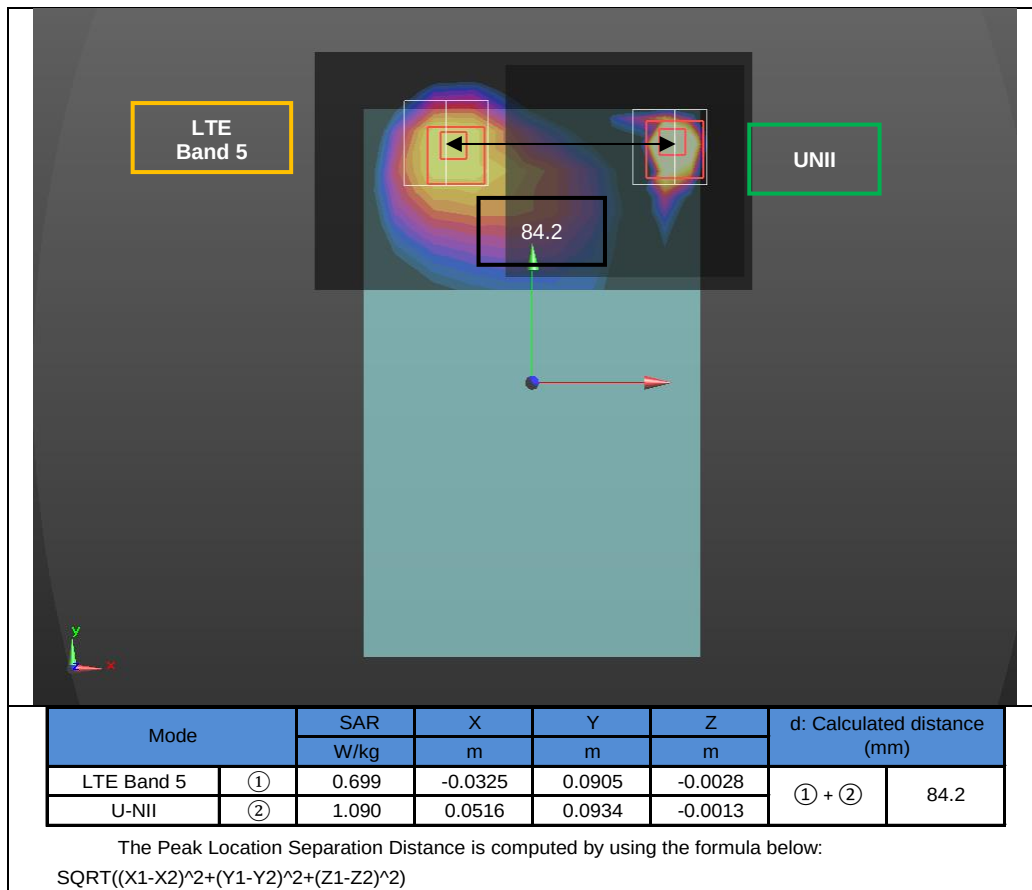


Figure (12)

