



**SAR EVALUATION REPORT**

**IEEE Std 1528-2013**

*For*

**GSM/WCDMA/LTE/5G Phablet with BT/BLE,DTS/UNII a/b/g/n/ac and NFC**

**FCC ID: A3LSMA526B**

**Model Name: SM-A526B/DS, SM-A526B**

**Report Number: 13583138-S1V4**

**Issue Date: 2/5/2021**

*Prepared for*

**Samsung Electronics Co. Ltd  
129 Samsung-Ro, Yeongtong-Gu,  
Suwon-Si, Gyeonggi-Do, 16677, Korea**

*Prepared by*

**UL VERIFICATION SERVICES INC.  
47173 BENICIA STREET  
FREMONT, CA 94538, U.S.A.  
TEL: (510) 319-4000  
FAX: (510) 661-0888**



NVLAP LAB CODE 200065-0

**Revision History**

Rev.	Date	Revisions	Revised By
V1	1/25/2021	Initial Issue	--
V2	2/1/2021	Section 1: Updated Highest SAR Values Section 6.2: Updated Duty Cycles Section 7: Updated Table Section 12.9: Updated Table Updated Appendix C Added Appendix G	Coltyce Sanders
V3	2/2/2021	Updated per TCB reviewer comments	Coltyce Sanders
V4	2/5/2021	Section 6.2: Removed BT HDR	Coltyce Sanders

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# 1. Attestation of Test Results

Applicant Name		Samsung Electronics Co. Ltd			
FCC ID		A3LSMA526B			
Model Name		SM-A526B/DS, SM-A526B			
Difference in Model Name		Model SM-A526B is electrically identical to Model SM-A526B/DS. Two model numbers are allocated for marketing and logistic purposes only. SM-A526B/DS was used to perform all final tests.			
Applicable Standards		Published RF exposure KDB procedures IEEE Std 1528-2013			
Exposure Category		SAR Limits (W/Kg)			
		Peak spatial-average (1g of tissue)		Extremities (hands, wrists, ankles, etc.) (10g of tissue)	
General population / Uncontrolled exposure		1.6		4	
RF Exposure Conditions		<u>Equipment Class</u> - Highest Reported SAR (W/kg)			
		PCE	DTS	NII	DSS
Head		0.547	0.550	0.514	0.646
Body-worn		0.535	0.137	0.305	0.132
Hotspot		0.618	0.319	0.687	0.312
Extremity		N/A	N/A	0.830	N/A
Simultaneous TX	Head	1.540	1.093	1.540	1.540
	Body-worn	1.055	0.755	1.055	1.055
	Hotspot	1.537	1.142	1.537	1.537
Date Tested		11/19/2020 to 1/22/2021			
Test Results		Pass			

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released By:	Prepared By:
	
Dave Weaver Operations Leader UL Verification Services Inc.	Coltyce Sanders Senior Test Engineer UL Verification Services Inc.

## 2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE STD 1528-2013, ANSI C63.10, ANSI C63.26, the following FCC Published RF exposure [KDB](#) procedures:

- 248227 D01 802.11 Wi-Fi SAR v02r02
- 447498 D01 General RF Exposure Guidance v06
- 648474 D04 Handset SAR v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02
- 941225 D01 3G SAR Procedures v03r01
- 941225 D05 SAR for LTE Devices v02r05
- 941225 D05A LTE Rel.10 KDB Inquiry Sheet v01r02
- 941225 D06 Hotspot Mode v02r01
- 941225 D07 UMPC Mini Tablet v01r02

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

- [TCB workshop](#) October 2014; RF Exposure Procedures (Other LTE Considerations)
- [TCB workshop](#) April 2015; RF Exposure Procedures (Overlapping LTE Bands)
- [TCB workshop](#) October 2015; RF Exposure Procedures (KDB 941225 D05A)
- [TCB workshop](#) April 2016; RF Exposure Procedures (LTE Carrier Aggregation for DL)
- [TCB workshop](#) October 2016; RF Exposure Procedures (Bluetooth Duty Factor)
- [TCB workshop](#) October 2016; RF Exposure Procedures (DUT Holder Perturbations)
- [TCB workshop](#) May 2017; RF Exposure Procedures (Broadband Liquid Above 3 GHz)
- [TCB workshop](#) November 2017; RF Exposure Procedures (LTE UL/DL Carrier Aggregation SAR)
- [TCB workshop](#) April 2018; RF Exposure Procedures (LTE DL CA SAR Test Exclusion)
- [TCB workshop](#) April 2019; RF Exposure Procedures (Tissue Simulating Liquids (TSL))
- [TCB workshop](#) November 2019; RF Exposure Policy Updates (5G NR FR1 NSA EN-DCUE SAR Evaluations)

### 3. Facilities and Accreditation

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

47173 Benicia Street	47266 Benicia Street
SAR Lab A	SAR Lab 1
SAR Lab B	SAR Lab 2
SAR Lab C	SAR Lab 3
SAR Lab D	SAR Lab 4
SAR Lab E	SAR Lab 5
SAR Lab F	SAR Lab 6
SAR Lab G	SAR Lab 7
SAR Lab H	SAR Lab 8

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

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

Suwon
SAR 4 Room

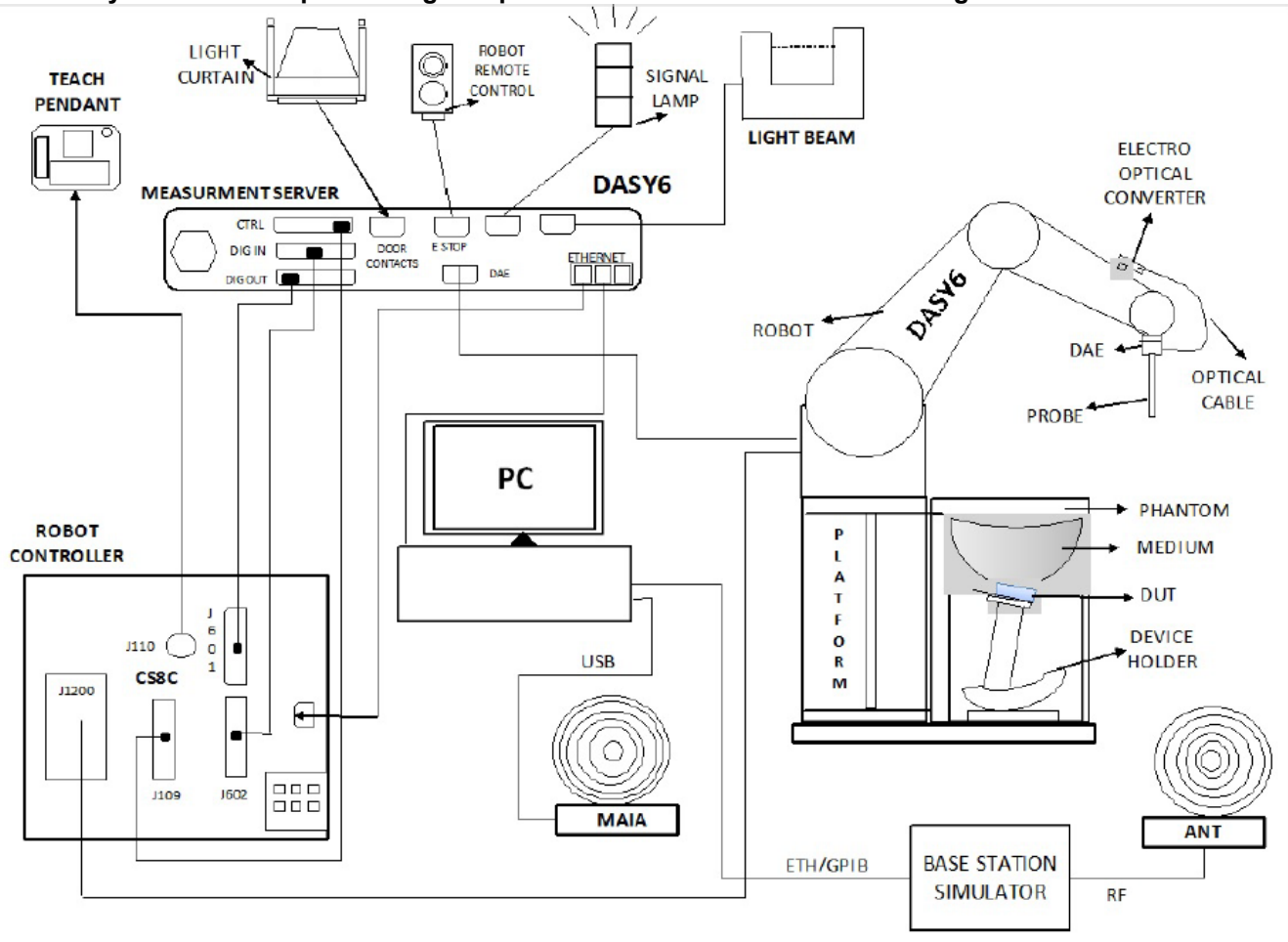
UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf>.



## 4. SAR Measurement System & Test Equipment

### 4.1. SAR Measurement System

The DASY 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 Win7, Win10 and the DASY52<sup>1</sup> and DASY6<sup>2</sup> 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.

<sup>1</sup> DASY52 software used: DASY52.10.4 & S 14.6.14 and older generations.

<sup>2</sup> DASY6 software used: DASY6.14 & S 14.6.14 and older generations.

## 4.2. SAR Scan Procedures

### Step 1: Power Reference Measurement

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

### Step 2: Area Scan

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

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

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

**Step 3: Zoom Scan**

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

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

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

**Step 4: Power drift measurement**

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

### 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.

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Network Analyzer	Rohde & Schwarz	ZNLE6	101273	2/27/2021
Dielectric Probe kit	SPEAG	DAK-12	2052	1/16/2021
Shorting block	SPEAG	DAK-12 Short	SM DAK200AC	1/16/2021
Thermometer	Fischer Scientific	4242	140493798	6/5/2021

#### System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
MXG Analog Signal Generator	Agilent	N5181A	MY50140630	1/21/2021
Power Sensor	Agilent	8481A	2237A31744	2/26/2021
Power Sensor	Agilent	8481A	2702A60780	2/12/2021
Power Meter	HP	437B	3125U16345	1/22/2021
Power Meter	HP	437B	3125U12345	1/22/2021
Regulated DC Power Supply	Ametek	XT15-4	1802A01877	N/A

#### Lab Equipment

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
E-Field Probe (SAR Lab 1)	SPEAG	EX3DV4	7463	7/24/2021
E-Field Probe (SAR Lab 2)	SPEAG	EX3DV4	7501	5/15/2021
E-Field Probe (SAR Lab 3)	SPEAG	EX3DV4	3749	1/23/2021
Data Acquisition Electronics (SAR Lab 1)	SPEAG	DAE4	1359	2/26/2021
Data Acquisition Electronics (SAR Lab 1)	SPEAG	DAE4	1352	11/17/2021
Data Acquisition Electronics (SAR Lab 2)	SPEAG	DAE4	1472	3/12/2021
Data Acquisition Electronics (SAR Lab 2)	SPEAG	DAE4	1377	9/10/2021
Data Acquisition Electronics (SAR Lab 3)	SPEAG	DAE4	1546	5/12/2021
System Validation Dipole	SPEAG	D750V3	1019	4/17/2021
System Validation Dipole	SPEAG	D750V3	1024	5/29/2021
System Validation Dipole	SPEAG	D835V2	4d142	8/18/2021
System Validation Dipole	SPEAG	D1750V2	1050	4/21/2021
System Validation Dipole	SPEAG	D1750V2	1077	10/16/2021
System Validation Dipole	SPEAG	D1900V2	5d140	4/21/2021
System Validation Dipole	SPEAG	D2450V2	899	4/17/2021
System Validation Dipole	SPEAG	D2600V2	1036	4/17/2021
System Validation Dipole	SPEAG	D5GHzV2	1138	8/17/2021
System Validation Dipole	SPEAG	D5GHzV2	1003	3/12/2021
Thermometer (SAR Lab 1)	Keysight	17025	181163664	3/11/2021
Thermometer (SAR Lab 2)	Keysight	17025	170024401	3/11/2021
Thermometer (SAR Lab 3)	Keysight	17025	181073773	3/11/2021

#### Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Base Station Simulator	R & S	CMW 500	137873-WG	2/19/2021
Base Station Simulator	R & S	CMW 500	125236-eS	2/22/2021
Base Station Simulator	R & S	CMW 500	134853-ud	2/21/2021
5G Wireless Test Platform	Keysight	UXM	MY60102066	6/15/2021
Common Interface Unit	Keysight	E7770A	MY58291246	6/14/2021

**Test Equipment Used for Testing Suwon Lab:****Dielectric Property Measurements**

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Network Analyzer	Agilent	E5071C	MY46522054	8-4-2021
Dielectric Assessment Kit	SPEAG	DAK-3.5	1196	7-17-2021
Shorting block	SPEAG	DAK-3.5 Short	SMDAK 200 BA	N/A
Thermometer	LKM	DTM3000	3424	8-11-2021

**System Check**

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
MXG Analog Signal Generator	Agilent	N5181A	MY50145882	8-4-2021
Power Sensor	Agilent	U2000A	MY60180020	9-9-2021
Power Sensor	Agilent	U2000A	MY54260007	8-7-2021
Power Amplifier	EXODUS	1410025-AMP2027-10003	10003	8-4-2021
Directional Coupler	Agilent	772D	MY52180193	8-4-2021
Low Pass Filter	FILTRON	L14012FL	1410003S	8-4-2021
Attenuator	Agilent	8491B/003	MY39271969	12-3-2021
Attenuator	Agilent	8491B/010	MY39271981	9-9-2021
Attenuator	Agilent	8491B/020	MY39271973	9-9-2021
E-Field Probe (SAR4)	SPEAG	EX3DV4	7314	5-29-2021
Data Acquisition Electronics (SAR4)	SPEAG	DAE4	1591	8-25-2021
System Validation Dipole	SPEAG	D2600V2	1097	9-19-2021
Thermometer (SAR4)	Lutron	MHB-382SD	AH45903	8-11-2021

**Others**

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Base Station Simulator	R & S	CMW500	162790	8-4-2021

**5. Measurement Uncertainty**

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

## 6. Device Under Test (DUT) Information

### 6.1. DUT Description

Device Dimension	Refer to Appendix A for Device Dimensions This is a Phablet Device (display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm)		
Back Cover	The Back Cover is not removable		
Battery Options	The rechargeable battery is not user accessible.		
Accessory	Headset		
Wireless Router (Hotspot)	Wi-Fi Hotspot mode permits the device to share its cellular data connection with other Wi-Fi-enabled devices. <input checked="" type="checkbox"/> Mobile Hotspot (Wi-Fi 2.4 GHz) <input checked="" type="checkbox"/> Mobile Hotspot (Wi-Fi 5.8 GHz)		
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other Wi-Fi Direct is only available in hand use configuration <input checked="" type="checkbox"/> Wi-Fi Direct (Wi-Fi 2.4 GHz) <input checked="" type="checkbox"/> Wi-Fi Direct (Wi-Fi 5 GHz)		
Bluetooth Tethering (Hotspot)	BT Tethering mode permits the device to share its cellular data connection with other devices. <input checked="" type="checkbox"/> BT Tethering (Bluetooth 2.4 GHz)		
Test sample information	<b>S/N</b>	<b>IMEI</b>	<b>Notes</b>
	R3CNB08S3SE	N/A	CONDUCTED UNIT
	R3CN90Q10CR	N/A	CONDUCTED UNIT
	R3CN90Q14HJ	N/A	RADIATED UNIT
	R3CN90Q133N	N/A	RADIATED UNIT
	R3CN90Q13HA	N/A	RADIATED UNIT
	R3CN90Q169L	N/A	RADIATED UNIT
	49a9C184c71d7ece	N/A	RADIATED UNIT
	49a9B5ed701d7ece	N/A	RADIATED UNIT
	R3CNB0CBWLD	N/A	RADIATED UNIT
	R3CNB0CBX0N	N/A	RADIATED UNIT
	R3CNB0CBWTH	N/A	RADIATED UNIT
	R3CNB0CBLDW	N/A	CONDUCTED UNIT (LTE B41)
R3CNB0CBD2F	N/A	RADIATED UNIT (LTE B41)	
Hardware Version	Refer to Operational Description		
Software Version	Refer to Operational Description		

## 6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating Mode		Duty Cycle used for SAR testing
GSM	850 1900	Voice (GMSK) GPRS (GMSK) EDGE (8PSK)	GSM Class : B Multi-Slot Class: Class 33 - 4 Up, 5 Down	GSM Voice: 12.5% (E)GPRS: 1 Slot: 12.5% 2 Slots: 25% 3 Slots: 37.5% 4 Slots: 50%
	Does this device support DTM (Dual Transfer Mode)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
W-CDMA (UMTS)	Band II Band IV Band V	UMTS Rel. 99 (Voice & Data) HSDPA (Cat. 24) HSUPA (Cat. 6) DC-HSDPA (Cat. 24) HSPA+ DL only		100%
LTE	FDD Band 2 FDD Band 4 FDD Band 5 FDD Band 12 FDD Band 17 FDD Band 26 TDD Band 41 FDD Band 66	QPSK 16QAM 64QAM Rel. 18 Carrier Aggregation (1 Uplink and 4 Downlinks)		100% (FDD) 63.3% (TDD) <sup>Power Class 3</sup> Refer to §6.4
	Does this device support SV-LTE (1xRTT-LTE)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
5G NR (FR1)	FDD Band n5 FDD Band n66	DFT-S-OFDM: $\pi/2$ BPSK, $\pi/2$ BPSK DMRS, QPSK, 16QAM, 64QAM, 256QAM, CP-OFDM: QPSK, 16QAM, 64QAM, 256QAM <sup>4</sup>		100% (FDD)
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20) 802.11n (HT40)		98.73% <sup>(802.11b)</sup> <sup>1</sup>
	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40) 802.11ac (VHT20) 802.11ac (VHT40) 802.11ac (VHT80) 802.11ac (VHT160)		97.41% <sup>(802.11a)</sup> <sup>1</sup> 94.86% <sup>(802.11n 40MHz BW)</sup> <sup>1</sup>
	Does this device support bands 5.60 ~ 5.65 GHz? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
Does this device support Band gap channel(s)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
Bluetooth	2.4 GHz	BR, EDR, LE		76.9% <sub>(GFSK)</sub> <sup>2</sup>
NFC	13.56 MHz	Type A/B/F		N/A <sup>3</sup>

### Notes:

1. Duty cycle for Wi-Fi is referenced from the DTS and UNII reports.
2. Duty cycle for Bluetooth is referenced from the BT report.
3. Measured Duty Cycle is not required due to SAR test exemption.
4. Manufacturer states that UL256QAM is Supported for FR1 bands but is Not Supported for LTE Bands. Refer to LTE Checklist and EN-DC FR1 document.

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

Item	Description						
Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 2	Frequency range: 1850 - 1910 MHz (BW = 60 MHz)					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	<b>18700</b> <b>/1860</b>	18675/ 1857.5	18650/ 1855	18625/ 1852.5	18615/ 1851.5	18607/ 1850.7
	Mid	<b>18900/</b> <b>1880</b>	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880
	High	<b>19100/</b> <b>1900</b>	19125/ 1902.5	19150/ 1905	19175/ 1907.5	19185/ 1908.5	19193/ 1909.3
	Band 4	Frequency range: 1710 - 1755 MHz (BW = 45 MHz)					
		Channel Bandwidth					
		20 MHz <sup>1</sup>	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	<b>20175/</b> <b>1732.5</b>	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 (BW = 25 MHz)					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz <sup>1</sup>	5 MHz	3 MHz	1.4 MHz
	Low			20450/ 829	20425/ 826.5	20415/ 825.5	20407/ 824.7
	Mid			<b>20525/</b> <b>836.5</b>	20525/ 836.5	20525/ 836.5	20525/ 836.5
	High			20600/ 844	20625/ 846.5	20635/ 847.5	20643/ 848.3
	Band 12	Frequency range: 699 – 716 MHz (BW = 17 MHz)					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz <sup>1</sup>	5 MHz	3 MHz	1.4 MHz
	Low			23060/ 704	23035/ 701.5	23025/ 700.5	23017/ 699.7
	Mid			<b>23095/</b> <b>707.5</b>	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 (BW = 12 MHz)					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz <sup>1</sup>	5 MHz <sup>1</sup>	3 MHz	1.4 MHz
	Low			23780/ 709	23755/ 706.5		
Mid			<b>23790/</b> <b>710</b>	23790/ 710			
High			23800/ 711	23825/ 713.5			
Band 26	Frequency range: 814 - 849 MHz (BW = 35 MHz)						
	Channel Bandwidth						
	20 MHz	15 MHz <sup>1</sup>	10 MHz	5 MHz	3 MHz	1.4 MHz	
Low		26765/ 821.5	26740/ 819	26715/ 816.5	26705/ 815.5	26697/ 814.7	
Mid		<b>26865/</b> <b>831.5</b>	26865/ 831.5	26865/ 831.5	26865/ 831.5	26865/ 831.5	
High		26965/ 841.5	26990/ 844	27015/ 846.5	27025/ 847.5	27033/ 848.3	



**General LTE SAR Test and Reporting Considerations (continued):**

Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 41 <sup>2</sup>	Frequency range: 2496 - 2690 MHz (BW = 194 MHz)																																																																		
		Channel Bandwidth																																																																		
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz																																																													
	Low	39750 / 2506.0																																																																		
	Mid- Low	40185 / 2549.5																																																																		
	Mid	40620 / 2593.0																																																																		
	Mid-High	41055 / 2636.5																																																																		
	High	41490 / 2680.0																																																																		
	Band 66	Frequency range: 1710 - 1780 MHz (BW = 70 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)	<p align="center"><b>Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3</b></p> <table border="1"> <thead> <tr> <th rowspan="2">Modulation</th> <th colspan="6">Channel bandwidth / Transmission bandwidth (N<sub>RB</sub>)</th> <th rowspan="2">MPR (dB)</th> </tr> <tr> <th>1.4 MHz</th> <th>3.0 MHz</th> <th>5 MHz</th> <th>10 MHz</th> <th>15 MHz</th> <th>20 MHz</th> </tr> </thead> <tbody> <tr> <td>QPSK</td> <td>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 18</td> <td>≤ 3</td> </tr> <tr> <td>256 QAM</td> <td colspan="6">≥ 1</td> <td>≤ 5</td> </tr> </tbody> </table> <p>MPR Built-in by design                      The manufacturer MPR values are always within the 3GPP maximum MPR allowance but may not follow the default MPR values.                      A-MPR (additional MPR) was disabled during SAR testing</p>						Modulation	Channel bandwidth / Transmission bandwidth (N <sub>RB</sub> )						MPR (dB)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1	16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2	64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2	64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3	256 QAM	≥ 1						≤ 5
Modulation	Channel bandwidth / Transmission bandwidth (N <sub>RB</sub> )							MPR (dB)																																																												
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz																																																														
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1																																																													
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1																																																													
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2																																																													
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2																																																													
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3																																																													
256 QAM	≥ 1						≤ 5																																																													
Power reduction	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:**

- Maximum bandwidth 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 41 test channels in accordance with October 2014 TCB workshop for all channels bandwidths.
- SAR Testing for LTE was performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

## 6.4. LTE (TDD) Considerations

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

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

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

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$(1+X) \cdot 2192 \cdot T_s$	$(1+X) \cdot 2560 \cdot T_s$	$7680 \cdot T_s$	$(1+X) \cdot 2192 \cdot T_s$	$(1+X) \cdot 2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$		
5	$6592 \cdot T_s$	$(2+X) \cdot 2192 \cdot T_s$	$(2+X) \cdot 2560 \cdot T_s$	$20480 \cdot T_s$	$(2+X) \cdot 2192 \cdot T_s$	$(2+X) \cdot 2560 \cdot T_s$
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-		
9	$13168 \cdot T_s$			-		
10	$13168 \cdot T_s$	$13152 \cdot T_s$	$12800 \cdot T_s$	-	-	-

Table 4.2-2: Uplink-downlink configurations & Calculated Duty Cycle

Uplink-Downlink Configuration	Downlink-to-Uplink Switch-point Periodicity	Subframe Number										Calculated Duty Cycle (%)
		0	1	2	3	4	5	6	7	8	9	
0	5 ms	D	S	U	U	U	D	S	U	U	U	63.3%
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.3%
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.3%
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.7%
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.7%
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.7%
6	5 ms	D	S	U	U	U	D	S	U	U	D	53.3%

Calculated Duty Cycle = Extended cyclic prefix in uplink \* ( $T_s$ ) \* # of S + # of U / period

### Note(s):

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

### 6.5. General NR(FR1) SAR Test and Reporting Considerations

Item	Description														
Frequency range, Channel Bandwidth, Numbers and Frequencies	n5	Frequency range: 824 - 849 MHz (BW = 25 MHz)													
		Channel Bandwidth (MHz)													
		100	90	80	70	60	50	40	30	25	20 <sup>1</sup>	15 <sup>1</sup>	10 <sup>1</sup>	5	
	Low										166800 /834	166300 /831.5	165800 /829	165300 /826.5	
	Mid										167300 /836.5	167300 /836.5	167300 /836.5	167300 /836.5	
	High										167800 /839	168300 /841.5	168800 /844	169300 /846.5	
	n66	Frequency range: 1710 - 1780 MHz (BW = 70 MHz)													
		Channel Bandwidth (MHz)													
		100	90	80	70	60	50	40 <sup>1</sup>	30 <sup>1</sup>	25 <sup>1</sup>	20	15	10	5	
	Low										344000 /1720	343500 /1717.5	343000 /1715	342500 /1712.5	
Mid										349000 /1745	349000 /1745	349000 /1745	349000 /1745		
High										354000 /1770	354500 /1772.5	355000 /1775	355500 /1777.5		
SCS	15 kHz (n5 and 66)														
NR(FR1) transmitter and antenna implementation	Refer to Appendix A.														
A-MPR(Additional MPR) disabled for SAT testing?	Yes														
EN-DC Carrier Aggregation Possible Combinations	5A-n66A, 66A-n5A, 5A-66A-n66A, 66A-66A-n5A														

**Notes:**

- Maximum bandwidth 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 FCC Guidance.
- SAR test for NR bands and LTE anchor Bands were performed separately due to limitations in SAR probe calibration factors. SAR testing was performed using Agilent UXM E7515B Callbox.

### 6.6. Power Back-off Operation

This device supports multiple power back-off modes: WWAN (Ear-jack), WWAN (Hotspot), WWAN (Grip Sensor), and WLAN (RCV). Each of the power back-off operates within specific exposure conditions for certain technologies. For full details on how each power back-off mode operates, refer to the Operational Description.

Power Back-off mode	Technologies Supported	Exposure Conditions Active			
		Head	Body-worn <sup>3</sup>	Hotspot	Product Specific 10g (Extremity) <sup>4</sup>
WWAN (Ear-jack) <sup>1</sup>	GSM 1900 W-CDMA BII/IV LTE B2/4/6/1 NR n66	N/A	✓	N/A	N/A
WWAN (Hotspot) <sup>1</sup>	GSM 1900 W-CDMA BII/IV LTE B2/4/6/1 NR n66	N/A	N/A	✓	N/A
WWAN (Grip Sensor) <sup>1</sup>	GSM 1900 W-CDMA BII/IV LTE B2/4/6/1 NR n66	N/A	N/A	N/A	✓
WLAN (RCV) <sup>1,5</sup>	Wi-Fi 2.4GHz Wi-Fi 5GHz	✓	N/A	N/A	N/A

**Note(s):**

1. Tune-Up Limits for WWAN (Hotspot), WWAN (Grip Sensor), WWAN (Ear-jack) and WLAN (RCV) are all Reduced Average Powers. Please refer to §9 for all conducted power measurements.
2. Back-off priority for WWAN: Hotspot → Ear-jack → Grip Sensor
3. Body-worn SAR with ear-jack connected at reduced power is tested when Body-worn measured at max power is > 1.2 W/kg.
4. For Phablet devices: when hotspot mode applies, Extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.
5. WLAN (RCV) refers to Earpiece active. WLAN power reduces when earpiece is active.

**Product Specific 10g (Extremity) Adjusted SAR Calculation**

Wireless technologies	Max Tune-up Limit (dBm)	Reduced Tune-Up Limit (dBm)	Power Factor	Reported SAR Limit (W/kg)
GSM 1900 2 Slots	29.5	28.0	1.41	0.850
W-CDMA B2	24.5	23.0	1.41	0.850
W-CDMA B4	24.5	23.0	1.41	0.850
LTE B2	24.0	23.0	1.26	0.953
LTE B4	24.5	23.0	1.41	0.850
LTE B66	25.0	23.5	1.41	0.850
NR n66	24.0	22.5	1.41	0.850

**Note(s):**

1. Hotspot mode supports power reduction. When the measured SAR is scaled to the maximum tune-up limit, the adjusted SAR is < 1.2 W/kg. Therefore, Extremity SAR testing is not required for these bands in accordance with KDB 648474 §2.5 b. Refer to §10 for Reported SAR results. If the Reported SAR 1g value in §10 is less than the Reported SAR Limit listed above, then Extremity SAR is not required.
2. LTE 50% RB is scaled up to the Max Tune-Up Limit with MPR included.
3. Please Refer to Appendix G for Proximity Sensor Trigger Distance.

