



SAR EVALUATION REPORT

CLASS II PERMISSIVE CHANGE

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

For

CDMA/GSM/WCDMA/LTE PHONE + BLUETOOTH, DTS/UNII a/b/g/n/ac & NFC

**FCC ID: ZNFH790
Model Name: LG-H790, LGH790, H790**

**Report Number: 15I21523-S1V1
Issue Date: 9/14/2015**

Prepared for

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Date	Revisions	Revised By
V1	9/14/2015	Initial Issue	--

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1. Attestation of Test Results

Applicant Name	LG ELECTRONICS MOBILECOMM USA, INC.			
FCC ID	ZNFH790			
Model Name	LG-H790, LGH790, H790			
Applicable Standards	FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013			
SAR Limits (W/Kg)				
Exposure Category	Peak spatial-average(1g of tissue)			
General population / Uncontrolled exposure	1.6			
The Highest Reported SAR (W/kg)				
RF Exposure Conditions	Equipment Class			
	Licensed	DTS	U-NII	DSS (BT)
Head	0.898	0.999	1.099	0.131
Body-worn*	1.000	0.356	0.379	0.050
Hotspot/Wi-Fi Direct			0.379	N/A
Simultaneous Tx	1.559	1.476	1.559	1.559
Date Tested	8/18/2015 to 8/27/2015			
Test Results	Pass			
UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report. Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.				
Approved & Released By:		Prepared By:		
				
Bobby Bayani Senior Engineer UL Verification Services Inc.		James Kim Laboratory Technician UL Verification Services Inc.		

2. Test Specification, Methods and Procedures

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

- 248227 D01 802.11 Wi-Fi SAR v02r01
- 447498 D01 General RF Exposure Guidance v05r02
- 648474 D04 Handset SAR v01r02
- 690783 D01 SAR Listings on Grants v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r01
- 941225 D01 3G SAR Procedures v03
- 941225 D02: HSPA and 1x Advanced v02r02
- 941225 D03: SAR Test Reduction GSM GPRS EDGE v01
- 941225 D05 SAR for LTE Devices v02r03
- 941225 D05A LTE Rel.10 KDB Inquiry Sheet v01r01
- 941225 D06 Hotspot Mode v02

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

- [TCB workshop](#) October, 2014; Page 36, RF Exposure Procedures Update

3. Facilities and Accreditation

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

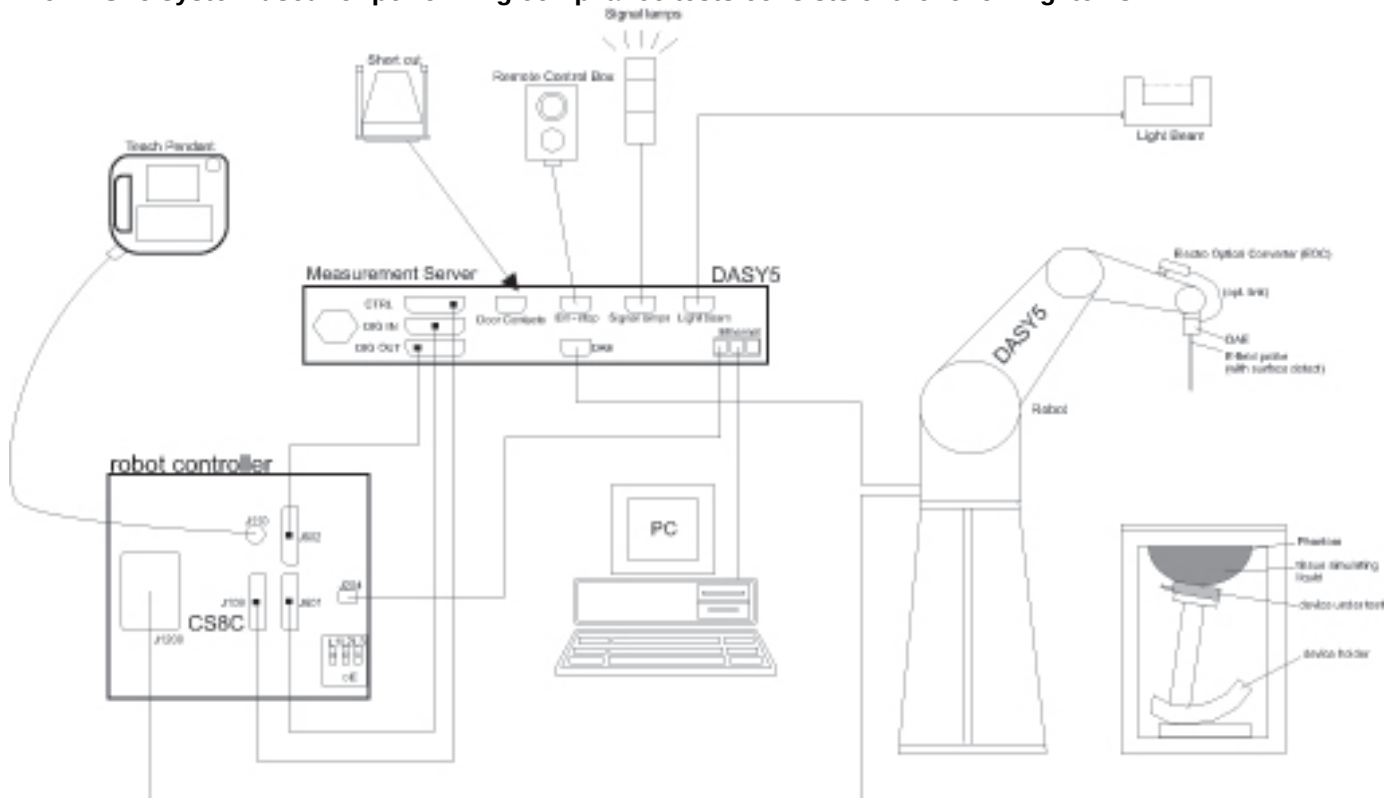
47173 Benicia Street	47266 Benicia Street
SAR Lab A	SAR Lab 1
SAR Lab B	SAR Lab 2
SAR Lab C	SAR Lab 3
SAR Lab D	SAR Lab 4
SAR Lab E	SAR Lab 5
SAR Lab F	
SAR Lab G	
SAR Lab H	

UL Verification Services Inc. is accredited by [NVLAP](#), Laboratory Code 200065-0.

4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

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



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

4.2. SAR Scan Procedures

Step 1: Power Reference Measurement

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

Step 2: Area Scan

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

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

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

Step 3: Zoom Scan

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

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

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

Step 4: Power drift measurement

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

Step 5: Z-Scan (FCC only)

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

4.3. Test Equipment

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

Dielectric Property Measurements

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Network Analyzer	Agilent	E753ES	MY40000980	4/17/2016
Dielectric Probe kit	SPEAG	DAK-3.5	1087	11/11/2015
Shorting block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	Control Company	Traceable	122529162	10/8/2015

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Synthesized Signal Generator	HP	8665B	3744A01155	3/18/2016
Power Meter	HP	437B	3125U16345	6/15/2016
Power Meter	HP	437B	3125U12345	7/31/2016
Power Sensor	HP	8481A	2349A36506	9/29/2016
Power Sensor	HP	8481A	2702A76223	9/17/2015
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1795092	N/A
Directional coupler	Werlatone	C8060-102	2141	N/A
DC Power Supply	BK PRECISION	1611	215-02292	N/A
E-Field Probe (SAR Lab A)	SPEAG	EX3DV4	3901	1/27/2016
E-Field Probe (SAR Lab B)	SPEAG	EX3DV4	3751	11/14/2015
E-Field Probe (SAR Lab E)	SPEAG	EX3DV4	3772	2/23/2016
E-Field Probe (SAR Lab F)	SPEAG	EX3DV4	3929	4/22/2016
Data Acquisition Electronics (SAR Lab A)	SPEAG	DAE4	1357	2/20/2016
Data Acquisition Electronics (SAR Lab B)	SPEAG	DAE4	1360	3/12/2016
Data Acquisition Electronics (SAR Lab E)	SPEAG	DAE4	1257	9/29/2015
Data Acquisition Electronics (SAR Lab F)	SPEAG	DAE4	1359	2/18/2016
System Validation Dipole	SPEAG	D750V3	1019	3/11/2016
System Validation Dipole	SPEAG	D835V2	4d002	11/13/2015
System Validation Dipole	SPEAG	D1750V2	1050	4/15/2016
System Validation Dipole	SPEAG	D1750V2	1077	9/11/2015
System Validation Dipole	SPEAG	D1900V2	5d043	11/7/2015
System Validation Dipole	SPEAG	D2450V2	899	3/13/2016
System Validation Dipole	SPEAG	D2600V2	1036	3/13/2016
System Validation Dipole	SPEAG	D5GHzV2	1003	2/20/2016
Thermometer (SAR Lab A)	EXTECH	445703	CCS-206	3/19/2016
Thermometer (SAR Lab B)	EXTECH	445703	CCS-249	9/18/2015
Thermometer (SAR Lab E)	EXTECH	445703	CCS-235	6/5/2016
Thermometer (SAR Lab F)	EXTECH	445703	CCS-209	3/16/2016

Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Power Meter	Agilent	N1912A	MY53060002	4/7/2016
Power Sensor	Agilent	N1921A	MY53260011	6/1/2016
Power Sensor	Agilent	N1921A	MY52260009	12/12/2015
Base Station Simulator	R & S	CMW500	135390	4/6/2016
Base Station Simulator	R & S	CMW500	124594	10/15/2015
Base Station Simulator	R & S	CMU200	838114	8/14/2016

5. Measurement Uncertainty

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

6. Device Under Test (DUT) Information

6.1. DUT Description

Device Dimension	Overall (Length x Width): 146.9 mm x 72.5 mm Overall Diagonal: 156 mm Display Diagonal: 133 mm		
Back Cover	☒ The rechargeable battery is not user accessible.		
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. ☒ Mobile Hotspot (Wi-Fi 2.4 GHz) ☒ Mobile Hotspot (Wi-Fi 5.8 GHz)		
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other ☒ Wi-Fi Direct (Wi-Fi 2.4 GHz) ☒ Wi-Fi Direct (Wi-Fi 5.2 and 5.8 GHz)		
Test sample information	S/N	IMEI	Notes
	218DM	353626-07-002261-6	LTE SAR SAMPLE
	218DK	353626-07-002262-4	LTE SAR SAMPLE
	218DL	353626-07-002259-0	2G/3G SAR SAMPLE
	218DJ	353626-07-002260-8	2G/3G SAR SAMPLE
	218DR	353626-07-002258-2	WLAN SAR SAMPLE
	218DN	353626-07-002257-4	WLAN SAR SAMPLE
	21SE0	353626-07-002249-1	WLAN CONDUCTED SAMPLE
	21SE2	353626-07-002250-9	WLAN CONDUCTED SAMPLE
Hardware Version	LG-H790, LGH790, H790		
Software Version	N/A		

6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode		Duty Cycle used for SAR testing
GSM	850 1900	Voice (GMSK) GPRS (GMSK) EGPRS (8PSK)	GPRS Multi-Slot Class: ☐ Class 8 - 1 Up, 4 Down ☐ Class 10 - 2 Up, 4 Down ☒ Class 12 - 4 Up, 4 Down ☐ 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%
	☐ Class A = Can be connected to GPRS service and GSM service (voice, SMS), using both at the same time. Does this device support DTM (Dual Transfer Mode)? ☐ Yes ☐ No ☒ Class B = GPRS connection interrupted during a GSM call, automatically resumed at end of call. ☐ Class C = manual GSM / GPRS mode switching.			
CDMA (CDMA2000)	BC0 BC1 BC10	1xRTT (Voice & Data) 1xEV-DO Rel. 0 1xEV-DO Rev. A 1xAdvanced		100%
	Does this device support SV-DO (1xRTT-1xEVDO)? ☐ Yes ☒ No			
W-CDMA (UMTS)	Band II Band IV Band V	UMTS Rel. 99 (Voice & Data) HSDPA (Rel. 5) HSUPA (Rel. 6) DC-HSDPA (Rel. 8) HSPA+ (Rel. 7)		100%
LTE	FDD Band 2 FDD Band 4 FDD Band 5 FDD Band 7 FDD Band 12 FDD Band 13 FDD Band 17 FDD Band 25 FDD Band 26 FDD Band 29 (Rx Only) TDD Band 41	QPSK 16QAM ☐ Rel. 10 Does not support Carrier Aggregation (CA) ☒ Rel. 10 Carrier Aggregation (1 Uplink and 2 Downlinks) ☐ Rel. 11 Carrier Aggregation (2 Uplink and 2 Downlinks)		100% (FDD) 63.3% (TDD)
	Does this device support SV-LTE (1xRTT-LTE)? ☐ Yes ☒ No			
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20) 802.11ac (VHT20)		100%
	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40) 802.11ac (VHT20) 802.11ac (VHT40) 802.11ac (VHT80)		100%
	Does this device support bands 5.60 ~ 5.65 GHz? ☐ Yes ☒ No			
	Does this device support Band gap channel(s)? ☒ Yes ☐ No			
Bluetooth	2.4 GHz	Version 4.2 LE		77.5% (DH5)

6.3. Nominal and Maximum Output Power

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

Upper limit (dB): -1.5 ~ 0.5		Max. RF Output Power (dBm)		
RF Air interface	Mode	Target	Max. tune-up tolerance limit	
			Burst	Frame
GSM850	Voice (1 slot)	32.7	33.2	24.2
	GPRS 1 slot	32.7	33.2	24.2
	GPRS 2 slots	30.7	31.2	25.2
	GPRS 3 slots	28.7	29.2	24.9
	GPRS 4 slots	27.7	28.2	25.2
	EGPRS 1 slot	26.7	27.2	18.2
	EGPRS 2 slots	25.7	26.2	20.2
	EGPRS 3 slots	24.7	25.2	20.9
	EGPRS 4 slots	23.7	24.2	21.2
GSM1900	Voice (1 slot)	29.2	29.7	20.7
	GPRS 1 slot	29.2	29.7	20.7
	GPRS 2 slots	27.2	27.7	21.7
	GPRS 3 slots	25.2	25.7	21.4
	GPRS 4 slots	24.2	24.7	21.7
	EGPRS 1 slot	25.2	25.7	16.7
	EGPRS 2 slots	24.2	24.7	18.7
	EGPRS 3 slots	23.2	23.7	19.4
	EGPRS 4 slots	22.2	22.7	19.7

Upper limit (dB): -1.5 ~ 0.5		Max. RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit
W-CDMA Band II	R99	23.4	23.9
	HSDPA	23.4	23.9
	HSUPA	23.4	23.9
	DC-HSDPA	23.4	23.9
	HSPA+	23.4	23.9
W-CDMA Band IV	R99	23.4	23.9
	HSDPA	23.4	23.9
	HSUPA	23.4	23.9
	DC-HSDPA	23.4	23.9
	HSPA+	23.4	23.9
W-CDMA Band V	R99	24.2	24.7
	HSDPA	24.2	24.7
	HSUPA	24.2	24.7
	DC-HSDPA	24.2	24.7
	HSPA+	24.2	24.7

Upper limit (dB): -1.5 ~ 0.5		Max. RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit
CDMA BC0	1xRTT	24.2	24.7
	1xAdvanced	24.2	24.7
	1xEVDO Rel. 0	24.2	24.7
	1xEVDO Rev. A	24.2	24.7
CDMA BC1	1xRTT	24.2	24.7
	1xAdvanced	24.2	24.7
	1xEVDO Rel. 0	23.2	23.7
	1xEVDO Rev. A	23.2	23.7
CDMA BC10	1xRTT	24.2	24.7
	1xAdvanced	24.2	24.7
	1xEVDO Rel. 0	24.2	24.7
	1xEVDO Rev. A	24.2	24.7
LTE Band 2	QPSK	22.9	23.4
	16QAM	21.9	22.4
LTE Band 4	QPSK	22.9	23.4
	16QAM	21.9	22.4
LTE Band 5	QPSK	23.7	24.2
	16QAM	22.7	23.2
LTE Band 7	QPSK	23.2	23.7
	16QAM	22.2	22.7
LTE Band 12	QPSK	23.7	24.2
	16QAM	22.7	23.2
LTE Band 13	QPSK	23.7	24.2
	16QAM	22.7	23.2
LTE Band 17	QPSK	23.7	24.2
	16QAM	22.7	23.2
LTE Band 25	QPSK	22.9	23.4
	16QAM	21.9	22.4
LTE Band 26	QPSK	23.7	24.2
	16QAM	22.7	23.2
LTE Band 41	QPSK	22.7	23.2
	16QAM	21.7	22.2

*LTE Carrier Aggregation shares identical target power and tune-up tolerance as noted above