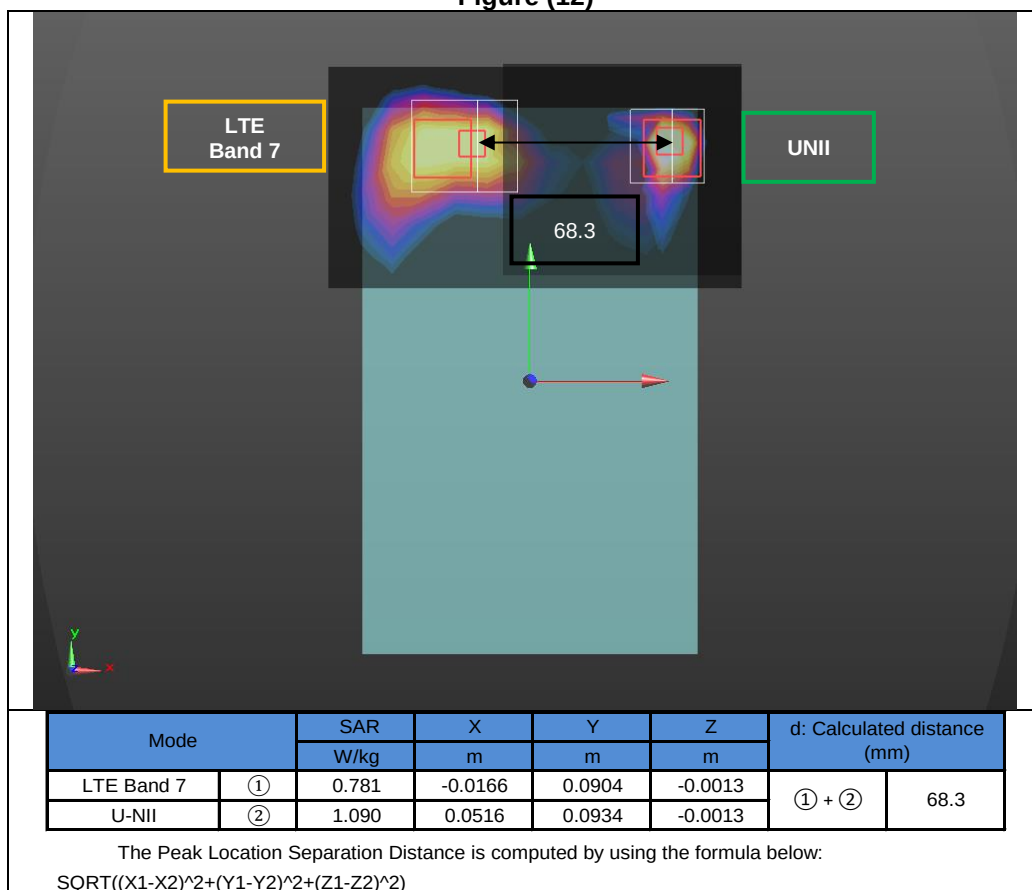


Figure (13)

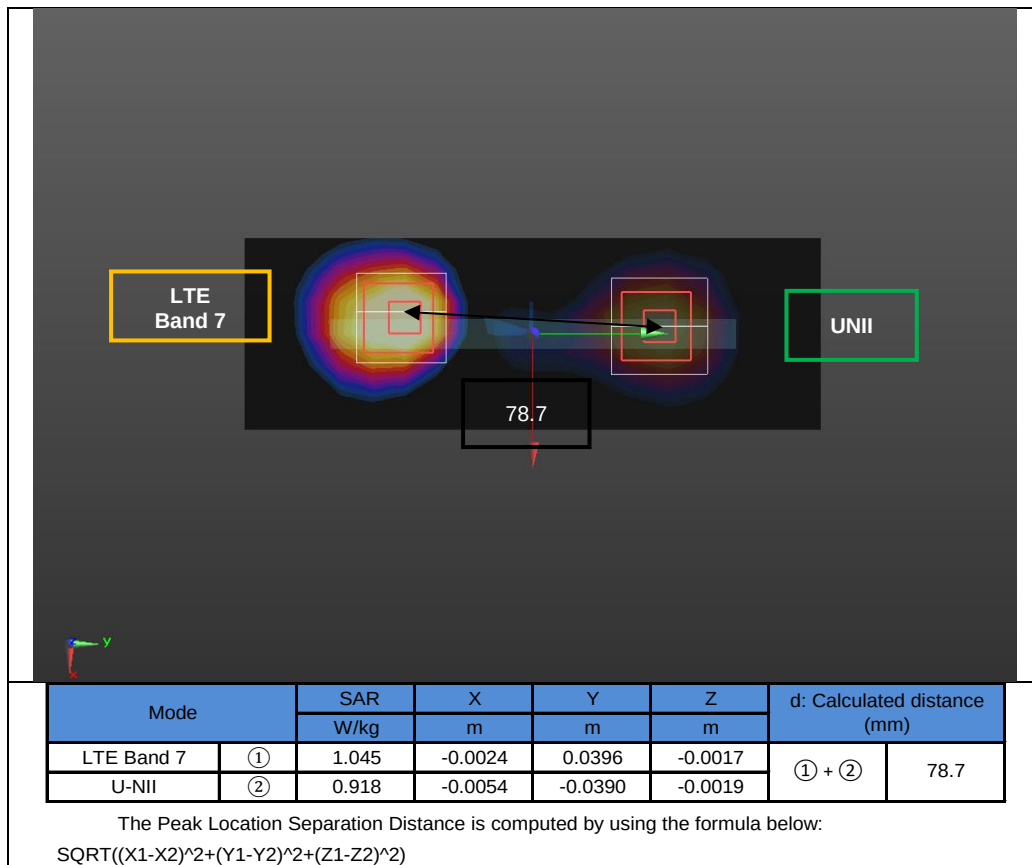


Figure (14)