## 7. RF Exposure Conditions (Test Configurations)

Refer to Appendix A for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

Wireless technologies	RF Exposure Conditions	DUT-to-User Separation	Test Position	Antenna-to-edge/surface	SAR Required	Note	
WWAN <sup>1</sup> Main 1 ANT	Head	0 mm	Left Touch	N/A	Yes		
			Left Tilt (15°)	N/A	Yes		
			Right Touch	N/A	Yes		
			Right Tilt (15°)	N/A	Yes		
	Body	15 mm	Rear	N/A	Yes		
			Front	N/A	Yes		
	Hotspot	10 mm	Rear	≤ 25 mm	Yes	✔	
			Front	≤ 25 mm	Yes	✔	
			Edge 1 (Top)	> 25 mm	No	3	
			Edge 2 (Right)	≤ 25 mm	Yes	✔	
			Edge 3 (Bottom)	≤ 25 mm	Yes	✔	
	Extremity	0 mm	Rear				
			Front				
			Edge 1 (Top)				
			Edge 2 (Right)				
			Edge 3 (Bottom)				
WWAN <sup>2</sup> Main 2 ANT	Head	0 mm	Left Touch	N/A	Yes		
			Left Tilt (15°)	N/A	Yes		
			Right Touch	N/A	Yes		
			Right Tilt (15°)	N/A	Yes		
	Body	15 mm	Rear	N/A	Yes		
			Front	N/A	Yes		
	Hotspot	10 mm	Rear	≤ 25 mm	Yes	✔	
			Front	≤ 25 mm	Yes	✔	
			Edge 1 (Top)	> 25 mm	No	3	
			Edge 2 (Right)	> 25 mm	No	3	
			Edge 3 (Bottom)	≤ 25 mm	Yes		
	Extremity	0 mm	Rear				
			Front				
			Edge 1 (Top)				
			Edge 2 (Right)				
			Edge 3 (Bottom)				

**Notes:**

1. WWAN Main 1 ANT supports GSM 850, WCDMA Band V, LTE Bands 5/12/17/26 and NR Band n5.
2. WWAN Main 2 ANT supports GSM 1900, WCDMA Bands II/IV, LTE Bands 2/4/41/66 and NR Band n66.
3. SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR.
4. For Phablet devices: when hotspot mode applies, Extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.
5. For Phablet devices: when hotspot mode applies and power reduction applies to hotspot mode, Extremity SAR is required for each test position that has an adjusted SAR to maximum power that is > 1.2 W/kg.

Wireless technologies	RF Exposure Conditions	DUT-to-User Separation	Test Position	Antenna-to-edge/surface	SAR Required	Note	
WLAN <sup>1</sup> Sub 2 ANT	Head	0 mm	Left Touch	N/A	Yes		
			Left Tilt (15°)	N/A	Yes		
			Right Touch	N/A	Yes		
			Right Tilt (15°)	N/A	Yes		
	Body	15 mm	Rear	N/A	Yes		
			Front	N/A	Yes		
	Hotspot	10 mm	Rear	≤ 25 mm	Yes		
			Front	≤ 25 mm	Yes		
			Edge 1 (Top)	≤ 25 mm	Yes		
			Edge 2 (Right)	> 25 mm	No	3	
			Edge 3 (Bottom)	> 25 mm	No	3	
			Edge 4 (Left)	≤ 25 mm	Yes		
	Extremity	0 mm	Rear	Refer to notes 4 & 5			
			Front				
			Edge 1 (Top)				
			Edge 2 (Right)				
Edge 3 (Bottom)							
Edge 4 (Left)							
WLAN <sup>2</sup> Sub 3 ANT	Head	0 mm	Left Touch	N/A	Yes		
			Left Tilt (15°)	N/A	Yes		
			Right Touch	N/A	Yes		
			Right Tilt (15°)	N/A	Yes		
	Body	15 mm	Rear	N/A	Yes		
			Front	N/A	Yes		
	Hotspot	10 mm	Rear	≤ 25 mm	Yes		
			Front	≤ 25 mm	Yes		
			Edge 1 (Top)	≤ 25 mm	Yes		
			Edge 2 (Right)	> 25 mm	No	3	
			Edge 3 (Bottom)	> 25 mm	No	3	
			Edge 4 (Left)	≤ 25 mm	Yes		
	Extremity	0 mm	Rear	Refer to notes 4 & 5			
			Front				
			Edge 1 (Top)				
			Edge 2 (Right)				
Edge 3 (Bottom)							
Edge 4 (Left)							

**Notes:**

1. WLAN Sub 2 ANT supports Wi-Fi 2.4 GHz and Bluetooth
2. WLAN Sub 3 ANT supports Wi-Fi 5GHz
3. SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR.
4. For Phablet devices: when Hotspot Mode is not supported, Extremity SAR is required for all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions.
5. For Phablet devices: when hotspot mode applies, Extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.
6. Wi-Fi Direct is only available in Hand use (Extremity) configuration.

## 8. Dielectric Property Measurements & System Check

### 8.1. Dielectric Property Measurements

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

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

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

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

#### Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

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

#### IEEE Std 1528-2013

Refer to Table 3 within the IEEE Std 1528-2013

#### IEC 62209-1

Refer to Table A.3 within the IEC 62209-1

**Dielectric Property Measurements Results:**

SAR Lab	Date	Band (MHz)	Tissue Type	Frequency (MHz)	Relative Permittivity ( $\epsilon_r$ )			Conductivity ( $\sigma$ )		
					Measured	Target	Delta (%)	Measured	Target	Delta (%)
1	12/10/2020	5250	Head	5250	36.08	35.93	0.41	4.69	4.70	-0.34
				5150	36.28	36.05	0.65	4.57	4.60	-0.60
				5350	35.86	35.82	0.11	4.82	4.80	0.22
1	12/10/2020	5600	Head	5600	35.35	35.53	-0.52	5.11	5.06	1.06
				5500	35.55	35.65	-0.27	5.00	4.96	0.75
				5725	35.09	35.39	-0.85	5.26	5.19	1.35
1	12/10/2020	5800	Head	5800	34.90	35.30	-1.13	5.35	5.27	1.56
				5700	35.14	35.42	-0.79	5.23	5.16	1.27
				5850	34.80	35.30	-1.42	5.43	5.27	2.96
1	12/14/2020	1750	Head	1750	39.50	40.08	-1.46	1.38	1.37	0.81
				1710	39.59	40.15	-1.39	1.35	1.35	0.56
				1755	39.50	40.08	-1.44	1.38	1.37	0.82
1	12/18/2020	1750	Head	1750	41.21	40.08	2.81	1.32	1.37	-3.36
				1710	41.26	40.15	2.77	1.30	1.35	-3.82
				1755	41.22	40.08	2.85	1.33	1.37	-3.34
1	1/11/2021	5250	Head	5250	35.90	35.93	-0.09	4.60	4.70	-2.11
				5150	36.11	36.05	0.17	4.49	4.60	-2.43
				5350	35.75	35.82	-0.19	4.72	4.80	-1.74
1	1/11/2021	5600	Head	5600	35.32	35.53	-0.60	5.01	5.06	-1.09
				5500	35.48	35.65	-0.47	4.89	4.96	-1.41
				5725	35.12	35.39	-0.77	5.15	5.19	-0.77
1	1/11/2021	5750	Head	5750	35.08	35.36	-0.80	5.17	5.21	-0.92
				5700	35.15	35.42	-0.76	5.12	5.16	-0.77
				5850	34.90	35.30	-1.13	5.28	5.27	0.19
2	11/19/2020	835	Head	835	41.96	41.50	1.11	0.93	0.90	3.66
				805	41.80	41.68	0.29	0.92	0.90	2.34
				850	41.99	41.50	1.18	0.94	0.92	2.49
2	11/19/2020	750	Head	750	40.02	41.96	-4.63	0.92	0.89	2.95
				660	40.77	42.42	-3.90	0.88	0.89	-0.25
				800	39.72	41.71	-4.76	0.93	0.90	4.16
2	11/23/2020	835	Head	835	39.73	41.50	-4.27	0.94	0.90	4.57
				805	39.81	41.68	-4.49	0.93	0.90	3.29
				850	39.66	41.50	-4.43	0.95	0.92	3.36
2	11/24/2020	1750	Head	1750	39.56	40.08	-1.31	1.43	1.37	4.24
				1710	39.72	40.15	-1.06	1.40	1.35	3.91
				1755	39.56	40.08	-1.29	1.43	1.37	4.32
2	11/30/2020	1900	Head	1900	41.16	40.00	2.90	1.44	1.40	2.79
				1850	41.23	40.00	3.07	1.40	1.40	0.14
				1920	41.13	40.00	2.83	1.45	1.40	3.71
2	11/30/2020	1750	Head	1750	41.39	40.08	3.26	1.36	1.37	-0.95
				1710	41.56	40.15	3.52	1.32	1.35	-2.04
				1755	41.38	40.08	3.25	1.36	1.37	-0.86
2	12/3/2020	1750	Head	1750	39.08	40.08	-2.51	1.41	1.37	2.92
				1710	39.11	40.15	-2.58	1.37	1.35	1.75
				1755	39.10	40.08	-2.44	1.41	1.37	3.00



**Dielectric Property Measurements Results (continued):**

SAR Lab	Date	Band (MHz)	Tissue Type	Frequency (MHz)	Relative Permittivity ( $\epsilon_r$ )			Conductivity ( $\sigma$ )		
					Measured	Target	Delta $\pm 5\%$	Measured	Target	Delta $\pm 5\%$
2	12/7/2020	1900	Head	1900	40.10	40.00	0.25	1.42	1.40	1.21
				1850	40.12	40.00	0.30	1.39	1.40	-0.93
				1920	40.08	40.00	0.20	1.43	1.40	2.07
2	12/8/2020	750	Head	750	42.51	41.96	1.31	0.93	0.89	4.28
				660	43.08	42.42	1.55	0.91	0.89	2.18
				800	42.39	41.71	1.64	0.94	0.90	4.97
2	12/10/2020	2450	Head	2450	40.20	39.20	2.55	1.73	1.80	-4.17
				2400	40.19	39.30	2.27	1.68	1.75	-4.38
				2480	40.27	39.16	2.83	1.74	1.83	-4.99
2	12/14/2020	1900	Head	1900	40.36	40.00	0.90	1.45	1.40	3.36
				1850	40.36	40.00	0.90	1.42	1.40	1.50
				1920	40.32	40.00	0.80	1.46	1.40	4.07
2	12/15/2020	835	Head	835	42.49	41.50	2.39	0.92	0.90	1.92
				805	42.49	41.68	1.94	0.89	0.90	-0.61
				850	42.51	41.50	2.43	0.93	0.92	1.73
2	1/11/2021	1750	Head	1750	40.44	40.08	0.89	1.35	1.37	-1.61
				1710	40.51	40.15	0.91	1.32	1.35	-2.26
				1755	40.44	40.08	0.91	1.35	1.37	-1.52
3	12/4/2020	2600	Head	2600	38.76	39.01	-0.64	1.95	1.96	-0.57
				2495	38.93	39.14	-0.54	1.85	1.85	0.02
				2690	38.59	38.90	-0.79	2.01	2.06	-2.50

**Dielectric Property Measurements Results Suwon Lab:**

SAR Lab	Date	Band (MHz)	Tissue Type	Frequency (MHz)	Relative Permittivity ( $\epsilon_r$ )			Conductivity ( $\sigma$ )		
					Measured	Target	Delta $\pm 5\%$	Measured	Target	Delta $\pm 5\%$
4	1/21/2021	2600	Head	2600	38.34	39.01	-1.72	2.02	1.96	3.06
				2500	38.71	39.14	-1.10	1.90	1.85	2.70
				2700	37.94	38.88	-2.42	2.13	2.07	2.90

## 8.2. System Check

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

### System Performance Check Measurement Conditions:

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

**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  $\pm 10\%$  of the manufacturer calibrated dipole SAR target. Refer to Appendix B for the SAR System Check Plots.

SAR Lab	Date	Tissue Type	Dipole Type _Serial #	Dipole Cal. Due Data	Measured Results for 1g SAR				Measured Results for 10g SAR				Plot No.
					Zoom Scan to 100 mW	Normalize to 1 W	Target (Ref. Value)	Delta $\pm 10\%$	Zoom Scan to 100 mW	Normalize to 1 W	Target (Ref. Value)	Delta $\pm 10\%$	
1	12/10/2020	Head	D5GHzV2 SN:1138 (5.25 GHz)	8/17/2021	7.780	77.80	80.00	-2.75	2.330	23.30	22.80	2.19	1,2
1	12/10/2020	Head	D5GHzV2 SN:1138 (5.6 GHz)	8/17/2021	8.230	82.30	82.80	-0.60	2.490	24.90	23.50	5.96	3,4
1	12/10/2020	Head	D5GHzV2 SN:1138 (5.8 GHz)	8/17/2021	7.660	76.60	80.10	-4.37	2.300	23.00	22.70	1.32	5,6
1	12/14/2020	Head	D1750V2 SN:1077	10/16/2021	3.470	34.70	35.15	-1.28	1.860	18.60	18.71	-0.59	
1	12/18/2020	Head	D1750V2 SN:1077	10/16/2021	3.580	35.80	35.15	1.85	1.910	19.10	18.71	2.08	7,8
1	1/11/2021	Head	D5GHzV2 SN:1003 (5.25 GHz)	3/12/2021	8.170	81.70	80.10	2.00	2.410	24.10	22.90	5.24	9,10
1	1/11/2021	Head	D5GHzV2 SN:1003 (5.60 GHz)	3/12/2021	7.730	77.30	79.80	-3.13	2.250	22.50	22.50	0.00	11,12
1	1/11/2021	Head	D5GHzV2 SN:1003 (5.75 GHz)	3/12/2021	6.850	68.50	73.70	-7.06	2.010	20.10	21.00	-4.29	13,14
2	11/19/2020	Head	D835V2 SN:4d142	8/18/2021	1.010	10.10	9.36	7.91	0.654	6.54	6.09	7.39	15,16
2	11/19/2020	Head	D750V3 SN:1019	4/17/2021	0.861	8.61	8.63	-0.23	0.566	5.66	5.69	-0.53	17,18
2	11/23/2020	Head	D835V2 SN:4d142	8/18/2021	0.949	9.49	9.36	1.39	0.615	6.15	6.09	0.99	
2	11/24/2020	Head	D1750V2 SN:1050	4/21/2021	3.740	37.40	35.51	5.32	1.980	19.80	18.91	4.71	
2	11/30/2020	Head	D1900V2 SN:5d140	4/21/2021	3.740	37.40	38.77	-3.53	1.910	19.10	19.90	-4.02	
2	11/30/2020	Head	D1750V2 SN:1050	4/21/2021	3.890	38.90	35.51	9.55	2.060	20.60	18.91	8.94	19,20
2	12/3/2020	Head	D1750V2 SN:1050	4/21/2021	3.840	38.40	35.51	8.14	2.020	20.20	18.91	6.82	
2	12/7/2020	Head	D1900V2 SN:5d140	4/21/2021	4.190	41.90	38.77	8.07	2.140	21.40	19.90	7.54	
2	12/8/2020	Head	D750V3 SN:1024	5/29/2021	0.852	8.52	8.36	1.91	0.554	5.54	5.45	1.65	21,22
2	12/10/2020	Head	D2450V2 SN:899	4/17/2021	5.230	52.30	51.75	1.06	2.420	24.20	24.12	0.33	23,24
2	12/14/2020	Head	D1900V2 SN:5d140	4/21/2021	4.240	42.40	38.77	9.36	2.180	21.80	19.90	9.55	25,26
2	12/15/2020	Head	D835V2 SN:4d142	8/18/2021	0.982	9.82	9.36	4.91	0.634	6.34	6.09	4.11	
2	1/11/2021	Head	D1750V2 SN:1050	4/21/2021	3.640	36.40	35.51	2.51	1.910	19.10	18.91	1.00	
3	12/4/2020	Head	D2600V2 SN:1036	4/17/2021	5.930	59.30	56.53	4.90	2.640	26.40	25.23	4.64	27,28

**System Check Results Suwon Lab:**

SAR Lab	Date	Tissue Type	Dipole Type _Serial #	Dipole Cal. Due Data	Measured Results for 1g SAR				Measured Results for 10g SAR				Plot No.
					Zoom Scan to 100 mW	Normalize to 1 W	Target (Ref. Value)	Delta $\pm 10\%$	Zoom Scan to 100 mW	Normalize to 1 W	Target (Ref. Value)	Delta $\pm 10\%$	
4	1/21/2021	Head	D2600V2 SN:1097	9/19/2021	5.560	55.60	57.30	-2.97	2.470	24.70	25.70	-3.89	29,30

## 9. Conducted Output Power Measurements

### 9.1. GSM

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

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

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

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

#### Per October 2013 TCB Workshop:

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

#### Maximum Output Power (Tune-up Limit) for GSM

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

RF Air interface	Mode	Maximum Output Power (Tune-up Limit) (dBm)			
		Main 1 Antenna		Main 2 Antenna	
		Maximum	Reduced	Maximum	Reduced
GSM 850	Voice/GPRS (1 slot)	33.5	N/A		
	GPRS 2 slots	33.0	N/A		
	GPRS 3 slots	31.0	N/A		
	GPRS 4 slots	28.5	N/A		
	EGPRS 1 slot	26.5	N/A		
	EGPRS 2 slot	26.0	N/A		
	EGPRS 3 slot	25.0	N/A		
	EGPRS 4 slots	23.0	N/A		
GSM 1900	Voice/GPRS (1 slot)			30.5	29.0
	GPRS 2 slots			29.5	28.0
	GPRS 3 slots			27.0	25.5
	GPRS 4 slots			25.5	24.0
	EGPRS 1 slot			26.5	25.0
	EGPRS 2 slot			26.0	24.5
	EGPRS 3 slot			24.5	23.0
	EGPRS 4 slots			22.0	20.5

**GSM850 Measured Results**

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			
					Measured		Tune-up Limit	
					Burst Pw r	Frame Pw r	Burst Pw r	Frame Pw r
GPRS/EDGE (GMSK)	CS1	1	128	824.2	32.3	23.3	33.5	24.5
			190	836.6	32.2	23.2		
			251	848.8	31.6	22.6		
		2	128	824.2	31.7	25.7	33.0	27.0
			190	836.6	31.8	25.7		
			251	848.8	31.4	25.4		
		3	128	824.2	29.7	25.4	31.0	26.7
			190	836.6	29.8	25.6		
			251	848.8	29.4	25.1		
		4	128	824.2	27.6	24.6	28.5	25.5
			190	836.6	27.6	24.6		
			251	848.8	27.2	24.1		
EDGE (8PSK)	MCS5	1	128	824.2	26.5	17.5	26.5	17.5
			190	836.6	26.5	17.5		
			251	848.8	26.2	17.2		
		2	128	824.2	25.6	19.6	26.0	20.0
			190	836.6	25.3	19.3		
			251	848.8	24.7	18.7		
		3	128	824.2	23.5	19.3	25.0	20.7
			190	836.6	23.4	19.1		
			251	848.8	22.9	18.7		
		4	128	824.2	22.3	19.3	23.0	20.0
			190	836.6	22.3	19.3		
			251	848.8	21.7	18.6		

**Notes:**

Based on the Tune-up Procedure, GPRS/EDGE (GMSK) mode with 2 time slots for Max power and reduced power have maximum frame-averaged power.

**GSM1900 Measured Results**

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Maximum Average Power (dBm)				Reduced Average Power (dBm)			
					Measured		Tune-up Limit		Measured		Tune-up Limit	
					Burst Pwr	Frame Pwr	Burst Pwr	Frame Pwr	Burst Pwr	Frame Pwr	Burst Pwr	Frame Pwr
GPRS/EDGE (GMSK)	CS1	1	512	1850.2	28.8	19.8	30.5	21.5	27.5	18.5	29.0	20.0
			661	1880.0	28.7	19.7			27.9	18.8		
			810	1909.8	28.8	19.7			27.3	18.3		
		2	512	1850.2	28.4	22.4	29.5	23.5	26.4	20.4	28.0	22.0
			661	1880.0	28.7	22.6			26.7	20.6		
			810	1909.8	27.8	21.8			26.1	20.0		
		3	512	1850.2	25.8	21.5	27.0	22.7	24.2	20.0	25.5	21.2
			661	1880.0	26.0	21.8			24.3	20.0		
			810	1909.8	25.0	20.7			23.7	19.4		
		4	512	1850.2	24.3	21.3	25.5	22.5	22.8	19.8	24.0	21.0
			661	1880.0	24.6	21.6			22.7	19.7		
			810	1909.8	23.8	20.8			22.3	19.2		
EDGE (8PSK)	MCS5	1	512	1850.2	25.1	16.0	26.5	17.5	23.5	14.4	25.0	16.0
			661	1880.0	25.1	16.1			23.8	14.7		
			810	1909.8	24.8	15.8			23.1	14.0		
		2	512	1850.2	24.0	18.0	26.0	20.0	22.3	16.3	24.5	18.5
			661	1880.0	24.3	18.3			22.5	16.4		
			810	1909.8	23.7	17.7			22.1	16.1		
		3	512	1850.2	22.1	17.8	24.5	20.2	21.5	17.2	23.0	18.7
			661	1880.0	22.4	18.1			21.4	17.1		
			810	1909.8	22.0	17.7			21.2	16.9		
		4	512	1850.2	21.1	18.1	22.0	19.0	18.7	15.7	20.5	17.5
			661	1880.0	21.2	18.2			19.0	15.9		
			810	1909.8	20.6	17.6			18.6	15.6		

**Notes:**

Based on the Tune-up Procedure, GPRS/EDGE (GMSK) mode with 2 time slots for Max power and reduced power have maximum frame-averaged power.

## 9.2. W-CDMA

### Per KDB 941225 D01 3G SAR Procedures for W-CDMA:

Maximum output power is verified on the high, middle and low channels and using the appropriate 12.2 kbps RMC with TPC (transmit power control) set to all "1's"

### 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. A summary of these settings is illustrated below:

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

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

The following 4 Sub-tests were completed according to procedures in table C.10.1.4 of 3GPP TS 34.121-1. A summary of these settings is illustrated below:

Table C.10.1.4:  $\beta$  values for transmitter characteristics tests with HS-DPCCH

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{HS}$ (Note 1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1:  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{CQI} = 30/15$  with  $\beta_{HS} = 30/15 * \beta_c$ .

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA,  $\Delta_{ACK}$  and  $\Delta_{NACK} = 30/15$  with  $\beta_{HS} = 30/15 * \beta_c$ , and  $\Delta_{CQI} = 24/15$  with  $\beta_{HS} = 24/15 * \beta_c$ .

Note 3: CM = 1 for  $\beta_c/\beta_d = 12/15$ ,  $\beta_{HS}/\beta_c = 24/15$ . For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the  $\beta_c/\beta_d$  ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 11/15$  and  $\beta_d = 15/15$ .

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

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

Table C.11.1.3:  $\beta$  values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{HS}$ (Note 1)	$\beta_{ec}$	$\beta_{ed}$ (Note 4) (Note 5)	$\beta_{ed}$ (SF)	$\beta_{ed}$ (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/25	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4,  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{CQI} = 30/15$  with  $\beta_{HS} = 30/15 * \beta_c$ . For sub-test 5,  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{CQI} = 5/15$  with  $\beta_{HS} = 5/15 * \beta_c$ .

Note 2: CM = 1 for  $\beta_c/\beta_d = 12/15$ ,  $\beta_{HS}/\beta_c = 24/15$ . For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPCCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the  $\beta_c/\beta_d$  ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 10/15$  and  $\beta_d = 15/15$ .

Note 4: In case of testing by UE using E-DPCCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 5:  $\beta_{ed}$  can not be set directly; it is set by Absolute Grant Value.

Note 6: For subtests 2, 3 and 4, UE may perform E-DPCCH power scaling at max power which could results in slightly smaller MPR values.

**DC-HSDPA Setup Procedures used to establish the test signals**

The following 4 Sub-tests for DC-HSDPA were completed according to procedures in table C08.1.12 of 3GPP TS 34.121-1. A summary of subtest settings is illustrated below:

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

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

**HSPA+ Setup Procedures used to establish the test signals**

The following 1 Sub-test was completed according to procedures in table C.11.1.4 of 3GPP TS34.121. A summary of these settings is illustrated below:

**Table C.11.1.4:  $\beta$  values for transmitter characteristics tests with HS-DPCCH and E-DCH with 16QAM**

Sub-test	$\beta_c$ (Note3)	$\beta_d$	$\beta_{HS}$ (Note1)	$\beta_{ec}$	$\beta_{ed}$ (2xSF2) (Note 4)	$\beta_{ed}$ (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	$\beta_{ed1}$ : 30/15 $\beta_{ed2}$ : 30/15	$\beta_{ed3}$ : 24/15 $\beta_{ed4}$ : 24/15	3.5	2.5	14	105	105
Note 1: $\Delta_{ACK}$ , $\Delta_{NACK}$ and $\Delta_{CGI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$ . Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0). Note 3: DPDCH is not configured, therefore the $\beta_c$ is set to 1 and $\beta_d = 0$ by default. Note 4: $\beta_{ed}$ can not be set directly; it is set by Absolute Grant Value. Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.											

DUT supports HSPA+ DL only. Therefore, conducted power measurements is not required.