Upper limit (dB): 1.0		Max. RF Output Power (dBm)		
RF Air interface	Mode	CH.	Target	Max. tune-up tolerance limit
WiFi 2.4 GHz	802.11b	All	17.0	18.0
	802.11g	1 and 11	14.5	15.5
		2-10	15.5	16.5
	802.11n HT20	1 and 11	14.5	15.5
		2-10	15.5	16.5
	802.11ac VHT20	1 and 11	14.5	15.5
		2-10	15.5	16.5
WiFi 5 GHz	802.11a	All	14.0	15.0
	802.11n HT20	All	13.5	14.5
	802.11n HT40	All	11.5	12.5
	802.11ac VHT20	All	13.5	14.5
	802.11ac VHT40	All	11.5	12.5
	802.11ac VHT80	All	10.5	11.5
Bluetooth		All	8.9	9.9
Bluetooth LE		All	1.0	2.0

6.4. General LTE SAR Test and Reporting Considerations

Item	Description						
Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 2	Frequency range: 1850 - 1910 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	18700/ 1860	18675/ 1857.5	18650/ 1855	18625/ 1852.5	18615/ 1851.5	18607/ 1850.7
	Mid	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880
	High	19100/ 1900	19125/ 1902.5	19150/ 1905	19175/ 1907.5	19185/ 1908.5	19193/ 1909.3
	Band 4	Frequency range: 1710 - 1755 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	20050/ 1720	20025/ 1717.5	20000/ 1715	19975/ 1712.5	19965/ 1711.5	19957/ 1710.7
	Mid	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5
	High	20300/ 1745	20325/ 1747.5	20350/ 1750	20375/ 1752.5	20385/ 1753.5	20393/ 1754.3
	Band 5	Frequency range: 824 - 849 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low			20450/ 829	20425/ 826.5	20415/ 825.5	20407/ 824.7
	Mid			20525/ 836.5	20525/ 836.5	20525/ 836.5	20525/ 836.5
	High			20600/ 844	20625/ 846.5	20635/ 847.5	20643/ 848.3
	Band 7	Frequency range: 2500 - 2570 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	20850 2510	20825 2507.5	20800 2505	20775 2502.5		
	Mid	21100 2535	21100 2535	21100 2535	21100 2535		
	High	21350 2560	21375 2562.5	21400 2565	21425 2567.5		
	Band 12	Frequency range: 699 – 716 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low				23035/ 701.5	23025/ 700.5	23017/ 699.7
	Mid			23095/ 707.5	23095/ 707.5	23095/ 707.5	23095/ 707.5
	High				23155/ 713.5	23165/ 714.5	23173/ 715.3
	Band 13	Frequency range: 777 - 787 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low				23205/ 779.5		
	Mid			23230/ 782	23230/ 782		
	High				23255/ 784.5		

General LTE SAR Test and Reporting Considerations (Continued)

Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 17	Frequency range: 704 - 716 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low				23755/ 706.5		
	Mid			23790/ 710	23790/ 710		
	High				23825/ 713.5		
	Band 25	Frequency range: 1850 - 1915 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	26140/ 1860	26115/ 1857.5	26090/ 1855	26065/ 1852.5	26055/ 1851.5	26047/ 1850.7
	Mid	26365/ 1882.5	26365/ 1882.5	26365/ 1882.5	26365/ 1882.5	26365/ 1882.5	26365/ 1882.5
	High	26590/ 1905	26615/ 1907.5	26640/ 1910	26665/ 1912.5	26675/ 1913.5	26683/ 1914.3
	Band 26	Frequency range: 814 - 849 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	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		26865/ 831.5	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
	Band 41	Frequency range: 2496 - 2690 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	39750/ 2506.0	39725/ 2503.5	39700/ 2501	39675/ 2498.5		
	Low-Mid	40185/ 2549.5	40173/ 2548.3	40160/ 2547.0	40148/ 2545.8		
	Mid	40620/ 2593.0	40620/ 2593.0	40620/ 2593.0	40620/ 2593.0		
	Mid-High	41055/ 2636.5	41068/ 2547.8	41080/ 2639.0	41093/ 2640.3		
	High	41490/ 2680.0	41515/ 2682.5	41540/ 2685.0	41565/ 2687.5		

General LTE SAR Test and Reporting Considerations (Continued)

	Primary Channel Bandwidth (MHz)		Secondary Channel Bandwidth (MHz)	
	Band	Bandwidth (MHz)	Band	Bandwidth (MHz)
Carrier Aggregation Combinations (For supported channels, please refer to the tables above)	Band 2	20, 15, 10, 5	Band 13	10
	Band 4	20, 15, 10, 5	Band 13	10
	Band 13	10	Band 2	20, 15, 10, 5
	Band 13	10	Band 4	20, 15, 10, 5
	Band 2	20, 15, 10, 5, 3, 1.4	Band 4	20, 15, 10, 5
	Band 4	20, 15, 10, 5	Band 2	20, 15, 10, 5, 3, 1.4
	Band 2	10, 5	Band 17	10, 5
	Band 17	10, 5	Band 2	10, 5
	Band 4	10, 5	Band 17	10, 5
	Band 17	10, 5	Band 4	10, 5
	Band 2	20, 15, 10, 5	Band 29	10, 5, 3
	Band 4	20, 15, 10, 5	Band 29	10, 5, 3
	Band 2	20, 15, 10, 5	Band 5	10, 5
	Band 5	10, 5	Band 2	20, 15, 10, 5
	Band 4	20, 15, 10, 5	Band 5	10, 5
	Band 5	10, 5	Band 4	20, 15, 10, 5
	Band 2	20, 15, 10, 5	Band 12	10, 5, 3
	Band 12	10, 5, 3	Band 2	20, 15, 10, 5
	Band 4	20, 15, 10, 5, 3, 1.4	Band 12	10, 5, 3
	Band 12	10, 5, 3	Band 4	20, 15, 10, 5, 3, 1.4
	Band 4	10, 5	Band 7	20, 15, 10, 5
	Band 7	20, 15, 10, 5	Band 4	10, 5
	Band 2	20, 15, 10, 5	Band 2	20, 15, 10, 5
	Band 4	20, 15, 10, 5	Band 4	20, 15, 10, 5
	Band 41	20, 15, 10, 5	Band 41	20, 15, 10, 5

General LTE SAR Test and Reporting Considerations (Continued)

LTE transmitter and antenna implementation	LTE Bands 2/4/25/41 have one (1) Tx/Rx antenna LTE Bands 5/7/12/13/17/26 have one (1) Tx/Rx antenna LTE Bands 2/4/5/12/13/17/25/26 have one (1) Rx antenna LTE Bands 7/41 have one (1) Rx antenna Refer to Appendix A																																														
Maximum power reduction (MPR)	<table><tr><th colspan="8">Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3</th></tr><tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th><th rowspan="2">MPR (dB)</th></tr><tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr><tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr><tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr><tr><td>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></table> MPR Built-in by design A-MPR (additional MPR) was disabled during SAR testing	Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3								Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1	64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3																																															
Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)																																								
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz																																									
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1																																								
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1																																								
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2																																								
Power reduction	No																																														
Spectrum plots for RB configurations	A properly configured base station simulator was used for the SAR and power measurements; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.																																														

6.5. 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.

SAR was tested with the highest transmission duty factor (63.33%) using Uplink-downlink configuration 0 and Special subframe configuration 7.

LTE TDD Band 41 supports 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	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
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	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

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	63.33
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.33
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.33
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.67
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.67
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.67
6	5 ms	D	S	U	U	U	D	S	U	U	D	53.33

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

Example for Calculated Duty Cycle for Uplink-Downlink Configuration 0:

Calculated Duty Cycle = $5120 \times [1/(15000 \times 2048)] \times 2 + 6 \text{ ms} = 63.33\%$

where

$T_s = 1/(15000 \times 2048)$ seconds

7. RF Exposure Conditions (Test Configurations)

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

Wireless technologies	RF Exposure Conditions	DUT-to-User Separation	Test Position	Antenna-to-edge/surface	SAR Required	Note
WWAN (Antenna 1)	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	10 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	1
			Edge 2 (Right)	< 25 mm	Yes	
			Edge 3 (Bottom)	< 25 mm	Yes	
			Edge 4 (Left)	> 25 mm	No	1
WWAN (Antenna 2)	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	10 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	1
			Edge 2 (Right)	< 25 mm	Yes	
			Edge 3 (Bottom)	< 25 mm	Yes	
			Edge 4 (Left)	< 25 mm	Yes	
WLAN (Antenna 3)	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	10 mm	Rear	N/A	Yes	
			Front	N/A	Yes	
	Hotspot / Wi-Fi Direct	10 mm	Rear	< 25 mm	Yes	
			Front	< 25 mm	Yes	
			Edge 1 (Top)	< 25 mm	Yes	
			Edge 2 (Right)	> 25 mm	No	1
			Edge 3 (Bottom)	> 25 mm	No	1
			Edge 4 (Left)	< 25 mm	Yes	
WLAN (Antenna 4)	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	10 mm	Rear	N/A	Yes	
			Front	N/A	Yes	
	Hotspot / Wi-Fi Direct	10 mm	Rear	< 25 mm	Yes	
			Front	< 25 mm	Yes	
			Edge 1 (Top)	< 25 mm	Yes	
			Edge 2 (Right)	> 25 mm	No	1
			Edge 3 (Bottom)	> 25 mm	No	1
			Edge 4 (Left)	< 25 mm	Yes	

Notes:

1. SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR.

8. Dielectric Property Measurements & System Check

8.1. Dielectric Property Measurements

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

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

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

Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

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

IEEE Std 1528-2013

Refer to Table 3 within the IEEE Std 1528-2013

Dielectric Property Measurements Results:**SAR Lab A**

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
8/18/2015	Body 1750	e'	52.0000	Relative Permittivity (ε _r):	52.00	53.44	-2.70	5
		e"	14.8800	Conductivity (σ):	1.45	1.49	-2.57	5
	Body 1710	e'	52.0100	Relative Permittivity (ε _r):	52.01	53.54	-2.86	5
		e"	14.8200	Conductivity (σ):	1.41	1.46	-3.59	5
	Body 1755	e'	51.9900	Relative Permittivity (ε _r):	51.99	53.43	-2.69	5
		e"	14.8700	Conductivity (σ):	1.45	1.49	-2.56	5
8/18/2015	Body 1900	e'	52.6500	Relative Permittivity (ε _r):	52.65	53.30	-1.22	5
		e"	14.9900	Conductivity (σ):	1.58	1.52	4.19	5
	Body 1850	e'	52.7900	Relative Permittivity (ε _r):	52.79	53.30	-0.96	5
		e"	14.9800	Conductivity (σ):	1.54	1.52	1.38	5
	Body 1910	e'	52.6300	Relative Permittivity (ε _r):	52.63	53.30	-1.26	5
		e"	14.9700	Conductivity (σ):	1.59	1.52	4.59	5
8/18/2015	Head 1750	e'	40.6000	Relative Permittivity (ε _r):	40.60	40.08	1.29	5
		e"	14.0800	Conductivity (σ):	1.37	1.37	0.08	5
	Head 1710	e'	40.7200	Relative Permittivity (ε _r):	40.72	40.15	1.43	5
		e"	13.9700	Conductivity (σ):	1.33	1.35	-1.35	5
	Head 1755	e'	40.5800	Relative Permittivity (ε _r):	40.58	40.08	1.26	5
		e"	14.0900	Conductivity (σ):	1.37	1.37	0.23	5
8/18/2015	Head 1900	e'	41.6400	Relative Permittivity (ε _r):	41.64	40.00	4.10	5
		e"	13.5900	Conductivity (σ):	1.44	1.40	2.55	5
	Head 1850	e'	41.8100	Relative Permittivity (ε _r):	41.81	40.00	4.53	5
		e"	13.5400	Conductivity (σ):	1.39	1.40	-0.51	5
	Head 1910	e'	41.6000	Relative Permittivity (ε _r):	41.60	40.00	4.00	5
		e"	13.5900	Conductivity (σ):	1.44	1.40	3.09	5
8/20/2015	Body 750	e'	56.2900	Relative Permittivity (ε _r):	56.29	55.55	1.34	5
		e"	23.1200	Conductivity (σ):	0.96	0.96	0.11	5
	Body 700	e'	56.7800	Relative Permittivity (ε _r):	56.78	55.74	1.87	5
		e"	23.6400	Conductivity (σ):	0.92	0.96	-4.08	5
	Body 790	e'	55.9600	Relative Permittivity (ε _r):	55.96	55.39	1.02	5
		e"	22.8000	Conductivity (σ):	1.00	0.97	3.66	5
8/20/2015	Head 750	e'	41.1200	Relative Permittivity (ε _r):	41.12	41.96	-2.01	5
		e"	21.3700	Conductivity (σ):	0.89	0.89	-0.21	5
	Head 700	e'	41.8100	Relative Permittivity (ε _r):	41.81	42.22	-0.97	5
		e"	21.8000	Conductivity (σ):	0.85	0.89	-4.58	5
	Head 790	e'	40.6600	Relative Permittivity (ε _r):	40.66	41.76	-2.63	5
		e"	21.1800	Conductivity (σ):	0.93	0.90	3.82	5
8/24/2015	Body 750	e'	53.5000	Relative Permittivity (ε _r):	53.50	55.55	-3.68	5
		e"	23.3200	Conductivity (σ):	0.97	0.96	0.98	5
	Body 700	e'	54.0700	Relative Permittivity (ε _r):	54.07	55.74	-2.99	5
		e"	23.6800	Conductivity (σ):	0.92	0.96	-3.91	5
	Body 790	e'	53.0200	Relative Permittivity (ε _r):	53.02	55.39	-4.28	5
		e"	23.0300	Conductivity (σ):	1.01	0.97	4.71	5
8/24/2015	Head 1750	e'	39.3000	Relative Permittivity (ε _r):	39.30	40.08	-1.96	5
		e"	13.7600	Conductivity (σ):	1.34	1.37	-2.20	5
	Head 1710	e'	39.5800	Relative Permittivity (ε _r):	39.58	40.15	-1.41	5
		e"	13.7500	Conductivity (σ):	1.31	1.35	-2.90	5
	Head 1755	e'	39.2300	Relative Permittivity (ε _r):	39.23	40.08	-2.11	5
		e"	13.7500	Conductivity (σ):	1.34	1.37	-2.19	5

SAR Lab B

Date	Freq. (MHz)		Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)
8/18/2015	Body 1900	e'	53.5400	Relative Permittivity (ϵ_r):	53.54	53.30	0.45	5
		e"	14.6700	Conductivity (σ):	1.55	1.52	1.96	5
	Body 1850	e'	53.6300	Relative Permittivity (ϵ_r):	53.63	53.30	0.62	5
		e"	14.4000	Conductivity (σ):	1.48	1.52	-2.55	5
	Body 1910	e'	53.5200	Relative Permittivity (ϵ_r):	53.52	53.30	0.41	5
		e"	14.7600	Conductivity (σ):	1.57	1.52	3.13	5
8/20/2015	Head 1900	e'	38.8800	Relative Permittivity (ϵ_r):	38.88	40.00	-2.80	5
		e"	13.2400	Conductivity (σ):	1.40	1.40	-0.09	5
	Head 1850	e'	39.0900	Relative Permittivity (ϵ_r):	39.09	40.00	-2.27	5
		e"	13.1400	Conductivity (σ):	1.35	1.40	-3.45	5
	Head 1910	e'	38.8500	Relative Permittivity (ϵ_r):	38.85	40.00	-2.88	5
		e"	13.2500	Conductivity (σ):	1.41	1.40	0.51	5
8/24/2015	Body 835	e'	53.2400	Relative Permittivity (ϵ_r):	53.24	55.20	-3.55	5
		e"	21.6800	Conductivity (σ):	1.01	0.97	3.77	5
	Body 820	e'	53.4700	Relative Permittivity (ϵ_r):	53.47	55.28	-3.27	5
		e"	21.7800	Conductivity (σ):	0.99	0.97	2.54	5
	Body 850	e'	53.1000	Relative Permittivity (ϵ_r):	53.10	55.16	-3.73	5
		e"	21.6200	Conductivity (σ):	1.02	0.99	3.51	5
8/25/2015	Head 835	e'	41.4400	Relative Permittivity (ϵ_r):	41.44	41.50	-0.14	5
		e"	20.1300	Conductivity (σ):	0.93	0.90	3.85	5
	Head 820	e'	41.7200	Relative Permittivity (ϵ_r):	41.72	41.60	0.28	5
		e"	20.2600	Conductivity (σ):	0.92	0.90	2.81	5
	Head 850	e'	41.4400	Relative Permittivity (ϵ_r):	41.44	41.50	-0.14	5
		e"	20.1300	Conductivity (σ):	0.95	0.92	3.98	5