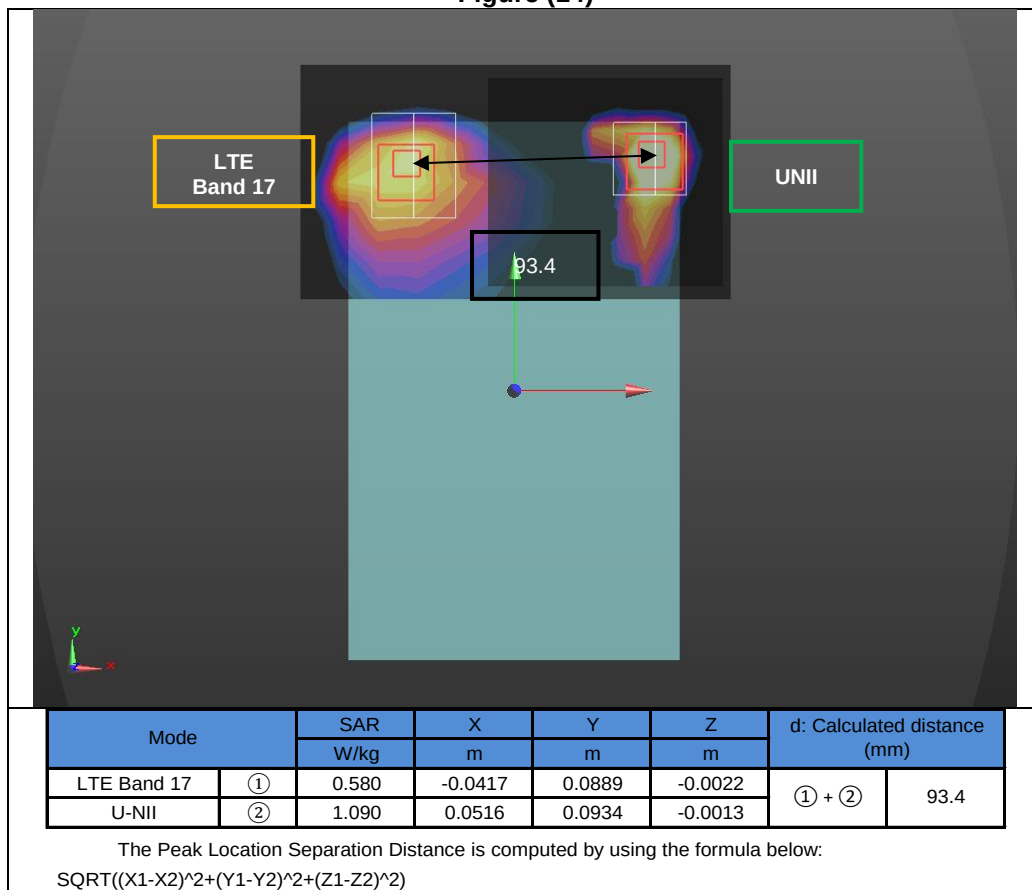


Figure (15)