**Maximum Output Power (Tune-up Limit) for W-CDMA**

SAR measurement is not required for the HSDPA, HSUPA, DC-HSDPA and HSPA+. When primary mode and the adjusted SAR is  $\leq 1.2$  W/kg and secondary mode is  $\leq 1/4$  dB higher than the primary mode

RF Air interface	Mode	Maximum Output Power (Tune-up Limit) (dBm)			
		Main 1 Antenna		Main 2 Antenna	
		Maximum	Reduced	Maximum	Reduced
W-CDMA Band 2	R99			24.5	23.0
	HSDPA			24.0	22.5
	HSUPA			24.0	22.5
	DC-HSDPA			24.0	22.5
W-CDMA Band 4	R99			24.5	23.0
	HSDPA			24.0	22.5
	HSUPA			24.0	22.5
	DC-HSDPA			24.0	22.5
W-CDMA Band 5	R99	25.0	N/A		
	HSDPA	24.5	N/A		
	HSUPA	24.5	N/A		
	DC-HSDPA	24.5	N/A		



**W-CDMA Band II Measured Results**

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			Reduced Average Power (dBm)		
				Measured Pwr	MPR	Tune-up Limit	Measured Pwr	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	23.8	N/A	24.5	22.3	N/A	23.0
		9400	1880.0	23.9			22.4		
		9538	1907.6	23.3			21.8		
HSDPA	Subtest 1	9262	1852.4	22.8	0	24.0	21.1	0	22.5
		9400	1880.0	22.9			21.2		
		9538	1907.6	22.4			21.1		
	Subtest 2	9262	1852.4	22.8	0	24.0	21.1	0	22.5
		9400	1880.0	22.9			21.2		
		9538	1907.6	22.4			21.0		
	Subtest 3	9262	1852.4	22.3	0.5	23.5	20.3	0.5	22.0
		9400	1880.0	22.4			20.6		
		9538	1907.6	21.8			20.2		
	Subtest 4	9262	1852.4	22.2	0.5	23.5	20.5	0.5	22.0
		9400	1880.0	22.4			20.7		
		9538	1907.6	21.7			20.4		
HSUPA	Subtest 1	9262	1852.4	22.7	0	24.0	21.3	0	22.5
		9400	1880.0	22.8			21.3		
		9538	1907.6	22.2			20.8		
	Subtest 2	9262	1852.4	20.7	2	22.0	19.3	2	20.5
		9400	1880.0	20.7			19.4		
		9538	1907.6	20.2			18.7		
	Subtest 3	9262	1852.4	21.7	1	23.0	20.3	1	21.5
		9400	1880.0	21.8			20.3		
		9538	1907.6	21.2			19.8		
	Subtest 4	9262	1852.4	20.7	2	22.0	19.3	2	20.5
		9400	1880.0	20.8			19.3		
		9538	1907.6	20.3			18.7		
	Subtest 5	9262	1852.4	23.7	0	24.0	21.2	0	22.5
		9400	1880.0	23.8			21.4		
		9538	1907.6	23.2			20.8		
DC-HSDPA	Subtest 1	9262	1852.4	22.8	0	24.0	21.1	0	22.5
		9400	1880.0	22.9			21.3		
		9538	1907.6	22.3			20.9		
	Subtest 2	9262	1852.4	22.8	0	24.0	21.3	0	22.5
		9400	1880.0	22.9			21.6		
		9538	1907.6	22.2			20.9		
	Subtest 3	9262	1852.4	22.2	0.5	23.5	21.2	0.5	22.0
		9400	1880.0	22.4			21.5		
		9538	1907.6	21.8			20.2		
	Subtest 4	9262	1852.4	22.3	0.5	23.5	21.1	0.5	22.0
		9400	1880.0	22.4			21.4		
		9538	1907.6	21.7			20.3		

**W-CDMA Band IV Measured Results**

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			Reduced Average Power (dBm)		
				Measured Pw r	MPR	Tune-up Limit	Measured Pw r	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	1312	1712.4	23.1	N/A	24.5	22.4	N/A	23.0
		1413	1732.6	22.8			22.6		
		1513	1752.6	23.6			22.2		
HSDPA	Subtest 1	1312	1712.4	22.1	0	24.0	21.0	0	22.5
		1413	1732.6	21.8			21.3		
		1513	1752.6	22.6			21.1		
	Subtest 2	1312	1712.4	22.1	0	24.0	21.2	0	22.5
		1413	1732.6	21.8			21.2		
		1513	1752.6	22.6			21.2		
	Subtest 3	1312	1712.4	21.5	0.5	23.5	20.8	0.5	22.0
		1413	1732.6	21.3			21.0		
		1513	1752.6	22.1			20.7		
	Subtest 4	1312	1712.4	21.6	0.5	23.5	20.3	0.5	22.0
		1413	1732.6	21.3			20.5		
		1513	1752.6	22.1			20.2		
HSUPA	Subtest 1	1312	1712.4	22.0	0	24.0	21.6	0	22.5
		1413	1732.6	21.8			21.7		
		1513	1752.6	22.6			21.5		
	Subtest 2	1312	1712.4	20.1	2	22.0	19.6	2	20.5
		1413	1732.6	19.7			19.9		
		1513	1752.6	20.6			19.7		
	Subtest 3	1312	1712.4	21.0	1	23.0	20.6	1	21.5
		1413	1732.6	20.7			20.6		
		1513	1752.6	21.6			20.3		
	Subtest 4	1312	1712.4	20.0	2	22.0	19.9	2	20.5
		1413	1732.6	19.7			20.1		
		1513	1752.6	20.6			19.8		
	Subtest 5	1312	1712.4	23.0	0	24.0	21.4	0	22.5
		1413	1732.6	22.7			21.3		
		1513	1752.6	23.5			21.2		
DC-HSDPA	Subtest 1	1312	1712.4	22.1	0	24.0	21.5	0	22.5
		1413	1732.6	21.8			21.5		
		1513	1752.6	22.6			21.2		
	Subtest 2	1312	1712.4	22.1	0	24.0	21.0	0	22.5
		1413	1732.6	21.8			21.2		
		1513	1752.6	22.6			21.1		
	Subtest 3	1312	1712.4	21.5	0.5	23.5	20.8	0.5	22.0
		1413	1732.6	21.3			21.1		
		1513	1752.6	22.1			20.9		
	Subtest 4	1312	1712.4	21.6	0.5	23.5	21.1	0.5	22.0
		1413	1732.6	21.3			21.2		
		1513	1752.6	22.1			20.9		

**W-CDMA Band V Measured Results**

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)		
				Measured Pwr	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	4132	826.4	24.2	N/A	25.0
		4183	836.6	23.9		
		4233	846.6	23.5		
HSDPA	Subtest 1	4132	826.4	23.2	0	24.5
		4183	836.6	22.9		
		4233	846.6	22.5		
	Subtest 2	4132	826.4	23.2	0	24.5
		4183	836.6	22.9		
		4233	846.6	22.5		
	Subtest 3	4132	826.4	23.2	0.5	24.0
		4183	836.6	22.9		
		4233	846.6	22.5		
	Subtest 4	4132	826.4	23.2	0.5	24.0
		4183	836.6	22.9		
		4233	846.6	22.5		
HSUPA	Subtest 1	4132	826.4	23.4	0	24.5
		4183	836.6	23.1		
		4233	846.6	22.7		
	Subtest 2	4132	826.4	21.4	2	22.5
		4183	836.6	21.4		
		4233	846.6	21.3		
	Subtest 3	4132	826.4	22.3	1	23.5
		4183	836.6	22.1		
		4233	846.6	21.7		
	Subtest 4	4132	826.4	21.3	2	22.5
		4183	836.6	21.1		
		4233	846.6	20.7		
	Subtest 5	4132	826.4	23.4	0	24.5
		4183	836.6	23.1		
		4233	846.6	22.7		
DC-HSDPA	Subtest 1	4132	826.4	23.2	0	24.5
		4183	836.6	22.9		
		4233	846.6	22.6		
	Subtest 2	4132	826.4	23.2	0	24.5
		4183	836.6	22.9		
		4233	846.6	22.6		
	Subtest 3	4132	826.4	23.3	0.5	24.0
		4183	836.6	23.0		
		4233	846.6	22.6		
	Subtest 4	4132	826.4	23.3	0.5	24.0
		4183	836.6	23.0		
		4233	846.6	22.6		

### 9.3. LTE

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

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

**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3**

Modulation	Channel bandwidth / Transmission bandwidth ( $N_{RB}$ )						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
256 QAM	≥ 1						≤ 5

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

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

Network Signalling value	Requirements (subclause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks ( $N_{RB}$ )	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	N/A

**Maximum Output Power (Tune-up Limit) for LTE**

According to April 2015 TCB workshop, SAR test exclusion can be applied for testing overlapping LTE bands as follows:

- a) The maximum output power, including tolerance, for the smaller band must be  $\leq$  the larger band to qualify for the SAR test exclusion.
- b) The channel bandwidth and other operating parameters for the smaller band must be fully supported by the larger band.
  - LTE Band 4 (1710-1755 MHz) is covered by LTE Band 66 (1710-1780 MHz)
  - LTE Band 17 (704-716 MHz) is covered by LTE Band 12 (699-716 MHz)

Maximum bandwidth 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 QPSK configuration has the highest maximum average output power per 3GPP standard.

SAR measurement is not required for the 16QAM and 64QAM. When the highest maximum output power for 16QAM and 64QAM is  $\leq$  ½ dB higher than the QPSK or when the reported SAR for the QPSK configuration is  $\leq$  1.45 W/kg.

Please refer to section 6.3. for LTE detail test channels.

RF Air interface	Mode	Maximum Output Power (Tune-up Limit) (dBm)			
		Main 1 Antenna		Main 2 Antenna	
		Maximum	Reduced	Maximum	Reduced
LTE Band 2	QPSK			24.00	23.00
LTE Band 4	QPSK			24.50	23.00
LTE Band 5	QPSK	25.50	N/A		
LTE Band 12	QPSK	25.50	N/A		
LTE Band 17	QPSK	25.50	N/A		
LTE Band 26	QPSK	25.00	N/A		
LTE Band 41	QPSK			25.00	N/A
LTE Band 66	QPSK			25.00	23.50

**LTE Band 2 Measured Results**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Hotspot/Grip/Earjack Reduced Average Power (dBm)					
				18700	18900	19100	MPR	Tune-up Limit	18700	18900	19100	MPR	Tune-up Limit	
				1860 MHz	1880 MHz	1900 MHz			1860 MHz	1880 MHz	1900 MHz			
20 MHz	QPSK	1	0	22.1	23.1	22.8	0	24.0	21.3	21.4	21.5	0	23	
		1	49	22.3	23.1	22.6	0	24.0	21.3	21.3	21.3	0	23	
		1	99	22.3	22.9	22.4	0	24.0	21.2	21.3	21.4	0	23	
		50	0	21.3	22.0	21.7	1	23.0	21.3	21.3	21.3	0	23	
		50	24	21.4	22.1	21.8	1	23.0	21.3	21.3	21.3	0	23	
		50	50	21.5	22.1	21.6	1	23.0	21.2	21.2	21.3	0	23	
	16QAM	100	0	21.4	22.0	21.7	1	23.0	21.2	21.2	21.5	0	23	
		1	0	21.6	22.7	22.4	1	23.0	21.5	21.5	21.2	0	23	
		1	49	21.9	22.7	22.2	1	23.0	21.5	21.5	21.0	0	23	
		1	99	22.0	22.5	22.1	1	23.0	21.3	21.3	21.3	0	23	
		50	0	20.3	21.1	20.7	2	22.0	21.1	21.3	21.2	0	23	
		50	24	20.4	21.1	20.8	2	22.0	21.1	21.1	21.3	0	23	
	64QAM	50	50	20.5	21.1	20.7	2	22.0	21.0	21.0	21.3	0	23	
		100	0	20.4	21.1	20.7	2	22.0	21.0	21.0	21.3	0	23	
		1	0	21.9	21.4	21.2	2	22.0	21.4	21.4	21.4	0	23	
		1	49	21.8	21.4	21.1	2	22.0	21.4	21.4	21.6	0	23	
		1	99	21.9	21.2	20.9	2	22.0	21.2	21.2	21.4	0	23	
		50	0	20.1	20.1	19.8	3	21.0	21.1	21.1	21.4	0	23	
	15 MHz	QPSK	50	24	20.3	20.2	19.9	3	21.0	21.2	21.2	21.4	0	23
			50	50	20.2	20.1	19.8	3	21.0	21.1	21.1	21.3	0	23
			100	0	20.1	20.1	19.8	3	21.0	21.1	21.1	21.3	0	23
			1	0	22.3	23.1	22.8	0	24.0	21.2	21.1	21.4	0	23
			1	37	22.4	23.1	22.6	0	24.0	21.2	21.3	21.4	0	23
			1	74	22.4	22.9	22.6	0	24.0	21.2	21.1	21.4	0	23
16QAM		36	0	21.3	22.0	21.7	1	23.0	21.1	21.2	21.6	0	23	
		36	20	21.4	22.1	21.7	1	23.0	21.1	21.2	21.7	0	23	
		36	39	21.5	22.1	21.6	1	23.0	21.1	21.4	21.5	0	23	
		75	0	21.4	22.1	21.7	1	23.0	21.1	21.0	21.4	0	23	
		1	0	21.2	22.2	22.2	1	23.0	21.7	21.5	21.7	0	23	
		1	37	21.3	22.2	22.0	1	23.0	21.8	21.5	21.8	0	23	
64QAM		1	74	21.4	22.0	21.9	1	23.0	21.6	21.4	21.7	0	23	
		36	0	20.3	21.0	20.8	2	22.0	21.5	21.7	21.5	0	23	
		36	20	20.4	21.1	20.8	2	22.0	21.6	21.6	21.5	0	23	
		36	39	20.5	21.1	20.7	2	22.0	21.6	21.7	21.6	0	23	
		75	0	20.4	21.1	20.7	2	22.0	21.7	21.6	21.6	0	23	
		1	0	21.2	21.8	21.2	2	22.0	21.4	21.4	21.4	0	23	
QPSK		1	37	21.3	21.8	21.0	2	22.0	21.4	21.4	21.5	0	23	
		1	74	21.2	21.6	20.9	2	22.0	21.4	21.4	21.4	0	23	
		36	0	20.2	20.1	19.8	3	21.0	21.0	21.0	21.0	0	23	
		36	20	20.3	20.2	19.8	3	21.0	21.2	21.2	21.2	0	23	
		36	39	20.3	20.2	19.7	3	21.0	21.2	21.2	21.2	0	23	
		75	0	20.2	20.2	19.7	3	21.0	21.1	21.1	21.1	0	23	
10 MHz	QPSK	1	0	23.0	23.0	22.9	0	24.0	21.3	21.4	21.3	0	23	
		1	25	23.3	23.4	22.8	0	24.0	21.3	21.3	21.3	0	23	
		1	49	23.1	23.0	22.7	0	24.0	21.4	21.3	21.4	0	23	
		25	0	22.3	22.2	21.8	1	23.0	21.3	21.3	21.4	0	23	
		25	12	22.4	22.4	21.9	1	23.0	21.3	21.3	21.3	0	23	
		25	25	22.3	22.2	21.7	1	23.0	21.3	21.3	21.3	0	23	
	16QAM	50	0	22.3	22.3	21.8	1	23.0	21.3	21.3	21.4	0	23	
		1	0	22.1	22.4	21.9	1	23.0	21.1	21.2	21.2	0	23	
		1	25	22.4	22.8	21.8	1	23.0	21.2	21.2	21.0	0	23	
		1	49	22.1	22.4	21.7	1	23.0	21.2	21.3	21.1	0	23	
		25	0	21.4	21.2	20.9	2	22.0	21.2	21.1	21.4	0	23	
		25	12	21.5	21.4	21.0	2	22.0	21.2	21.3	21.1	0	23	
	64QAM	25	25	21.4	21.3	20.8	2	22.0	21.2	21.2	21.2	0	23	
		50	0	21.3	21.3	20.8	2	22.0	21.3	21.1	21.0	0	23	
		1	0	21.4	21.3	21.2	2	22.0	21.4	21.4	21.3	0	23	
		1	25	21.6	21.8	21.1	2	22.0	21.4	21.4	21.6	0	23	
		1	49	21.3	21.3	20.9	2	22.0	21.4	21.4	21.7	0	23	
		25	0	20.4	20.3	20.0	3	21.0	21.1	21.2	21.2	0	23	
	QPSK	25	12	20.5	20.4	20.1	3	21.0	21.1	21.1	21.4	0	23	
		25	25	20.4	20.3	19.9	3	21.0	21.1	21.1	21.5	0	23	
		50	0	20.4	20.3	19.9	3	21.0	21.1	21.1	21.3	0	23	

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

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Hotspot/Grip/Earjack Reduced Average Power (dBm)					
				18625	18900	19175	MPR	Tune-up Limit	18625	18900	19175	MPR	Tune-up Limit	
				1852.5 MHz	1880 MHz	1907.5 MHz			1852.5 MHz	1880 MHz	1907.5 MHz			
5 MHz	QPSK	1	0	23.3	23.3	22.8	0	24.0	21.6	21.5	21.4	0	23	
		1	12	23.3	23.3	22.8	0	24.0	21.6	21.6	21.3	0	23	
		1	24	23.3	23.2	22.6	0	24.0	21.5	21.6	21.3	0	23	
		12	0	22.5	22.4	21.8	1	23.0	21.4	21.4	21.4	0	23	
		12	7	22.5	22.4	21.9	1	23.0	21.4	21.4	21.5	0	23	
		12	13	22.4	22.3	21.7	1	23.0	21.4	21.3	21.4	0	23	
		25	0	22.4	22.3	21.8	1	23.0	21.3	21.3	21.4	0	23	
	16QAM	1	0	22.5	22.4	22.3	1	23.0	21.3	21.4	21.1	0	23	
		1	12	22.6	22.5	22.3	1	23.0	21.5	21.5	21.1	0	23	
		1	24	22.5	22.3	22.2	1	23.0	21.4	21.3	21.0	0	23	
		12	0	21.5	21.4	21.0	2	22.0	21.4	21.4	21.1	0	23	
		12	7	21.5	21.4	21.0	2	22.0	21.4	21.4	21.1	0	23	
		12	13	21.4	21.4	21.0	2	22.0	21.4	21.4	21.0	0	23	
		25	0	21.4	21.4	20.9	2	22.0	21.3	21.3	21.0	0	23	
	64QAM	1	0	21.7	21.3	21.2	2	22.0	21.3	21.2	21.3	0	23	
		1	12	21.7	21.4	21.1	2	22.0	21.4	21.4	21.4	0	23	
		1	24	21.6	21.2	21.2	2	22.0	21.2	21.1	21.2	0	23	
		12	0	20.6	20.5	19.9	3	21.0	21.5	21.4	21.5	0	23	
		12	7	20.6	20.5	19.9	3	21.0	21.5	21.4	21.5	0	23	
		12	13	20.5	20.4	19.8	3	21.0	21.4	21.4	21.5	0	23	
		25	0	20.5	20.4	19.9	3	21.0	21.4	21.3	21.4	0	23	
	3 MHz	QPSK	1	0	22.5	23.2	22.8	0	24.0	21.2	21.3	21.1	0	23
			1	8	22.5	23.2	22.8	0	24.0	21.0	21.2	21.1	0	23
			1	14	22.5	23.2	22.7	0	24.0	21.2	21.3	21.0	0	23
			8	0	21.5	22.4	21.8	1	23.0	21.0	21.2	21.0	0	23
8			4	21.7	22.4	21.9	1	23.0	21.1	21.2	20.9	0	23	
8			7	21.7	22.4	21.9	1	23.0	21.3	21.3	20.9	0	23	
15			0	21.6	22.4	21.8	1	23.0	21.1	21.4	20.9	0	23	
16QAM		1	0	21.5	22.2	22.2	1	23.0	21.0	21.3	21.4	0	23	
		1	8	21.5	22.3	22.2	1	23.0	21.1	21.1	21.3	0	23	
		1	14	21.5	22.1	22.1	1	23.0	21.4	21.3	21.4	0	23	
		8	0	20.7	21.5	20.9	2	22.0	21.2	21.1	21.2	0	23	
		8	4	20.7	21.5	21.0	2	22.0	21.3	21.2	21.2	0	23	
		8	7	20.7	21.5	20.9	2	22.0	21.3	21.3	21.2	0	23	
		15	0	20.6	21.4	20.9	2	22.0	21.2	21.1	21.3	0	23	
64QAM		1	0	21.6	21.7	21.3	2	22.0	21.3	21.3	21.4	0	23	
		1	8	21.6	21.6	21.2	2	22.0	21.4	21.4	21.4	0	23	
		1	14	21.5	21.6	21.2	2	22.0	21.6	21.6	21.4	0	23	
		8	0	20.6	20.4	20.0	3	21.0	21.1	21.1	21.2	0	23	
		8	4	20.6	20.4	20.0	3	21.0	21.2	21.2	21.2	0	23	
		8	7	20.6	20.4	20.0	3	21.0	21.3	21.2	21.2	0	23	
		15	0	20.5	20.5	19.9	3	21.0	21.2	21.1	21.2	0	23	
1.4 MHz		QPSK	1	0	23.4	23.2	22.6	0	24.0	21.1	21.1	21.5	0	23
			1	3	23.4	23.2	22.7	0	24.0	21.2	21.2	21.6	0	23
			1	5	23.3	23.2	22.6	0	24.0	21.1	21.0	21.4	0	23
			3	0	23.3	23.3	22.6	0	24.0	21.1	21.1	21.5	0	23
	3		3	23.3	23.3	22.7	0	24.0	21.1	21.1	21.5	0	23	
	3		6	22.4	22.3	21.7	1	23.0	21.1	21.1	21.6	0	23	
	6		0	22.5	22.7	21.8	1	23.0	21.5	21.4	21.3	0	23	
	16QAM	1	3	22.6	22.8	21.8	1	23.0	21.6	21.6	21.5	0	23	
		1	5	22.5	22.6	21.7	1	23.0	21.5	21.4	21.5	0	23	
		3	0	22.4	22.5	21.9	1	23.0	21.3	21.3	21.3	0	23	
		3	1	22.4	22.6	22.0	1	23.0	21.3	21.3	21.3	0	23	
		3	3	22.4	22.6	21.9	1	23.0	21.3	21.3	21.3	0	23	
		6	0	21.5	21.2	20.8	2	22.0	21.3	21.3	21.4	0	23	
		6	3	21.5	21.2	20.8	2	22.0	21.3	21.3	21.4	0	23	
	64QAM	1	0	21.6	21.5	21.1	2	22.0	21.6	21.6	21.4	0	23	
		1	3	21.9	21.6	21.2	2	22.0	21.6	21.6	21.4	0	23	
		1	5	21.8	21.4	21.1	2	22.0	21.5	21.4	21.5	0	23	
		3	0	21.8	21.6	20.8	2	22.0	21.5	21.5	21.5	0	23	
		3	1	21.8	21.6	20.8	2	22.0	21.5	21.5	21.5	0	23	
		3	3	21.8	21.6	20.8	2	22.0	21.5	21.5	21.5	0	23	
		6	0	20.4	20.6	19.9	3	21.0	21.7	21.5	21.4	0	23	

**LTE Band 5 Measured Results**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				20525			MPR	Tune-up Limit
				836.5 MHz				
10 MHz	QPSK	1	0		23.9		0	25.5
		1	25		23.9		0	25.5
		1	49		23.7		0	25.5
		25	0		23.2		1	24.5
		25	12		23.1		1	24.5
		25	25		23.0		1	24.5
	16QAM	50	0		23.0		1	24.5
		1	0		23.1		1	24.5
		1	25		23.1		1	24.5
		1	49		22.9		1	24.5
		25	0		22.2		2	23.5
		25	12		22.2		2	23.5
	64QAM	25	25		22.0		2	23.5
		50	0		21.9		2	23.5
		1	0		22.5		2	23.5
		1	25		22.4		2	23.5
		1	49		22.2		2	23.5
		25	0		21.2		3	22.5
5 MHz	QPSK	25	12		21.2		3	22.5
		25	25		21.0		3	22.5
		50	0		21.0		3	22.5
		1	0	24.0	24.0	23.8	0	25.5
		1	12	24.1	24.0	23.7	0	25.5
		1	24	24.1	23.8	23.6	0	25.5
	16QAM	12	0	23.2	23.1	22.7	1	24.5
		12	7	23.3	23.1	22.7	1	24.5
		12	13	23.2	23.0	22.6	1	24.5
		25	0	23.2	23.1	22.6	1	24.5
		1	0	23.2	23.2	23.2	1	24.5
		1	12	23.2	23.1	23.1	1	24.5
	64QAM	1	24	23.3	23.0	23.1	1	24.5
		12	0	22.3	22.2	21.8	2	23.5
		12	7	22.3	22.2	21.9	2	23.5
		12	13	22.3	22.1	21.8	2	23.5
		25	0	22.1	22.1	21.7	2	23.5
		1	0	22.3	22.0	21.9	2	23.5
64QAM	1	12	22.3	22.0	21.8	2	23.5	
	1	24	22.3	21.8	21.8	2	23.5	
	12	0	21.3	21.2	20.7	3	22.5	
	12	7	21.3	21.2	20.7	3	22.5	
	12	13	21.2	21.0	20.6	3	22.5	
	25	0	21.2	21.1	20.6	3	22.5	



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

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				20415	20525	20635	MPR	Tune-up Limit
				825.5 MHz	836.5 MHz	847.5 MHz		
3 MHz	QPSK	1	0	24.1	23.9	23.6	0	25.5
		1	8	24.0	23.8	23.5	0	25.5
		1	14	24.1	23.8	23.5	0	25.5
		8	0	23.2	23.1	22.6	1	24.5
		8	4	23.2	23.1	22.6	1	24.5
		8	7	23.2	23.1	22.6	1	24.5
		15	0	23.2	23.1	22.6	1	24.5
	16QAM	1	0	23.1	22.9	23.0	1	24.5
		1	8	23.0	22.8	22.9	1	24.5
		1	14	23.1	22.7	22.9	1	24.5
		8	0	22.2	22.2	21.7	2	23.5
		8	4	22.3	22.2	21.7	2	23.5
		8	7	22.3	22.2	21.7	2	23.5
		15	0	22.1	22.1	21.7	2	23.5
	64QAM	1	0	22.3	22.4	21.8	2	23.5
		1	8	22.2	22.3	21.7	2	23.5
		1	14	22.3	22.2	21.7	2	23.5
		8	0	21.2	21.2	20.7	3	22.5
		8	4	21.2	21.2	20.8	3	22.5
		8	7	21.2	21.2	20.7	3	22.5
		15	0	21.3	21.1	20.7	3	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				20407	20525	20643	MPR	Tune-up Limit
				824.7 MHz	836.5 MHz	848.3 MHz		
1.4 MHz	QPSK	1	0	24.1	24.0	23.6	0	25.5
		1	3	24.1	24.0	23.6	0	25.5
		1	5	24.1	23.9	23.5	0	25.5
		3	0	24.1	23.9	23.5	0	25.5
		3	1	24.1	23.9	23.5	0	25.5
		3	3	24.1	23.9	23.5	0	25.5
		6	0	23.1	23.0	22.5	1	24.5
	16QAM	1	0	23.1	23.2	22.9	1	24.5
		1	3	23.2	23.2	23.0	1	24.5
		1	5	23.1	23.1	22.8	1	24.5
		3	0	23.3	23.0	22.7	1	24.5
		3	1	23.4	23.0	22.8	1	24.5
		3	3	23.4	23.0	22.8	1	24.5
		6	0	22.3	22.2	21.5	2	23.5
	64QAM	1	0	22.3	22.1	21.9	2	23.5
		1	3	22.3	22.2	22.0	2	23.5
		1	5	22.2	22.1	21.9	2	23.5
		3	0	22.3	21.9	21.9	2	23.5
		3	1	22.3	21.9	21.9	2	23.5
		3	3	22.3	22.0	21.9	2	23.5
		6	0	21.4	21.1	20.5	3	22.5

**LTE Band 12 Measured Results**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				23095			MPR	Tune-up Limit
				707.5 MHz				
10 MHz	QPSK	1	0		23.8		0	25.5
		1	25		23.9		0	25.5
		1	49		24.0		0	25.5
		25	0		23.1		1	24.5
		25	12		23.2		1	24.5
		25	25		23.2		1	24.5
	16QAM	50	0		23.1		1	24.5
		1	0		23.2		1	24.5
		1	25		23.4		1	24.5
		1	49		23.2		1	24.5
		25	0		22.2		2	23.5
		25	12		22.3		2	23.5
	64QAM	25	25		22.2		2	23.5
		50	0		22.1		2	23.5
		1	0		22.4		2	23.5
		1	25		22.7		2	23.5
		1	49		22.5		2	23.5
		25	0		21.2		3	22.5
5 MHz	QPSK	25	12		21.3		3	22.5
		25	25		21.3		3	22.5
		50	0		21.2		3	22.5
		1	0	24.1	24.1	24.2	0	25.5
		1	12	24.2	24.3	24.1	0	25.5
		1	24	24.3	24.1	23.9	0	25.5
	16QAM	12	0	23.1	23.2	23.1	1	24.5
		12	7	23.2	23.3	23.1	1	24.5
		12	13	23.2	23.3	23.0	1	24.5
		25	0	23.2	23.2	23.1	1	24.5
		1	0	23.6	23.3	23.3	1	24.5
		1	12	23.6	23.2	23.2	1	24.5
	64QAM	1	24	23.7	23.3	23.1	1	24.5
		12	0	22.3	22.2	22.3	2	23.5
		12	7	22.4	22.3	22.2	2	23.5
		12	13	22.3	22.3	22.1	2	23.5
		25	0	22.3	22.2	22.1	2	23.5
		1	0	22.5	22.2	22.5	2	23.5
64QAM	1	12	22.4	22.2	22.4	2	23.5	
	1	24	22.5	22.2	22.1	2	23.5	
	12	0	21.3	21.2	21.2	3	22.5	
	12	7	21.4	21.4	21.2	3	22.5	
	12	13	21.3	21.4	21.1	3	22.5	
	25	0	21.3	21.2	21.1	3	22.5	

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

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				23025	23095	23165	MPR	Tune-up Limit
				700.5 MHz	707.5 MHz	714.5 MHz		
3 MHz	QPSK	1	0	24.1	24.0	24.1	0	25.5
		1	8	24.1	24.0	24.0	0	25.5
		1	14	24.1	24.1	23.9	0	25.5
		8	0	23.2	23.2	23.1	1	24.5
		8	4	23.2	23.3	23.1	1	24.5
		8	7	23.2	23.3	23.1	1	24.5
		15	0	23.2	23.3	23.1	1	24.5
	16QAM	1	0	23.2	22.9	23.5	1	24.5
		1	8	23.1	22.9	23.3	1	24.5
		1	14	23.2	23.0	23.2	1	24.5
		8	0	22.2	22.2	22.2	2	23.5
		8	4	22.3	22.3	22.1	2	23.5
		8	7	22.3	22.3	22.1	2	23.5
		15	0	22.2	22.3	22.1	2	23.5
	64QAM	1	0	22.5	22.4	22.3	2	23.5
		1	8	22.5	22.4	22.1	2	23.5
		1	14	22.4	22.5	22.1	2	23.5
		8	0	21.2	21.3	21.2	3	22.5
		8	4	21.3	21.4	21.2	3	22.5
		8	7	21.3	21.4	21.1	3	22.5
		15	0	21.3	21.3	21.1	3	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				23017	23095	23173	MPR	Tune-up Limit
				699.7 MHz	707.5 MHz	715.3 MHz		
1.4 MHz	QPSK	1	0	24.0	24.2	24.0	0	25.5
		1	3	24.1	24.2	24.1	0	25.5
		1	5	24.1	24.3	23.9	0	25.5
		3	0	24.1	24.3	23.9	0	25.5
		3	1	24.1	24.2	23.9	0	25.5
		3	3	24.1	24.2	23.9	0	25.5
		6	0	23.1	23.2	22.9	1	24.5
	16QAM	1	0	23.1	23.5	23.2	1	24.5
		1	3	23.2	23.5	23.4	1	24.5
		1	5	23.2	23.6	23.1	1	24.5
		3	0	23.4	23.3	23.2	1	24.5
		3	1	23.4	23.3	23.2	1	24.5
		3	3	23.4	23.4	23.2	1	24.5
		6	0	22.3	22.4	21.8	2	23.5
	64QAM	1	0	22.3	22.4	22.1	2	23.5
		1	3	22.4	22.6	22.2	2	23.5
		1	5	22.4	22.5	22.0	2	23.5
		3	0	22.1	22.6	22.1	2	23.5
		3	1	22.1	22.6	22.2	2	23.5
		3	3	22.1	22.6	22.2	2	23.5
		6	0	21.3	21.2	21.2	3	22.5