SAR Lab E

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
8/21/2015	Head 2450	e'	37.6800	Relative Permittivity (ϵ_r):	37.68	39.20	-3.88	5
		e"	13.4400	Conductivity (σ):	1.83	1.80	1.72	5
	Head 2410	e'	37.8000	Relative Permittivity (ϵ_r):	37.80	39.28	-3.77	5
		e"	13.3200	Conductivity (σ):	1.78	1.76	1.39	5
	Head 2475	e'	37.5900	Relative Permittivity (ϵ_r):	37.59	39.17	-4.03	5
		e"	13.4700	Conductivity (σ):	1.85	1.83	1.46	5
8/22/2015	Body 2450	e'	52.3600	Relative Permittivity (ϵ_r):	52.36	52.70	-0.65	5
		e"	14.3600	Conductivity (σ):	1.96	1.95	0.32	5
	Body 2410	e'	52.4700	Relative Permittivity (ϵ_r):	52.47	52.76	-0.55	5
		e"	14.2500	Conductivity (σ):	1.91	1.91	0.11	5
	Body 2475	e'	52.3100	Relative Permittivity (ϵ_r):	52.31	52.67	-0.68	5
		e"	14.4100	Conductivity (σ):	1.98	1.99	-0.10	5
8/24/2015	Head 2600	e'	40.7000	Relative Permittivity (ϵ_r):	40.70	39.01	4.33	5
		e"	14.0700	Conductivity (σ):	2.03	1.96	3.66	5
	Head 2500	e'	41.0500	Relative Permittivity (ϵ_r):	41.05	39.14	4.89	5
		e"	13.8400	Conductivity (σ):	1.92	1.85	3.77	5
	Head 2700	e'	40.3400	Relative Permittivity (ϵ_r):	40.34	38.88	3.74	5
		e"	14.2500	Conductivity (σ):	2.14	2.07	3.34	5
8/24/2015	Body 2600	e'	51.3000	Relative Permittivity (ϵ_r):	51.30	52.51	-2.31	5
		e"	15.3600	Conductivity (σ):	2.22	2.16	2.77	5
	Body 2500	e'	51.6100	Relative Permittivity (ϵ_r):	51.61	52.64	-1.95	5
		e"	15.1200	Conductivity (σ):	2.10	2.02	4.04	5
	Body 2700	e'	50.9600	Relative Permittivity (ϵ_r):	50.96	52.38	-2.72	5
		e"	15.5700	Conductivity (σ):	2.34	2.30	1.57	5
8/26/2015	Head 2450	e'	39.0700	Relative Permittivity (ϵ_r):	39.07	39.20	-0.33	5
		e"	13.0800	Conductivity (σ):	1.78	1.80	-1.01	5
	Head 2410	e'	39.2000	Relative Permittivity (ϵ_r):	39.20	39.28	-0.20	5
		e"	12.9900	Conductivity (σ):	1.74	1.76	-1.12	5
	Head 2475	e'	38.9800	Relative Permittivity (ϵ_r):	38.98	39.17	-0.48	5
		e"	13.1200	Conductivity (σ):	1.81	1.83	-1.18	5
8/26/2015	Body 2450	e'	51.3400	Relative Permittivity (ϵ_r):	51.34	52.70	-2.58	5
		e"	14.6600	Conductivity (σ):	2.00	1.95	2.42	5
	Body 2410	e'	51.4400	Relative Permittivity (ϵ_r):	51.44	52.76	-2.50	5
		e"	14.5600	Conductivity (σ):	1.95	1.91	2.29	5
	Body 2475	e'	51.2900	Relative Permittivity (ϵ_r):	51.29	52.67	-2.62	5
		e"	14.7000	Conductivity (σ):	2.02	1.99	1.91	5

SAR Lab F

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
8/20/2015	Head 5180	e'	36.8800	Relative Permittivity (ϵ_r):	36.88	36.01	2.41	5
		e"	15.5000	Conductivity (σ):	4.46	4.63	-3.59	5
	Head 5200	e'	36.8600	Relative Permittivity (ϵ_r):	36.86	35.99	2.42	5
		e"	15.5000	Conductivity (σ):	4.48	4.65	-3.64	5
	Head 5600	e'	36.3000	Relative Permittivity (ϵ_r):	36.30	35.53	2.16	5
		e"	15.7200	Conductivity (σ):	4.89	5.06	-3.27	5
	Head 5800	e'	36.0600	Relative Permittivity (ϵ_r):	36.06	35.30	2.15	5
		e"	15.8000	Conductivity (σ):	5.10	5.27	-3.31	5
	Head 5825	e'	36.0500	Relative Permittivity (ϵ_r):	36.05	35.30	2.12	5
e"		15.8000	Conductivity (σ):	5.12	5.27	-2.90	5	
8/20/2015	Body 5180	e'	47.6500	Relative Permittivity (ϵ_r):	47.65	49.05	-2.85	5
		e"	18.4900	Conductivity (σ):	5.33	5.27	1.03	5
	Body 5200	e'	47.6000	Relative Permittivity (ϵ_r):	47.60	49.02	-2.90	5
		e"	18.5200	Conductivity (σ):	5.35	5.29	1.14	5
	Body 5600	e'	46.8700	Relative Permittivity (ϵ_r):	46.87	48.48	-3.32	5
		e"	18.9500	Conductivity (σ):	5.90	5.76	2.42	5
	Body 5800	e'	46.5300	Relative Permittivity (ϵ_r):	46.53	48.20	-3.46	5
		e"	19.1100	Conductivity (σ):	6.16	6.00	2.72	5
	Body 5825	e'	46.5000	Relative Permittivity (ϵ_r):	46.50	48.20	-3.53	5
e"		19.1700	Conductivity (σ):	6.21	6.00	3.48	5	
8/24/2015	Body 5180	e'	48.3600	Relative Permittivity (ϵ_r):	48.36	49.05	-1.40	5
		e"	17.9000	Conductivity (σ):	5.16	5.27	-2.20	5
	Body 5200	e'	48.2900	Relative Permittivity (ϵ_r):	48.29	49.02	-1.49	5
		e"	17.9600	Conductivity (σ):	5.19	5.29	-1.92	5
	Body 5600	e'	47.7200	Relative Permittivity (ϵ_r):	47.72	48.48	-1.56	5
		e"	18.2100	Conductivity (σ):	5.67	5.76	-1.58	5
	Body 5800	e'	47.5200	Relative Permittivity (ϵ_r):	47.52	48.20	-1.41	5
		e"	18.3700	Conductivity (σ):	5.92	6.00	-1.26	5
	Body 5825	e'	47.4600	Relative Permittivity (ϵ_r):	47.46	48.20	-1.54	5
e"		18.3700	Conductivity (σ):	5.95	6.00	-0.84	5	
8/24/2015	Head 5180	e'	36.5800	Relative Permittivity (ϵ_r):	36.58	36.01	1.57	5
		e"	15.7600	Conductivity (σ):	4.54	4.63	-1.97	5
	Head 5200	e'	36.4900	Relative Permittivity (ϵ_r):	36.49	35.99	1.39	5
		e"	15.8000	Conductivity (σ):	4.57	4.65	-1.78	5
	Head 5600	e'	36.0100	Relative Permittivity (ϵ_r):	36.01	35.53	1.34	5
		e"	15.9100	Conductivity (σ):	4.95	5.06	-2.10	5
	Head 5800	e'	35.7700	Relative Permittivity (ϵ_r):	35.77	35.30	1.33	5
		e"	15.9900	Conductivity (σ):	5.16	5.27	-2.15	5
	Head 5825	e'	35.7300	Relative Permittivity (ϵ_r):	35.73	35.30	1.22	5
e"		15.9800	Conductivity (σ):	5.18	5.27	-1.79	5	

8.2. System Check

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

System Performance Check Measurement Conditions:

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

Reference Target SAR Values

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

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	Target SAR Values (W/kg)		
				1g/10g	Head	Body
D750V3	1019	3/11/2015	750	1g	8.44	8.53
				10g	5.50	5.68
D835V2	4d002	11/13/2014	835	1g	9.23	9.33
				10g	5.99	6.12
D1750V2	1050	4/15/2015	1750	1g	36.4	37.0
				10g	19.3	19.9
D1750V2	1077	9/11/2014	1750	1g	36.5	36.9
				10g	19.4	19.8
D1900V2	5d043	11/7/2014	1900	1g	40.6	40.0
				10g	21.1	21.3
D2450V2	899	3/13/2015	2450	1g	51.6	48.8
				10g	23.9	22.7
D2600V2	1036	3/13/2015	2600	1g	56.1	56.2
				10g	25.0	25.0
D5GHzV2	1003	2/20/2015	5200	1g	76.4	72.7
				10g	21.9	20.4
			5600	1g	79.6	77.0
				10g	22.8	21.3
			5800	1g	76.1	75.0
				10g	21.7	20.6

System Check Results

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

SAR Lab A

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta $\pm 10\%$	Plot No.
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W			
8/18/2015	D1750V2	1050	Head	1g	3.82	38.2	36.4	4.95
				10g	2.03	20.3	19.3	5.18
8/18/2015	D1750V2	1050	Body	1g	3.86	38.6	37.0	4.32
				10g	2.04	20.4	19.9	2.51
8/18/2015	D1900V2	5d043	Head	1g	4.05	40.5	40.6	-0.25
				10g	2.07	20.7	21.1	-1.90
8/18/2015	D1900V2	5d043	Body	1g	4.12	41.2	40.0	3.00
				10g	2.11	21.1	21.3	-0.94
8/20/2015	D750V3	1019	Head	1g	0.876	8.76	8.44	3.79
				10g	0.576	5.76	5.50	4.73
8/20/2015	D750V3	1019	Body	1g	0.825	8.25	8.53	-3.28
				10g	0.551	5.51	5.68	-2.99
8/24/2015	D750V3	1019	Body	1g	0.852	8.52	8.53	-0.12
				10g	0.566	5.66	5.68	-0.35
8/24/2015	D1750V2	1077	Head	1g	3.73	37.3	36.5	2.19
				10g	1.99	19.9	19.4	2.58

SAR Lab B

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta $\pm 10\%$	Plot No.
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W			
8/18/2015	D1900V2	5d043	Body	1g	3.98	39.8	40.0	-0.50
				10g	2.06	20.6	21.3	-3.29
8/20/2015	D1900V2	5d043	Head	1g	3.88	38.8	40.6	-4.43
				10g	2.03	20.3	21.1	-3.79
8/24/2015	D835V2	4d002	Body	1g	0.933	9.33	9.33	0.00
				10g	0.613	6.13	6.12	0.16
8/25/2015	D835V2	4d002	Head	1g	0.923	9.23	9.23	0.00
				10g	0.603	6.03	5.99	0.67

SAR Lab E

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta $\pm 10\%$	Plot No.
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W			
8/21/2015	D2450V2	899	Head	1g	5.24	52.4	51.6	1.55
				10g	2.42	24.2	23.9	1.26
8/22/2015	D2450V2	899	Body	1g	4.87	48.7	48.8	-0.20
				10g	2.26	22.6	22.7	-0.44
8/24/2015	D2600V2	1036	Head	1g	5.96	59.6	56.1	6.24
				10g	2.64	26.4	25.0	5.60
8/24/2015	D2600V2	1036	Body	1g	5.81	58.1	56.2	3.38
				10g	2.56	25.6	25.0	2.40
8/26/2015	D2450V2	899	Head	1g	5.19	51.9	51.6	0.58
				10g	2.40	24.0	23.9	0.42
8/26/2015	D2450V2	899	Body	1g	4.96	49.6	48.8	1.64
				10g	2.29	22.9	22.7	0.88

SAR Lab F

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W			
8/20/2015	D5GHzV2 5.2 GHz	1003	Head	1g	7.35	73.5	76.4	-3.80
				10g	2.12	21.2	21.9	-3.20
8/20/2015	D5GHzV2 5.6 GHz	1003	Head	1g	8.31	83.1	79.6	4.40
				10g	2.36	23.6	22.8	3.51
8/20/2015	D5GHzV2 5.8 GHz	1003	Head	1g	7.75	77.5	76.1	1.84
				10g	2.20	22.0	21.7	1.38
8/20/2015	D5GHzV2 5.2 GHz	1003	Body	1g	7.47	74.7	72.7	2.75
				10g	2.11	21.1	20.4	3.43
8/20/2015	D5GHzV2 5.6 GHz	1003	Body	1g	8.20	82.0	77.0	6.49
				10g	2.28	22.8	21.3	7.04
8/20/2015	D5GHzV2 5.8 GHz	1003	Body	1g	7.28	72.8	75.0	-2.93
				10g	2.04	20.4	20.6	-0.97
8/24/20015	D5GHzV2 5.2 GHz	1003	Body	1g	7.35	73.5	72.7	1.10
				10g	2.09	20.9	20.4	2.45
8/24/20015	D5GHzV2 5.6 GHz	1003	Body	1g	7.88	78.8	77.0	2.34
				10g	2.20	22.0	21.3	3.29
8/24/20015	D5GHzV2 5.8 GHz	1003	Body	1g	7.01	70.1	75.0	-6.53
				10g	1.98	19.8	20.6	-3.88
8/24/20015	D5GHzV2 5.6 GHz	1003	Head	1g	8.06	80.6	79.6	1.26
				10g	2.28	22.8	22.8	0.00
8/25/2015	D5GHzV2 5.2 GHz	1003	Head	1g	7.43	74.3	76.4	-2.75
				10g	2.12	21.2	21.9	-3.20
8/25/2015	D5GHzV2 5.8 GHz	1003	Head	1g	7.54	75.4	76.1	-0.92
				10g	2.13	21.3	21.7	-1.84

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.

GSM850 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Max. Pwr		Frame Pwr Maximum
						Burst (dBm)	Frame (dBm)	
850	GSM (Voice)	CS1	1	128	824.2	33.1	24.1	24.17
				190	836.6	33.1	24.1	
				251	848.8	33.1	24.1	
	GPRS (GMSK)	CS1	1	128	824.2	33.1	24.1	24.17
				190	836.6	33.1	24.1	
				251	848.8	33.1	24.1	
			2	128	824.2	31.2	25.2	25.18
				190	836.6	31.1	25.1	
				251	848.8	31.2	25.2	
			3	128	824.2	29.2	24.9	24.94
				190	836.6	29.2	24.9	
				251	848.8	29.2	24.9	
			4	128	824.2	28.1	25.1	25.19
				190	836.6	28.1	25.1	
				251	848.8	28.1	25.1	
	EGPRS (8PSK)	MCS5	1	128	824.2	27.2	18.2	18.17
				190	836.6	27.1	18.1	
				251	848.8	27.2	18.2	
			2	128	824.2	26.2	20.2	20.18
				190	836.6	26.1	20.1	
				251	848.8	26.2	20.2	
			3	128	824.2	25.1	20.8	20.94
				190	836.6	25.1	20.8	
				251	848.8	25.2	20.9	
			4	128	824.2	24.2	21.2	21.19
				190	836.6	24.1	21.1	
				251	848.8	24.2	21.2	

Notes:

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

- Head & Body-worn: GMSK Voice Mode
- Hotspot mode: GMSK (GPRS) mode with 4 time slots for Max power, based on the output power measurements above.
- SAR is not required for EGPRS (8PSK) mode because its output power is less than that of GPRS Mode

GSM1900 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Max. Pwr		Frame Pwr Maximum
						Burst (dBm)	Frame (dBm)	
1900	GSM (Voice)	CS1	1	512	1850.2	29.7	20.7	20.67
				661	1880	29.7	20.7	
				810	1909.8	29.6	20.6	
	GPRS (GMSK)	CS1	1	512	1850.2	29.7	20.7	20.67
				661	1880	29.7	20.7	
				810	1909.8	29.6	20.6	
			2	512	1850.2	27.7	21.7	21.68
				661	1880	27.7	21.7	
				810	1909.8	27.7	21.7	
			3	512	1850.2	25.6	21.3	21.46
				661	1880	25.6	21.3	
				810	1909.8	25.7	21.4	
			4	512	1850.2	24.7	21.7	21.69
				661	1880	24.7	21.7	
				810	1909.8	24.5	21.5	
	EGPRS (8PSK)	MCS5	1	512	1850.2	25.7	16.7	16.67
				661	1880	25.7	16.7	
				810	1909.8	25.7	16.7	
			2	512	1850.2	24.7	18.7	18.68
				661	1880	24.7	18.7	
				810	1909.8	24.7	18.7	
			3	512	1850.2	23.7	19.4	19.44
				661	1880	23.6	19.3	
				810	1909.8	23.7	19.4	
			4	512	1850.2	22.7	19.7	19.69
				661	1880	22.6	19.6	
				810	1909.8	22.6	19.6	