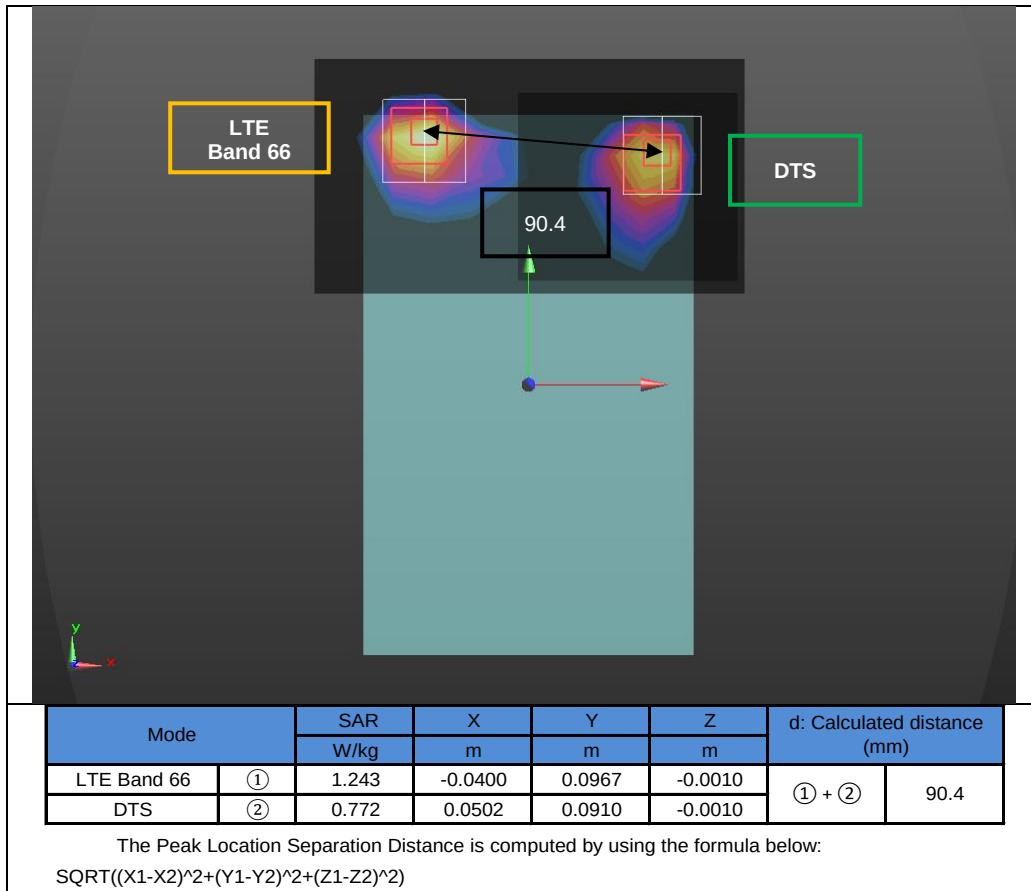


Figure (16)