**LTE Band 26 Measured Results**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				26865			MPR	Tune-up Limit
				831.5 MHz				
15 MHz	QPSK	1	0		23.9		0	25.0
		1	37		24.0		0	25.0
		1	74		23.8		0	25.0
		36	0		22.8		1	24.0
		36	20		22.9		1	24.0
		36	39		22.9		1	24.0
		75	0		22.8		1	24.0
	16QAM	1	0		23.2		1	24.0
		1	37		23.2		1	24.0
		1	74		23.0		1	24.0
		36	0		21.9		2	23.0
		36	20		21.9		2	23.0
		36	39		21.9		2	23.0
		75	0		21.8		2	23.0
	64QAM	1	0		22.1		2	23.0
		1	37		22.1		2	23.0
		1	74		22.0		2	23.0
		36	0		20.9		3	22.0
		36	20		21.0		3	22.0
		36	39		21.0		3	22.0
		75	0		20.9		3	22.0
BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				26740	26865	26990		
				819 MHz	831.5 MHz	844 MHz		
10 MHz	QPSK	1	0	24.2	23.9	23.8	0	25.0
		1	25	24.1	24.0	23.6	0	25.0
		1	49	24.1	23.9	23.6	0	25.0
		25	0	23.1	23.0	22.6	1	24.0
		25	12	23.2	23.2	22.7	1	24.0
		25	25	23.1	23.1	22.6	1	24.0
		50	0	23.1	23.1	22.7	1	24.0
	16QAM	1	0	23.3	23.2	23.4	1	24.0
		1	25	23.2	23.3	23.1	1	24.0
		1	49	23.1	23.1	23.1	1	24.0
		25	0	22.2	22.1	21.6	2	23.0
		25	12	22.3	22.3	21.7	2	23.0
		25	25	22.2	22.2	21.7	2	23.0
		50	0	22.2	22.1	21.7	2	23.0
	64QAM	1	0	22.5	22.5	22.2	2	23.0
		1	25	22.6	22.6	22.0	2	23.0
		1	49	22.6	22.4	21.9	2	23.0
		25	0	21.2	21.1	20.7	3	22.0
		25	12	21.3	21.2	20.8	3	22.0
		25	25	21.2	21.2	20.7	3	22.0
		50	0	21.1	21.1	20.7	3	22.0

**LTE Band 26 Measured Results (continued)**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				26715	26865	27015	MPR	Tune-up Limit
				816.5 MHz	831.5 MHz	846.5 MHz		
5 MHz	QPSK	1	0	24.1	24.1	23.8	0	25.0
		1	12	24.2	24.2	23.7	0	25.0
		1	24	24.1	24.1	23.7	0	25.0
		12	0	23.2	23.1	22.6	1	24.0
		12	7	23.3	23.2	22.7	1	24.0
		12	13	23.3	23.2	22.7	1	24.0
		25	0	23.2	23.2	22.6	1	24.0
	16QAM	1	0	23.3	23.3	23.2	1	24.0
		1	12	23.3	23.3	23.1	1	24.0
		1	24	23.3	23.3	23.2	1	24.0
		12	0	22.3	22.2	21.8	2	23.0
		12	7	22.4	22.3	21.9	2	23.0
		12	13	22.3	22.3	21.8	2	23.0
		25	0	22.2	22.2	21.7	2	23.0
	64QAM	1	0	22.3	22.1	21.9	2	23.0
		1	12	22.4	22.2	21.8	2	23.0
		1	24	22.4	22.1	21.9	2	23.0
		12	0	21.3	21.2	20.6	3	22.0
		12	7	21.3	21.2	20.7	3	22.0
		12	13	21.3	21.2	20.7	3	22.0
		25	0	21.2	21.1	20.6	3	22.0
BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				26705	26865	27025	MPR	Tune-up Limit
				815.5 MHz	831.5 MHz	847.5 MHz		
3 MHz	QPSK	1	0	24.1	24.1	23.6	0	25.0
		1	8	24.1	24.0	23.5	0	25.0
		1	14	24.1	24.0	23.6	0	25.0
		8	0	23.2	23.2	22.6	1	24.0
		8	4	23.2	23.2	22.7	1	24.0
		8	7	23.2	23.2	22.7	1	24.0
		15	0	23.2	23.2	22.7	1	24.0
	16QAM	1	0	23.2	22.9	23.0	1	24.0
		1	8	23.1	23.0	22.9	1	24.0
		1	14	23.2	23.0	23.0	1	24.0
		8	0	22.3	22.3	21.7	2	23.0
		8	4	22.3	22.3	21.7	2	23.0
		8	7	22.3	22.3	21.8	2	23.0
		15	0	22.2	22.2	21.7	2	23.0
	64QAM	1	0	22.4	22.3	21.8	2	23.0
		1	8	22.3	22.4	21.7	2	23.0
		1	14	22.4	22.4	21.8	2	23.0
		8	0	21.2	21.2	20.7	3	22.0
		8	4	21.3	21.2	20.7	3	22.0
		8	7	21.3	21.2	20.8	3	22.0
		15	0	21.3	21.2	20.7	3	22.0

**LTE Band 26 Measured Results (continued)**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				26697	26865	27033	MPR	Tune-up Limit
				814.7 MHz	831.5 MHz	848.3 MHz		
1.4 MHz	QPSK	1	0	24.2	24.1	23.5	0	25.0
		1	3	24.3	24.3	23.6	0	25.0
		1	5	24.2	24.1	23.5	0	25.0
		3	0	24.2	24.1	23.5	0	25.0
		3	1	24.2	24.1	23.5	0	25.0
		3	3	24.2	24.1	23.6	0	25.0
		6	0	23.2	23.1	22.6	1	24.0
	16QAM	1	0	23.4	23.4	22.6	1	24.0
		1	3	23.5	23.6	22.6	1	24.0
		1	5	23.4	23.4	22.6	1	24.0
		3	0	23.3	23.3	22.8	1	24.0
		3	1	23.3	23.3	22.8	1	24.0
		3	3	23.3	23.3	22.8	1	24.0
		6	0	22.4	22.0	21.7	2	23.0
	64QAM	1	0	22.3	22.4	21.7	2	23.0
		1	3	22.4	22.5	21.8	2	23.0
		1	5	22.4	22.4	21.6	2	23.0
		3	0	22.1	22.4	21.7	2	23.0
		3	1	22.1	22.5	21.7	2	23.0
		3	3	22.1	22.5	21.8	2	23.0
		6	0	21.3	21.1	20.8	3	22.0

**LTE Band 41 Measured Results (Suwon Lab)**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					MPR	Tune-up Limit
				39750	40185	40620	41055	41490		
				2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz		
20 MHz	QPSK	1	0	23.6	23.6	23.8	24.5	23.6	0	25.0
		1	49	23.6	23.5	24.3	24.6	23.9	0	25.0
		1	99	23.5	23.5	24.2	24.0	23.7	0	25.0
		50	0	22.6	22.5	23.1	23.7	22.8	1	24.0
		50	24	22.7	22.5	23.4	23.7	23.0	1	24.0
		50	50	22.6	22.5	23.4	23.4	22.8	1	24.0
	100	0	22.6	22.4	23.3	23.6	22.9	1	24.0	
	16QAM	1	0	22.6	22.7	22.9	23.6	22.5	1	24.0
		1	49	22.6	22.7	23.5	23.8	22.9	1	24.0
		1	99	22.6	22.6	23.3	23.2	22.7	1	24.0
		50	0	21.6	21.5	22.2	22.7	21.8	2	23.0
		50	24	21.6	21.5	22.4	22.7	21.9	2	23.0
		50	50	21.5	21.6	22.4	22.4	21.8	2	23.0
	64QAM	100	0	21.6	21.4	22.3	22.6	21.9	2	23.0
		1	0	22.0	21.9	22.2	22.6	22.1	2	23.0
		1	49	22.0	21.9	22.7	22.6	22.3	2	23.0
		1	99	21.9	21.9	22.6	22.4	22.1	2	23.0
		50	0	20.7	20.5	21.2	21.7	20.9	3	22.0
50		24	20.7	20.6	21.4	21.7	21.0	3	22.0	
15 MHz	QPSK	1	0	23.6	23.4	24.0	24.6	23.7	0	25.0
		1	37	23.5	23.5	24.3	24.6	23.9	0	25.0
		1	74	23.5	23.3	24.2	24.2	23.8	0	25.0
		36	0	22.6	22.4	23.2	23.7	22.9	1	24.0
		36	20	22.6	22.5	23.4	23.7	22.9	1	24.0
		36	39	22.5	22.5	23.4	23.5	22.9	1	24.0
16QAM	75	0	22.5	22.4	23.3	23.6	22.9	1	24.0	
	1	0	22.7	22.4	23.1	23.7	22.8	1	24.0	
	1	37	22.6	22.6	23.3	23.7	22.9	1	24.0	
	1	74	22.6	22.3	23.3	23.3	22.8	1	24.0	
	36	0	21.7	21.5	22.2	22.7	21.9	2	23.0	
	36	20	21.7	21.5	22.4	22.7	22.0	2	23.0	
64QAM	36	39	21.6	21.5	22.4	22.5	21.9	2	23.0	
	75	0	21.6	21.4	22.3	22.6	21.9	2	23.0	
	1	0	21.2	20.9	21.6	22.2	21.3	2	23.0	
	1	37	21.2	21.1	21.9	22.2	21.6	2	23.0	
	1	74	21.1	20.9	21.8	21.8	21.4	2	23.0	
	36	0	20.7	20.5	21.3	21.8	21.0	3	22.0	
10 MHz	QPSK	36	20	20.7	20.6	21.5	21.8	21.1	3	22.0
		36	39	20.6	20.6	21.4	21.6	20.9	3	22.0
		75	0	20.6	20.4	21.3	21.6	20.9	3	22.0
		1	0	23.8	23.4	24.1	24.6	23.8	0	25.0
		1	25	23.7	23.7	24.4	24.8	24.0	0	25.0
		1	49	23.8	23.4	24.3	24.5	23.6	0	25.0
16QAM	25	0	22.9	22.6	23.4	23.8	23.0	1	24.0	
	25	12	22.8	22.8	23.6	23.9	23.1	1	24.0	
	25	25	22.8	22.7	23.5	23.8	23.0	1	24.0	
	50	0	22.8	22.7	23.5	23.8	23.0	1	24.0	
	1	0	22.9	22.5	23.2	23.8	22.9	1	24.0	
	1	25	22.9	22.8	23.5	23.9	23.1	1	24.0	
64QAM	1	49	22.9	22.5	23.3	23.6	22.8	1	24.0	
	25	0	21.9	21.7	22.4	22.8	22.1	2	23.0	
	25	12	21.9	21.9	22.5	22.9	22.2	2	23.0	
	25	25	21.8	21.8	22.5	22.8	22.0	2	23.0	
	50	0	21.8	21.7	22.5	22.8	22.1	2	23.0	
	1	0	22.2	22.8	21.6	21.7	21.9	2	23.0	
5 MHz	QPSK	1	25	22.3	22.9	22.0	22.0	21.9	2	23.0
		1	49	22.0	22.5	21.9	21.8	21.8	2	23.0
		25	0	21.1	21.8	21.4	20.6	20.8	3	22.0
		25	12	21.1	21.8	21.6	20.7	20.8	3	22.0
		25	25	20.9	21.7	21.5	20.7	20.7	3	22.0
		50	0	21.0	21.8	21.5	20.6	20.7	3	22.0
5 MHz	16QAM	1	0	23.7	23.6	23.8	24.6	23.7	0	25.0
		1	12	23.7	23.6	24.1	24.7	23.8	0	25.0
		1	24	23.7	23.6	24.2	24.7	23.9	0	25.0
		12	0	22.8	22.8	23.5	23.8	23.2	1	24.0
		12	7	22.8	22.8	23.6	23.9	23.2	1	24.0
		12	13	22.8	22.8	23.6	23.8	23.1	1	24.0
	64QAM	25	0	22.8	22.8	23.5	23.9	23.1	1	24.0
		1	0	22.8	22.5	23.0	23.6	22.5	1	24.0
		1	12	23.1	22.6	23.2	23.7	22.7	1	24.0
		1	24	23.2	22.6	23.3	23.8	22.8	1	24.0
		12	0	21.8	21.8	22.5	22.9	22.2	2	23.0
		12	7	21.8	21.8	22.6	22.9	22.2	2	23.0
10 MHz	QPSK	12	13	21.8	21.7	22.7	22.8	22.1	2	23.0
		25	0	21.8	21.8	22.5	22.7	22.2	2	23.0
		1	0	22.3	21.9	22.1	22.6	22.3	2	23.0
		1	12	22.2	21.9	22.2	22.6	22.2	2	23.0
		1	24	22.3	21.9	22.2	22.4	22.2	2	23.0
		12	0	21.0	20.7	21.5	22.0	21.1	3	22.0
15 MHz	QPSK	12	7	21.0	20.7	21.6	22.0	21.1	3	22.0
		12	13	21.0	20.7	21.6	21.9	21.1	3	22.0
		25	0	20.8	20.7	21.6	21.8	21.1	3	22.0

**LTE Band 66 Measured Results**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Reduced Average Power (dBm)					
				132072	132322	132572	MPR	Tune-up Limit	132072	132322	132572	MPR	Tune-up Limit	
				1720 MHz	1745 MHz	1770 MHz			1720 MHz	1745 MHz	1770 MHz			
20 MHz	QPSK	1	0	23.0	23.0	23.2	0	25.0	21.5	21.5	21.5	0	23.5	
		1	49	23.1	23.3	23.2	0	25.0	21.8	21.8	21.8	0	23.5	
		1	99	23.0	23.1	23.3	0	25.0	21.7	21.7	21.6	0	23.5	
		50	0	22.0	22.1	22.2	1	24.0	21.8	21.7	21.5	0	23.5	
		50	24	22.2	22.3	22.3	1	24.0	21.7	21.8	21.6	0	23.5	
		50	50	22.1	22.3	22.3	1	24.0	21.7	21.7	21.5	0	23.5	
	16QAM	100	0	22.1	22.3	22.2	1	24.0	21.6	21.6	21.6	0	23.5	
		1	0	22.1	22.4	22.6	1	24.0	21.6	21.5	21.5	0	23.5	
		1	49	22.4	22.7	22.7	1	24.0	21.5	21.5	21.5	0	23.5	
		1	99	22.3	22.4	22.7	1	24.0	21.5	21.6	21.5	0	23.5	
		50	0	20.8	21.0	21.2	2	23.0	21.5	21.6	21.6	0	23.5	
		50	24	20.9	21.1	21.3	2	23.0	21.5	21.5	21.5	0	23.5	
	64QAM	50	50	20.8	21.1	21.3	2	23.0	21.5	21.5	21.5	0	23.5	
		100	0	20.9	21.0	21.2	2	23.0	21.5	21.5	21.6	0	23.5	
		1	0	21.3	21.0	21.6	2	23.0	21.6	21.6	21.7	0	23.5	
		1	49	21.7	21.4	21.7	2	23.0	21.6	21.9	21.7	0	23.5	
		1	99	21.5	21.3	21.8	2	23.0	21.7	21.7	21.5	0	23.5	
		50	0	19.9	20.2	20.4	3	22.0	21.6	21.6	21.5	0	23.5	
	15 MHz	QPSK	50	24	20.1	20.2	20.5	3	22.0	21.7	21.7	21.6	0	23.5
			50	50	20.0	20.2	20.5	3	22.0	21.7	21.7	21.6	0	23.5
			100	0	19.9	20.2	20.4	3	22.0	21.6	21.6	21.5	0	23.5
			1	0	22.6	22.8	23.2	0	25.0	21.5	21.6	21.6	0	23.5
			1	37	22.8	23.0	23.2	0	25.0	21.6	21.5	21.6	0	23.5
			1	74	22.7	22.9	23.3	0	25.0	21.6	21.6	21.6	0	23.5
16QAM		36	0	21.8	22.0	22.3	1	24.0	21.5	21.3	21.5	0	23.5	
		36	20	21.9	22.1	22.3	1	24.0	21.6	21.5	21.6	0	23.5	
		36	39	21.8	22.1	22.4	1	24.0	21.6	21.5	21.7	0	23.5	
		75	0	21.8	22.1	22.4	1	24.0	21.5	21.6	21.5	0	23.5	
		1	0	22.0	22.2	22.3	1	24.0	21.5	21.6	21.6	0	23.5	
		1	37	22.2	22.4	22.3	1	24.0	21.5	21.6	21.5	0	23.5	
64QAM		1	74	22.1	22.3	22.3	1	24.0	21.2	21.5	21.5	0	23.5	
		36	0	20.8	21.1	21.3	2	23.0	21.5	21.6	21.7	0	23.5	
		36	20	20.9	21.1	21.3	2	23.0	21.6	21.6	21.3	0	23.5	
		36	39	20.9	21.1	21.4	2	23.0	21.7	21.7	21.6	0	23.5	
		75	0	20.8	21.0	21.4	2	23.0	21.6	21.6	21.5	0	23.5	
		1	0	20.9	21.6	21.8	2	23.0	21.5	21.5	21.6	0	23.5	
QPSK		1	37	21.1	21.8	21.8	2	23.0	21.7	21.7	21.5	0	23.5	
		1	74	21.0	21.7	21.8	2	23.0	21.7	21.8	21.5	0	23.5	
		36	0	20.0	20.2	20.5	3	22.0	21.5	21.5	21.6	0	23.5	
		36	20	20.1	20.2	20.5	3	22.0	21.4	21.5	21.6	0	23.5	
		36	39	20.1	20.3	20.6	3	22.0	21.5	21.6	21.7	0	23.5	
		75	0	20.0	20.2	20.5	3	22.0	21.4	21.5	21.8	0	23.5	
10 MHz	QPSK	1	0	22.9	22.8	23.3	0	25.0	21.6	21.5	21.6	0	23.5	
		1	25	23.2	23.2	23.6	0	25.0	21.5	21.7	21.6	0	23.5	
		1	49	23.1	23.0	23.4	0	25.0	21.6	21.5	21.6	0	23.5	
		25	0	22.2	22.2	22.5	1	24.0	21.5	21.7	21.5	0	23.5	
		25	12	22.3	22.3	22.6	1	24.0	21.7	21.7	21.7	0	23.5	
		25	25	22.3	22.3	22.6	1	24.0	21.6	21.8	21.8	0	23.5	
	16QAM	50	0	22.2	22.2	22.6	1	24.0	21.6	21.7	21.6	0	23.5	
		1	0	22.1	22.1	22.7	1	24.0	21.7	21.6	21.5	0	23.5	
		1	25	22.4	22.4	23.0	1	24.0	21.6	21.7	21.7	0	23.5	
		1	49	22.1	22.1	22.8	1	24.0	21.8	21.7	21.7	0	23.5	
		25	0	21.3	21.3	21.5	2	23.0	21.6	21.6	21.6	0	23.5	
		25	12	21.4	21.4	21.7	2	23.0	21.6	21.8	21.6	0	23.5	
	64QAM	25	25	21.4	21.3	21.6	2	23.0	21.6	21.9	21.6	0	23.5	
		50	0	21.2	21.3	21.6	2	23.0	21.5	21.7	21.5	0	23.5	
		1	0	20.9	21.4	21.7	2	23.0	21.5	21.6	21.5	0	23.5	
		1	25	21.2	21.7	22.0	2	23.0	21.7	21.5	21.5	0	23.5	
		1	49	21.0	21.4	21.8	2	23.0	21.5	21.5	21.6	0	23.5	
		25	0	20.1	20.4	20.6	3	22.0	21.5	21.5	21.5	0	23.5	
	QPSK	25	12	20.2	20.5	20.8	3	22.0	21.7	21.6	21.7	0	23.5	
		25	25	20.2	20.4	20.7	3	22.0	21.5	21.7	21.7	0	23.5	
		50	0	20.1	20.3	20.6	3	22.0	21.5	21.7	21.6	0	23.5	



**LTE Band 66 Measured Results (continued)**

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Reduced Average Power (dBm)					
				131997	132322	132647	MPR	Tune-up Limit	131997	132322	132647	MPR	Tune-up Limit	
				1712.5 MHz	1745 MHz	1777.5 MHz			1712.5 MHz	1745 MHz	1777.5 MHz			
5 MHz	QPSK	1	0	22.9	23.3	23.5	0	25.0	21.5	21.5	21.6	0	23.5	
		1	12	22.9	23.3	23.6	0	25.0	21.5	21.6	21.6	0	23.5	
		1	24	22.9	23.3	23.5	0	25.0	21.6	21.5	21.6	0	23.5	
		12	0	22.0	22.3	22.6	1	24.0	21.7	21.6	21.5	0	23.5	
		12	7	22.1	22.3	22.6	1	24.0	21.5	21.6	21.6	0	23.5	
		12	13	22.0	22.4	22.6	1	24.0	21.5	21.7	21.6	0	23.5	
		25	0	22.1	22.3	22.6	1	24.0	21.7	21.6	21.6	0	23.5	
	16QAM	1	0	22.1	22.4	23.1	1	24.0	21.6	21.7	21.7	0	23.5	
		1	12	22.2	22.5	23.2	1	24.0	21.7	21.7	21.7	0	23.5	
		1	24	22.1	22.4	23.1	1	24.0	21.7	21.6	21.7	0	23.5	
		12	0	21.1	21.4	21.7	2	23.0	21.6	21.5	21.5	0	23.5	
		12	7	21.1	21.4	21.8	2	23.0	21.6	21.6	21.6	0	23.5	
		12	13	21.1	21.4	21.8	2	23.0	21.6	21.7	21.6	0	23.5	
		25	0	21.0	21.3	21.6	2	23.0	21.5	21.5	21.5	0	23.5	
	64QAM	1	0	21.2	21.2	22.0	2	23.0	21.7	21.5	21.4	0	23.5	
		1	12	21.3	21.3	21.9	2	23.0	21.7	21.6	21.4	0	23.5	
		1	24	21.2	21.2	22.0	2	23.0	21.9	21.7	21.5	0	23.5	
		12	0	20.1	20.4	20.6	3	22.0	21.8	21.6	21.5	0	23.5	
		12	7	20.1	20.4	20.6	3	22.0	21.8	21.5	21.5	0	23.5	
		12	13	20.1	20.4	20.6	3	22.0	21.8	21.6	21.5	0	23.5	
		25	0	20.1	20.3	20.5	3	22.0	21.7	21.6	21.5	0	23.5	
	3 MHz	QPSK	1	0	23.0	23.2	23.5	0	25.0	21.6	21.5	21.4	0	23.5
			1	8	22.9	23.2	23.5	0	25.0	21.5	21.6	21.5	0	23.5
			1	14	22.9	23.2	23.5	0	25.0	21.5	21.6	21.6	0	23.5
			8	0	22.0	22.3	22.6	1	24.0	21.4	21.4	21.4	0	23.5
8			4	22.1	22.3	22.7	1	24.0	21.5	21.5	21.5	0	23.5	
8			7	22.1	22.4	22.7	1	24.0	21.5	21.5	21.5	0	23.5	
15			0	22.0	22.3	22.6	1	24.0	21.5	21.5	21.5	0	23.5	
16QAM		1	0	22.4	22.4	22.6	1	24.0	21.7	21.5	21.5	0	23.5	
		1	8	22.4	22.3	22.6	1	24.0	21.8	21.7	21.6	0	23.5	
		1	14	22.4	22.3	22.5	1	24.0	21.8	21.7	21.7	0	23.5	
		8	0	21.1	21.4	21.7	2	23.0	21.6	21.7	21.7	0	23.5	
		8	4	21.2	21.4	21.8	2	23.0	21.7	21.8	21.8	0	23.5	
		8	7	21.2	21.5	21.8	2	23.0	21.7	21.7	21.7	0	23.5	
		15	0	21.1	21.3	21.7	2	23.0	21.6	21.8	21.8	0	23.5	
64QAM		1	0	21.3	21.7	21.7	2	23.0	21.4	21.5	21.5	0	23.5	
		1	8	21.2	21.7	21.7	2	23.0	21.6	21.6	21.6	0	23.5	
		1	14	21.3	21.7	21.7	2	23.0	21.6	21.6	21.6	0	23.5	
		8	0	20.0	20.4	20.7	3	22.0	21.3	21.3	21.3	0	23.5	
		8	4	20.0	20.4	20.8	3	22.0	21.4	21.4	21.4	0	23.5	
		8	7	20.0	20.5	20.7	3	22.0	21.4	21.4	21.4	0	23.5	
		15	0	20.1	20.3	20.7	3	22.0	21.4	21.4	21.4	0	23.5	
1.4 MHz		QPSK	1	0	22.8	23.2	23.5	0	25.0	21.5	21.7	21.5	0	23.5
			1	3	22.9	23.3	23.6	0	25.0	21.5	21.7	21.6	0	23.5
			1	5	22.8	23.2	23.5	0	25.0	21.5	21.7	21.6	0	23.5
			3	0	22.8	23.2	23.5	0	25.0	21.7	21.6	21.5	0	23.5
	3		1	22.8	23.2	23.5	0	25.0	21.7	21.6	21.5	0	23.5	
	3		3	22.9	23.2	23.5	0	25.0	21.7	21.6	21.5	0	23.5	
	6		0	21.9	22.2	22.5	1	24.0	21.6	21.6	21.6	0	23.5	
	16QAM	1	0	21.8	22.4	23.0	1	24.0	21.6	21.6	21.7	0	23.5	
		1	3	21.9	22.5	23.1	1	24.0	21.5	21.7	21.5	0	23.5	
		1	5	21.9	22.4	22.9	1	24.0	21.4	21.7	21.5	0	23.5	
		3	0	22.1	22.2	22.8	1	24.0	21.5	21.5	21.5	0	23.5	
		3	1	22.1	22.3	22.8	1	24.0	21.5	21.5	21.5	0	23.5	
		3	3	22.1	22.3	22.8	1	24.0	21.6	21.5	21.4	0	23.5	
		6	0	21.1	21.5	21.5	2	23.0	21.6	21.5	21.5	0	23.5	
	64QAM	1	0	20.9	21.6	22.1	2	23.0	21.5	21.5	21.6	0	23.5	
		1	3	21.1	21.7	22.2	2	23.0	21.6	21.6	21.6	0	23.5	
		1	5	21.0	21.7	22.0	2	23.0	21.6	21.5	21.7	0	23.5	
		3	0	21.1	21.2	22.0	2	23.0	21.5	21.5	21.5	0	23.5	
		3	1	21.1	21.3	22.0	2	23.0	21.5	21.5	21.5	0	23.5	
		3	3	21.1	21.3	22.0	2	23.0	21.5	21.5	21.6	0	23.5	
		6	0	20.3	20.4	20.6	3	22.0	21.5	21.4	21.5	0	23.5	

### 9.4. LTE Down-Link Carrier Aggregation

The tables below show the supported frequency bands of the device for DL Inter-band and DL Intra-band combinations.

Power measurements were performed on the channel with the highest maximum output power from Tune-up Procedure.

When carrier aggregation is limited to downlink only, uplink maximum output power (single carrier) is measured for the supported combinations of downlink carrier aggregation listed in the table below. In applying the power measurement procedures of KDB 941225 D05A and April 2018 TCB workshop for DL CA to qualify for UL SAR test exclusion, power measurement is required only for the subset in each row with the largest combination of frequency bands and CCs (far right most configuration highlighted in the table below).