Notes:

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

- Head & Body-worn: GMSK Voice Mode
- Hotspot mode: GMSK (GPRS) mode with 4 time slots for Max power, based on the output power measurements above.
- SAR is not required for EGPRS (8PSK) mode because its output power is less than that of GPRS Mode

9.2. W-CDMA

Release 99 Setup Procedures used to establish the test signals

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

Mode	Subtest	Rel99
WCDMA General Settings	Loopback Mode	Test Mode 2
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	β_c/β_d	8/15

HSDPA Setup Procedures used to establish the test signals

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

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

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

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

	Mode	HSPA				
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2 kbps RMC				
	HSDPA FRC	H-Set 1				
	HSUPA Test	HSPA				
	Power Control Algorithm	Algorithm 2				Algorithm 1
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	0
	β_{ec}	209/225	12/15	30/15	2/15	5/15
	β_c/β_d	11/15	6/15	15/9	2/15	15/1
	β_{hs}	22/15	12/15	30/15	4/15	5/15
	β_{ed}	1309/225	94/75	47/15	56/75	47/15
HSDPA Specific Settings	CM (dB)	1	3	2	3	1
	MPR (dB)	0	2	1	2	0
	DACK	8				0
	DNAK	8				0
	DCQI	8				0
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
HSUPA Specific Settings	CQI Repetition Factor (Table 5.2B.4)	2				
	$A_{hs} = \beta_{hs}/\beta_c$	30/15				
	E-DPDCCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E-TFCIs	5	5	2	5	1
	Reference E-TFCI	11	11	11	11	67
	Reference E-TFCI PO	4	4	4	4	18
	Reference E-TFCI	67	67	92	67	67
	Reference E-TFCI PO	18	18	18	18	18
	Reference E-TFCI	71	71	71	71	71
	Reference E-TFCI PO	23	23	23	23	23
	Reference E-TFCI	75	75	75	75	75
	Reference E-TFCI PO	26	26	26	26	26
	Reference E-TFCI	81	81	81	81	81
	Reference E-TFCI PO	27	27	27	27	27
	Maximum Channelization Codes	2xSF2				SF4

DC-HSDPA Setup Procedures used to establish the test signals

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

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

Table E.5.0: Levels for HSDPA connection setup

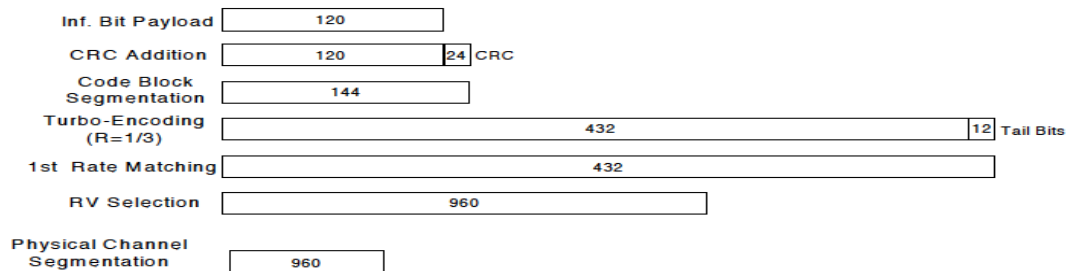
Parameter During Connection setup	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH_Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

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

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

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

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

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

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

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set 1			
	Power Control Algorithm	Algorithm2			
	β_c	2/15	11/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	β_d (SF)	64			
	β_c/β_d	2/15	11/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
HSDPA Specific Settings	MPR (dB)	0	0	0.5	0.5
	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack Repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	$A_{hs} = \beta_{hs}/\beta_c$	30/15			

HSPA+

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

W-CDMA Band II Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Max. Pwr (dBm)
W-CDMA Band II	Rel 99	RMC, 12.2 kbps	9262	1852.4	N/A	23.8
			9400	1880.0	N/A	23.8
			9538	1907.6	N/A	23.8
	HSDPA	Subtest 1	9262	1852.4	0	23.9
			9400	1880.0	0	23.9
			9538	1907.6	0	23.8
		Subtest 2	9262	1852.4	0	23.9
			9400	1880.0	0	23.9
			9538	1907.6	0	23.8
		Subtest 3	9262	1852.4	0.5	23.4
			9400	1880.0	0.5	23.4
			9538	1907.6	0.5	23.3
		Subtest 4	9262	1852.4	0.5	23.3
			9400	1880.0	0.5	23.3
			9538	1907.6	0.5	23.2
	HSUPA	Subtest 1	9262	1852.4	0	23.0
			9400	1880.0	0	22.9
			9538	1907.6	0	22.9
		Subtest 2	9262	1852.4	2	21.9
			9400	1880.0	2	21.9
			9538	1907.6	2	21.9
		Subtest 3	9262	1852.4	1	22.6
			9400	1880.0	1	22.4
			9538	1907.6	1	22.6
		Subtest 4	9262	1852.4	2	21.9
			9400	1880.0	2	21.9
			9538	1907.6	2	21.9
		Subtest 5	9262	1852.4	0	23.7
			9400	1880.0	0	23.9
			9538	1907.6	0	23.6
	DC-HSDPA	Subtest 1	9262	1852.4	0	23.9
			9400	1880.0	0	23.8
			9538	1907.6	0	23.8
		Subtest 2	9262	1852.4	0	23.9
			9400	1880.0	0	23.8
			9538	1907.6	0	23.7
		Subtest 3	9262	1852.4	0.5	23.4
			9400	1880.0	0.5	23.3
			9538	1907.6	0.5	23.3
		Subtest 4	9262	1852.4	0.5	23.3
			9400	1880.0	0.5	23.3
			9538	1907.6	0.5	23.3

W-CDMA Band IV Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Max. Pwr (dBm)
W-CDMA Band IV	Rel 99	RMC, 12.2 kbps	1312	1712.4	N/A	23.9
			1413	1732.6	N/A	23.8
			1513	1752.6	N/A	23.8
	HSDPA	Subtest 1	1312	1712.4	0	23.6
			1413	1732.6	0	23.7
			1513	1752.6	0	23.7
		Subtest 2	1312	1712.4	0	23.6
			1413	1732.6	0	23.7
			1513	1752.6	0	23.7
		Subtest 3	1312	1712.4	0.5	23.1
			1413	1732.6	0.5	23.2
			1513	1752.6	0.5	23.1
		Subtest 4	1312	1712.4	0.5	23.1
			1413	1732.6	0.5	23.2
			1513	1752.6	0.5	23.1
	HSUPA	Subtest 1	1312	1712.4	0	22.8
			1413	1732.6	0	22.7
			1513	1752.6	0	23.0
		Subtest 2	1312	1712.4	2	21.9
			1413	1732.6	2	21.9
			1513	1752.6	2	21.9
		Subtest 3	1312	1712.4	1	22.6
			1413	1732.6	1	22.7
			1513	1752.6	1	22.7
		Subtest 4	1312	1712.4	2	21.9
			1413	1732.6	2	21.9
			1513	1752.6	2	21.9
		Subtest 5	1312	1712.4	0	23.3
			1413	1732.6	0	23.6
			1513	1752.6	0	23.5
	DC-HSDPA	Subtest 1	1312	1712.4	0	23.7
			1413	1732.6	0	23.8
			1513	1752.6	0	23.7
		Subtest 2	1312	1712.4	0	23.6
			1413	1732.6	0	23.8
			1513	1752.6	0	23.7
		Subtest 3	1312	1712.4	0.5	23.1
			1413	1732.6	0.5	23.1
			1513	1752.6	0.5	23.2
		Subtest 4	1312	1712.4	0.5	23.1
			1413	1732.6	0.5	23.2
			1513	1752.6	0.5	23.2

W-CDMA Band V Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Max. Pwr (dBm)
W-CDMA Band V	Rel 99	RMC, 12.2 kbps	4132	826.4	N/A	24.6
			4183	836.6	N/A	24.7
			4233	846.6	N/A	24.7
	HSDPA	Subtest 1	4132	826.4	0	24.4
			4183	836.6	0	24.6
			4233	846.6	0	24.3
		Subtest 2	4132	826.4	0	24.6
			4183	836.6	0	24.5
			4233	846.6	0	24.3
		Subtest 3	4132	826.4	0.5	23.9
			4183	836.6	0.5	24.1
			4233	846.6	0.5	23.8
		Subtest 4	4132	826.4	0.5	23.9
			4183	836.6	0.5	24.1
			4233	846.6	0.5	23.9
	HSUPA	Subtest 1	4132	826.4	0	23.9
			4183	836.6	0	24.0
			4233	846.6	0	23.9
		Subtest 2	4132	826.4	2	22.7
			4183	836.6	2	22.7
			4233	846.6	2	22.5
		Subtest 3	4132	826.4	1	23.5
			4183	836.6	1	23.5
			4233	846.6	1	23.1
		Subtest 4	4132	826.4	2	22.7
			4183	836.6	2	22.7
			4233	846.6	2	22.7
		Subtest 5	4132	826.4	0	24.2
			4183	836.6	0	24.5
			4233	846.6	0	23.7
	DC-HSDPA	Subtest 1	4132	826.4	0	24.5
			4183	836.6	0	24.6
			4233	846.6	0	24.3
		Subtest 2	4132	826.4	0	24.6
			4183	836.6	0	24.6
			4233	846.6	0	24.4
		Subtest 3	4132	826.4	0.5	23.9
			4183	836.6	0.5	24.1
			4233	846.6	0.5	23.9
		Subtest 4	4132	826.4	0.5	23.9
			4183	836.6	0.5	24.1
			4233	846.6	0.5	23.9

9.3. CDMA

1x Advanced Setup Procedures used to establish the test signals

Call box setup procedure

- Protocol Rev > 6 (IS-2000-0)
- System ID: 331; NID: 65535, Reg. Ch. #.:
- Radio Config (RC) > Fwd11,Rvs8
- Service Option (SO) Setup > SO75 (Loopback)
- Traffic Data Rate > Full
- Rvs Power Ctrl > All Up bits (Maximum TxPout)
- Reverse Power Control Mode: 00-200 to 400 bps
- Smart blanking was disabled.

CDMA BC0 Measured Results

Band	Mode		Ch No.	Freq. (MHz)	Max. Pwr (dBm)
BC 0	1xRTT	RC1 SO55 (Loopback)	1013	824.70	24.6
			384	836.52	24.7
			777	848.31	24.5
		RC3 SO55 (Loopback)	1013	824.70	24.6
			384	836.52	24.7
			777	848.31	24.5
		RC3 SO32 (+F-SCH)	1013	824.70	24.5
			384	836.52	24.7
			777	848.31	24.5
	1xAdvanced	Fwd11/Rvs8 SO75 (Loopback)	1013	824.70	24.6
			384	836.52	24.7
			777	848.31	24.5
	1xEVDO Rel. 0	FTAP Rate: 307.2 kbps(2 slot, QPSK) RTAP Rate: 153.6 kbps	1013	824.70	24.5
			384	836.52	24.5
			777	848.31	24.5
	1xEVDO Rev. A	FETAP: 307.2k, QPSK/ ACK RETAP: 4096	1013	824.70	24.5
			384	836.52	24.5
			777	848.31	24.4

CDMA BC1 Measured Results

Band	Mode		Ch No.	Freq. (MHz)	Max. Pwr (dBm)
BC 1	1xRTT	RC1 SO55 (Loopback)	25	1851.25	24.7
			600	1880.00	24.7
			1175	1908.75	24.7
		RC3 SO55 (Loopback)	25	1851.25	24.7
			600	1880.00	24.7
			1175	1908.75	24.7
		RC3 SO32 (+F-SCH)	25	1851.25	24.7
			600	1880.00	24.7
			1175	1908.75	24.7
	1xAdvanced	Fwd11/Rvs8 SO75 (Loopback)	25	1851.25	24.7
			600	1880.00	24.7
			1175	1908.75	24.7
	1xEVDO Rel. 0	FTAP Rate: 307.2 kbps(2 slot, QPSK) RTAP Rate: 153.6 kbps	25	1851.25	23.7
			600	1880.00	23.7
			1175	1908.75	23.6
	1xEVDO Rev. A	FETAP: 307.2k, QPSK/ ACK RETAP: 4096	25	1851.25	23.7
			600	1880.00	23.7
			1175	1908.75	23.6

CDMA BC10 Measured Results

Band	Mode		Ch No.	Freq. (MHz)	Max. Pwr (dBm)
BC 10	1xRTT	RC1 SO55 (Loopback)	476	817.9	24.6
			580	820.5	24.6
			684	823.1	24.6
		RC3 SO55 (Loopback)	476	817.9	24.6
			580	820.5	24.6
			684	823.1	24.6
		RC3 SO32 (+F-SCH)	476	817.9	24.6
			580	820.5	24.6
			684	823.1	24.6
	1xAdvanced	Fwd11/Rvs8 SO75 (Loopback)	476	817.9	24.7
			580	820.5	24.7
			684	823.1	24.6
	1xEVDO Rel. 0	FTAP Rate: 307.2 kbps(2 slot, QPSK) RTAP Rate: 153.6 kbps	476	817.9	24.6
			580	820.5	24.6
			684	823.1	24.5
	1xEVDO Rev. A	FETAP: 307.2k, QPSK/ ACK RETAP: 4096	476	817.9	24.6
			580	820.5	24.6
			684	823.1	24.5

9.4. LTE

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

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

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

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

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

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

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

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

LTE Band 2 Measured Results

SAR for LTE Band 2 is covered by LTE Band 25 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 4 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
							1732.5 MHz	
LTE Band 4	20	QPSK	1	0	0		23.4	
			1	49	0		23.2	
			1	99	0		23.3	
			50	0	1		22.1	
			50	24	1		22.0	
			50	50	1		219	
			100	0	1		22.0	
		16QAM	1	0	1		22.0	
			1	49	1		219	
			1	99	1		216	
			50	0	2		20.8	
			50	24	2		20.8	
			50	50	2		20.8	
			100	0	2		20.9	
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1717.5 MHz	1732.5 MHz	1747.5 MHz
LTE Band 4	15	QPSK	1	0	0	23.4	23.4	23.3
			1	37	0	23.4	23.1	23.3
			1	74	0	23.2	23.2	23.1
			36	0	1	22.2	22.0	22.1
			36	20	1	22.2	22.0	22.0
			36	39	1	22.0	219	22.0
			75	0	1	22.1	22.0	22.0
		16QAM	1	0	1	22.2	218	219
			1	37	1	22.1	217	219
			1	74	1	22.1	217	217
			36	0	2	211	20.8	20.9
			36	20	2	210	20.8	210
			36	39	2	20.9	20.7	20.9
			75	0	2	20.9	20.8	20.8
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1715 MHz	1732.5 MHz	1750 MHz
LTE Band 4	10	QPSK	1	0	0	23.2	23.3	23.4
			1	25	0	23.3	23.0	23.2
			1	49	0	23.2	23.0	23.2
			25	0	1	22.1	218	22.0
			25	12	1	22.1	218	219
			25	25	1	22.0	218	218
			50	0	1	22.1	218	219
		16QAM	1	0	1	22.2	218	219
			1	25	1	22.1	216	217
			1	49	1	22.1	215	218
			25	0	2	20.9	20.6	20.8
			25	12	2	210	20.6	20.7
			25	25	2	20.9	20.7	20.9
			50	0	2	20.8	20.7	20.9

Note(s):

20 MHz 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 4 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1712.5 MHz	1732.5 MHz	1752.5 MHz
LTE Band 4	5	QPSK	1	0	0	23.3	23.1	23.3
			1	12	0	23.3	23.2	23.0
			1	24	0	23.3	22.9	23.2
			12	0	1	21.9	21.8	21.9
			12	7	1	22.0	21.8	21.9
			12	13	1	21.9	21.8	22.0
			25	0	1	21.9	21.8	21.8
		16QAM	1	0	1	22.1	21.8	22.0
			1	12	1	21.9	21.7	22.0
			1	24	1	22.1	21.8	22.2
			12	0	2	20.9	20.7	21.0
			12	7	2	20.9	20.7	20.8
			12	13	2	20.8	20.7	20.8
			25	0	2	20.9	20.7	20.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1711.5 MHz	1732.5 MHz	1753.5 MHz
LTE Band 4	3	QPSK	1	0	0	23.1	23.1	23.2
			1	8	0	23.2	23.2	23.1
			1	14	0	23.2	22.9	23.2
			8	0	1	21.8	21.8	21.9
			8	4	1	22.1	21.9	21.9
			8	7	1	22.0	21.8	21.9
			15	0	1	21.9	21.8	21.9
		16QAM	1	0	1	21.8	21.8	22.0
			1	8	1	21.7	21.8	22.2
			1	14	1	21.6	21.8	22.3
			8	0	2	20.8	20.6	20.8
			8	4	2	20.9	20.7	20.8
			8	7	2	20.9	20.6	20.7
			15	0	2	20.7	20.7	20.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1710.7 MHz	1732.5 MHz	1754.3 MHz
LTE Band 4	1.4	QPSK	1	0	0	23.2	23.1	23.3
			1	3	0	23.2	23.1	23.4
			1	5	0	23.2	23.1	23.4
			3	0	0	21.9	21.8	22.1
			3	1	0	23.2	23.0	23.2
			3	3	0	23.1	22.9	23.0
			6	0	1	22.0	21.7	21.8
		16QAM	1	0	1	21.7	21.8	21.8
			1	3	1	21.8	21.9	22.0
			1	5	1	21.7	21.8	21.8
			3	0	1	21.7	21.5	21.5
			3	1	1	21.9	21.6	21.7
			3	3	1	21.7	21.5	21.6
			6	0	2	20.9	20.6	20.8