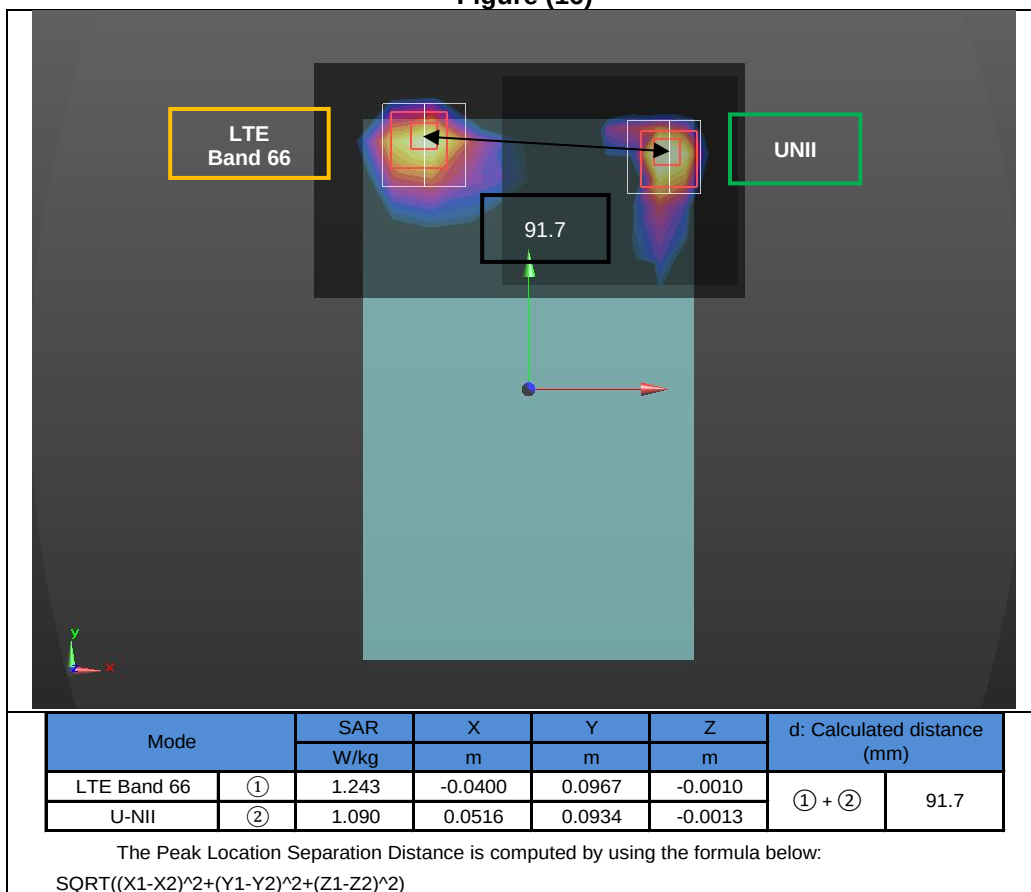
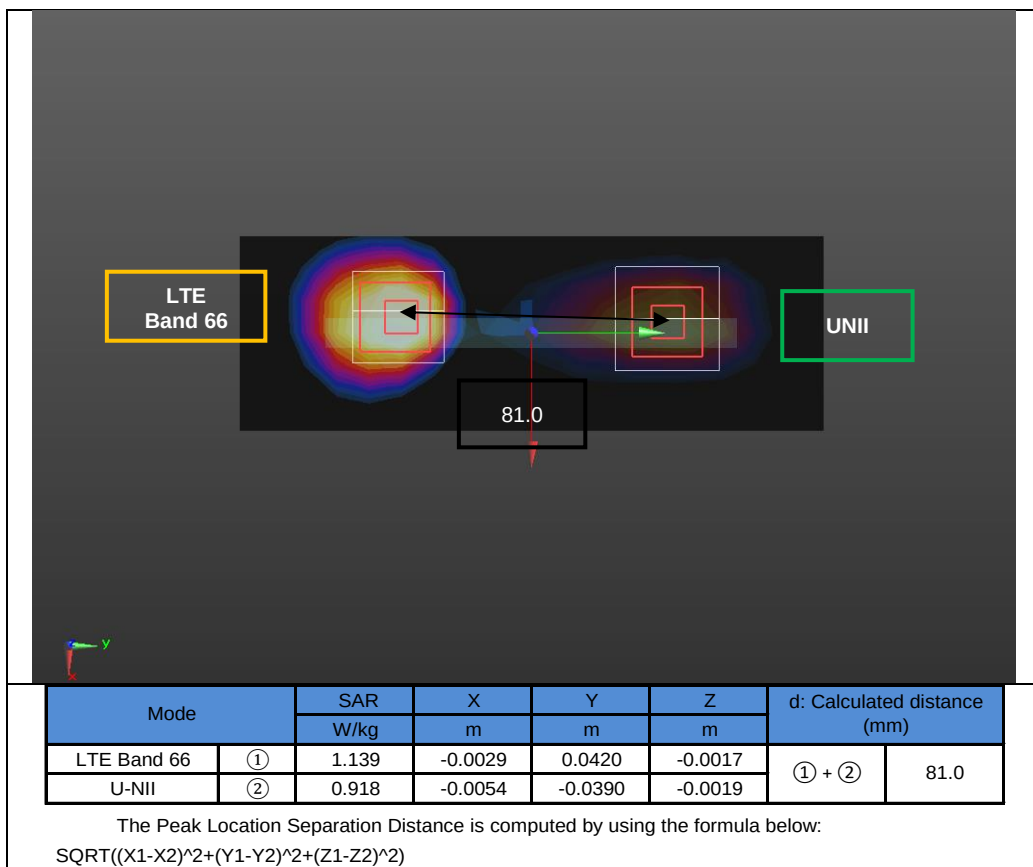


Figure (17)



Appendixes

Refer to separated files for the following appendixes.

4788665909-S1V1 FCC Report SAR_App A_Photos & Ant. Locations

4788665909-S1V1 FCC Report SAR_App B_Highest SAR Test Plots

4788665909-S1V1 FCC Report SAR_App C_System Check Plots

4788665909-S1V1 FCC Report SAR_App D_SAR Tissue Ingredients

4788665909-S1V1 FCC Report SAR_App E_Probe Cal. Certificates

4788665909-S1V1 FCC Report SAR_App F_Dipole Cal. Certificates

END OF REPORT