Index	2CC	Completely Covered by Measurement Superset	Index	3CC	Completely Covered by Measurement Superset	Index	4CC	Completely Covered by Measurement Superset
2CC # 1	CA_2C	No	3CC # 1	CA_41D	No	4CC # 1	CA_41E	No
2CC # 2	CA_41C	4CC # 3	3CC # 2	CA_41A-41C	4CC # 2	4CC # 2	CA_41A-41D	No
2CC # 3	CA_66B	No	3CC # 3	CA_4A-4A-12A	No	4CC # 3	CA_41C-41C	No
2CC # 4	CA_66C	No	3CC # 4	CA_5A-66A-66A	No			
2CC # 5	CA_2A-2A	No	3CC # 5	CA_12A-66A-66A	No			
2CC # 6	CA_4A-4A	3CC # 3	3CC # 6	CA_26A-41C	No			
2CC # 7	CA_41A-41A	4CC # 2	3CC # 7	CA_2A-4A-5A	No			
2CC # 8	CA_66A-66A	No	3CC # 8	CA_12A-4A-4A	No			
2CC # 9	CA_2A-4A	3CC # 7	3CC # 9	CA_66A-66A-5A	No			
2CC # 10	CA_2A-5A	3CC # 7	3CC # 10	CA_66A-66A-12A	No			
2CC # 11	CA_2A-12A	No						
2CC # 12	CA_2A-17A	No						
2CC # 13	CA_2A-66A	No						
2CC # 14	CA_4A-2A	No						
2CC # 15	CA_4A-5A	No						
2CC # 16	CA_4A-12A	3CC # 3						
2CC # 17	CA_4A-17A	No						
2CC # 18	CA_5A-2A	No						
2CC # 19	CA_5A-4A	No						
2CC # 20	CA_5A-41A	No						
2CC # 21	CA_5A-66A	3CC # 4						
2CC # 22	CA_12A-2A	No						
2CC # 23	CA_12A-4A	3CC # 8						
2CC # 24	CA_12A-66A	3CC # 5						
2CC # 25	CA_17A-2A	No						
2CC # 26	CA_17A-4A	No						
2CC # 27	CA_26A-41A	3CC # 6						
2CC # 28	CA_66A-2A	No						
2CC # 29	CA_66A-5A	3CC # 9						
2CC # 30	CA_66A-12A	3CC # 10						

In applying the power measurement procedures of KDB 941225 D05A for DL CA to qualify for UL SAR test exclusion, power measurement is required only for the CA configuration with the largest aggregated DL CA BW in each frequency band, independently for contiguous and non-contiguous CA; however, if the same frequency band is used for both contiguous and non-contiguous CA, power measurement was performed using the configuration with the largest aggregated BW and maximum output power among contiguous and non-contiguous CA.

### 2CC DL CA Measured Results

E-UTRA CA configuration	CC1 (UL)					CC2 (DL)			Aggregated BW	CA Inactive (dBm)	CA Active (dBm)	Delta	2CC #
	Mode	BW (MHz)	Channel	Freq (MHz)	RB, Offset	BW (MHz)	Channel	Freq (MHz)					
CA_2C	QPSK	20	18801	1870.1	1,0	20	999	1969.9	40	22.92	22.95	0.03	1
CA_66B	QPSK	10	132022	1715	1,0	10	66585	2124.9	20	23.06	23.08	0.02	3
CA_66C	QPSK	20	132072	1720	1,0	20	66734	2139.8	40	22.84	22.81	-0.03	4
CA_2A-2A	QPSK	20	18700	1860	1,0	20	1100	1980	40	23.03	23.04	0.01	5
CA_66A-66A	QPSK	20	132322	1745	1,0	20	67236	2190	40	23.11	23.11	0.00	8
CA_2A-12A	QPSK	20	18900	1880	1,0	10	5095	737.5	30	22.99	23.04	0.05	11
CA_2A-17A	QPSK	10	18900	1880	1,0	10	5790	740	20	22.76	22.86	0.10	12
CA_2A-66A	QPSK	20	18900	1880	1,0	20	67236	2190	40	23.02	23.07	0.05	13
CA_4A-2A	QPSK	20	20175	1732.5	1,0	20	900	1960	40	22.00	21.99	-0.01	14
CA_4A-5A	QPSK	20	20175	1732.5	1,0	10	2525	881.5	30	22.08	22.15	0.07	15
CA_4A-17A	QPSK	10	20175	1732.5	1,0	10	5790	740	20	22.26	22.31	0.05	16
CA_5A-2A	QPSK	10	20525	836.5	1,0	20	900	1960	30	23.60	23.70	0.10	18
CA_5A-4A	QPSK	10	20525	836.5	1,0	20	2175	2132.5	30	23.60	23.65	0.05	19
CA_5A-41A	QPSK	10	20525	836.5	1,0	20	40620	2593	30	23.81	23.94	0.13	20
CA_12A-2A	QPSK	10	23095	707.5	1,0	20	900	1960	30	24.21	24.21	0.00	22
CA_17A-2A	QPSK	10	23790	710	1,0	10	900	1960	20	24.30	24.18	-0.12	25
CA_17A-4A	QPSK	10	23790	710	1,0	10	2175	2132.5	20	24.30	24.20	-0.10	26
CA_66A-2A	QPSK	20	132322	1745	1,0	20	900	1960	40	23.60	23.55	-0.05	28

### 3CC DL CA Measured Results

E-UTRA CA configuration	CC1 (UL)					CC2 (DL)			CC3 (DL)			Aggregated BW	CA Inactive (dBm)	CA Active (dBm)	Delta	3CC #
	Mode	BW (MHz)	Channel	Freq (MHz)	RB, Offset	BW (MHz)	Channel	Freq (MHz)	BW (MHz)	Channel	Freq (MHz)					
CA_41D	QPSK	20	40422	2573.2	1,0	20	40620	2593	20	40818	2612.8	60	24.60	24.57	-0.03	1
CA_4A-4A-12A	QPSK	20	20050	1720	1,0	20	2300	2145	10	5095	737.5	50	22.33	22.26	-0.07	3
CA_5A-66A-66A	QPSK	10	20450	829	1,0	20	66536	2120	20	66886	2155	50	24.03	24.02	-0.01	4
CA_12A-66A-66A	QPSK	10	23095	707.5	1,0	20	66536	2120	20	67236	2190	50	25.03	25.13	0.10	5
CA_26A-41C	QPSK	15	26865	831.5	1,0	20	40842	2615.2	20	41040	2645	55	23.83	23.80	-0.03	6
CA_2A-4A-5A	QPSK	20	18700	1860	1,0	20	2050	2120	10	2525	881.5	50	23.04	23.08	0.04	7
CA_12A-4A-4A	QPSK	10	23095	707.5	1,0	20	2050	2120	20	2300	2145	50	24.01	24.03	0.02	8
CA_66A-66A-5A	QPSK	20	132322	1745	1,0	20	67236	2190	10	2525	881.5	50	22.16	22.02	-0.14	9
CA_66A-66A-12A	QPSK	20	132322	1745	1,0	20	67236	2190	10	5095	737.5	50	22.16	22.01	-0.15	10

### 4CC DL CA Measured Results (Suwon Lab)

E-UTRA CA configuration	CC1 (UL)					CC2 (DL)			CC3 (DL)			CC4 (DL)			Aggregated BW	CA Inactive (dBm)	CA Active (dBm)	Delta	4CC #
	Mode	BW (MHz)	Channel	Freq (MHz)	RB, Offset	BW (MHz)	Channel	Freq (MHz)	BW (MHz)	Channel	Freq (MHz)	BW (MHz)	Channel	Freq (MHz)					
CA_41E	QPSK	20	40890	2620	1,0	20	41090	2640	20	41290	2660	20	41490	2680	80	24.60	24.59	-0.01	1
CA_41A-41D	QPSK	20	39750	2506	1,0	20	41094	2640.4	20	41292	2660.2	20	41490	2680	80	24.60	24.55	-0.05	2
CA_41C-41C	QPSK	20	39750	2506	1,0	20	39948	2525.8	20	41292	2660.2	20	41490	2680	80	24.60	24.56	-0.04	3

### 9.5. 5G NR (FR1)

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS 138.521-1 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 TS138.521-1.

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

Modulation		MPR (dB)		
		Edge RB Allocations	Outer RB Allocations	Inner RB Allocations
DFT-s-OFDM	π/2 BPSK	≤ 3.5 <sup>1</sup>	≤ 1.2 <sup>1</sup>	≤ 0.2 <sup>1</sup>
		≤ 0.5 <sup>2</sup>	≤ 0.5 <sup>2</sup>	≤ 0 <sup>2</sup>
	π/2 BPSK with π/2 BPSK DMRS	≤ 0.5 <sup>2</sup>	≤ 0 <sup>2</sup>	≤ 0 <sup>2</sup>
	QPSK	≤ 1		≤ 0
	16 QAM	≤ 2		≤ 1
	64 QAM		≤ 2.5	
CP-OFDM	256 QAM		≤ 4.5	
	QPSK	≤ 3		≤ 1.5
	16 QAM	≤ 3		≤ 2
	64 QAM		≤ 3.5	
	256 QAM		≤ 6.5	

NOTE 1: Applicable for UE operating in TDD mode with π/2 BPSK modulation and UE indicates support for UE capability powerBoosting π/2 BPSK and if the IE powerBoost π/2 BPSK is set to 1 and 40 % or less slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79. The reference power of 0 dB MPR is 26 dBm.

NOTE 2: Applicable for UE operating in FDD mode, or in TDD mode in bands other than n40, n41, n77, n78 and n79 with π/2 BPSK modulation and if the IE powerBoost π/2 BPSK is set to 0 and if more than 40 % of slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79.

The allowed A-MPR values specified below in Table 6.2.3.3.1-1 of 3GPP TS138.521-1 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of “NS\_01”

**Table 6.2.3.3.1-1: Additional maximum power reduction (A-MPR)**

Network Signalling label	Requirements (subclause)	NR Band	Channel bandwidth (MHz)	Resources Blocks (N <sub>RB</sub> )	A-MPR (dB)
NS_01		Table 5.2-1	5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100	Table 5.3.2-1	N/A

Uplink RB allocations were used to Table 6.1-1 of the 3GPP TS 138.521-1.

Channel Bandwidth	SCS(kHz)	OFDM	RB allocation							
			Edge_Full_Left	Edge_Full_Right	Edge_1RB_Left	Edge_1RB_Right	Outer_Full	Inner_Full	Inner_1RB_Left	Inner_1RB_Right
5MHz	15	DFT-s	2@0	2@23	1@0	1@24	25@0	12@6	1@1	1@23
		CP	2@0	2@23	1@0	1@24	25@0	13@6	1@1	1@23
	30	DFT-s	2@0	2@9	1@0	1@10	10@0	5@2 <sup>1</sup>	1@1	1@9
		CP	2@0	2@9	1@0	1@10	11@0	5@2 <sup>1</sup>	1@1	1@9
	60	DFT-s	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		CP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10MHz	15	DFT-s	2@0	2@50	1@0	1@51	50@0	25@12	1@1	1@50
		CP	2@0	2@50	1@0	1@51	52@0	26@13	1@1	1@50
	30	DFT-s	2@0	2@22	1@0	1@23	24@0	12@6	1@1	1@22
		CP	2@0	2@22	1@0	1@23	24@0	12@6	1@1	1@22
	60	DFT-s	2@0	2@9	1@0	1@10	10@0	5@2 <sup>1</sup>	1@1	1@9
		CP	2@0	2@9	1@0	1@10	11@0	5@2 <sup>1</sup>	1@1	1@9
15MHz	15	DFT-s	2@0	2@77	1@0	1@78	75@0	36@18	1@1	1@77
		CP	2@0	2@77	1@0	1@78	79@0	39@19 <sup>1</sup>	1@1	1@77
	30	DFT-s	2@0	2@36	1@0	1@37	36@0	18@9	1@1	1@36
		CP	2@0	2@36	1@0	1@37	38@0	19@9	1@1	1@36
	60	DFT-s	2@0	2@16	1@0	1@17	18@0	9@4	1@1	1@16
		CP	2@0	2@16	1@0	1@17	18@0	9@4	1@1	1@16
20MHz	15	DFT-s	2@0	2@104	1@0	1@105	100@0	50@25	1@1	1@104
		CP	2@0	2@104	1@0	1@105	106@0	53@26	1@1	1@104
	30	DFT-s	2@0	2@49	1@0	1@50	50@0	25@12	1@1	1@49
		CP	2@0	2@49	1@0	1@50	51@0	25@12 <sup>1</sup>	1@1	1@49
	60	DFT-s	2@0	2@22	1@0	1@23	24@0	12@6	1@1	1@22
		CP	2@0	2@22	1@0	1@23	24@0	12@6	1@1	1@22
25MHz	15	DFT-s	2@0	2@131	1@0	1@132	128@0	64@32	1@1	1@131
		CP	2@0	2@131	1@0	1@132	133@0	67@33	1@1	1@131
	30	DFT-s	2@0	2@63	1@0	1@64	64@0	32@16	1@1	1@63
		CP	2@0	2@63	1@0	1@64	65@0	33@16	1@1	1@63
	60	DFT-s	2@0	2@29	1@0	1@30	30@0	15@7 <sup>1</sup>	1@1	1@29
		CP	2@0	2@29	1@0	1@30	31@0	15@7 <sup>1</sup>	1@1	1@29
30MHz	15	DFT-s	2@0	2@158	1@0	1@159	160@0	80@40	1@1	1@158
		CP	2@0	2@158	1@0	1@159	160@0	80@40	1@1	1@158
	30	DFT-s	2@0	2@76	1@0	1@77	75@0	36@18	1@1	1@76
		CP	2@0	2@76	1@0	1@77	78@0	39@19	1@1	1@76
	60	DFT-s	2@0	2@36	1@0	1@37	36@0	18@9	1@1	1@36
		CP	2@0	2@36	1@0	1@37	38@0	19@9	1@1	1@36
40MHz	15	DFT-s	2@0	2@214	1@0	1@215	216@0	108@54	1@1	1@214
		CP	2@0	2@214	1@0	1@215	216@0	108@54	1@1	1@214
	30	DFT-s	2@0	2@104	1@0	1@105	100@0	50@25	1@1	1@104
		CP	2@0	2@104	1@0	1@105	106@0	53@26	1@1	1@104
	60	DFT-s	2@0	2@49	1@0	1@50	50@0	25@12	1@1	1@49
		CP	2@0	2@49	1@0	1@50	51@0	25@12 <sup>1</sup>	1@1	1@49
50MHz	15	DFT-s	2@0	2@268	1@0	1@269	270@0	135@67	1@1	1@268
		CP	2@0	2@268	1@0	1@269	270@0	135@67	1@1	1@268
	30	DFT-s	2@0	2@131	1@0	1@132	128@0	64@32	1@1	1@131
		CP	2@0	2@131	1@0	1@132	133@0	67@33	1@1	1@131
	60	DFT-s	2@0	2@63	1@0	1@64	64@0	32@16	1@1	1@63
		CP	2@0	2@63	1@0	1@64	65@0	33@16	1@1	1@63
60MHz	15	DFT-s	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		CP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	30	DFT-s	2@0	2@160	1@0	1@161	162@0	81@40	1@1	1@160
		CP	2@0	2@160	1@0	1@161	162@0	81@40	1@1	1@160
	60	DFT-s	2@0	2@77	1@0	1@78	75@0	36@18	1@1	1@77
		CP	2@0	2@77	1@0	1@78	79@0	39@19 <sup>1</sup>	1@1	1@77
80MHz	15	DFT-s	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		CP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
90MHz	30	DFT-s	2@0	2@215	1@0	1@216	216@0	108@54	1@1	1@215
		CP	2@0	2@215	1@0	1@216	217@0	109@54	1@1	1@215
	60	DFT-s	2@0	2@105	1@0	1@106	100@0	50@25	1@1	1@105
		CP	2@0	2@105	1@0	1@106	107@0	53@26 <sup>1</sup>	1@1	1@105
	15	DFT-s	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		CP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
30	DFT-s	2@0	2@243	1@0	1@244	240@0	120@60	1@1	1@243	
	CP	2@0	2@243	1@0	1@244	245@0	123@61	1@1	1@243	
60	DFT-s	2@0	2@119	1@0	1@120	120@0	60@30	1@1	1@119	
	CP	2@0	2@119	1@0	1@120	121@0	61@30	1@1	1@119	
100MHz	15	DFT-s	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		CP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	30	DFT-s	2@0	2@271	1@0	1@272	270@0	135@67	1@1	1@271
		CP	2@0	2@271	1@0	1@272	273@0	137@68	1@1	1@271
	60	DFT-s	2@0	2@133	1@0	1@134	135@0	64@32	1@1	1@133
		CP	2@0	2@133	1@0	1@134	135@0	67@33 <sup>1</sup>	1@1	1@133

Note 1: The allocated RB number  $Low$  is  $cell(N_{RB}/2) - 1$  in order to meet Inner RB allocation definition ( $RB_{start,Low} \leq RB_{start} \leq RB_{start,High}$ ) described in subclause 6.2.2 of TS 38.101-1 [2].

**Maximum Output Power (Tune-up Limit) for 5G NR (FR1)**

According to April 2015 TCB workshop, SAR test exclusion can be applied for testing overlapping 5G NR(FR1) bands as follows:

- c) The maximum output power, including tolerance, for the smaller band must be  $\leq$  the larger band to qualify for the SAR test exclusion.
- d) The channel bandwidth and other operating parameters for the smaller band must be fully supported by the larger band.

Maximum bandwidth 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.

SAR measurement is not required for the QPSK, 16QAM, 64QAM and 256QAM. When the highest maximum output power for QPSK, 16QAM, 64QAM and 256QAM is  $\leq$  1/2 dB higher than the  $\pi/2$  BPSK or when the reported SAR for the  $\pi/2$  BPSK configuration is  $\leq$  1.45 W/kg.

Please refer to section 6.5. for 5G NR(FR1) detail test channels.

RF Air interface	Mode	Maximum Output Power (Tune-up Limit) (dBm)			
		Main 1 Antenna		Main 2 Antenna	
		Maximum	Reduced	Maximum	Reduced
NR n5	$\pi/2$ BPSK	25.00	N/A		
NR n66	$\pi/2$ BPSK			24.00	22.50

**NR Band 5 Measured Results**

BW (MHz)	Modulation	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
					166800	167300	167800	MPR	Tune-up Limit
					834 MHz	836.6 MHz	839 MHz		
20 MHz	DFTS-s OFDM	$\pi/2$ BPSK	1	1	23.9	23.8	23.8	0	25.0
			1	53	23.8	23.8	23.9	0	25.0
			1	104	23.8	23.5	23.7	0	25.0
			50	0	23.3	23.4	23.5	0.5	24.5
			50	25	23.9	23.9	23.9	0	25.0
			50	50	23.3	23.3	23.4	0.5	24.5
			100	0	23.3	23.2	23.3	0.5	24.5
		$\pi/2$ BPSK DMRS	1	1	24.0	24.0	23.8	0	25.0
			1	53	23.8	24.0	23.9	0	25.0
			1	104	23.8	23.9	23.7	0	25.0
			50	0	23.5	23.5	23.5	0	25.0
			50	25	24.0	24.0	23.9	0	25.0
			50	50	23.4	23.5	23.4	0	25.0
		QPSK	1	1	23.3	23.0	23.2	0	25.0
			1	53	23.1	23.0	23.2	0	25.0
			1	104	23.1	23.0	23.0	0	25.0
			50	0	23.2	23.3	23.2	1	24.0
			50	25	23.2	23.2	23.2	0	25.0
			50	50	23.0	23.2	23.2	1	24.0
			100	0	22.9	23.1	23.1	1	24.0
16QAM	1	1	23.6	23.5	23.4	1	24.0		
64QAM	1	1	22.0	22.1	22.1	2.5	22.5		
256QAM	1	1	19.3	19.3	19.1	4.5	20.5		
CP-OFDM	QPSK	1	1	22.8	22.8	22.7	1.5	23.5	
BW (MHz)	Modulation	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
					166300	167300	168300	MPR	Tune-up Limit
					831.5 MHz	836.6 MHz	841.5 MHz		
15 MHz	DFTS-s OFDM	$\pi/2$ BPSK	1	1	23.9	23.7	23.7	0	25.0
			1	40	23.7	23.8	23.7	0	25.0
			1	77	23.8	23.7	23.6	0	25.0
			36	0	23.4	23.4	23.3	0.5	24.5
			36	18	23.9	23.8	23.8	0	25.0
			36	36	23.4	23.4	23.3	0.5	24.5
			75	0	23.4	23.3	23.3	0.5	24.5
		$\pi/2$ BPSK DMRS	1	1	23.9	23.7	23.9	0	25.0
			1	40	23.7	23.8	23.9	0	25.0
			1	77	23.9	23.7	23.8	0	25.0
			36	0	23.4	23.4	23.4	0	25.0
			36	18	23.9	23.8	23.9	0	25.0
			36	36	23.4	23.4	23.4	0	25.0
			75	0	23.4	23.3	23.4	0.5	24.5
		QPSK	1	1	23.2	23.3	23.3	0	25.0
			1	40	23.2	23.3	23.2	0	25.0
			1	77	23.2	23.2	23.2	0	25.0
			36	0	23.1	23.1	23.1	1	24.0
			36	18	23.2	23.2	23.1	0	25.0
			36	36	23.2	23.2	23.1	1	24.0
75	0		22.8	22.8	22.8	1	24.0		
16QAM	1	1	23.4	23.4	23.5	1	24.0		
64QAM	1	1	22.2	22.2	22.2	2.5	22.5		
256QAM	1	1	19.3	19.3	19.2	4.5	20.5		
CP-OFDM	QPSK	1	1	22.7	22.7	22.6	1.5	23.5	

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

BW (MHz)	Modulation	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
					165800	167300	168800	MPR	Tune-up Limit
					829 MHz	836.6 MHz	844 MHz		
10 MHz	DFTS-s OFDM	π/2 BPSK	1	1	23.6	23.4	23.1	0	25.0
			1	26	23.4	23.6	23.3	0	25.0
			1	50	23.6	23.5	23.5	0	25.0
			25	0	23.5	23.1	23.1	0.5	24.5
			25	12	23.7	23.7	23.3	0	25.0
			25	25	23.5	23.1	23.2	0.5	24.5
			50	0	23.4	23.1	23.2	0.5	24.5
		π/2 BPSK DMRS	1	1	23.8	23.5	23.4	0	25.0
			1	26	23.6	23.7	23.5	0	25.0
			1	50	23.7	23.7	23.5	0	25.0
			25	0	23.6	23.4	23.2	0	25.0
			25	12	23.7	23.6	23.4	0	25.0
			25	25	23.7	23.4	23.4	0	25.0
		QPSK	50	0	23.5	23.3	23.5	0.5	24.5
			1	1	23.1	23.0	23.1	0	25.0
			1	26	23.0	23.0	23.0	0	25.0
			1	50	23.0	23.0	23.0	0	25.0
			25	0	23.2	23.0	23.0	1	24.0
			25	12	23.1	23.0	23.0	0	25.0
			25	25	23.1	23.0	22.9	1	24.0
50	0	23.2	23.0	23.0	1	24.0			
16QAM	1	1	23.4	23.1	23.6	1	24.0		
64QAM	1	1	21.8	21.4	21.9	2.5	22.5		
256QAM	1	1	19.8	19.4	19.6	4.5	20.5		
CP-OFDM	QPSK	1	1	22.5	22.6	22.7	1.5	23.5	
BW (MHz)	Modulation	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
					165300	167300	169300	MPR	Tune-up Limit
					826.5 MHz	836.6 MHz	846.5 MHz		
5 MHz	DFTS-s OFDM	π/2 BPSK	1	1	24.4	24.5	24.2	0	25.0
			1	13	24.4	24.7	24.3	0	25.0
			1	23	24.2	24.6	24.2	0	25.0
			12	0	24.1	24.2	23.9	0.5	24.5
			12	6	24.5	24.7	24.4	0	25.0
			12	12	24.0	24.1	23.9	0.5	24.5
			25	0	24.0	24.2	24.0	0.5	24.5
		π/2 BPSK DMRS	1	1	24.5	24.5	24.1	0	25.0
			1	13	24.5	24.7	24.2	0	25.0
			1	23	24.4	24.1	24.2	0	25.0
			12	0	24.2	24.2	23.8	0	25.0
			12	6	24.6	24.7	24.2	0	25.0
			12	12	24.1	24.2	23.8	0	25.0
			25	0	24.2	24.1	23.9	0.5	24.5
		QPSK	1	1	23.1	23.0	23.0	0	25.0
			1	13	23.0	23.0	23.0	0	25.0
			1	23	23.0	23.0	23.0	0	25.0
			12	0	23.2	23.1	23.0	1	24.0
			12	6	23.1	23.1	23.0	0	25.0
			12	12	23.1	23.1	23.0	1	24.0
25	0		23.1	23.1	23.0	1	24.0		
16QAM	1	1	22.2	23.2	23.0	1	24.0		
64QAM	1	1	21.7	21.5	21.7	2.5	22.5		
256QAM	1	1	19.8	19.5	19.3	4.5	20.5		
CP-OFDM	QPSK	1	1	22.5	22.6	22.6	1.5	23.5	



**NR Band 66 Measured Results**

BW (MHz)	Modulation	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Hotspot/Grip/Earjack Reduced Average Power (dBm)								
					344000			349000		354000		344000			349000		354000	
					1720 MHz	1745 MHz	1770 MHz	MFR	Tune-up Limit	1720 MHz	1745 MHz	1770 MHz	MFR	Tune-up Limit				
20 MHz	DFTS-s OFDM	π/2 BPSK	1	1	23.7	23.6	23.8	0	24.0	22.5	22.5	22.3	0	22.5				
			1	53	23.9	24.0	24.0	0	24.0	22.3	22.5	22.5	0	22.5				
			1	104	23.9	23.8	23.7	0	24.0	22.4	22.4	22.3	0	22.5				
			50	0	23.4	23.4	23.3	0.5	23.5	22.5	22.5	22.5	0	22.5				
			50	25	24.0	24.0	24.0	0	24.0	22.5	22.5	22.5	0	22.5				
			50	50	23.4	23.5	23.5	0.5	23.5	22.4	22.5	22.5	0	22.5				
		100	0	23.4	23.5	23.5	0.5	23.5	22.5	22.5	22.5	0	22.5					
		1	1	23.2	23.5	23.9	0	24.0	22.2	22.2	22.3	0	22.5					
		1	53	23.2	23.8	23.6	0	24.0	22.2	22.0	22.4	0	22.5					
		1	104	23.3	23.7	23.0	0	24.0	21.9	22.2	22.2	0	22.5					
		50	0	23.3	23.9	23.0	0	24.0	21.8	22.1	21.9	0	22.5					
		50	25	23.7	23.5	23.5	0	24.0	22.0	21.9	22.3	0	22.5					
		50	50	23.2	23.5	23.2	0	24.0	21.6	22.0	22.4	0	22.5					
		100	0	23.3	23.4	23.2	0.5	23.5	22.2	22.1	22.0	0	22.5					
		1	1	23.9	23.9	23.2	0	24.0	22.3	22.0	22.2	0	22.5					
		1	53	23.9	24.0	23.0	0	24.0	22.3	22.5	22.5	0	22.5					
		1	104	23.0	24.0	23.2	0	24.0	22.4	22.2	22.2	0	22.5					
		50	0	23.0	23.0	23.0	1	23.0	22.5	22.4	22.5	0	22.5					
		50	25	23.1	23.4	23.4	0	24.0	22.4	22.5	22.5	0	22.5					
		50	50	23.0	23.0	23.0	1	23.0	22.4	22.5	22.5	0	22.5					
		100	0	23.0	23.0	23.0	1	23.0	22.3	22.4	22.3	0	22.5					
		16QAM	1	1	22.4	22.2	22.3	1	23.0	22.2	22.1	22.3	0	22.5				
		64QAM	1	1	21.5	21.5	21.5	2.5	21.5	20.4	21.5	21.4	1	21.5				
		256QAM	1	1	19.2	19.0	19.0	4.5	19.5	19.4	19.5	18.8	3	19.5				
CP-OFDM	QPSK	1	1	22.3	22.5	22.4	1.5	22.5	22.0	21.9	22.0	0	22.5					
15 MHz	DFTS-s OFDM	π/2 BPSK	1	1	23.9	23.8	24.0	0	24.0	22.4	22.4	22.4	0	22.5				
			1	40	23.8	23.9	24.0	0	24.0	22.4	22.4	22.5	0	22.5				
			1	77	23.9	24.0	23.9	0	24.0	22.4	22.4	22.5	0	22.5				
			36	0	23.5	23.5	23.5	0.5	23.5	22.5	22.5	22.5	0	22.5				
			36	18	23.9	24.0	24.0	0	24.0	22.5	22.3	22.5	0	22.5				
			36	36	23.3	23.5	23.5	0.5	23.5	22.3	22.4	22.5	0	22.5				
		75	0	23.5	23.5	23.5	0.5	23.5	22.5	22.5	22.5	0	22.5					
		1	1	23.3	23.3	23.2	0	24.0	22.3	22.3	22.3	0	22.5					
		1	40	23.2	23.4	23.3	0	24.0	22.4	22.4	22.4	0	22.5					
		1	77	23.4	23.5	23.4	0	24.0	22.2	22.3	22.4	0	22.5					
		36	0	23.3	23.4	23.4	0	24.0	22.4	22.4	22.1	0	22.5					
		36	18	23.7	23.8	23.8	0	24.0	22.3	22.2	22.3	0	22.5					
		36	36	23.5	23.5	23.4	0	24.0	22.2	22.3	22.4	0	22.5					
		75	0	23.4	23.5	23.4	0.5	23.5	22.5	22.4	22.5	0	22.5					
		1	1	24.0	24.0	23.9	0	24.0	22.0	22.2	22.4	0	22.5					
		1	40	24.0	23.8	24.0	0	24.0	21.9	22.5	22.4	0	22.5					
		1	77	23.1	23.9	23.0	0	24.0	22.1	22.4	22.3	0	22.5					
		36	0	23.0	22.8	23.0	1	23.0	22.1	22.5	22.5	0	22.5					
		36	18	23.2	23.8	23.2	0	24.0	22.1	22.5	22.5	0	22.5					
		36	36	23.0	22.9	23.0	1	23.0	22.1	22.5	22.5	0	22.5					
		75	0	23.0	22.8	23.0	1	23.0	22.1	22.4	22.5	0	22.5					
		16QAM	1	1	23.0	22.7	23.0	1	23.0	22.0	22.2	22.5	0	22.5				
		64QAM	1	1	21.2	20.9	21.3	2.5	21.5	20.9	20.9	21.5	1	21.5				
		256QAM	1	1	18.8	18.4	18.9	4.5	19.5	18.5	18.9	19.0	3	19.5				
CP-OFDM	QPSK	1	1	22.2	21.4	22.2	1.5	22.5	22.0	22.0	22.0	0	22.5					
10 MHz	DFTS-s OFDM	π/2 BPSK	1	1	23.9	23.8	23.9	0	24.0	22.4	22.4	22.4	0	22.5				
			1	26	24.0	23.9	23.9	0	24.0	22.5	22.4	22.5	0	22.5				
			1	50	24.0	24.0	23.8	0	24.0	22.4	22.5	22.5	0	22.5				
			25	0	23.5	23.5	23.5	0.5	23.5	22.2	22.3	22.4	0	22.5				
			25	12	24.0	24.0	24.0	0	24.0	22.3	22.4	22.4	0	22.5				
			25	25	23.5	23.5	23.5	0.5	23.5	22.3	22.3	22.4	0	22.5				
		50	0	23.5	23.5	23.4	0.5	23.5	22.4	22.4	22.4	0	22.5					
		1	1	23.8	23.7	23.9	0	24.0	22.3	22.3	22.2	0	22.5					
		1	26	23.7	23.8	23.9	0	24.0	22.2	22.2	22.4	0	22.5					
		1	50	23.9	23.8	23.8	0	24.0	22.2	22.3	22.4	0	22.5					
		25	0	23.6	23.5	23.6	0	24.0	22.1	22.1	22.3	0	22.5					
		25	12	23.8	23.9	23.7	0	24.0	22.1	22.3	22.3	0	22.5					
		25	25	23.7	23.4	23.6	0	24.0	22.2	22.2	22.2	0	22.5					
		50	0	23.4	23.5	23.4	0.5	23.5	22.3	22.3	22.1	0	22.5					
		1	1	24.0	23.8	23.9	0	24.0	22.5	22.5	22.5	0	22.5					
		1	26	24.0	23.8	23.9	0	24.0	22.3	22.4	22.3	0	22.5					
		1	50	23.1	23.9	23.0	0	24.0	22.4	22.3	22.2	0	22.5					
		25	0	23.0	22.9	23.0	1	23.0	22.4	22.4	22.3	0	22.5					
		25	12	23.1	23.9	23.0	0	24.0	22.4	22.4	22.3	0	22.5					
		25	25	23.0	22.7	23.0	1	23.0	22.4	22.4	22.4	0	22.5					
		50	0	23.0	22.7	23.0	1	23.0	22.5	22.4	22.5	0	22.5					
		16QAM	1	1	23.0	23.0	23.0	1	23.0	22.4	22.5	22.5	0	22.5				
		64QAM	1	1	21.2	21.3	21.3	2.5	21.5	21.3	21.2	21.5	1	21.5				
		256QAM	1	1	18.8	19.4	18.9	4.5	19.5	19.0	18.9	18.9	3	19.5				
CP-OFDM	QPSK	1	1	22.2	21.4	22.2	1.5	22.5	22.1	22.2	22.3	0	22.5					