LTE Band 5 Measured Results

SAR for LTE Band 5 is covered by LTE Band 26 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 7 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						2510 MHz	2535 MHz	2560 MHz
LTE Band 7	20	QPSK	1	0	0	23.4	23.6	23.6
			1	49	0	23.6	23.6	23.6
			1	99	0	23.4	23.2	23.4
			50	0	1	22.3	22.3	22.3
			50	24	1	22.3	22.1	22.1
			50	50	1	22.3	22.1	22.1
			100	0	1	22.2	22.1	22.3
		16QAM	1	0	1	22.6	22.3	22.2
			1	49	1	22.3	22.2	22.2
			1	99	1	22.6	22.1	22.2
			50	0	2	21.2	21.1	21.2
			50	24	2	21.2	21.1	21.1
			50	50	2	21.2	21.1	21.2
			100	0	2	21.2	21.1	21.2
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						2507.5 MHz	2535 MHz	2562.5 MHz
LTE Band 7	15	QPSK	1	0	0	23.4	23.7	23.6
			1	37	0	23.6	23.7	23.6
			1	74	0	23.6	23.5	23.5
			36	0	1	22.2	22.2	22.2
			36	20	1	22.3	22.2	22.5
			36	39	1	22.3	22.2	22.4
			75	0	1	22.2	22.1	22.5
		16QAM	1	0	1	22.6	21.9	22.4
			1	37	1	22.5	21.9	22.3
			1	74	1	22.4	21.2	22.4
			36	0	2	21.3	21.3	21.4
			36	20	2	21.3	21.3	21.4
			36	39	2	21.3	21.2	21.4
			75	0	2	21.3	21.1	21.5
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						2505 MHz	2535 MHz	2565 MHz
LTE Band 7	10	QPSK	1	0	0	23.6	23.6	23.4
			1	25	0	23.3	23.6	23.5
			1	49	0	23.6	23.4	23.4
			25	0	1	22.1	22.2	22.0
			25	12	1	22.2	22.4	22.2
			25	25	1	22.2	22.4	22.1
			50	0	1	22.2	22.5	22.2
		16QAM	1	0	1	22.3	22.2	22.3
			1	25	1	22.2	22.2	22.2
			1	49	1	22.3	22.1	22.2
			25	0	2	21.2	21.4	21.1
			25	12	2	21.3	21.4	21.2
			25	25	2	21.2	21.3	21.1
			50	0	2	21.2	21.4	21.1

LTE Band 7 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						2502.5 MHz	2535 MHz	2567.5 MHz
LTE Band 7	5	QPSK	1	0	0	23.6	23.6	23.3
			1	12	0	23.7	23.5	23.4
			1	24	0	23.5	23.6	23.1
			12	0	1	22.3	22.1	21.8
			12	7	1	22.2	22.4	22.2
			12	13	1	22.1	22.4	22.1
			25	0	1	22.1	22.4	22.1
		16QAM	1	0	1	22.1	22.3	22.0
			1	12	1	22.0	22.3	22.0
			1	24	1	22.2	22.1	22.0
			12	0	2	21.2	21.4	21.2
			12	7	2	21.2	21.4	21.1
			12	13	2	21.1	21.4	21.1
			25	0	2	21.2	21.4	21.2

LTE Band 12 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						707.5 MHz		
LTE Band 12	10	QPSK	1	0	0		23.9	
			1	25	0		24.1	
			1	49	0		24.0	
			25	0	1		22.7	
			25	12	1		22.8	
			25	25	1		22.8	
			50	0	1		22.8	
		16QAM	1	0	1		22.7	
			1	25	1		22.7	
			1	49	1		22.8	
			25	0	2		21.8	
			25	12	2		21.9	
			25	25	2		21.9	
			50	0	2		21.8	
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						701.5 MHz	707.5 MHz	713.5 MHz
LTE Band 12	5	QPSK	1	0	0	23.9	23.9	23.9
			1	12	0	24.0	24.0	23.9
			1	24	0	24.0	23.9	23.7
			12	0	1	22.7	22.7	22.7
			12	7	1	22.9	22.8	22.9
			12	13	1	22.8	22.8	22.8
			25	0	1	22.9	22.8	22.9
		16QAM	1	0	1	22.7	22.8	22.8
			1	12	1	22.8	22.9	22.8
			1	24	1	22.8	22.8	22.8
			12	0	2	21.8	21.9	21.8
			12	7	2	21.9	21.9	21.8
			12	13	2	21.8	21.8	21.8
			25	0	2	22.0	21.8	21.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						700.5 MHz	707.5 MHz	714.5 MHz
LTE Band 12	3	QPSK	1	0	0	23.8	23.9	24.0
			1	8	0	24.0	24.1	24.0
			1	14	0	24.0	23.9	23.8
			8	0	1	22.7	22.8	22.6
			8	4	1	22.9	22.9	22.9
			8	7	1	22.8	22.8	22.8
			15	0	1	22.8	22.8	22.8
		16QAM	1	0	1	22.8	22.5	22.8
			1	8	1	23.1	22.8	22.9
			1	14	1	22.9	22.5	23.0
			8	0	2	21.9	21.9	21.8
			8	4	2	21.9	22.0	21.8
			8	7	2	21.9	21.9	21.8
			15	0	2	21.8	21.7	21.9

Note(s):

10 MHz 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 12 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						699.7 MHz	707.5 MHz	715.3 MHz
LTE Band 12	1.4	QPSK	1	0	0	24.0	23.9	23.9
			1	3	0	24.1	23.9	23.9
			1	5	0	23.9	24.0	23.9
			3	0	0	23.8	23.8	23.6
			3	1	0	24.1	24.1	24.1
			3	3	0	24.0	24.0	23.9
			6	0	1	22.8	22.8	22.7
		16QAM	1	0	1	22.8	22.9	22.8
			1	3	1	23.0	23.0	22.9
			1	5	1	22.9	22.9	22.8
			3	0	1	22.5	22.6	22.5
			3	1	1	22.7	22.7	22.7
			3	3	1	22.6	22.7	22.6
			6	0	2	21.8	21.8	21.7

LTE Band 13 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)
						782 MHz
LTE Band 13	10	QPSK	1	0	0	24.1
			1	25	0	24.2
			1	49	0	24.1
			25	0	1	23.0
			25	12	1	22.9
			25	25	1	22.9
			50	0	1	23.0
		16QAM	1	0	1	23.1
			1	25	1	23.0
			1	49	1	23.1
			25	0	2	21.9
			25	12	2	21.9
			25	25	2	21.9
			50	0	2	21.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)
						782 MHz
LTE Band 13	5	QPSK	1	0	0	24.1
			1	12	0	24.2
			1	24	0	24.1
			12	0	1	22.8
			12	7	1	22.8
			12	13	1	22.8
			25	0	1	22.8
		16QAM	1	0	1	23.2
			1	12	1	23.2
			1	24	1	23.2
			12	0	2	21.7
			12	7	2	21.8
			12	13	2	21.8
			25	0	2	21.7

Note(s):

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

LTE Band 17 Measured Results

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

LTE Band 25 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1860 MHz	1882.5 MHz	1905 MHz
LTE Band 25	20	QPSK	1	0	0	23.3	23.4	23.4
			1	49	0	23.3	23.1	23.4
			1	99	0	23.1	23.1	23.3
			50	0	1	22.2	22.1	22.3
			50	24	1	21.9	21.8	22.2
			50	50	1	21.9	21.9	22.1
			100	0	1	22.1	21.9	22.1
		16QAM	1	0	1	22.1	22.4	22.2
			1	49	1	22.1	22.2	22.1
			1	99	1	22.1	22.2	22.2
			50	0	2	20.7	20.7	20.8
			50	24	2	20.7	20.6	20.8
			50	50	2	20.7	20.6	20.9
			100	0	2	20.8	20.7	20.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1857.5 MHz	1882.5 MHz	1907.5 MHz
LTE Band 25	15	QPSK	1	0	0	23.4	23.4	23.3
			1	37	0	23.4	23.2	23.3
			1	74	0	23.2	23.1	23.3
			36	0	1	22.1	22.0	22.2
			36	20	1	22.0	21.8	22.0
			36	39	1	21.9	21.8	22.0
			75	0	1	21.9	21.8	22.2
		16QAM	1	0	1	22.4	21.8	22.0
			1	37	1	22.1	21.6	21.8
			1	74	1	22.0	21.6	21.9
			36	0	2	20.7	20.7	20.9
			36	20	2	20.9	20.7	20.9
			36	39	2	20.8	20.6	21.0
			75	0	2	20.8	20.6	21.2
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1855 MHz	1882.5 MHz	1910 MHz
LTE Band 25	10	QPSK	1	0	0	23.3	23.4	23.3
			1	25	0	23.3	23.3	23.2
			1	49	0	23.3	23.4	23.0
			25	0	1	21.9	22.1	22.1
			25	12	1	21.9	22.0	22.0
			25	25	1	21.9	21.9	22.0
			50	0	1	21.9	21.9	22.1
		16QAM	1	0	1	22.2	21.8	22.2
			1	25	1	22.1	21.7	21.8
			1	49	1	22.0	21.7	22.3
			25	0	2	20.7	20.8	21.0
			25	12	2	20.9	20.9	20.8
			25	25	2	20.8	20.7	21.0
			50	0	2	20.7	20.7	21.0

LTE Band 25 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1852.5 MHz	1882.5 MHz	1912.5 MHz
LTE Band 25	5	QPSK	1	0	0	23.3	23.4	23.3
			1	12	0	23.3	23.2	23.2
			1	24	0	23.2	23.2	23.3
			12	0	1	21.9	22.0	21.9
			12	7	1	22.0	21.9	22.0
			12	13	1	22.0	21.8	22.0
			25	0	1	21.8	21.8	21.7
		16QAM	1	0	1	22.0	22.0	21.9
			1	12	1	21.9	21.8	22.1
			1	24	1	22.0	21.9	22.0
			12	0	2	20.8	20.9	20.8
			12	7	2	20.8	20.7	21.0
			12	13	2	20.8	20.8	20.8
			25	0	2	20.8	20.7	20.8
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1851.5 MHz	1882.5 MHz	1913.5 MHz
LTE Band 25	3	QPSK	1	0	0	23.0	23.4	23.2
			1	8	0	23.3	23.3	23.2
			1	14	0	23.1	23.3	23.3
			8	0	1	21.9	22.0	21.9
			8	4	1	21.9	21.9	22.3
			8	7	1	21.9	21.8	21.9
			15	0	1	21.9	21.8	22.0
		16QAM	1	0	1	22.2	21.7	22.1
			1	8	1	22.2	21.7	22.4
			1	14	1	22.0	21.6	22.3
			8	0	2	20.8	20.7	20.8
			8	4	2	20.8	20.7	20.8
			8	7	2	20.8	20.7	20.6
			15	0	2	20.8	20.6	20.8
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1850.7 MHz	1882.5 MHz	1914.3 MHz
LTE Band 25	1.4	QPSK	1	0	0	23.3	23.4	23.1
			1	3	0	23.4	23.3	23.3
			1	5	0	23.2	23.4	23.3
			3	0	0	21.9	22.0	22.0
			3	1	0	23.2	23.0	23.2
			3	3	0	22.9	23.0	22.7
			6	0	1	21.9	21.7	22.0
		16QAM	1	0	1	21.8	22.0	21.9
			1	3	1	22.0	22.1	22.0
			1	5	1	21.8	21.8	21.9
			3	0	1	21.6	21.7	21.6
			3	1	1	21.7	21.5	21.7
			3	3	1	21.6	21.5	21.6
			6	0	2	20.7	20.6	20.8

LTE Band 26 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						831.5 MHz		
LTE Band 26	15	QPSK	1	0	0		24.2	
			1	37	0		24.1	
			1	74	0		24.1	
			36	0	1		22.9	
			36	20	1		22.9	
			36	39	1		22.9	
			75	0	1		23.0	
		16QAM	1	0	1		23.2	
			1	37	1		23.2	
			1	74	1		23.2	
			36	0	2		21.9	
			36	20	2		21.9	
			36	39	2		21.9	
			75	0	2		21.9	
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						819 MHz	831.5 MHz	844 MHz
LTE Band 26	10	QPSK	1	0	0	24.1	24.0	24.0
			1	25	0	24.2	24.0	24.1
			1	49	0	24.1	24.2	23.8
			25	0	1	22.7	22.8	22.9
			25	12	1	22.7	22.8	22.9
			25	25	1	22.8	22.7	22.8
			50	0	1	22.7	22.8	23.0
		16QAM	1	0	1	22.9	23.1	23.1
			1	25	1	22.8	23.0	23.1
			1	49	1	22.9	23.0	23.1
			25	0	2	21.6	21.9	21.9
			25	12	2	21.7	21.8	22.0
			25	25	2	21.7	21.8	21.8
			50	0	2	21.7	21.8	21.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						816.5 MHz	831.5 MHz	846.5 MHz
LTE Band 26	5	QPSK	1	0	0	24.2	24.0	24.0
			1	12	0	24.0	24.1	24.1
			1	24	0	24.1	24.0	23.7
			12	0	1	22.9	22.8	22.8
			12	7	1	22.8	22.8	22.8
			12	13	1	22.7	22.8	22.8
			25	0	1	22.8	22.7	22.8
		16QAM	1	0	1	23.0	23.1	23.1
			1	12	1	23.0	23.1	23.1
			1	24	1	23.1	23.1	23.1
			12	0	2	21.8	21.8	21.8
			12	7	2	21.8	21.8	21.8
			12	13	2	21.7	21.7	21.8
			25	0	2	21.8	21.7	21.7

Note(s):

15 MHz 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 26 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						815.5 MHz	831.5 MHz	847.5 MHz
LTE Band 26	3	QPSK	1	0	0	24.1	24.1	24.0
			1	8	0	24.0	24.0	24.1
			1	14	0	24.0	23.8	23.6
			8	0	1	22.8	22.8	22.7
			8	4	1	22.8	22.9	22.8
			8	7	1	22.7	22.8	22.8
		16QAM	15	0	1	22.8	22.9	22.7
			1	0	1	22.9	23.1	23.1
			1	8	1	23.0	23.2	23.1
			1	14	1	22.8	23.1	23.0
			8	0	2	21.8	21.8	21.7
			8	4	2	21.8	21.9	21.8
			8	7	2	21.7	21.7	21.8
			15	0	2	21.6	21.9	21.8
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						814.7 MHz	831.5 MHz	848.3 MHz
LTE Band 26	1.4	QPSK	1	0	0	24.2	24.2	24.1
			1	3	0	24.0	24.0	24.0
			1	5	0	24.1	24.1	23.5
			3	0	0	24.0	24.0	24.0
			3	1	0	24.0	24.1	23.7
			3	3	0	24.0	24.1	23.6
			6	0	1	22.7	22.7	22.7
		16QAM	1	0	1	23.1	23.1	23.1
			1	3	1	23.1	23.0	23.1
			1	5	1	23.1	22.9	22.9
			3	0	1	22.8	22.9	22.8
			3	1	1	22.8	23.0	22.9
			3	3	1	22.7	22.9	22.8
			6	0	2	21.7	21.8	21.6