**NR Band 66 Measured Results (continued)**

BW (MHz)	Modulation	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Hotspot/Grip/Earjack Reduced Average Power (dBm)								
					342500			349000		355500		342500			349000		355500	
					1712.5 MHz	1745 MHz	1777.5 MHz	MFR	Tune-up Limit	1712.5 MHz	1745 MHz	1777.5 MHz	MFR	Tune-up Limit				
5 MHz	DFTS-s OFDM	π/2 BPSK	1	1	23.9	23.9	24.0	0	24.0	22.3	22.4	22.3	0	22.5				
			1	13	24.0	23.8	24.0	0	24.0	22.4	22.3	22.2	0	22.5				
			1	23	23.9	23.9	23.9	0	24.0	22.4	22.4	22.3	0	22.5				
			12	0	23.5	23.5	23.5	0.5	23.5	22.4	22.4	22.3	0	22.5				
			12	6	24.0	24.0	24.0	0	24.0	22.4	22.4	22.4	0	22.5				
			12	12	23.5	23.5	23.5	0.5	23.5	22.5	22.4	22.5	0	22.5				
			25	0	23.5	23.5	23.5	0.5	23.5	22.4	22.5	22.5	0	22.5				
			1	1	23.7	23.8	23.8	0	24.0	22.2	22.3	22.1	0	22.5				
			1	13	23.8	23.6	23.9	0	24.0	22.2	22.1	22.1	0	22.5				
			1	23	23.8	23.8	23.7	0	24.0	22.3	22.3	22.3	0	22.5				
		π/2 BPSK DMRS	12	0	23.4	23.3	23.3	0	24.0	22.1	22.2	22.2	0	22.5				
			12	6	23.8	23.7	23.8	0	24.0	22.3	22.2	22.3	0	22.5				
			12	12	23.3	23.3	23.3	0	24.0	22.4	22.3	22.3	0	22.5				
			25	0	23.4	23.3	23.4	0.5	23.5	22.3	22.4	22.4	0	22.5				
			1	1	23.9	23.7	23.9	0	24.0	22.2	22.3	22.4	0	22.5				
		QPSK	1	13	24.0	23.7	23.8	0	24.0	22.3	22.4	22.4	0	22.5				
			1	23	23.1	23.8	23.0	0	24.0	22.3	22.3	22.4	0	22.5				
			12	0	23.0	22.8	22.9	1	23.0	22.4	22.4	22.4	0	22.5				
			12	6	23.0	23.9	23.0	0	24.0	22.5	22.5	22.5	0	22.5				
			12	12	23.0	22.9	23.0	1	23.0	22.4	22.5	22.5	0	22.5				
			25	0	23.0	22.8	23.0	1	23.0	22.4	22.5	22.5	0	22.5				
		16QAM	1	1	22.8	22.9	22.9	1	23.0	22.5	22.5	22.5	0	22.5				
			64QAM	1	1	21.3	21.5	21.3	2.5	21.5	21.5	21.2	21.1	1	21.5			
		256QAM	1	1	19.1	19.5	18.8	4.5	19.5	18.9	19.1	18.9	3	19.5				
			CP-OFDM	QPSK	1	1	22.3	21.6	21.5	1.5	22.5	22.0	22.1	22.0	0	22.5		

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

#### Maximum Output Power (Tune-up Limit) for Wi-Fi 2.4 GHz

The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures.

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 802.11b/g/n mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band. Additional output power measurements were not deemed necessary.

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  $\leq 1.2$  W/kg.

Mode	Bandwidth	Channel	Frequency (MHz)	Tune-up Power Limit (dBm)	
				Sub 2 Antenna	
				Maximum	Reduced
802.11b DSSS (SISO)	20 MHz	1	2412	20.0	17.0
		6	2437	20.0	17.0
		11	2462	20.0	17.0
		12	2467	9.0	9.0
		13	2472	3.0	3.0
802.11g/n OFDM (SISO)	20 MHz	1	2412	18.0	17.0
		6	2437	18.0	17.0
		11	2462	18.0	17.0
		12	2467	9.0	9.0
		13	2472	3.0	3.0

#### Wi-Fi 2.4GHz Measured Results

Band	Mode	Ch #	Freq. (MHz)	Maximum Average Power (dBm)			Reduced Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
DSSS 2.4 GHz	802.11b	1	2412	19.9	20.0	Yes	16.6	17.0	Yes
		6	2437	19.8	20.0		16.6	17.0	
		11	2462	20.0	20.0		16.5	17.0	
		12	2467	8.8	9.0		8.7	9.0	
		13	2472	2.8	3.0		2.6	3.0	
OFDM 2.4 GHz	802.11g	1	2412		18.0	No		17.0	No
		6	2437		18.0			17.0	
		11	2462		18.0			17.0	
		12	2467		9.0			9.0	
		13	2472		3.0			3.0	
	802.11n (HT20)	1	2412		18.0	No		17.0	No
		6	2437		18.0			17.0	
		11	2462		18.0			17.0	
		12	2467		9.0			9.0	
		13	2472		3.0			3.0	

**Note(s):**

SAR is not required for channel 12 and 13 because the tune-up limit and the measured output power for these two channels are not greater than those for the default test channels. Refer to KDB 248227 D01 section 3.1.

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

### Maximum Output Power (Tune-up Limit) for Wi-Fi 5 GHz

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 transmission mode is selected.

The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures.

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 802.11 a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band. Additional output power measurements were not deemed necessary.

When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is  $\leq 1.2$  W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.

Mode	Bandwidth	Channel	Frequency (MHz)	Tune-up Power Limit (dBm)		
				Sub 3 Antenna		
				Maximum	Reduced	
U-NII-1 5.2 GHz	802.11a/n 20 MHz	36	5180	17.0	14.0	
		40	5200	17.0	14.0	
		44	5220	17.0	14.0	
		48	5240	17.0	14.0	
	802.11ac 20 MHz	36	5180	16.0	14.0	
		40	5200	16.0	14.0	
		44	5220	16.0	14.0	
		48	5240	16.0	14.0	
	802.11n/ac 40 MHz	38	5190	15.0	14.0	
		46	5230	15.0	14.0	
	802.11ac 80 MHz	42	5210	13.0	13.0	
	U-NII-2A 5.3 GHz	802.11a/n 20 MHz	52	5260	17.0	14.0
56			5280	17.0	14.0	
60			5300	17.0	14.0	
64			5320	17.0	14.0	
802.11ac 20 MHz		52	5260	16.0	14.0	
		56	5280	16.0	14.0	
		60	5300	16.0	14.0	
		64	5320	16.0	14.0	
802.11n/ac 40 MHz		54	5270	15.0	14.0	
		62	5310	15.0	14.0	
802.11ac 80 MHz		58	5290	13.0	13.0	
U-NII-2C 5.5 GHz		802.11a/n 20 MHz	100	5500	17.0	14.0
			116	5580	17.0	14.0
			124	5620	17.0	14.0
	140/144		5700/5720	17.0	14.0	
	802.11ac 20 MHz	100	5500	16.0	14.0	
		116	5580	16.0	14.0	
		124	5620	16.0	14.0	
		140/144	5700/5720	16.0	14.0	
	802.11n/ac 40 MHz	102	5510	15.0	14.0	
		118	5590	15.0	14.0	
		126	5630	15.0	14.0	
		134/142	5670/5710	15.0	14.0	
	802.11ac 80 MHz	106	5530	13.0	13.0	
		122	5610	13.0	13.0	
		138	5690	13.0	13.0	
	U-NII-3 5.8 GHz	802.11a/n 20 MHz	149	5745	17.0	14.0
			157	5785	17.0	14.0
165			5825	17.0	14.0	
802.11ac 20 MHz		149	5745	16.0	14.0	
		157	5785	16.0	14.0	
		165	5825	16.0	14.0	
802.11n/ac 40 MHz		151	5755	15.0	14.0	
		159	5795	15.0	14.0	
802.11ac 80 MHz		155	5775	13.0	13.0	

**Wi-Fi 5 GHz Measured Results**

Band	Mode	Ch #	Freq. (MHz)	Maximum Average Power (dBm)			Reduced Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-1 5.2 GHz	802.11a	36	5180	16.5	17.0	Yes		14.0	No
		40	5200	16.7	17.0		14.0		
		44	5220	16.7	17.0		14.0		
		48	5240	16.4	17.0		14.0		
	802.11n (HT20)	36	5180		17.0	No		14.0	No
		40	5200		17.0		14.0		
		44	5220		17.0		14.0		
		48	5240		17.0		14.0		
	802.11ac (VHT20)	36	5180		16.0	No		14.0	No
		40	5200		16.0		14.0		
		44	5220		16.0		14.0		
		48	5240		16.0		14.0		
	802.11n (HT40)	38	5190		15.0	No	13.9	14.0	Yes
		46	5230		15.0		13.8	14.0	
	802.11ac (VHT40)	38	5190		15.0	No		14.0	No
		46	5230		15.0		14.0		
802.11ac (VHT80)	42	5210		13.0	No		13.0	No	
Band	Mode	Ch #	Freq. (MHz)	Maximum Average Power (dBm)			Reduced Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-2A 5.3 GHz	802.11a	52	5260	16.8	17.0	Yes		14.0	No
		56	5280	16.7	17.0		14.0		
		60	5300	16.6	17.0		14.0		
		64	5320	16.8	17.0		14.0		
	802.11n (HT20)	52	5260		17.0	No		14.0	No
		56	5280		17.0		14.0		
		60	5300		17.0		14.0		
		64	5320		17.0		14.0		
	802.11ac (VHT20)	52	5260		16.0	No		14.0	No
		56	5280		16.0		14.0		
		60	5300		16.0		14.0		
		64	5320		16.0		14.0		
	802.11n (HT40)	54	5270		15.0	No	13.7	14.0	Yes
		62	5310		15.0		13.4	14.0	
	802.11ac (VHT40)	54	5270		15.0	No		14.0	No
		62	5310		15.0		14.0		
802.11ac (VHT80)	58	5290		13.0	No		13.0	No	

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

Band	Mode	Ch #	Freq. (MHz)	Maximum Average Power (dBm)			Reduced Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-2C 5.5 GHz	802.11a	100	5500	16.8	17.0	Yes		14.0	No
		116	5580	16.5	17.0			14.0	
		124	5620	16.7	17.0			14.0	
		144	5720	16.6	17.0			14.0	
	802.11n (HT20)	100	5500		17.0	No		14.0	No
		116	5580		17.0			14.0	
		124	5620		17.0			14.0	
		140/144	5700/5720		17.0			14.0	
	802.11ac (VHT20)	100	5500		16.0	No		14.0	No
		116	5580		16.0			14.0	
		124	5620		16.0			14.0	
		140/144	5700/5720		16.0			14.0	
	802.11n (HT40)	102	5510		15.0	No	13.6	14.0	Yes
		118	5590		15.0		13.4	14.0	
		126	5630		15.0		13.6	14.0	
		134/142	5670/5710		15.0		13.4/13.42	14.0	
	802.11ac (VHT40)	102	5510		15.0	No		14.0	No
		118	5590		15.0			14.0	
		126	5630		15.0			14.0	
		134/142	5670/5710		15.0			14.0	
802.11ac (VHT80)	106	5530		13.0	No		13.0	No	
	122	5610		13.0			13.0		
	138	5690		13.0			13.0		
Band	Mode	Ch #	Freq. (MHz)	Maximum Average Power (dBm)			Reduced Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-3 5.8 GHz	802.11a	149	5745	16.6	17.0	Yes		14.0	No
		157	5785	17.0	17.0			14.0	
		165	5825	16.8	17.0			14.0	
	802.11n (HT20)	149	5745		17.0	No		14.0	No
		157	5785		17.0			14.0	
		165	5825		17.0			14.0	
	802.11ac (VHT20)	149	5745		16.0	No		14.0	No
		157	5785		16.0			14.0	
		165	5825		16.0			14.0	
	802.11n (HT40)	151	5755		15.0	No	13.7	14.0	Yes
		159	5795		15.0		13.7	14.0	
	802.11ac (VHT40)	151	5755		15.0	No		14.0	No
159		5795		15.0			14.0		
802.11ac (VHT80)	155	5775		13.0	No		13.0	No	

### 9.8. Bluetooth

#### Maximum Output Power (Tune-up Limit) for Bluetooth

From October 2016 TCB workshop, Power and SAR were measured with the device connected to a call box with hopping disabled using DH5 modulation. The duty cycle value from the device is taken from the Duty Cycle plot below.

SAR measurement is not required for the EDR and LE. When the secondary mode is  $\leq \frac{1}{4}$  dB higher than the primary mode.

Band	Mode	Channel	Frequency (MHz)	Tune-up Power Limit (dBm)	
				Sub 2 Antenna	
				Maximum	Reduced
Bluetooth 2.4 GHz	BR	0	2402	16.0	N/A
		39	2441	16.0	N/A
		78	2480	16.0	N/A
	EDR	0	2402	11.0	N/A
		39	2441	11.0	N/A
		78	2480	11.0	N/A
	LE	0	2402	6.0	N/A
		19	2440	6.0	N/A
		39	2480	6.0	N/A

#### Bluetooth Measured Results

Band	Mode	Ch #	Freq. (MHz)	Maximum Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
Bluetooth 2.4 GHz	BR GFSK	0	2402	14.0	16.0	Yes
		39	2441	14.6	16.0	
		78	2480	14.2	16.0	
	EDR, $\pi/4$ DQPSK	0	2402		11.0	No
		39	2441		11.0	
		78	2480		11.0	
	EDR, 8-DPSK	0	2402		11.0	No
		39	2441		11.0	
		78	2480		11.0	
	LE 1 Mbps, GFSK	0	2402		6.0	No
		19	2440		6.0	
		39	2480		6.0	
	LE 2 Mbps, GFSK	0	2402		6.0	No
		19	2440		6.0	
		39	2480		6.0	

#### Duty Factor Measured Results

Mode	Type	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
GFSK	DH5	2.87	3.74	76.90%	1.30

**Note(s):**

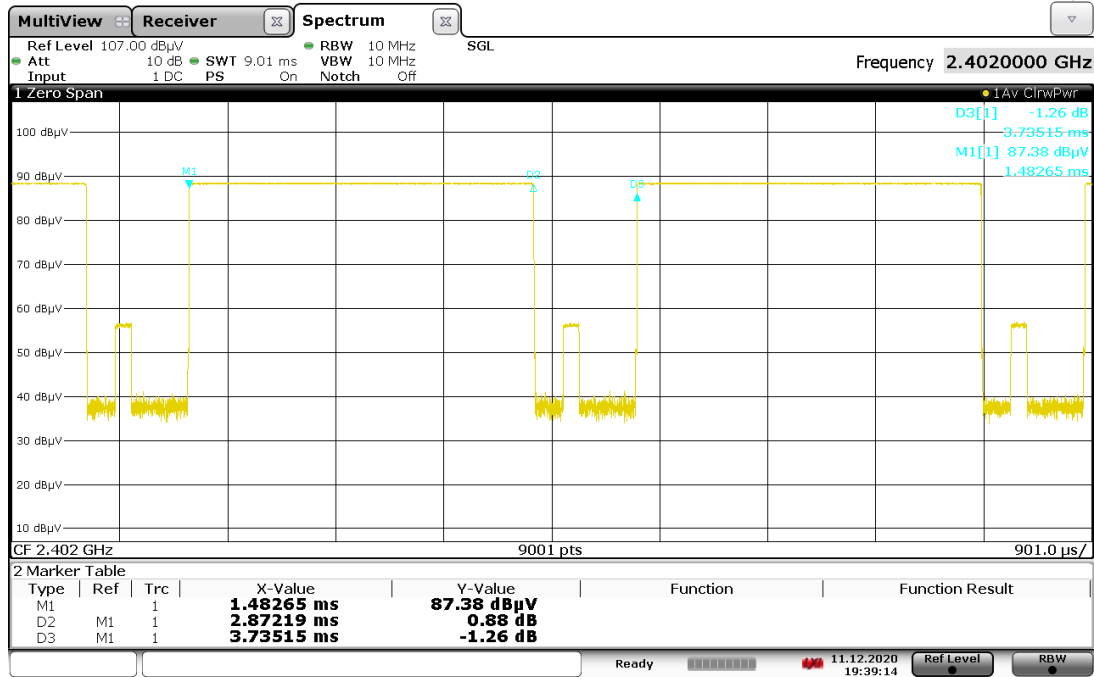
Duty Cycle = (T on / period) \* 100%



# Duty Cycle plots

GFSK

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

### SAR Test Reduction criteria are as follows:

- Reported SAR(W/kg) for WWAN and Bluetooth = Measured SAR \* Tune-up Scaling Factor
- Reported SAR(W/kg) for Wi-Fi = Measured SAR \* Tune-up scaling factor \* Duty Cycle scaling factor
- Duty Cycle scaling factor = 1 / Duty cycle (%)

### KDB 447498 D01 General RF Exposure Guidance:

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

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

### KDB 648474 D04 Handset SAR:

With headset attached, when the reported SAR for body-worn accessory, measured without a headset connected to the handset, is  $> 1.2$  W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

### KDB 648474 D04 Handset SAR (Phablet Only):

For smart phones, with a display diagonal dimension  $> 15.0$  cm or an overall diagonal dimension  $> 16.0$  cm.

When hotspot mode does not apply, 10-g Extremity SAR is required for all surfaces and edges with an antenna located at  $\leq 25$  mm from that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR  $> 1.2$  W/kg; however, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold.

### KDB 941225 D01 SAR test for 3G devices:

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

### KDB 941225 D05 SAR for LTE Devices:

SAR test reduction is applied using the following criteria:

- Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel.
- When the reported SAR is  $> 0.8$  W/kg, testing for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel.
- Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are  $> 0.8$  W/kg. Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation  $< 1.45$  W/kg.
- Testing for 16-QAM modulation is not required because the reported SAR for QPSK is  $< 1.45$  W/Kg and its output power is not more than 0.5 dB higher than that of QPSK.
- Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is  $< 1.45$  W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.
- 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). Initial Test Position SAR Test Reduction Procedure is outlined in KDB 248227 D01 §5.1.1. To determine the *initial test position*, Area Scans were performed to determine the position with the *Maximum Value of SAR (measured)*. The position that produced the highest *Maximum Value of SAR* is considered the worst case position; thus used as the *initial test position*.

**10.1. GSM850**

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up Limit	Meas.	Meas.	Scaled	
Head	GPRS 2 Slots	N/A	0	Left Touch	190	836.6	33.0	31.8	0.352	0.469	1
				Left Tilt	190	836.6	33.0	31.8	0.199	0.265	
				Right Touch	190	836.6	33.0	31.8	0.411	<b>0.547</b>	
				Right Tilt	190	836.6	33.0	31.8	0.216	0.288	
Body-Worn	GPRS 2 Slots	N/A	15	Rear	190	836.6	33.0	31.8	0.402	<b>0.535</b>	2
				Front	190	836.6	33.0	31.8	0.370	0.493	
Hotspot	GPRS 2 Slots	N/A	10	Rear	190	836.6	33.0	31.8	0.464	<b>0.618</b>	3
				Front	190	836.6	33.0	31.8	0.379	0.505	
				Edge 2	190	836.6	33.0	31.8	0.453	0.603	
				Edge 3	190	836.6	33.0	31.8	0.189	0.252	
				Edge 4	190	836.6	33.0	31.8	0.260	0.346	

**10.2. GSM1900**

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up Limit	Meas.	Meas.	Scaled	
Head	GPRS 2 slot	N/A	0	Left Touch	661	1880.0	29.5	28.7	0.113	<b>0.137</b>	4
				Left Tilt	661	1880.0	29.5	28.7	0.080	0.097	
				Right Touch	661	1880.0	29.5	28.7	0.088	0.106	
				Right Tilt	661	1880.0	29.5	28.7	0.055	0.067	
Body-Worn	GPRS 2 slot	N/A	15	Rear	661	1880.0	29.5	28.7	0.148	<b>0.180</b>	5
				Front	661	1880.0	29.5	28.7	0.098	0.119	
Hotspot	GPRS 2 slot	ON	10	Rear	661	1880.0	28.0	26.7	0.199	0.268	6
				Front	661	1880.0	28.0	26.7	0.255	0.344	
				Edge 3	661	1880.0	28.0	26.7	0.378	<b>0.510</b>	
				Edge	661	1880.0	28.0	26.7	0.180	0.243	

**10.3. W-CDMA Band II**

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up Limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC 12.2 kbps	N/A	0	Left Touch	9400	1880.0	24.5	23.9	0.162	<b>0.188</b>	7
				Left Tilt	9400	1880.0	24.5	23.9	0.116	0.135	
				Right Touch	9400	1880.0	24.5	23.9	0.133	0.154	
				Right Tilt	9400	1880.0	24.5	23.9	0.083	0.096	
Body-Worn	Rel 99 RMC 12.2 kbps	N/A	15	Rear	9400	1880.0	24.5	23.9	0.213	<b>0.247</b>	8
				Front	9400	1880.0	24.5	23.9	0.189	0.219	
Hotspot	Rel 99 RMC 12.2 kbps	ON	10	Rear	9400	1880.0	23.0	22.4	0.367	<b>0.421</b>	9
				Front	9400	1880.0	23.0	22.4	0.291	0.334	
				Edge 3	9400	1880.0	23.0	22.4	0.357	0.410	
				Edge 4	9400	1880.0	23.0	22.4	0.188	0.216	

**10.4. W-CDMA Band IV**

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up Limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC 12.2 kbps	N/A	0	Left Touch	1513	1752.6	24.5	23.6	0.183	<b>0.226</b>	10
				Left Tilt	1513	1752.6	24.5	23.6	0.126	0.156	
				Right Touch	1513	1752.6	24.5	23.6	0.122	0.151	
				Right Tilt	1513	1752.6	24.5	23.6	0.093	0.115	
Body-Worn	Rel 99 RMC 12.2 kbps	N/A	15	Rear	1513	1752.6	24.5	23.6	0.246	<b>0.304</b>	11
				Front	1513	1752.6	24.5	23.6	0.194	0.240	
Hotspot	Rel 99 RMC 12.2 kbps	ON	10	Rear	1413	1732.6	23.0	22.6	0.282	0.309	
				Front	1413	1732.6	23.0	22.6	0.246	0.270	
				Edge 3	1413	1732.6	23.0	22.6	0.302	<b>0.331</b>	12
				Edge 4	1413	1732.6	23.0	22.6	0.214	0.235	

**10.5. W-CDMA Band V**

RF Exposure Conditions	Power Back-off	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up Limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC 12.2 kbps	N/A	0	Left Touch	4132	826.4	25.0	24.2	0.261	0.317	
				Left Tilt	4132	826.4	25.0	24.2	0.133	0.162	
				Right Touch	4132	826.4	25.0	24.2	0.285	<b>0.347</b>	13
				Right Tilt	4132	826.4	25.0	24.2	0.161	0.196	
Body-Worn	Rel 99 RMC 12.2 kbps	N/A	15	Rear	4132	826.4	25.0	24.2	0.324	<b>0.394</b>	14
				Front	4132	826.4	25.0	24.2	0.290	0.353	
Hotspot	Rel 99 RMC 12.2 kbps	N/A	10	Rear	4132	826.4	25.0	24.2	0.368	0.448	
				Front	4132	826.4	25.0	24.2	0.291	0.354	
				Edge 2	4132	826.4	25.0	24.2	0.390	<b>0.474</b>	15
				Edge 3	4132	826.4	25.0	24.2	0.095	0.115	
				Edge 4	4132	826.4	25.0	24.2	0.259	0.315	

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

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	QPSK	N/A	0	Left Touch	18900	1880.0	1	49	24.0	23.1	0.130	<b>0.160</b>	16
							50	24	23.0	22.1	0.106	0.130	
				Left Tilt (15°)	18900	1880.0	1	49	24.0	23.1	0.103	0.126	
							50	24	23.0	22.1	0.080	0.099	
				Right Touch	18900	1880.0	1	49	24.0	23.1	0.116	0.142	
							50	24	23.0	22.1	0.095	0.117	
				Right Tilt (15°)	18900	1880.0	1	49	24.0	23.1	0.068	0.083	
							50	24	23.0	22.1	0.054	0.066	
Body-worn	QPSK	N/A	15	Rear	18900	1880.0	1	49	24.0	23.1	0.201	<b>0.247</b>	17
							50	24	23.0	22.1	0.159	0.195	
				Front	18900	1880.0	1	49	24.0	23.1	0.195	0.239	
							50	24	23.0	22.1	0.154	0.189	
Hotspot	QPSK	ON	10	Rear	18900	1880.0	1	0	23.0	21.4	0.297	0.429	
							50	24	23.0	21.3	0.289	0.427	
				Front	18900	1880.0	1	0	23.0	21.4	0.284	0.411	
							50	24	23.0	21.3	0.223	0.330	
				Edge 3	18900	1880.0	1	0	23.0	21.4	0.300	0.434	
							50	24	23.0	21.3	0.303	<b>0.448</b>	18
				Edge 4	18900	1880.0	1	0	23.0	21.4	0.198	0.286	
							50	24	23.0	21.3	0.155	0.229	

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

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	QPSK	N/A	0	Left Touch	20525	836.5	1	0	25.5	23.9	0.286	<b>0.415</b>	19
							25	0	24.5	23.2	0.240	0.327	
				Left Tilt (15°)	20525	836.5	1	0	25.5	23.9	0.164	0.238	
							25	0	24.5	23.2	0.136	0.185	
				Right Touch	20525	836.5	1	0	25.5	23.9	0.283	0.410	
							25	0	24.5	23.2	0.234	0.319	
				Right Tilt (15°)	20525	836.5	1	0	25.5	23.9	0.156	0.226	
							25	0	24.5	23.2	0.128	0.174	
Body-Worn	QPSK	N/A	15	Rear	20525	836.5	1	0	25.5	23.9	0.281	<b>0.407</b>	20
							25	0	24.5	23.2	0.231	0.315	
				Front	20525	836.5	1	0	25.5	23.9	0.240	0.348	
							25	0	24.5	23.2	0.198	0.270	
Hotspot	QPSK	N/A	10	Rear	20525	836.5	1	0	25.5	23.9	0.315	0.457	
							25	0	24.5	23.2	0.258	0.352	
				Front	20525	836.5	1	0	25.5	23.9	0.257	0.373	
							25	0	24.5	23.2	0.214	0.292	
				Edge 2	20525	836.5	1	0	25.5	23.9	0.201	0.291	
							25	0	24.5	23.2	0.167	0.228	
				Edge 3	20525	836.5	1	0	25.5	23.9	0.119	0.173	
							25	0	24.5	23.2	0.101	0.138	
Edge 4	20525	836.5	1	0	25.5	23.9	0.328	<b>0.476</b>	21				
			25	0	24.5	23.2	0.274	0.373					

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

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	QPSK	N/A	0	Left Touch	23095	707.5	1	49	25.5	24.0	0.233	0.330	
							25	12	24.5	23.2	0.177	0.237	
				Left Tilt (15°)	23095	707.5	1	49	25.5	24.0	0.132	0.187	
							25	12	24.5	23.2	0.101	0.135	
				Right Touch	23095	707.5	1	49	25.5	24.0	0.235	<b>0.333</b>	22
							25	12	24.5	23.2	0.185	0.248	
				Right Tilt (15°)	23095	707.5	1	49	25.5	24.0	0.148	0.210	
							25	12	24.5	23.2	0.116	0.155	
Body-Worn	QPSK	N/A	15	Rear	23095	707.5	1	49	25.5	24.0	0.336	<b>0.476</b>	23
							25	12	24.5	23.2	0.261	0.349	
				Front	23095	707.5	1	49	25.5	24.0	0.288	0.408	
							25	12	24.5	23.2	0.219	0.293	
Hotspot	QPSK	N/A	10	Rear	23095	707.5	1	49	25.5	24.0	0.364	0.515	
							25	12	24.5	23.2	0.281	0.376	
				Front	23095	707.5	1	49	25.5	24.0	0.291	0.412	
							25	12	24.5	23.2	0.223	0.299	
				Edge 2	23095	707.5	1	49	25.5	24.0	0.430	<b>0.609</b>	24
							25	12	24.5	23.2	0.328	0.439	
				Edge 3	23095	707.5	1	49	25.5	24.0	0.041	0.058	
							25	12	24.5	23.2	0.031	0.042	
				Edge 4	23095	707.5	1	49	25.5	24.0	0.394	0.558	
							25	12	24.5	23.2	0.310	0.415	

### 10.9. LTE Band 26 (15MHz Bandwidth)

RF Exposure Conditions	Mode	Power back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	QPSK	N/A	0	Left Touch	26865	831.5	1	37	25.0	24.0	0.289	0.364	
							36	20	24.0	22.9	0.229	0.295	
				Left Tilt (15°)	26865	831.5	1	37	25.0	24.0	0.161	0.203	
							36	20	24.0	22.9	0.128	0.165	
				Right Touch	26865	831.5	1	37	25.0	24.0	0.328	<b>0.413</b>	25
							36	20	24.0	22.9	0.257	0.331	
				Right Tilt (15°)	26865	831.5	1	37	25.0	24.0	0.189	0.238	
							36	20	24.0	22.9	0.149	0.192	
Body-worn	QPSK	N/A	15	Rear	26865	831.5	1	37	25.0	24.0	0.293	<b>0.369</b>	26
							36	20	24.0	22.9	0.233	0.300	
				Front	26865	831.5	1	37	25.0	24.0	0.264	0.332	
							36	20	24.0	22.9	0.210	0.271	
Hotspot	QPSK	N/A	10	Rear	26865	831.5	1	37	25.0	24.0	0.360	0.453	
							36	20	24.0	22.9	0.292	0.376	
				Front	26865	831.5	1	37	25.0	24.0	0.296	0.373	
							36	20	24.0	22.9	0.239	0.308	
				Edge 2	26865	831.5	1	37	25.0	24.0	0.364	<b>0.458</b>	27
							36	20	24.0	22.9	0.295	0.380	
				Edge 3	26865	831.5	1	37	25.0	24.0	0.129	0.162	
							36	20	24.0	22.9	0.102	0.131	
				Edge 4	26865	831.5	1	37	25.0	24.0	0.223	0.281	
							36	20	24.0	22.9	0.180	0.232	

### 10.10. LTE Band 41 (20MHz Bandwidth) (Suwon Lab)

RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	N/A	0	Left Touch	41055	2636.5	1	49	25.0	24.6	0.198	<b>0.215</b>	28
							50	24	24.0	23.7	0.148	0.159	
				Left Tilt	41055	2636.5	1	49	25.0	24.6	0.059	0.064	
							50	24	24.0	23.7	0.046	0.050	
				Right Touch	41055	2636.5	1	49	25.0	24.6	0.108	0.117	
							50	24	24.0	23.7	0.084	0.091	
				Right Tilt	41055	2636.5	1	49	25.0	24.6	0.092	0.100	
							50	24	24.0	23.7	0.072	0.077	
Body-worn	QPSK	N/A	15	Rear	41055	2636.5	1	49	25.0	24.6	0.121	0.131	
							50	24	24.0	23.7	0.098	0.105	
				Front	41055	2636.5	1	49	25.0	24.6	0.155	<b>0.168</b>	29
							50	24	24.0	23.7	0.128	0.138	
Hotspot	QPSK	N/A	10	Rear	41055	2636.5	1	49	25.0	24.6	0.252	0.274	
							50	24	24.0	23.7	0.206	0.221	
				Front	41055	2636.5	1	49	25.0	24.6	0.277	<b>0.301</b>	30
							50	24	24.0	23.7	0.229	0.246	
				Edge 3	41055	2636.5	1	49	25.0	24.6	0.231	0.251	
							50	24	24.0	23.7	0.190	0.204	
				Edge 4	41055	2636.5	1	49	25.0	24.6	0.210	0.228	
							50	24	24.0	23.7	0.176	0.189	

### 10.11. LTE Band 66 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Power Back Off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	QPSK	N/A	0	Left Touch	132322	1745.0	1	49	25.0	23.3	0.163	<b>0.241</b>	31
							50	50	24.0	22.3	0.127	0.187	
				Left Tilt	132322	1745.0	1	49	25.0	23.3	0.113	0.167	
							50	50	24.0	22.3	0.091	0.134	
				Right Touch	132322	1745.0	1	49	25.0	23.3	0.117	0.173	
							50	50	24.0	22.3	0.093	0.137	
Right Tilt	132322	1745.0	1	49	25.0	23.3	0.078	0.115					
			50	50	24.0	22.3	0.062	0.092					
Body-Worn	QPSK	N/A	15	Rear	132322	1745.0	1	49	25.0	23.3	0.138	0.204	
							50	50	24.0	22.3	0.108	0.159	
				Front	132322	1745.0	1	49	25.0	23.3	0.143	<b>0.212</b>	32
							50	50	24.0	22.3	0.104	0.153	
Hotspot	QPSK	ON	10	Rear	132322	1745.0	1	49	23.5	21.8	0.246	0.364	
							50	24	23.5	21.8	0.245	0.362	
				Front	132322	1745.0	1	49	23.5	21.8	0.304	<b>0.450</b>	33
							50	24	23.5	21.8	0.251	0.371	
				Edge 3	132322	1745.0	1	49	23.5	21.8	0.250	0.370	
							50	24	23.5	21.8	0.251	0.371	
Edge 4	132322	1745.0	1	49	23.5	21.8	0.215	0.318					
			50	24	23.5	21.8	0.172	0.254					

## SAR Testing for 5G NR Bands:

The 5G NR Bands have an LTE equivalent Band, such as LTE Band 5 for 5G Band n5 and LTE Band 66 for 5G Band n66. Spot-checks for the 5G NR band were performed on the worst-case position per Exposure Condition per Antenna from the equivalent LTE band.

If the Reported SAR Result for the 5G NR band spot-check is  $\leq$  the Reported SAR result of the LTE equivalent Band, then no further testing is required. If the value is more than 10% greater than the LTE equivalent Band, full testing is required for on the 5G NR band.

### 10.12. NR Band n5 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	$\pi/2$ BPSK	N/A	0	Left Touch	167300	836.6	1	1	25.0	23.8	0.247	<b>0.326</b>	34
Body-worn	$\pi/2$ BPSK	N/A	15	Rear	167300	836.6	1	1	25.0	23.8	0.314	<b>0.414</b>	35
Hotspot	$\pi/2$ BPSK	N/A	10	Edge 4	167300	836.6	1	1	25.0	23.8	0.269	<b>0.355</b>	36

#### Notes:

The Reported SAR for NR Band n5 is  $\leq$  the Reported SAR for LTE Band 5 on the worst-case position per Exposure Condition. Therefore, full SAR testing is not required for NR Band n5.

### 10.13. NR Band n66 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	$\pi/2$ BPSK	N/A	0	Left Touch	349000	1745.0	1	53	24.0	24.0	0.188	<b>0.188</b>	37
Body-worn	$\pi/2$ BPSK	N/A	15	Front	349000	1745.0	1	53	24.0	24.0	0.194	<b>0.194</b>	38
Hotspot	$\pi/2$ BPSK	ON	10	Front	349000	1745.0	1	53	22.5	22.5	0.149	<b>0.149</b>	39

#### Notes:

The Reported SAR for NR Band n66 is  $\leq$  the Reported SAR for LTE Band 66 on the worst-case position per Exposure Condition. Therefore, full SAR testing is not required for NR Band n66.



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

When the 802.11b reported SAR of the highest measured maximum output power channel is  $\leq 0.8$  W/kg, no further SAR testing is required. If SAR is  $> 0.8$  W/kg and  $\leq 1.2$  W/kg, SAR is required for the next highest measured output power channel. Finally, if SAR is  $> 1.2$  W/kg, SAR is required for the third channel.

SAR testing is not required for OFDM mode(s) when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is  $\leq 1.2$  W/kg.

RF Exposure Conditions	Mode	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)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	802.11b	ON	0	Left Touch	6	2437	0.431	98.7%	17.0	16.6			
				Left Tilt	6	2437	0.560	98.7%	17.0	16.6			
				Right Touch	6	2437	0.735	98.7%	17.0	16.6	0.438	0.490	
				Right Tilt	6	2437	0.795	98.7%	17.0	16.6	0.492	<b>0.550</b>	40
Body-worn	802.11b	N/A	15	Rear	11	2462	0.217	98.7%	20.0	20.0	0.135	<b>0.137</b>	41
				Front	11	2462	0.117	98.7%	20.0	20.0			
Hotspot	802.11b	N/A	10	Rear	11	2462	0.477	98.7%	20.0	20.0	0.314	<b>0.319</b>	42
				Front	11	2462	0.217	98.7%	20.0	20.0			
				Edge 1	11	2462	0.355	98.7%	20.0	20.0			
				Edge 4	11	2462	0.083	98.7%	20.0	20.0			

Adjusted SAR for 802.11g/n mode:

RF Exposure Condition	802.11b Max. Power		802.11g/n Max. Power		Worst SAR for 802.11b (W/kg)	Adjusted SAR for 802.11g/n (W/kg)
	dBm	mW	dBm	mW		
Head	17.0	50	17.0	50	0.551	0.551
Body-worn	20.0	100	18.0	63	0.137	0.086
Hotspot	20.0	100	18.0	63	0.319	0.201

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

#### UNII-1 &2A

When the specified maximum output power is the same for both UNII band 1 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 or 3.0 W/kg (1g and 10g respectively), SAR is not required for UNII band 1
- > 1.2 W/kg or 3.0 W/kg (1g and 10g respectively), both bands should be tested independently for SAR.

RF Exposure Conditions	Mode	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)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	802.11n HT40	ON	0	Left Touch	54	5270	0.114	94.9%	14.0	13.7			43
				Left Tilt	54	5270	0.126	94.9%	14.0	13.7			
				Right Touch	54	5270	0.381	94.9%	14.0	13.7	0.146	<b>0.165</b>	
				Right Tilt	54	5270	0.318	94.9%	14.0	13.7			
Body-worn	802.11a	N/A	15	Rear	52	5260	0.273	97.4%	17.0	16.8	0.134	<b>0.143</b>	44
				Front	52	5260	0.094	97.4%	17.0	16.8			
RF Exposure Conditions	Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power (dBm)		10-g SAR (W/kg)		Plot No.
Extremity	802.11a	N/A	0	Rear	52	5260	2.750	97.4%	17.0	16.8			45
				Front	52	5260	2.270	97.4%	17.0	16.8			
				Edge 1	52	5260	1.090	97.4%	17.0	16.8			
				Edge 4	52	5260	9.770	97.4%	17.0	16.8	0.776	<b>0.830</b>	

Adjusted SAR for UNII Band 1 mode:

RF Exposure Condition	Mode	UNII-2A Max. Power		UNII-1 Max. Power		Worst SAR for UNII-2A (W/kg)	Adjusted SAR for UNII-1 (W/kg)
		dBm	mW	dBm	mW		
Head	802.11n HT40	14.0	25	14.0	25	0.165	0.165
Body-worn	802.11a	17.0	50	17.0	50	0.143	0.143
RF Exposure Condition	Mode	UNII-2A Max. Power		UNII-1 Max. Power		Worst SAR for UNII-2A (W/kg)	Adjusted SAR for UNII-1 (W/kg)
Extremity	802.11a	dBm	mW	dBm	mW		

#### UNII-2C

RF Exposure Conditions	Mode	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)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	802.11n HT40	ON	0	Left Touch	126	5630	0.205	94.9%	14.0	13.6			46
				Left Tilt	126	5630	0.153	94.9%	14.0	13.6			
				Right Touch	126	5630	1.010	94.9%	14.0	13.6	0.424	<b>0.487</b>	
				Right Tilt	126	5630	0.638	94.9%	14.0	13.6	0.207	0.238	
Body-worn	802.11a	N/A	15	Rear	100	5500	0.343	97.4%	17.0	16.8	0.165	<b>0.178</b>	47
				Front	100	5500	0.094	97.4%	17.0	16.8			
RF Exposure Conditions	Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power (dBm)		10-g SAR (W/kg)		Plot No.
Extremity	802.11a	N/A	0	Rear	100	5500	2.720	97.4%	17.0	16.8			48
				Front	100	5500	3.840	97.4%	17.0	16.8			
				Edge 1	100	5500	1.410	97.4%	17.0	16.8			
				Edge 4	100	5500	3.970	97.4%	17.0	16.8	0.712	<b>0.767</b>	

**UNII-3**

RF Exposure Conditions	Mode	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)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	802.11n HT40	ON	0	Left Touch	159	5795	0.212	94.9%	14.0	13.7			
				Left Tilt	159	5795	0.201	94.9%	14.0	13.7			
				Right Touch	159	5795	1.160	94.9%	14.0	13.7	0.457	<b>0.514</b>	49
				Right Tilt	159	5795	0.590	94.9%	14.0	13.7	0.313	0.352	
Body-worn	802.11a	N/A	15	Rear	157	5785	0.626	97.4%	17.0	17.0	0.296	<b>0.305</b>	50
				Front	157	5785	0.265	97.4%	17.0	17.0			
Hotspot	802.11a	N/A	10	Rear	157	5785	0.948	97.4%	17.0	17.0	0.488	0.503	
				Front	157	5785	0.483	97.4%	17.0	17.0			
				Edge 1	157	5785	0.489	97.4%	17.0	17.0			
				Edge 4	157	5785	1.400	97.4%	17.0	17.0	0.666	<b>0.687</b>	51

**10.16. Bluetooth**

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up Limit	Meas.	Meas.	Scaled	
Head	GFSK	N/A	0	Left Touch	39	2441	16.0	14.6	0.267	0.369	
				Left Tilt	39	2441	16.0	14.6	0.360	0.497	
				Right Touch	39	2441	16.0	14.6	0.444	0.613	
				Right Tilt	39	2441	16.0	14.6	0.468	<b>0.646</b>	52
Body-worn	GFSK	N/A	15	Rear	39	2441	16.0	14.6	0.096	<b>0.132</b>	53
				Front	39	2441	16.0	14.6	0.057	0.079	
Hotspot	GFSK	N/A	10	Rear	39	2441	16.0	14.6	0.226	<b>0.312</b>	54
				Front	39	2441	16.0	14.6	0.094	0.129	
				Edge 1	39	2441	16.0	14.6	0.174	0.240	
				Edge 4	39	2441	16.0	14.6	0.040	0.056	

## 11. SAR Measurement Variability

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

- 1) Repeated measurement is not required when the original highest measured SAR is  $< 0.8$  or  $2$  W/kg (1-g or 10-g respectively); steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is  $\geq 0.8$  or  $2$  W/kg (1-g or 10-g respectively), repeat that measurement once.
- 3) Perform a second repeated measurement only if the **ratio of largest to smallest SAR** for the original and first repeated measurements is  $> 1.20$  or when the original or repeated measurement is  $\geq 1.45$  or  $3.6$  W/kg ( $\sim 10\%$  from the 1-g or 10-g respective SAR limit).
- 4) Perform a third repeated measurement only if the original, first, or second repeated measurement is  $\geq 1.5$  or  $3.75$  W/kg (1-g or 10-g respectively) and the ratio of largest to smallest SAR for the original, first and second repeated measurements is  $> 1.20$ .

### Note(s):

Repeated measurement is not required since the original highest measured SAR is  $< 0.8$  W/kg (1-g) or  $2$  W/kg (10-g) .

## 12. Simultaneous Transmission Conditions

RF Exposure Condition	Item	Capable Transmit Configurations			
Head	1	WWAN	+	DTS	
	2	WWAN	+	U-NII	
	3	WWAN	+	BT	
	4	WWAN	+	U-NII	+
Body-worn	5	WWAN	+	DTS	
	6	WWAN	+	U-NII	
	7	WWAN	+	BT	
	8	WWAN	+	U-NII	+
Hotspot & Wi-Fi Direct	9	WWAN	+	DTS	
	10	WWAN	+	U-NII	
	11	WWAN	+	BT	
	12	WWAN	+	U-NII	+

Notes:

1. DTS and UNII (5.8GHz) support Hotspot.
2. WWAN support includes GPRS/EDGE, W-CDMA, LTE and NR
3. GPRS/EDGE, W-CDMA, LTE and NR support Hotspot.
4. VoIP is supported in GPRS/EDGE, W-CDMA, LTE and NR.
5. DTS Radio cannot transmit simultaneously with Bluetooth Radio.
6. U-NII Radio can transmit simultaneously with Bluetooth Radio.
7. Wi-Fi Direct is only supported in Hand use configuration.

### 12.1. Simultaneous transmission SAR test exclusion considerations

KDB 447498 D01 General RF Exposure Guidance provides two procedures for determining simultaneous transmission SAR test exclusion: Sum of SAR and SAR to Peak Location Ratio (SPLSR)

#### 12.1.1. Sum of SAR

To qualify for simultaneous transmission SAR test exclusion based upon Sum of SAR the sum of the reported standalone SARs for all simultaneously transmitting antennas shall be below the applicable standalone SAR limit. If the sum of the SARs is above the applicable limit then simultaneous transmission SAR test exclusion may still apply if the requirements of the SAR to Peak Location Ratio (SPLSR) evaluation are met.

#### 12.1.2. SAR to Peak Location Ratio (SPLSR)

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

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

Where:

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

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

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

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

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

When an individual antenna transmits at on two bands simultaneously, the sum of the highest *reported* SAR for the frequency bands should be used to determine **SAR<sub>1</sub>**, or **SAR<sub>2</sub>**. When SPLSR is necessary, the smallest distance between the peak SAR locations for the antenna pair with respect to the peaks from each antenna should be used.

The antennas in all antenna pairs that do not qualify for simultaneous transmission SAR test exclusion must be tested for SAR compliance, according to the enlarged zoom scan and volume scan post-processing procedures in KDB Publication 865664 D01

### 12.2. Sum of the SAR for GSM 850 & Wi-Fi & BT

RF Exposure conditions	Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)			
		WWAN	DTS	UNII	DSS	1+2	1+3	1+4	1+3+4
		Main 1	Sub 2	Sub 3	Sub 2				
		1	2	3	4				
Head	Left Touch	0.469	0.490	0.352	0.369	0.959	0.821	0.837	1.189
	Left Tilt	0.265	0.490	0.352	0.497	0.755	0.617	0.762	1.114
	Right Touch	0.547	0.490	0.514	0.613	1.037	1.061	1.160	1.674
	Right Tilt	0.288	0.550	0.352	0.646	0.838	0.640	0.934	1.286
Body-w orn	Rear	0.535	0.137	0.305	0.132	0.672	0.840	0.667	0.972
	Front	0.493	0.137	0.305	0.079	0.630	0.798	0.571	0.876
Hotspot	Rear	0.618	0.319	0.503	0.312	0.937	1.121	0.930	1.433
	Front	0.505	0.319	0.503	0.129	0.824	1.008	0.634	1.137
	Edge 1		0.319	0.503	0.240				0.743
	Edge 2	0.603							
	Edge 3	0.252							
	Edge 4	0.346	0.319	0.687	0.056	0.665	1.033	0.402	1.089

**Notes:**  
Sum of SAR is > 1.6W/kg. Refer to §12.2.1 for SPLSR Analysis.

### 12.2.1. SAR to Peak Location Ratio (SPLSR) for GSM 850 & Wi-Fi & BT

RF Exposure Conditions	Test Position	WWAN	UNII	DSS	$\Sigma$ 1-g SAR (W/kg)		Calculated distance (mm)	SPLSR ( $\leq 0.04$ )	Volume Scan (Yes/ No)	Figure
		Main 1	Sub 3	Sub 2						
		1	3	4						
Head	Right Touch	0.547	0.514	0.613	1 + 3 + 4	1.674	86.9	0.01	No	1
					1 + 3	1.061				
					1 + 4	1.160				
					3 + 4	1.127				

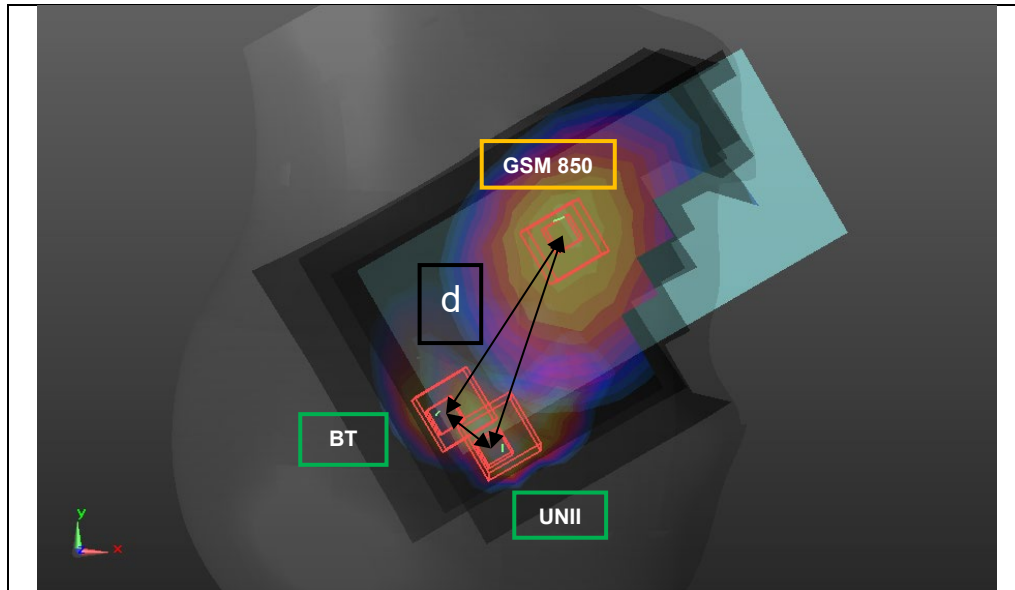
RF Exposure Conditions	Test Position	Mode		Peak SAR	X	Y	Z	d: Calculated distance (mm)	
				W/kg	m	m	m		
Head	Right Touch	GSM 850	Main 1 Ant	0.485	0.058	-0.259	-0.175	1 + 3	86.9
		UNII	Sub 3 Ant	1.220	0.036	-0.343	-0.175		
		GSM 850	Main 1 Ant	0.485	0.058	-0.259	-0.175	1 + 4	85.0
		BT	Sub 2 Ant	0.752	0.012	-0.330	-0.179		
		UNII	Sub 3 Ant	1.220	0.036	-0.343	-0.175	3 + 4	27.8
		BT	Sub 2 Ant	0.752	0.012	-0.330	-0.179		

The Peak Location Separation Distance is computed by using the formula:  $\text{SQRT}((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)$

**Conclusion:**

Simultaneous transmission SAR measurement (Volume Scan) is not required because the SPLSR is  $\leq 0.04$  for all circumstances that require SPLSR calculation.