LTE Band 41 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)				
						2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz
LTE Band 41	20	QPSK	1	0	0	23.0	22.8	23.1	23.0	23.1
			1	49	0	22.8	22.7	22.9	22.9	23.1
			1	99	0	22.9	22.9	23.0	23.1	22.9
			50	0	1	22.0	21.9	22.1	22.2	22.2
			50	24	1	22.0	21.9	22.0	22.1	22.2
			50	50	1	22.0	21.9	22.0	22.2	22.2
			100	0	1	22.1	22.0	22.2	22.2	22.1
		16QAM	1	0	1	22.2	22.2	22.2	22.1	22.2
			1	49	1	22.2	22.2	22.2	22.2	22.2
			1	99	1	22.0	22.2	22.2	22.2	22.1
			50	0	2	21.0	20.9	21.1	21.2	21.1
			50	24	2	21.0	20.9	21.0	21.1	21.2
			50	50	2	21.0	20.9	21.2	21.1	21.2
			100	0	2	21.0	20.9	21.1	21.2	21.1
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)				
						2503.5 MHz	2548.3 MHz	2593 MHz	2637.8 MHz	2682.5 MHz
LTE Band 41	15	QPSK	1	0	0	22.8	22.9	22.8	23.1	22.9
			1	37	0	22.9	22.8	22.8	23.0	23.2
			1	74	0	22.8	22.8	22.8	23.0	23.0
			36	0	1	21.8	22.0	21.9	22.1	22.1
			36	20	1	21.8	22.0	21.9	22.0	22.2
			36	39	1	21.8	21.9	22.1	22.2	22.2
			75	0	1	21.8	22.0	22.0	22.1	21.9
		16QAM	1	0	1	22.0	22.1	22.0	22.2	22.1
			1	37	1	22.0	22.1	22.0	22.2	22.2
			1	74	1	22.0	22.0	22.0	22.2	22.2
			36	0	2	20.8	21.0	21.2	21.2	21.1
			36	20	2	20.9	21.0	21.1	21.2	21.2
			36	39	2	20.9	20.9	21.1	20.9	21.1
			75	0	2	20.8	21.0	21.0	21.0	21.0
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)				
						2501 MHz	2547 MHz	2593 MHz	2639 MHz	2685 MHz
LTE Band 41	10	QPSK	1	0	0	22.9	22.9	23.1	23.2	22.7
			1	25	0	22.8	22.8	23.1	23.1	22.7
			1	49	0	22.8	23.0	23.1	23.1	22.6
			25	0	1	22.0	22.0	22.2	22.0	21.9
			25	12	1	22.0	22.0	22.2	22.0	21.9
			25	25	1	21.9	22.0	22.1	22.1	21.8
			50	0	1	22.0	22.0	22.1	22.0	21.9
		16QAM	1	0	1	22.1	22.0	22.1	22.1	21.7
			1	25	1	22.1	22.0	22.0	22.1	21.8
			1	49	1	22.0	22.0	22.2	22.1	21.7
			25	0	2	21.0	20.9	21.2	21.1	20.8
			25	12	2	20.9	20.9	21.1	21.1	20.8
			25	25	2	20.9	21.0	21.1	21.1	20.7
			50	0	2	20.8	20.9	21.1	21.0	20.8

LTE Band 41 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)				
						2498.5 MHz	2545.8 MHz	2593 MHz	2640.3 MHz	2687.5 MHz
LTE Band 41	5	QPSK	1	0	0	22.6	22.9	22.9	23.2	22.8
			1	12	0	22.7	22.9	22.9	23.1	22.7
			1	24	0	22.7	22.9	22.8	23.2	22.7
			12	0	1	21.8	21.9	22.1	21.9	21.8
			12	7	1	21.9	22.0	22.2	22.0	21.7
			12	13	1	21.9	22.0	22.1	22.0	21.6
			25	0	1	21.7	21.9	22.1	21.8	21.7
		16QAM	1	0	1	22.2	21.9	22.2	21.9	22.1
			1	12	1	22.2	22.1	22.1	22.1	22.2
			1	24	1	22.2	22.0	22.1	21.8	22.1
			12	0	2	20.8	20.9	20.9	21.0	20.7
			12	7	2	20.7	20.9	21.1	20.9	20.8
			12	13	2	20.8	20.9	21.2	21.0	20.6
			25	0	2	20.6	20.9	21.0	20.9	20.7

LTE Release 10 Carrier Aggregation

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

LTE CA combinations			PCC (UL)				SCC (DL)			LTE Rel 10 Tx. Power [dBm]
PCC	+	SCC	Bandwidth (MHz)	Frequency (MHz)	Channel	RB/Offset	Bandwidth (MHz)	Frequency (MHz)	Channel	
2	+	13	20	1880	18900	1/0	10	751	5230	23.40
4	+	13	20	1732.5	20175	1/0	10	751	5230	23.40
13	+	2	10	782	23230	1/25	20	1960	900	24.15
13	+	4	10	782	23230	1/25	20	2132.5	2175	24.11
2	+	4	20	1880	18900	1/0	20	2132.5	2175	23.40
4	+	2	20	1732.5	20175	1/0	20	1960	900	23.40
2	+	17	10	1880	18900	1/0	10	740	5790	23.35
17	+	2	10	710	23790	1/25	20	1960	900	24.13
4	+	17	10	1732.5	20175	1/0	10	740	5790	23.35
17	+	4	10	710	23790	1/25	20	2132.5	2175	24.18
2	+	29	20	1880	18900	1/0	10	722.5	9715	23.34
4	+	29	20	1732.5	20175	1/0	10	722.5	9715	23.40
2	+	5	20	1880	18900	1/0	10	881.5	2525	23.40
5	+	2	10	836.5	20525	1/0	20	1960	900	24.20
4	+	5	20	1732.5	20175	1/0	10	881.5	2525	23.40
5	+	4	10	836.5	20525	1/0	20	2132.5	2175	24.20
2	+	12	20	1880	18900	1/0	10	737.5	5095	23.40
12	+	2	10	707.5	23095	1/25	20	1960	900	24.10
4	+	12	20	1732.5	20175	1/0	10	737.5	5095	23.35
12	+	4	10	707.5	23095	1/25	20	2132.5	2175	24.20
4	+	7	10	1732.5	20175	1/0	20	2655	3100	23.40
7	+	4	20	2535	21100	1/0	20	2132.5	2175	23.62
2	+	2	20	1880	18900	1/0	20	1960	900	23.40
4	+	4	20	1732.5	20175	1/0	20	2132.5	2175	23.40
41	+	41	20	2549.5	40185	1/0	20	2593	40620	23.14

Note:

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

9.5. Wi-Fi 2.4GHz (DTS Band)

Measured Results

Antenna	Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)	Note(s)
SISO Core 0 (Main)	2.4	802.11b	1 Mbps	1	2412	17.5	18	Yes	
				6	2437	17.3			
				11	2462	17.0			
		802.11g	6 Mbps	1	2412	Not Required	15.5	No	1
				6	2437		16.5		
				11	2462		15.5		
		802.11n (HT20)	6.5 Mbps	1	2412		15.5	No	1
				6	2437		16.5		
				11	2462		15.5		
		802.11ac (VHT20)	6.5 Mbps	1	2412		15.5	No	1
				6	2437		16.5		
				11	2462		15.5		
SISO Core 1 (Diversity)	2.4	802.11b	1 Mbps	1	2412	17.4	18	Yes	
				6	2437	17.2			
				11	2462	17.3			
		802.11g	6 Mbps	1	2412	Not Required	15.5	No	1
				6	2437		16.5		
				11	2462		15.5		
		802.11n (HT20)	6.5 Mbps	1	2412		15.5	No	1
				6	2437		16.5		
				11	2462		15.5		
		802.11n (HT20)	6.5 Mbps	1	2412		15.5	No	1
				6	2437		16.5		
				11	2462		15.5		

Note(s):

- Output Power and SAR is not required for 802.11g/n HT20/ac VHT20 channels when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

9.6. Wi-Fi 5GHz (U-NII Bands)

MIMO Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Avg Pwr (dBm)		Max Output Power (dBm)	SAR Test (Yes/No)	Note(s)
					Core 0	Core 1			
5.3 UNII-2A	802.11a	6 Mbps	52	5260	14.8	14.5	15.0	Yes	2
			56	5280	14.9	14.9			
			60	5300	14.8	14.8			
			64	5320	14.8	14.8			
	802.11n/ac (HT20/VHT20)	6.5 Mbps	52	5260	Not Required	Not Required	14.5	No	1
			56	5280					
			60	5300					
			64	5320					
	802.11n/ac (HT40/VHT40)	13.5 Mbps	54	5270			12.5	No	1
			62	5310					
	802.11ac (VHT80)	29.3 Mbps	58	5290			11.5	No	1
5.5 UNII-2C	802.11a	6 Mbps	100	5500	14.8	14.9	15.0	Yes	
			116	5580	14.8	14.8			
			140	5700	14.7	14.5			
	802.11n/ac (HT20/VHT20)	6.5 Mbps	100	5500	Not Required	Not Required	14.5	No	1
			116	5580					
			140	5580					
			144	5720					
	802.11n/ac (HT40/VHT40)	13.5 Mbps	102	5510			12.5	No	1
			110	5550					
			134	5670					
			142	5710					
	802.11ac (VHT80)	29.3 Mbps	106	5530			11.5	No	1
			138	5690					
5.8 UNII-3	802.11a	6 Mbps	149	5745	14.4	14.5	15.0	Yes	
			157	5785	14.5	14.9			
			165	5825	14.5	14.9			
	802.11n/ac (HT20/VHT20)	6.5 Mbps	149	5745	Not Required	Not Required	14.5	No	1
			157	5785					
			165	5825					
	802.11n/ac (HT40/VHT40)	13.5 Mbps	151	5755			12.5	No	1
			159	5795					
	802.11ac (VHT80)	29.3 Mbps	155	5775			11.5	No	1

Note(s):

- Output Power and SAR measurement is not required for 802.11n HT20/HT40 and 802.11acVHT20/40/80 channels when the specified tune-up tolerances for 802.11n HT20/HT40 and 802.11acVHT20/40/80 are lower than 802.11a by more than ½ dB and the measured SAR is ≤ 1.2 W/Kg.
- When the specified maximum output power is the same for both UNII band I and UNII band 2A, begin SAR measurement in UNII band 2A; and if the highest reported SAR for UNII band 2A is
 - ≤ 1.2 W/kg, SAR is not required for UNII band I
 - > 1.2 W/kg, both bands should be tested independently for SAR.

9.7. Bluetooth

Band (GHz)	Mode	Ch #	Freq. (MHz)	Avg Pwr (dBm)	Avg Pwr (mW)
2.4	V3.0 + EDR, GFSK	0	2402	7.20	5.25
		39	2441	9.40	8.71
		78	2480	7.70	5.89
	V3.0 + EDR, $\pi/4$ DQPSK	0	2402	3.80	2.40
		39	2441	6.10	4.07
		78	2480	4.30	2.69
	V3.0 + EDR, 8-DPSK	0	2402	3.90	2.45
		39	2441	6.10	4.07
		78	2480	4.30	2.69
	V4.0 LE, GFSK	0	2402	-1.38	0.73
		19	2440	1.12	1.29
		39	2480	-0.21	0.95

10. Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

KDB 447498 D01 General RF Exposure Guidance:

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

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

KDB 648474 D04 Handset SAR:

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

KDB 941225 D01 SAR test for 3G devices:

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

KDB 941225 D05 SAR for LTE Devices:

SAR test reduction is applied using the following criteria:

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

KDB 248227 D01 SAR meas for 802.11:

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

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

- ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.
- > 0.4 W/kg, SAR is repeated using the same wireless mode test configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg or all required test positions are tested.
 - For subsequent test positions with equivalent test separation distance or when exposure is dominated by coupling conditions, the position for maximum coupling condition should be tested.
 - When it is unclear, all equivalent conditions must be tested.
- For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required test channels are considered.
 - The additional power measurements required for this step should be limited to those necessary for identifying subsequent highest output power channels to apply the test reduction.
- When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is ≤ 1.2 W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.
- When the specified maximum output power is different between UNII 1 and UNII 2A, begin SAR with the band that has the higher specified maximum output. If the highest reported SAR for the band with the highest specified power is ≤ 1.2 W/kg, testing for the band with the lower specified output power is not required; otherwise test the remaining bands independently for SAR.

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

10.1. GSM850

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	Voice	0	Left Touch	190	836.6	33.2	33.1	0.383	0.392	1
			Left Tilt	190	836.6	33.2	33.1	0.222	0.227	
			Right Touch	190	836.6	33.2	33.1	0.296	0.303	
			Right Tilt	190	836.6	33.2	33.1	0.205	0.210	
Head VoIP	GPRS 4 Slots	0	Left Touch	190	836.6	28.2	28.1	0.364	0.372	2
			Left Tilt	190	836.6	28.2	28.1	0.218	0.223	
			Right Touch	190	836.6	28.2	28.1	0.308	0.315	
			Right Tilt	190	836.6	28.2	28.1	0.231	0.236	
Body-worn	Voice	10	Rear	190	836.6	33.2	33.1	0.409	0.419	
			Front	190	836.6	33.2	33.1	0.509	0.521	3
Body-worn(VoIP) & Hotspot	GPRS 4 Slots	10	Rear	190	836.6	28.2	28.1	0.446	0.456	
Front			190	836.6	28.2	28.1	0.555	0.568	4	
Hotspot			Edge 2	190	836.6	28.2	28.1	0.188	0.192	
			Edge 3	190	836.6	28.2	28.1	0.416	0.426	
			Edge 4	190	836.6	28.2	28.1	0.462	0.473	

10.2. GSM1900

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	Voice	0	Left Touch	661	1880.0	29.7	29.7	0.221	0.221	5
			Left Tilt	661	1880.0	29.7	29.7	0.121	0.121	
			Right Touch	661	1880.0	29.7	29.7	0.426	0.426	
			Right Tilt	661	1880.0	29.7	29.7	0.169	0.169	
Head VoIP	GPRS 4 Slots	0	Left Touch	661	1880.0	24.7	24.7	0.269	0.269	6
			Left Tilt	661	1880.0	24.7	24.7	0.144	0.144	
			Right Touch	661	1880.0	24.7	24.7	0.477	0.477	
			Right Tilt	661	1880.0	24.7	24.7	0.210	0.210	
Body-worn	Voice	10	Rear	661	1880.0	29.7	29.7	0.324	0.324	7
			Front	661	1880.0	29.7	29.7	0.353	0.353	
Body-worn(VoIP) & Hotspot	GPRS 4 Slots	10	Rear	661	1880.0	24.7	24.7	0.404	0.404	8
Front			661	1880.0	24.7	24.7	0.400	0.400		
Hotspot			Edge 2	661	1880.0	24.7	24.7	0.408	0.408	9
			Edge 3	661	1880.0	24.7	24.7	0.251	0.251	
			Edge 4	661	1880.0	24.7	24.7	0.113	0.113	

10.4. W-CDMA Band II

RF Exposure Conditions	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	0	Left Touch	9400	1880.0	23.9	23.8	0.398	0.407	
			Left Tilt	9400	1880.0	23.9	23.8	0.205	0.210	
			Right Touch	9400	1880.0	23.9	23.8	0.772	0.790	10
			Right Tilt	9400	1880.0	23.9	23.8	0.275	0.281	
Body-worn & Hotspot	Rel 99 RMC	10	Rear	9400	1880.0	23.9	23.8	0.585	0.599	
			Front	9400	1880.0	23.9	23.8	0.697	0.713	11
Hotspot	Rel 99 RMC	10	Edge 2	9400	1880.0	23.9	23.8	0.756	0.774	12
			Edge 3	9400	1880.0	23.9	23.8	0.476	0.487	

10.5. W-CDMA Band IV

RF Exposure Conditions	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	0	Left Touch	1413	1732.6	23.9	23.8	0.405	0.414	
			Left Tilt	1413	1732.6	23.9	23.8	0.268	0.274	
			Right Touch	1312	1712.4	23.9	23.9	0.763	0.763	
				1413	1732.6	23.9	23.8	0.822	0.841	
				1513	1752.6	23.9	23.8	0.864	0.884	13
			Right Tilt	1413	1732.6	23.9	23.8	0.291	0.298	
Body-worn & Hotspot	Rel 99 RMC	10	Rear	1312	1712.4	23.9	23.9	0.830	0.830	
				1413	1732.6	23.9	23.8	0.847	0.867	
				1513	1752.6	23.9	23.8	0.864	0.884	14
			Front	1312	1712.4	23.9	23.9	0.779	0.779	
				1413	1732.6	23.9	23.8	0.800	0.819	
				1513	1752.6	23.9	23.8	0.826	0.845	
Hotspot	Rel 99 RMC	10	Edge 2	1413	1732.6	23.9	23.8	0.644	0.659	
			Edge 3	1413	1732.6	23.9	23.8	0.555	0.568	