Figure (1)



### 12.3. Sum of the SAR for GSM 1900 & Wi-Fi & BT

RF Exposure conditions	Test Position	Standalone SAR (W/kg)				$\Sigma$ 1-g SAR (W/kg)			
		WWAN	DTS	UNII	DSS	1+2	1+3	1+4	1+3+4
		Main 2	Sub 2	Sub 3	Sub 2				
		1	2	3	4				
Head	Left Touch	0.137	0.490	0.352	0.369	0.627	0.489	0.506	0.858
	Left Tilt	0.097	0.490	0.352	0.497	0.587	0.449	0.594	0.946
	Right Touch	0.106	0.490	0.514	0.613	0.596	0.621	0.719	1.233
	Right Tilt	0.067	0.550	0.352	0.646	0.617	0.419	0.713	1.065
Body-w orn	Rear	0.180	0.137	0.305	0.132	0.317	0.485	0.312	0.617
	Front	0.119	0.137	0.305	0.079	0.256	0.424	0.198	0.503
Hotspot	Rear	0.268	0.319	0.503	0.312	0.587	0.771	0.580	1.083
	Front	0.344	0.319	0.503	0.129	0.663	0.847	0.473	0.976
	Edge 1		0.319	0.503	0.240				0.743
	Edge 2								
	Edge 3	0.510							
	Edge 4	0.243	0.319	0.687	0.056	0.562	0.930	0.299	0.986

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

RF Exposure conditions	Test Position	Standalone SAR (W/kg)				$\Sigma$ 1-g SAR (W/kg)			
		WWAN	DTS	UNII	DSS	1+2	1+3	1+4	1+3+4
		Main 2	Sub 2	Sub 3	Sub 2				
		1	2	3	4				
Head	Left Touch	0.188	0.490	0.352	0.369	0.678	0.540	0.556	0.908
	Left Tilt	0.135	0.490	0.352	0.497	0.625	0.487	0.631	0.983
	Right Touch	0.154	0.490	0.514	0.613	0.644	0.668	0.767	1.281
	Right Tilt	0.096	0.550	0.352	0.646	0.646	0.448	0.742	1.094
Body-w orn	Rear	0.247	0.137	0.305	0.132	0.384	0.552	0.379	0.684
	Front	0.219	0.137	0.305	0.079	0.356	0.524	0.298	0.603
Hotspot	Rear	0.421	0.319	0.503	0.312	0.740	0.924	0.733	1.236
	Front	0.334	0.319	0.503	0.129	0.653	0.837	0.463	0.966
	Edge 1		0.319	0.503	0.240				0.743
	Edge 2								
	Edge 3	0.410							
	Edge 4	0.216	0.319	0.687	0.056	0.535	0.902	0.272	0.958



### 12.5. Sum of the SAR for WCDMA Band IV & Wi-Fi & BT

RF Exposure conditions	Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)			
		WWAN	DTS	UNII	DSS	1+2	1+3	1+4	1+3+4
		Main 2	Sub 2	Sub 3	Sub 2				
		1	2	3	4				
Head	Left Touch	0.226	0.490	0.352	0.369	0.716	0.578	0.595	0.947
	Left Tilt	0.156	0.490	0.352	0.497	0.646	0.508	0.653	1.005
	Right Touch	0.151	0.490	0.514	0.613	0.641	0.665	0.764	1.278
	Right Tilt	0.115	0.550	0.352	0.646	0.665	0.467	0.761	1.113
Body-w orn	Rear	0.304	0.137	0.305	0.132	0.441	0.609	0.436	0.741
	Front	0.240	0.137	0.305	0.079	0.377	0.545	0.318	0.623
Hotspot	Rear	0.309	0.319	0.503	0.312	0.628	0.812	0.621	1.124
	Front	0.270	0.319	0.503	0.129	0.589	0.773	0.399	0.902
	Edge 1		0.319	0.503	0.240				0.743
	Edge 2								
	Edge 3	0.331							
	Edge 4	0.235	0.319	0.687	0.056	0.554	0.921	0.291	0.977

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

RF Exposure conditions	Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)			
		WWAN	DTS	UNII	DSS	1+2	1+3	1+4	1+3+4
		Main 1	Sub 2	Sub 3	Sub 2				
		1	2	3	4				
Head	Left Touch	0.317	0.490	0.352	0.369	0.807	0.669	0.686	1.038
	Left Tilt	0.162	0.490	0.352	0.497	0.652	0.514	0.659	1.011
	Right Touch	0.347	0.490	0.514	0.613	0.837	0.861	0.960	1.474
	Right Tilt	0.196	0.550	0.352	0.646	0.746	0.548	0.842	1.194
Body-w orn	Rear	0.394	0.137	0.305	0.132	0.531	0.699	0.526	0.831
	Front	0.353	0.137	0.305	0.079	0.490	0.658	0.431	0.736
Hotspot	Rear	0.448	0.319	0.503	0.312	0.767	0.951	0.760	1.263
	Front	0.354	0.319	0.503	0.129	0.673	0.857	0.483	0.986
	Edge 1		0.319	0.503	0.240				0.743
	Edge 2	0.474							
	Edge 3	0.115							
	Edge 4	0.315	0.319	0.687	0.056	0.634	1.002	0.371	1.058

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

RF Exposure conditions	Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)			
		WWAN	DTS	UNII	DSS	1+2	1+3	1+4	1+3+4
		Main 2	Sub 2	Sub 3	Sub 2				
		1	2	3	4				
Head	Left Touch	0.160	0.490	0.352	0.369	0.650	0.512	0.529	0.881
	Left Tilt	0.126	0.490	0.352	0.497	0.616	0.478	0.623	0.975
	Right Touch	0.142	0.490	0.514	0.613	0.632	0.656	0.755	1.269
	Right Tilt	0.083	0.550	0.352	0.646	0.633	0.435	0.729	1.081
Body-w orn	Rear	0.247	0.137	0.305	0.132	0.384	0.552	0.379	0.684
	Front	0.239	0.137	0.305	0.079	0.376	0.544	0.318	0.623
Hotspot	Rear	0.429	0.319	0.503	0.312	0.748	0.932	0.741	1.244
	Front	0.411	0.319	0.503	0.129	0.730	0.914	0.540	1.043
	Edge 1		0.319	0.503	0.240				0.743
	Edge 2								
	Edge 3	0.448							
	Edge 4	0.286	0.319	0.687	0.056	0.605	0.973	0.342	1.029

### 12.8. Sum of the SAR for LTE Band 5 & Wi-Fi & BT

RF Exposure conditions	Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)			
		WWAN	DTS	UNII	DSS	1+2	1+3	1+4	1+3+4
		Main 1	Sub 2	Sub 3	Sub 2				
		1	2	3	4				
Head	Left Touch	0.415	0.490	0.352	0.369	0.905	0.767	0.784	1.136
	Left Tilt	0.238	0.490	0.352	0.497	0.728	0.590	0.735	1.087
	Right Touch	0.410	0.490	0.514	0.613	0.900	0.924	1.023	1.537
	Right Tilt	0.226	0.550	0.352	0.646	0.776	0.578	0.872	1.224
Body-w orn	Rear	0.407	0.137	0.305	0.132	0.544	0.712	0.539	0.844
	Front	0.348	0.137	0.305	0.079	0.485	0.653	0.427	0.732
Hotspot	Rear	0.457	0.319	0.503	0.312	0.776	0.960	0.769	1.272
	Front	0.373	0.319	0.503	0.129	0.692	0.876	0.502	1.005
	Edge 1		0.319	0.503	0.240				0.743
	Edge 2	0.291							
	Edge 3	0.173							
	Edge 4	0.476	0.319	0.687	0.056	0.795	1.163	0.532	1.219

### 12.9. Sum of the SAR for LTE Band 12 & Wi-Fi & BT

RF Exposure conditions	Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)			
		WWAN	DTS	UNII	DSS	1+2	1+3	1+4	1+3+4
		Main 1	Sub 2	Sub 3	Sub 2				
		1	2	3	4				
Head	Left Touch	0.330	0.490	0.352	0.369	0.820	0.682	0.699	1.051
	Left Tilt	0.187	0.490	0.352	0.497	0.677	0.539	0.684	1.036
	Right Touch	0.333	0.490	0.514	0.613	0.823	0.847	0.946	1.460
	Right Tilt	0.210	0.550	0.352	0.646	0.760	0.562	0.856	1.208
Body-w orn	Rear	0.476	0.137	0.305	0.132	0.613	0.781	0.608	0.913
	Front	0.408	0.137	0.305	0.079	0.545	0.713	0.487	0.792
Hotspot	Rear	0.515	0.319	0.503	0.312	0.834	1.018	0.827	1.330
	Front	0.412	0.319	0.503	0.129	0.731	0.915	0.541	1.044
	Edge 1		0.319	0.503	0.240				0.743
	Edge 2	0.609							
	Edge 3	0.058							
	Edge 4	0.558	0.319	0.687	0.056	0.877	1.245	0.614	1.301

### 12.10. Sum of the SAR for LTE Band 26 & Wi-Fi & BT

RF Exposure conditions	Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)			
		WWAN	DTS	UNII	DSS	1+2	1+3	1+4	1+3+4
		Main 1	Sub 2	Sub 3	Sub 2				
		1	2	3	4				
Head	Left Touch	0.364	0.490	0.352	0.369	0.854	0.716	0.733	1.085
	Left Tilt	0.203	0.490	0.352	0.497	0.693	0.555	0.700	1.052
	Right Touch	0.413	0.490	0.514	0.613	0.903	0.927	1.026	1.540
	Right Tilt	0.238	0.550	0.352	0.646	0.788	0.590	0.884	1.236
Body-w orn	Rear	0.369	0.137	0.305	0.132	0.506	0.674	0.501	0.806
	Front	0.332	0.137	0.305	0.079	0.469	0.637	0.411	0.716
Hotspot	Rear	0.453	0.319	0.503	0.312	0.772	0.956	0.765	1.268
	Front	0.373	0.319	0.503	0.129	0.692	0.876	0.502	1.005
	Edge 1		0.319	0.503	0.240				0.743
	Edge 2	0.458							
	Edge 3	0.162							
	Edge 4	0.281	0.319	0.687	0.056	0.600	0.968	0.337	1.024

### 12.11. Sum of the SAR for LTE Band 41 & Wi-Fi & BT

RF Exposure conditions	Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)			
		WWAN	DTS	UNII	DSS	1+2	1+3	1+4	1+3+4
		Main 2	Sub 2	Sub 3	Sub 2				
		1	2	3	4				
Head	Left Touch	0.215	0.490	0.352	0.369	0.705	0.567	0.584	0.936
	Left Tilt	0.064	0.490	0.352	0.497	0.554	0.416	0.561	0.913
	Right Touch	0.117	0.490	0.514	0.613	0.607	0.631	0.730	1.244
	Right Tilt	0.100	0.550	0.352	0.646	0.650	0.452	0.746	1.098
Body-worn	Rear	0.131	0.137	0.305	0.132	0.268	0.436	0.263	0.568
	Front	0.168	0.137	0.305	0.079	0.305	0.473	0.247	0.552
Hotspot	Rear	0.274	0.319	0.503	0.312	0.593	0.777	0.586	1.089
	Front	0.301	0.319	0.503	0.129	0.620	0.804	0.430	0.933
	Edge 1		0.319	0.503	0.240				0.743
	Edge 2								
	Edge 3	0.251							
	Edge 4	0.228	0.319	0.687	0.056	0.547	0.915	0.284	0.971

### 12.12. Sum of the SAR for LTE Band 66 & Wi-Fi & BT

RF Exposure conditions	Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)			
		WWAN	DTS	UNII	DSS	1+2	1+3	1+4	1+3+4
		Main 2	Sub 2	Sub 3	Sub 2				
		1	2	3	4				
Head	Left Touch	0.241	0.490	0.352	0.369	0.731	0.593	0.610	0.962
	Left Tilt	0.167	0.490	0.352	0.497	0.657	0.519	0.664	1.016
	Right Touch	0.173	0.490	0.514	0.613	0.663	0.687	0.786	1.300
	Right Tilt	0.115	0.550	0.352	0.646	0.665	0.467	0.761	1.113
Body-worn	Rear	0.204	0.137	0.305	0.132	0.341	0.509	0.336	0.641
	Front	0.212	0.137	0.305	0.079	0.349	0.517	0.291	0.596
Hotspot	Rear	0.364	0.319	0.503	0.312	0.683	0.867	0.676	1.179
	Front	0.450	0.319	0.503	0.129	0.769	0.953	0.579	1.082
	Edge 1		0.319	0.503	0.240				0.743
	Edge 2								
	Edge 3	0.371							
	Edge 4	0.318	0.319	0.687	0.056	0.637	1.005	0.374	1.061

### 12.13. Sum of the SAR for LTE Band 66 (Anchor) & NR Band n5 & Wi-Fi & BT

RF Exposure conditions	Test Position	Standalone SAR (W/kg)					Σ 1-g SAR (W/kg)				
		WWAN		DTS	UNII	DSS	1+2	1+2+3	1+2+4	1+2+5	1+2+4+5
		Anchor	NR	Sub 2	Sub 3	Sub 2					
		1	2	3	4	5					
Head	Left Touch	0.241	0.326	0.490	0.352	0.369	0.567	1.057	0.919	0.936	1.288
	Left Tilt	0.167	0.238	0.490	0.352	0.497	0.405	0.895	0.757	0.902	1.254
	Right Touch	0.173	0.410	0.490	0.514	0.613	0.583	1.073	1.097	1.196	1.710
	Right Tilt	0.115	0.226	0.550	0.352	0.646	0.341	0.891	0.693	0.987	1.339
Body-worn	Rear	0.204	0.414	0.137	0.305	0.132	0.618	0.755	0.923	0.750	1.055
	Front	0.212	0.348	0.137	0.305	0.079	0.560	0.697	0.865	0.639	0.944
Hotspot	Rear	0.364	0.457	0.319	0.503	0.312	0.821	1.140	1.324	1.133	1.636
	Front	0.450	0.373	0.319	0.503	0.129	0.823	1.142	1.326	0.952	1.455
	Edge 1			0.319	0.503	0.240					0.743
	Edge 2		0.291								
	Edge 3	0.371	0.173				0.544				
	Edge 4	0.318	0.355	0.319	0.687	0.056	0.673	0.992	1.360	0.729	1.416

**Notes:**

- The Reported SAR for NR Band n5 is ≤ the Reported SAR for LTE Band 5 on the worst-case position per Exposure Condition. Therefore, full SAR testing is not required for NR Band n5. LTE Band 5 data is considered representative of NR Band n5 for Simultaneous Transmission Analysis.
- Sum of SAR is > 1.6W/kg. Refer to §12.13.1 for SPLSR Analysis.

### 12.13.1. SAR to Peak Location Ratio (SPLSR) for LTE B66 & NR Bn5 & Wi-Fi & BT

RF Exposure Conditions	Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure	
		WWAN		UNII	DSS						
		Anchor	NR	Sub 3	Sub 2						
		1	2	4	5						
Head	Right Touch	0.173	0.410	0.514	0.613	1 + 2 + 4 + 5	1.710			2	
						1 + 2	0.583	13.4	0.03		No
						1 + 4	0.687	93.0	0.01		No
						1 + 5	0.786	89.4	0.01		No
						2 + 4	0.924	82.3	0.01		No
						2 + 5	1.023	81.4	0.01		No
Hotspot	Rear	0.364	0.457	0.503	0.312	1 + 2 + 4 + 5	1.636			3	
						1 + 2	0.821	88.5	0.01		No
						1 + 4	0.867	135.5	0.01		No
						1 + 5	0.676	135.5	0.00		No
						2 + 4	0.96	68.5	0.01		No
						2 + 5	0.769	59.4	0.01		No
Head	Right Touch	Mode		Peak SAR	X	Y	Z	d: Calculated distance (mm)			
				W/kg	m	m	m				
		LTE B66	Main 2 Ant	0.126	0.054	-0.252	-0.171	1 + 2	13.4		
		NR n5	Main 1 Ant	0.339	0.059	-0.264	-0.175				
		LTE B66	Main 2 Ant	0.126	0.054	-0.252	-0.171	1 + 4	93.0		
		UNII	Sub 3 Ant	1.220	0.036	-0.343	-0.175				
		LTE B66	Main 2 Ant	0.126	0.054	-0.252	-0.171	1 + 5	89.4		
		BT	Sub 2 Ant	0.752	0.012	-0.330	-0.179				
		NR n5	Main 1 Ant	0.339	0.059	-0.264	-0.175	2 + 4	82.3		
		UNII	Sub 3 Ant	1.220	0.036	-0.343	-0.175				
NR n5	Main 1 Ant	0.339	0.059	-0.264	-0.175	2 + 5	81.4				
BT	Sub 2 Ant	0.752	0.012	-0.330	-0.179						
Hotspot	Rear	Mode		Peak SAR	X	Y	Z	d: Calculated distance (mm)			
				W/kg	m	m	m				
		LTE B66	Main 2 Ant	0.349	0.002	-0.064	-0.209	1 + 2	88.5		
		NR n5	Main 1 Ant	0.382	-0.030	0.019	-0.207				
		LTE B66	Main 2 Ant	0.349	0.002	-0.064	-0.209	1 + 4	135.5		
		UNII	Sub 3 Ant	1.120	0.014	0.071	-0.209				
		LTE B66	Main 2 Ant	0.349	0.002	-0.064	-0.209	1 + 5	135.5		
		BT	Sub 2 Ant	0.388	-0.003	0.071	-0.212				
		NR n5	Main 1 Ant	0.382	-0.030	0.019	-0.207	2 + 4	68.5		
		UNII	Sub 3 Ant	1.120	0.014	0.071	-0.209				
NR n5	Main 1 Ant	0.382	-0.030	0.019	-0.207	2 + 5	59.4				
BT	Sub 2 Ant	0.388	-0.003	0.071	-0.212						
UNII	Sub 3 Ant	1.120	0.014	0.071	-0.209	4 + 5	17.7				
BT	Sub 2 Ant	0.388	-0.003	0.071	-0.212						

The Peak Location Separation Distance is computed by using the formula:  $SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)$

**Conclusion:**  
 Simultaneous transmission SAR measurement (Volume Scan) is not required because the SPLSR is ≤ 0.04 for all circumstances that require SPLSR calculation.

Figure (2)

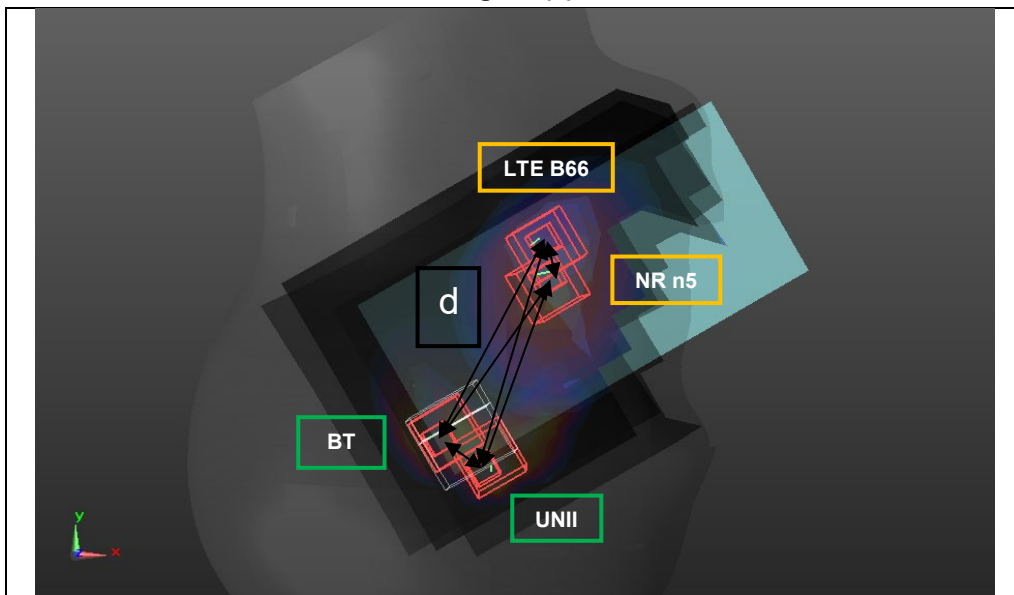
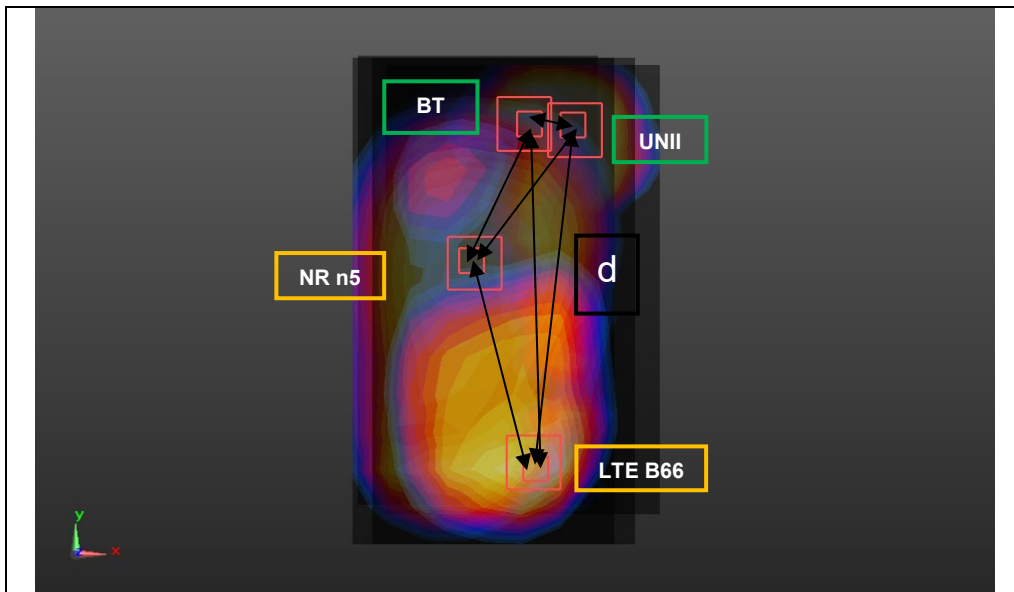


Figure (3)



### 12.14. Sum of the SAR for LTE Band 5 (Anchor) & NR Band n66 & Wi-Fi & BT

RF Exposure conditions	Test Position	Standalone SAR (W/kg)					Σ 1-g SAR (W/kg)				
		WWAN		DTS	UNII	DSS	1+2	1+2+3	1+2+4	1+2+5	1+2+4+5
		Anchor	NR	Sub 2	Sub 3	Sub 2					
1	2	3	4	5							
Head	Left Touch	0.415	0.188	0.490	0.352	0.369	0.603	1.093	0.955	0.972	1.324
	Left Tilt	0.238	0.167	0.490	0.352	0.497	0.405	0.895	0.757	0.902	1.254
	Right Touch	0.410	0.173	0.490	0.514	0.613	0.583	1.073	1.097	1.196	1.710
	Right Tilt	0.226	0.115	0.550	0.352	0.646	0.341	0.891	0.693	0.987	1.339
Body-worn	Rear	0.407	0.204	0.137	0.305	0.132	0.611	0.748	0.916	0.743	1.048
	Front	0.348	0.194	0.137	0.305	0.079	0.542	0.679	0.847	0.621	0.926
Hotspot	Rear	0.457	0.364	0.319	0.503	0.312	0.821	1.140	1.324	1.133	1.636
	Front	0.373	0.149	0.319	0.503	0.129	0.522	0.841	1.025	0.651	1.154
	Edge 1			0.319	0.503	0.240					0.743
	Edge 2	0.291									
	Edge 3	0.173	0.371				0.544				
	Edge 4	0.476	0.318	0.319	0.687	0.056	0.794	1.113	1.481	0.850	1.537

**Notes:**

- The Reported SAR for NR Band n66 is ≤ the Reported SAR for LTE Band 66 on the worst-case position per Exposure Condition. Therefore, full SAR testing is not required for NR Band n66. LTE Band 66 data is considered representative of NR Band n66 for Simultaneous Transmission Analysis.
- Sum of SAR is > 1.6W/kg. Refer to §12.14.1 for SPLSR Analysis.

**12.14.1. SAR to Peak Location Ratio (SPLSR) for LTE B5 & NR Bn66 & Wi-Fi & BT**

RF Exposure Conditions	Test Position	Standalone SAR (W/kg)				Σ 1-g SAR (W/kg)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure	
		WWAN		UNII	DSS						
		Anchor	NR	Sub 3	Sub 2						
	1	2	4	5							
Head	Right Touch	0.410	0.173	0.514	0.613	1 + 2 + 4 + 5	1.710			4	
						1 + 2	0.583	13.4	0.03		No
						1 + 4	0.924	82.3	0.01		No
						1 + 5	1.023	81.4	0.01		No
						2 + 4	0.687	93.0	0.01		No
						2 + 5	0.786	89.4	0.01		No
						4 + 5	1.127	27.8	0.04		No
Hotspot	Rear	0.457	0.364	0.503	0.312	1 + 2 + 4 + 5	1.636			5	
						1 + 2	0.821	88.5	0.01		No
						1 + 4	0.96	68.5	0.01		No
						1 + 5	0.769	59.4	0.01		No
						2 + 4	0.867	135.5	0.01		No
						2 + 5	0.676	135.5	0.00		No
						4 + 5	0.815	17.7	0.04		No

RF Exposure Conditions	Test Position	Mode		Peak SAR	X	Y	Z	d: Calculated distance (mm)	
				W/kg	m	m	m		
Head	Right Touch	LTE B5	Main 1 Ant	0.339	0.059	-0.264	-0.175	1 + 2	13.4
		NR n66	Main 2 Ant	0.126	0.054	-0.252	-0.171		
		LTE B5	Main 1 Ant	0.339	0.059	-0.264	-0.175	1 + 4	82.3
		UNII	Sub 3 Ant	1.220	0.036	-0.343	-0.175		
		LTE B5	Main 1 Ant	0.339	0.059	-0.264	-0.175	1 + 5	81.4
		BT	Sub 2 Ant	0.752	0.012	-0.330	-0.179		
		NR n66	Main 2 Ant	0.126	0.054	-0.252	-0.171	2 + 4	93.0
		UNII	Sub 3 Ant	1.220	0.036	-0.343	-0.175		
		NR n66	Main 2 Ant	0.126	0.054	-0.252	-0.171	2 + 5	89.4
		BT	Sub 2 Ant	0.752	0.012	-0.330	-0.179		
		UNII	Sub 3 Ant	1.220	0.036	-0.343	-0.175	4 + 5	27.8
		BT	Sub 2 Ant	0.752	0.012	-0.330	-0.179		
Hotspot	Rear	LTE B5	Main 1 Ant	0.382	-0.030	0.019	-0.207	1 + 2	88.5
		NR n66	Main 2 Ant	0.349	0.002	-0.064	-0.209		
		LTE B5	Main 1 Ant	0.382	-0.030	0.019	-0.207	1 + 4	68.5
		UNII	Sub 3 Ant	1.120	0.014	0.071	-0.209		
		LTE B5	Main 1 Ant	0.382	-0.030	0.019	-0.207	1 + 5	59.4
		BT	Sub 2 Ant	0.388	-0.003	0.071	-0.212		
		NR n66	Main 2 Ant	0.349	0.002	-0.064	-0.209	2 + 4	135.5
		UNII	Sub 3 Ant	1.120	0.014	0.071	-0.209		
		NR n66	Main 2 Ant	0.349	0.002	-0.064	-0.209	2 + 5	135.5
		BT	Sub 2 Ant	0.388	-0.003	0.071	-0.212		
		UNII	Sub 3 Ant	1.120	0.014	0.071	-0.209	4 + 5	17.7
		BT	Sub 2 Ant	0.388	-0.003	0.071	-0.212		

The Peak Location Separation Distance is computed by using the formula:  $\text{SQRT}((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)$

**Conclusion:**  
 Simultaneous transmission SAR measurement (Volume Scan) is not required because the SPLSR is ≤ 0.04 for all circumstances that require SPLSR calculation.

Figure (4)

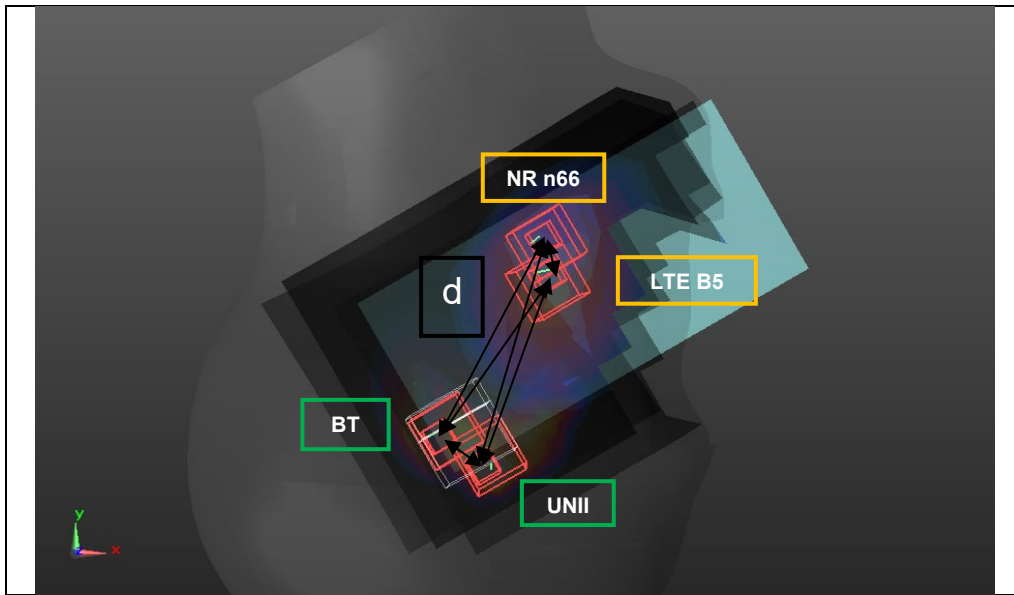
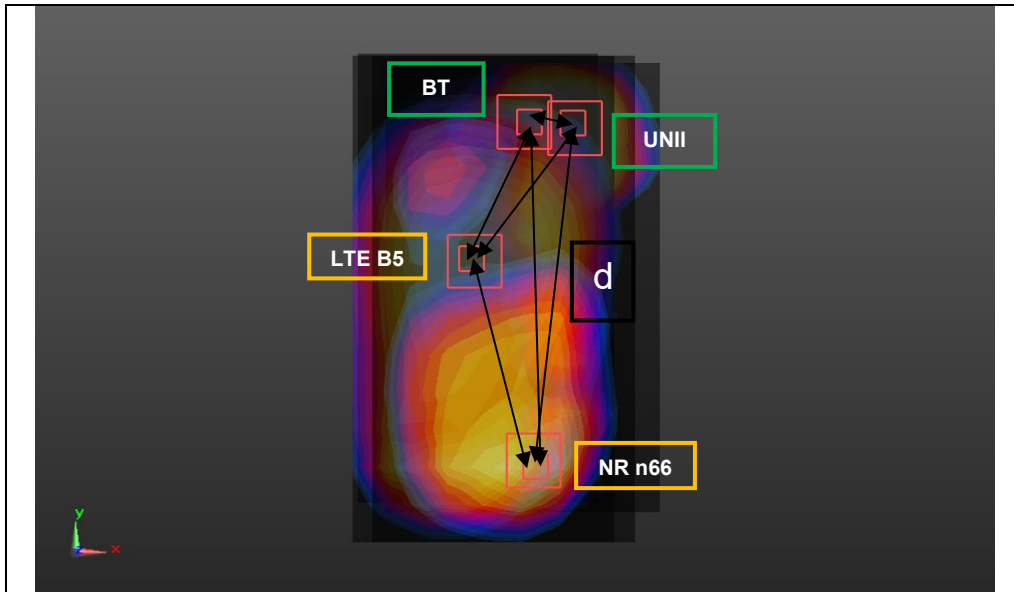


Figure (5)





## **Appendixes**

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

**Appendix A: SAR Setup Photos**

**Appendix B: SAR System Check Plots**

**Appendix C: SAR Highest Test Plots**

**Appendix D: SAR Tissue Ingredients**

**Appendix E: SAR Probe Certificates**

**Appendix F: SAR Dipole Certificates**

**Appendix G: Proximity Sensors**

**END OF REPORT**