10.6. W-CDMA Band V

RF Exposure Conditions	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	0	Left Touch	4183	836.6	24.7	24.7	0.503	0.503	15
			Left Tilt	4183	836.6	24.7	24.7	0.284	0.284	
			Right Touch	4183	836.6	24.7	24.7	0.371	0.371	
			Right Tilt	4183	836.6	24.7	24.7	0.265	0.265	
Body-worn & Hotspot	Rel 99 RMC	10	Rear	4183	836.6	24.7	24.7	0.531	0.531	
			Front	4183	836.6	24.7	24.7	0.539	0.539	16
Hotspot	Rel 99 RMC	10	Edge 2	4183	836.6	24.7	24.7	0.210	0.210	
			Edge 3	4183	836.6	24.7	24.7	0.459	0.459	
			Edge 4	4183	836.6	24.7	24.7	0.475	0.475	

10.7. CDMA BC0

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	1xRTT (RC3 SO55)	0	Left Touch	384	836.5	24.7	24.7	0.479	0.479	17
			Left Tilt	384	836.5	24.7	24.7	0.260	0.260	
			Right Touch	384	836.5	24.7	24.7	0.373	0.373	
			Right Tilt	384	836.5	24.7	24.7	0.243	0.243	
	1xEVDO (Rel. 0)	0	Left Touch	384	836.5	24.7	24.5	0.410	0.429	
			Left Tilt	384	836.5	24.7	24.5	0.216	0.226	
			Right Touch	384	836.5	24.7	24.5	0.311	0.326	
			Right Tilt	384	836.5	24.7	24.5	0.210	0.220	
Body-worn & Hotspot	1xRTT (RC3 SO32)	10	Rear	384	836.5	24.7	24.7	0.509	0.509	
			Front	384	836.5	24.7	24.7	0.619	0.619	18
Hotspot	1xRTT (RC3 SO32)	10	Edge 2	384	836.5	24.7	24.7	0.202	0.202	
			Edge 3	384	836.5	24.7	24.7	0.479	0.479	
			Edge 4	384	836.5	24.7	24.7	0.464	0.464	

10.8. CDMA BC1

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	1xRTT (RC3 SO55)	0	Left Touch	600	1880.0	24.7	24.7	0.479	0.479	
			Left Tilt	600	1880.0	24.7	24.7	0.241	0.241	
			Right Touch	25	1851.3	24.7	24.7	0.898	0.898	19
				600	1880.0	24.7	24.7	0.871	0.871	
				1175	1908.8	24.7	24.7	0.892	0.892	
			Right Tilt	600	1880.0	24.7	24.7	0.319	0.319	
	1xEVDO (Rel. 0)	0	Left Touch	600	1880.0	23.7	23.7	0.445	0.445	
			Left Tilt	600	1880.0	23.7	23.7	0.261	0.261	
			Right Touch	25	1851.3	23.7	23.7	0.846	0.846	
				600	1880.0	23.7	23.7	0.828	0.828	
				1175	1908.8	23.7	23.6	0.822	0.841	
			Right Tilt	600	1880.0	23.7	23.7	0.379	0.379	
Body-worn & Hotspot	1xRTT (RC3 SO32)	10	Rear	600	1880.0	24.7	24.7	0.649	0.649	
			Front	600	1880.0	24.7	24.7	0.774	0.774	20
Hotspot	1xRTT (RC3 SO32)	10	Edge 2	25	1851.3	24.7	24.7	0.848	0.848	
				600	1880.0	24.7	24.7	0.877	0.877	
				1175	1908.8	24.7	24.7	0.879	0.879	21
			Edge 3	600	1880.0	24.7	24.7	0.512	0.512	

10.9. CDMA BC10

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	1xRTT (RC3 SO55)	0	Left Touch	580	820.5	24.7	24.6	0.456	0.467	22
			Left Tilt	580	820.5	24.7	24.6	0.254	0.260	
			Right Touch	580	820.5	24.7	24.6	0.363	0.371	
			Right Tilt	580	820.5	24.7	24.6	0.228	0.233	
	1xEVDO (Rel. 0)	0	Left Touch	580	820.5	24.7	24.6	0.414	0.424	
			Left Tilt	580	820.5	24.7	24.6	0.230	0.235	
			Right Touch	580	820.5	24.7	24.6	0.319	0.326	
			Right Tilt	580	820.5	24.7	24.6	0.210	0.215	
Body-worn & Hotspot	1xRTT (RC3 SO32)	10	Rear	580	820.5	24.7	24.6	0.570	0.583	
			Front	580	820.5	24.7	24.6	0.616	0.630	23
Hotspot	1xRTT (RC3 SO32)	10	Edge 2	580	820.5	24.7	24.6	0.252	0.258	
			Edge 3	580	820.5	24.7	24.6	0.428	0.438	
			Edge 4	580	820.5	24.7	24.6	0.526	0.538	

10.10. LTE Band 2 (20MHz Bandwidth)

SAR for LTE Band 2 is covered by LTE Band 25 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

10.11. LTE Band 4 (20MHz Bandwidth)

RF Exposure Conditions	Mode	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	0	Left Touch	20175	1732.5	1	0	23.4	23.4	0.393	0.393	
						50	0	22.4	22.1	0.331	0.355	
			Left Tilt	20175	1732.5	1	0	23.4	23.4	0.254	0.254	
						50	0	22.4	22.1	0.212	0.227	
			Right Touch	20175	1732.5	1	0	23.4	23.4	0.767	0.767	24
						50	0	22.4	22.1	0.666	0.714	
			Right Tilt	20175	1732.5	1	0	23.4	23.4	0.297	0.297	
						50	0	22.4	22.1	0.251	0.269	
Body & Hotspot	QPSK	10	Rear	20175	1732.5	1	0	23.4	23.4	0.753	0.753	25
						50	0	22.4	22.1	0.641	0.687	
			Front	20175	1732.5	1	0	23.4	23.4	0.752	0.752	
						50	0	22.4	22.1	0.656	0.703	
Hotspot	QPSK	10	Edge 2	20175	1732.5	1	0	23.4	23.4	0.634	0.634	
						50	0	22.4	22.1	0.545	0.584	
			Edge 3	20175	1732.5	1	0	23.4	23.4	0.559	0.559	
						50	0	22.4	22.1	0.457	0.490	

10.12. LTE Band 5 (10MHz Bandwidth)

SAR for LTE Band 5 is covered by LTE Band 26 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

10.13. LTE Band 7 (20MHz Bandwidth)

RF Exposure Conditions	Mode	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	0	Left Touch	21100	2535.0	1	0	23.7	23.6	0.566	0.579	26
						50	0	22.7	22.3	0.471	0.516	
			Left Tilt	21100	2535.0	1	0	23.7	23.6	0.113	0.116	
						50	0	22.7	22.3	0.095	0.104	
			Right Touch	21100	2535.0	1	0	23.7	23.6	0.256	0.262	
						50	0	22.7	22.3	0.216	0.237	
			Right Tilt	21100	2535.0	1	0	23.7	23.6	0.129	0.132	
						50	0	22.7	22.3	0.128	0.140	
Body-worn & Hotspot	QPSK	10	Rear	21100	2535.0	1	0	23.7	23.6	0.536	0.548	
						50	0	22.7	22.3	0.406	0.445	
			Front	21100	2535.0	1	0	23.7	23.6	0.622	0.636	27
						50	0	22.7	22.3	0.493	0.541	
Hotspot	QPSK	10	Edge 2	21100	2535.0	1	0	23.7	23.6	0.074	0.076	
						50	0	22.7	22.3	0.062	0.068	
			Edge 3	21100	2535.0	1	0	23.7	23.6	0.656	0.671	28
						50	0	22.7	22.3	0.531	0.582	
			Edge 4	21100	2535.0	1	0	23.7	23.6	0.423	0.433	
						50	0	22.7	22.3	0.337	0.370	

10.14. LTE Band 12 (10MHz Bandwidth)

RF Exposure Conditions	Mode	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	0	Left Touch	23095	707.5	1	25	24.2	24.1	0.249	0.255	29
						25	12	23.2	22.8	0.208	0.228	
			Left Tilt	23095	707.5	1	25	24.2	24.1	0.133	0.136	
						25	12	23.2	22.8	0.112	0.123	
			Right Touch	23095	707.5	1	25	24.2	24.1	0.195	0.200	
						25	12	23.2	22.8	0.163	0.179	
			Right Tilt	23095	707.5	1	25	24.2	24.1	0.115	0.118	
						25	12	23.2	22.8	0.095	0.104	
Body-worn & Hotspot	QPSK	10	Rear	23095	707.5	1	25	24.2	24.1	0.382	0.391	30
						25	12	23.2	22.8	0.314	0.344	
			Front	23095	707.5	1	25	24.2	24.1	0.308	0.315	
						25	12	23.2	22.8	0.252	0.276	
Hotspot	QPSK	10	Edge 2	23095	707.5	1	25	24.2	24.1	0.306	0.313	
						25	12	23.2	22.8	0.253	0.277	
			Edge 3	23095	707.5	1	25	24.2	24.1	0.195	0.200	
						25	12	23.2	22.8	0.161	0.177	
			Edge 4	23095	707.5	1	25	24.2	24.1	0.530	0.542	31
						25	12	23.2	22.8	0.438	0.480	

10.15. LTE Band 13 (10MHz Bandwidth)

RF Exposure Conditions	Mode	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	0	Left Touch	23230	782.0	1	25	24.2	24.2	0.289	0.289	32
						25	0	23.2	23.0	0.260	0.272	
			Left Tilt	23230	782.0	1	25	24.2	24.2	0.178	0.178	
						25	0	23.2	23.0	0.158	0.165	
			Right Touch	23230	782.0	1	25	24.2	24.2	0.211	0.211	
						25	0	23.2	23.0	0.180	0.188	
			Right Tilt	23230	782.0	1	25	24.2	24.2	0.153	0.153	
						25	0	23.2	23.0	0.130	0.136	
Body-worn & Hotspot	QPSK	10	Rear	23230	782.0	1	25	24.2	24.2	0.399	0.399	33
						25	0	23.2	23.0	0.338	0.354	
			Front	23230	782.0	1	25	24.2	24.2	0.365	0.365	
						25	0	23.2	23.0	0.312	0.327	
Hotspot	QPSK	10	Edge 2	23230	782.0	1	25	24.2	24.2	0.194	0.194	
						25	0	23.2	23.0	0.169	0.177	
			Edge 3	23230	782.0	1	25	24.2	24.2	0.280	0.280	
						25	0	23.2	23.0	0.237	0.248	
			Edge 4	23230	782.0	1	25	24.2	24.2	0.465	0.465	34
						25	0	23.2	23.0	0.403	0.422	

10.16. LTE Band 17 (10MHz Bandwidth)

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

10.17. LTE Band 25 (20MHz Bandwidth)

RF Exposure Conditions	Mode	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	0	Left Touch	26365	1882.5	1	0	23.4	23.4	0.448	0.448	
						50	0	22.4	22.1	0.350	0.375	
			Left Tilt	26365	1882.5	1	0	23.4	23.4	0.233	0.233	
						50	0	22.4	22.1	0.177	0.190	
			Right Touch	26140	1860.0	1	0	23.4	23.3	0.853	0.873	35
				26365	1882.5	1	0	23.4	23.4	0.843	0.843	
						50	0	22.4	22.1	0.670	0.718	
			Right Tilt	26590	1905.0	1	0	23.4	23.4	0.854	0.854	
						50	0	23.4	23.4	0.333	0.333	
Body-worn & Hotspot	QPSK	10	Rear	26140	1860.0	1	0	23.4	23.3	0.853	0.873	
				26365	1882.5	1	0	23.4	23.4	0.806	0.806	
						50	0	22.4	22.1	0.643	0.689	
				26590	1905.0	1	0	23.4	23.4	0.807	0.807	
			Front	26140	1860.0	1	0	23.4	23.3	0.975	0.998	
						50	0	22.4	22.2	0.611	0.640	
				26365	1882.5	1	0	23.4	23.4	0.962	0.962	
						50	0	22.4	22.1	0.768	0.823	
						100	0	22.4	21.9	0.610	0.684	
				26590	1905.0	1	0	23.4	23.4	1.000	1.000	36
						50	0	22.4	22.3	0.638	0.653	
Hotspot	QPSK	10	Edge 2	26365	1882.5	1	0	23.4	23.4	0.685	0.685	
						50	0	22.4	22.1	0.519	0.556	
			Edge 3	26365	1882.5	1	49	23.4	23.4	0.416	0.416	
						50	0	22.4	22.1	0.323	0.346	

10.18. LTE Band 26 (15MHz Bandwidth)

RF Exposure Conditions	Mode	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	0	Left Touch	26865	831.5	1	37	24.2	24.2	0.430	0.430	37
						36	0	23.2	22.9	0.351	0.376	
			Left Tilt	26865	831.5	1	37	24.2	24.2	0.235	0.235	
						36	0	23.2	22.9	0.192	0.206	
			Right Touch	26865	831.5	1	37	24.2	24.2	0.325	0.325	
						36	0	23.2	22.9	0.268	0.287	
			Right Tilt	26865	831.5	1	37	24.2	24.2	0.216	0.216	
						36	0	23.2	22.9	0.181	0.194	
Body-worn & Hotspot	QPSK	10	Rear	26865	831.5	1	37	24.2	24.2	0.483	0.483	
						36	0	23.2	22.9	0.396	0.424	
			Front	26865	831.5	1	37	24.2	24.2	0.506	0.506	38
						36	0	23.2	22.9	0.412	0.441	
Hotspot	QPSK	10	Edge 2	26865	831.5	1	37	24.2	24.2	0.187	0.187	
						36	0	23.2	22.9	0.153	0.164	
			Edge 3	26865	831.5	1	37	24.2	24.2	0.409	0.409	
						36	0	23.2	22.9	0.333	0.357	
			Edge 4	26865	831.5	1	37	24.2	24.2	0.479	0.479	
						36	0	23.2	22.9	0.386	0.414	

10.19. LTE Band 41 (20MHz Bandwidth)

RF Exposure Conditions	Mode	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	0	Left Touch	40620	2593.0	1	0	23.2	23.1	0.489	0.500	39
						50	0	22.2	22.1	0.311	0.318	
			Left Tilt	40620	2593.0	1	0	23.2	23.1	0.095	0.097	
						50	0	22.2	22.1	0.060	0.061	
			Right Touch	40620	2593.0	1	0	23.2	23.1	0.182	0.186	
						50	0	22.2	22.1	0.110	0.113	
			Right Tilt	40620	2593.0	1	0	23.2	23.1	0.132	0.135	
						50	0	22.2	22.1	0.088	0.090	
Body-worn & Hotspot	QPSK	10	Rear	40620	2593.0	1	0	23.2	23.1	0.348	0.356	
						50	0	22.2	22.1	0.214	0.219	
			Front	40620	2593.0	1	0	23.2	23.1	0.532	0.544	40
						50	0	22.2	22.1	0.313	0.320	
Hotspot	QPSK	10	Edge 2	40620	2593.0	1	0	23.2	23.1	0.057	0.058	
						50	0	22.2	22.1	0.035	0.036	
			Edge 3	40620	2593.0	1	0	23.2	23.1	0.461	0.472	
						50	0	22.2	22.1	0.286	0.293	
			Edge 4	40620	2593.0	1	0	23.2	23.1	0.334	0.342	
						50	0	22.2	22.1	0.199	0.204	

10.20. Wi-Fi (DTS Band)

Frequency Band	RF Exposure Conditions	Mode	Dist. (mm)	ANT	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Note(s)	Plot
									Tune-up limit	Meas.	Meas.	Scaled		
2.4 GHz	Head	802.11b 1 Mbps	0	Core 0	Left Touch	6	2437	0.49	18.0	17.3	0.335	0.394	3	
					Left Tilt	6	2437	0.49	18.0	17.3				
					Right Touch	1	2412	1.09	18.0	17.5	0.843	0.946		
					Right Tilt	6	2437	1.08	18.0	17.3	0.850	0.999	2	41
				Core 1	Right Tilt	1	2412	0.80	18.0	17.5	0.662	0.743		
						6	2437	0.99	18.0	17.3	0.759	0.892	2	
					Left Touch	6	2437	0.09	18.0	17.2				
					Left Tilt	6	2437	0.05	18.0	17.2				
	Body & Hotspot	802.11b 1 Mbps	10	Core 0	Right Touch	6	2437	0.24	18.0	17.2	0.194	0.233	1	
					Right Tilt	6	2437	0.12	18.0	17.2				
				Core 1	Rear	6	2437	0.35	18.0	17.3	0.303	0.356	1	42
					Front	6	2437	0.23	18.0	17.3				
	Hotspot	802.11b 1 Mbps	10	Core 0	Rear	6	2437	0.26	18.0	17.2	0.197	0.237	1	
					Front	6	2437	0.06	18.0	17.2				
				Core 1	Edge 1	6	2437	0.30	18.0	17.3				
					Edge 4	6	2437	0.26	18.0	17.3				
				Core 0	Edge 1	6	2437	0.03	18.0	17.2				
					Edge 4	6	2437	0.19	18.0	17.2				

Note(s):

1. Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.
2. Highest reported SAR is > 0.4 W/kg. Due to the highest reported SAR for this test position, other test positions in Head exposure condition were evaluated until a SAR ≤ 0.8 W/kg was reported.
3. Additional testing required in order satisfying FCC simultaneous transmission limit criteria.

10.21. Wi-Fi (U-NII Band)

Frequency Band	RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Core 0 Power (dBm)		Core 1 Power (dBm)		Core 0 1-g SAR (W/kg)		Core 1 1-g SAR (W/kg)		Note(s)	Plot
								Tune-up limit	Meas.	Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled		
5.3 GHz U-NII 2A	Head	802.11a 6 Mbps	0	Left Touch	56	5280	0.818	15.0	14.9	15.0	14.9	0.404	0.413			2,3	
				Left Tilt	56	5280	0.826	15.0	14.9	15.0	14.9						
				Right Touch	56	5280	2.010	15.0	14.9	15.0	14.9	0.972	0.995			3	43
					60	5300	1.950	15.0	14.8	15.0	14.8	0.927	0.971			2,3	
				Right Tilt	56	5280	1.880	15.0	14.9	15.0	14.9	0.866	0.886			2,3	
					60	5300	1.920	15.0	14.8	15.0	14.8	0.879	0.920			2,3	
	Body-worn	802.11a 6 Mbps	10	Rear	56	5280	1.340	15.0	14.9	15.0	14.9	0.335	0.343			1,3	44
				Front	56	5280	0.345	15.0	14.9	15.0	14.9						
5.5 GHz U-NII 2C	Head	802.11a 6 Mbps	0	Left Touch	100	5500	0.894	15.0	14.8	15.0	14.9	0.440	0.461			2,3	
				Left Tilt	100	5500	0.842	15.0	14.8	15.0	14.9						
				Right Touch	100	5500	2.550	15.0	14.8	15.0	14.9	1.050	1.099			3	45
					116	5580	2.100	15.0	14.8	15.0	14.8	0.976	1.022			2,3	
					140	5700	2.200	15.0	14.7	15.0	14.5	0.997	1.068			2,3	
					100	5500	1.910	15.0	14.8	15.0	14.9	0.904	0.947			2,3	
				Right Tilt	116	5580	1.810	15.0	14.8	15.0	14.8	0.854	0.894			2,3	
					140	5700	1.890	15.0	14.7	15.0	14.5	0.873	0.935			2,3	
	Body-worn	802.11a 6 Mbps	10	Rear	100	5500	0.585	15.0	14.8	15.0	14.9	0.279	0.292			1,3	46
				Front	100	5500	0.427	15.0	14.8	15.0	14.9						
5.8 GHz U-NII 3	Head	802.11a 6 Mbps	0	Left Touch	157	5785	1.180	15.0	14.5	15.0	14.9	0.591	0.663			2,3	
				Left Tilt	157	5785	0.899	15.0	14.5	15.0	14.9						
				Right Touch	149	5745	1.950	15.0	14.4	15.0	14.5	0.857	0.984			2,3	
					157	5785	2.070	15.0	14.5	15.0	14.9	0.971	1.089			3	47
					165	5825	1.740	15.0	14.5	15.0	14.9	0.773	0.867			2,3	
					149	5745	2.150	15.0	14.4	15.0	14.5	0.931	1.069			2,3	
				Right Tilt	157	5785	1.730	15.0	14.5	15.0	14.9	0.873	0.980			2,3	
					165	5825	1.940	15.0	14.5	15.0	14.9	0.875	0.982			2,3	
	Body & Hotspot	802.11a 6 Mbps	10	Rear	157	5785	0.681	15.0	14.5	15.0	14.9	0.338	0.379			1,3	48
				Front	157	5785	0.432	15.0	14.5	15.0	14.9						
	Hotspot	802.11a 6 Mbps	10	Edge 1	157	5785	0.334	15.0	14.5	15.0	14.9						
				Edge 4	157	5785	0.652	15.0	14.5	15.0	14.9						

Note(s):

- Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.
- Highest reported SAR is > 0.4 W/kg. Due to the highest reported SAR for this test position, other test positions in Head exposure condition were evaluated until a SAR ≤ 0.8 W/kg was reported.
- For 802.11a SAR testing, MIMO measurements were performed. The Antennas are right next to each other therefore the resulting measurement cubes were right on top of one another. Because of this, there is only one 1g/10g cube for the MIMO scans. The highest 1g cube measured for the MIMO scans was from the main antenna (Core 0). The results are illustrated in the table above.

10.22. Bluetooth

Frequency Band	RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
2.4 GHz	Head	GFSK	0	Left Touch	39	2441.0	9.9	9.4	0.053	0.059	
				Left Tilt	39	2441.0	9.9	9.4	0.057	0.064	
				Right Touch	39	2441.0	9.9	9.4	0.117	0.131	49
				Right Tilt	39	2441.0	9.9	9.4	0.099	0.111	
	Body-worn	GFSK	10	Rear	39	2441.0	9.9	9.4	0.045	0.050	50
				Front	39	2441.0	9.9	9.4	0.027	0.030	

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 < 1.6 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 ≥ 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 3 (1-g or 10-g respectively) or when the original or repeated measurement is ≥ 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 ≥ 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 or 3 (1-g or 10-g respectively).

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	First Repeated		Second Repeated		Third Repeated
						Measured SAR (W/kg)	Largest to Smallest SAR Ratio	Measured SAR (W/kg)	Largest to Smallest SAR Ratio	Measured SAR (W/kg)
700	LTE Band 12	Hotspot	Edge 4	No	0.530	N/A	N/A	N/A	N/A	N/A
	LTE Band 13	Hotspot	Edge 4	No	0.465	N/A	N/A	N/A	N/A	N/A
850	GSM 850	Body & Hotspot	Front	No	0.555	N/A	N/A	N/A	N/A	N/A
	CDMA BC0	Body & Hotspot	Front	No	0.619	N/A	N/A	N/A	N/A	N/A
	CDMA BC10	Body & Hotspot	Front	No	0.616	N/A	N/A	N/A	N/A	N/A
	WCDMA Band V	Body & Hotspot	Front	No	0.539	N/A	N/A	N/A	N/A	N/A
	LTE Band 26	Body & Hotspot	Front	No	0.506	N/A	N/A	N/A	N/A	N/A
1700	LTE Band 4	Head	Right Touch	No	0.767	N/A	N/A	N/A	N/A	N/A
	WCDMA Band IV	Head	Right Touch	Yes	0.864	0.848	1.02	N/A	N/A	N/A
1900	GSM 1900	Head	Right Touch	No	0.477	N/A	N/A	N/A	N/A	N/A
	CDMA BC1	Head	Right Touch	No	0.898	N/A	N/A	N/A	N/A	N/A
	WCDMA Band II	Head	Right Touch	No	0.772	N/A	N/A	N/A	N/A	N/A
	LTE Band 25	Body & Hotspot	Front	Yes	1.000	0.957	1.04	N/A	N/A	N/A
2400	Wi-Fi 802.11b/g/n/ac	Head	Right Touch	Yes	0.850	0.826	1.03	N/A	N/A	N/A
	BT	Head	Right Touch	No	0.117	N/A	N/A	N/A	N/A	N/A
2600	LTE Band 7	Hotspot	Edge 3	No	0.656	N/A	N/A	N/A	N/A	N/A
	LTE Band 41	Body & Hotspot	Front	No	0.532	N/A	N/A	N/A	N/A	N/A
5300	Wi-Fi 802.11a/n/ac	Head	Right Touch	Yes	0.972	0.971	1.00	N/A	N/A	N/A
5500	Wi-Fi 802.11a/n/ac	Head	Right Touch	Yes	1.05	0.981	1.07	N/A	N/A	N/A
5800	Wi-Fi 802.11a/n/ac	Head	Right Touch	Yes	0.971	0.937	1.04	N/A	N/A	N/A

Note(s):

Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the original and first repeated measurement is not > 1.20 or 3 (1-g or 10-g respectively).

12. Simultaneous Transmission SAR Analysis

Simultaneous Transmission Condition

RF Exposure Condition	Item	Capable Transmit Configurations			
Head & Body-worn	1	GSM(Voice)	+	DTS	
	2	GSM(Voice)	+	U-NII	
	3	GSM(Voice)	+	BT	
	4	GSM(Voice)	+	U-NII	+ BT
	5	GSM(GPRS/EDGE)	+	DTS	
	6	GSM(GPRS/EDGE)	+	U-NII	
	7	GSM(GPRS/EDGE)	+	BT	
	8	GSM(GPRS/EDGE)	+	U-NII	+ BT
	9	W-CDMA	+	DTS	
	10	W-CDMA	+	U-NII	
	11	W-CDMA	+	BT	
	12	W-CDMA	+	U-NII	+ BT
	13	CDMA	+	DTS	
	14	CDMA	+	U-NII	
	15	CDMA	+	BT	
	16	CDMA	+	U-NII	+ BT
	17	LTE	+	DTS	
	18	LTE	+	U-NII	
	19	LTE	+	BT	
	20	LTE	+	U-NII	+ BT
Hotspot & Wi-Fi Direct	21	GSM(GPRS/EDGE)	+	DTS	
	22	GSM(GPRS/EDGE)	+	U-NII	
	23	W-CDMA	+	DTS	
	24	W-CDMA	+	U-NII	
	25	CDMA	+	DTS	
	26	CDMA	+	U-NII	
	27	LTE	+	DTS	
	28	LTE	+	U-NII	
Notes:					
1. DTS and UNII-3 bands support Hotspot. 2. DTS, UNII-1, and UNII-3 bands support Wi-Fi Direct. 3. GPRS/EDGE, W-CDMA, CDMA and LTE support Hotspot. 4. VoIP is supported in GPRS/EDGE, W-CDMA, CDMA and LTE. 5. DTS Radio cannot transmit simultaneously with Bluetooth Radio. 6. U-NII Radio can transmit simultaneously with Bluetooth Radio.					

12.1. Sum of the SAR for GSM850 & Wi-Fi & BT

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN + DTS		①+③ WWAN + U-NII		①+③+④ WWAN + U-NII + BT	
						Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.394	0.394	0.663	0.059	0.788	No	1.057	No	1.116	No
	Left Tilt	0.227	0.999	1.099	0.064	1.226	No	1.326	No	1.390	No
	Right Touch	0.315	0.999	1.099	0.131	1.314	No	1.414	No	1.545	No
	Right Tilt	0.236	0.892	1.069	0.111	1.128	No	1.305	No	1.416	No
Body-worn & Hotspot	Rear	0.456	0.356	0.379	0.050	0.812	No	0.835	No	0.886	No
	Front	0.568	0.356	0.379	0.030	0.924	No	0.947	No	0.977	No
Hotspot	Edge 2	0.192	0.356	0.379	0.050	0.548	No	0.571	No	0.621	No
	Edge 3	0.426	0.356	0.379	0.050	0.782	No	0.805	No	0.855	No
	Edge 4	0.473	0.356	0.379	0.050	0.829	No	0.852	No	0.902	No

12.2. Sum of the SAR for GSM1900 & Wi-Fi & BT

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN + DTS		①+③ WWAN + U-NII		①+③+④ WWAN + U-NII + BT	
						Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.269	0.394	0.663	0.059	0.663	No	0.932	No	0.991	No
	Left Tilt	0.144	0.999	1.099	0.064	1.143	No	1.243	No	1.307	No
	Right Touch	0.477	0.999	1.099	0.131	1.476	No	1.576	No	1.707	Yes
	Right Tilt	0.210	0.892	1.069	0.111	1.102	No	1.279	No	1.390	No
Body-worn & Hotspot	Rear	0.404	0.356	0.379	0.050	0.760	No	0.783	No	0.833	No
	Front	0.400	0.356	0.379	0.030	0.756	No	0.779	No	0.809	No
Hotspot	Edge 2	0.408	0.356	0.379	0.050	0.764	No	0.787	No	0.837	No
	Edge 3	0.251	0.356	0.379	0.050	0.607	No	0.630	No	0.680	No
	Edge 4	0.113	0.356	0.379	0.050	0.469	No	0.492	No	0.542	No

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Worst-case combination		Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② + ③ U-NII + BT						
Right Touch	0.477	1.230	① + ② + ③	1.707	81.6	0.03	No	1

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN + DTS		①+③ WWAN + U-NII		①+③+④ WWAN + U-NII + BT	
						Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.407	0.394	0.663	0.059	0.801	No	1.070	No	1.130	No
	Left Tilt	0.210	0.999	1.099	0.064	1.209	No	1.309	No	1.373	No
	Right Touch	0.790	0.999	1.099	0.131	1.789	Yes	1.889	Yes	2.020	Yes
	Right Tilt	0.281	0.892	1.069	0.111	1.173	No	1.350	No	1.461	No
Body-worn & Hotspot	Rear	0.599	0.356	0.379	0.050	0.955	No	0.978	No	1.028	No
	Front	0.713	0.356	0.379	0.030	1.069	No	1.092	No	1.123	No
Hotspot	Edge 2	0.774	0.356	0.379	0.050	1.130	No	1.153	No	1.203	No
	Edge 3	0.487	0.356	0.379	0.050	0.843	No	0.866	No	0.916	No
	Edge 4	0.774	0.356	0.379	0.050	1.130	No	1.153	No	1.203	No

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Worst-case combination			Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS	③ U-NII						
Right Touch	0.790	0.999		① + ②	1.789	86.8	0.03	No	2
	0.790		1.099	① + ③	1.889	92.2	0.03	No	3
Test Position	Worst-case combination		Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure	
	① WWAN	② + ③ U-NII +BT							
Right Touch	0.790	1.230	① + ② + ③	2.020	84.4	0.03	No	4	

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN + DTS		①+③ WWAN + U-NII		①+③+④ WWAN + U-NII + BT	
						Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.414	0.394	0.663	0.059	0.808	No	1.077	No	1.137	No
	Left Tilt	0.274	0.999	1.099	0.064	1.273	No	1.373	No	1.437	No
	Right Touch	0.884	0.999	1.099	0.131	1.883	Yes	1.983	Yes	2.114	Yes
	Right Tilt	0.298	0.892	1.069	0.111	1.190	No	1.367	No	1.478	No
Body-worn & Hotspot	Rear	0.884	0.356	0.379	0.050	1.240	No	1.263	No	1.314	No
	Front	0.845	0.356	0.379	0.030	1.201	No	1.224	No	1.255	No
Hotspot	Edge 2	0.659	0.356	0.379	0.050	1.015	No	1.038	No	1.088	No
	Edge 3	0.568	0.356	0.379	0.050	0.924	No	0.947	No	0.997	No
	Edge 4	0.884	0.356	0.379	0.050	1.240	No	1.263	No	1.313	No

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Worst-case combination			Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS	③ U-NII						
Right Touch	0.884	0.999		① + ②	1.883	83.9	0.03	No	5
	0.884		1.099	① + ③	1.983	89.2	0.03	No	6
Test Position	Worst-case combination			Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	②+③ U-NII + BT							
Right Touch	0.884	1.230		① + ② + ③	2.114	81.5	0.04	No	7

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN + DTS		①+③ WWAN + U-NII		①+③+④ WWAN + U-NII + BT	
						Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.503	0.394	0.663	0.059	0.897	No	1.166	No	1.225	No
	Left Tilt	0.284	0.999	1.099	0.064	1.283	No	1.383	No	1.447	No
	Right Touch	0.371	0.999	1.099	0.131	1.370	No	1.470	No	1.601	Yes
	Right Tilt	0.265	0.892	1.069	0.111	1.157	No	1.334	No	1.445	No
Body-worn & Hotspot	Rear	0.531	0.356	0.379	0.050	0.887	No	0.910	No	0.960	No
	Front	0.426	0.356	0.379	0.030	0.782	No	0.805	No	0.835	No
Hotspot	Edge 2	0.210	0.356	0.379	0.050	0.566	No	0.589	No	0.639	No
	Edge 3	0.459	0.356	0.379	0.050	0.815	No	0.838	No	0.888	No
	Edge 4	0.475	0.356	0.379	0.050	0.831	No	0.854	No	0.904	No

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Worst-case combination			Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	②+③ U-NII + BT							
Right Touch	0.371	1.230		① + ② + ③	1.601	253.5	0.01	No	8

12.6. Sum of the SAR for CDMA BC0 & Wi-Fi & BT

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN + DTS		①+③ WWAN + U-NII		①+③+④ WWAN + U-NII + BT	
						Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.479	0.394	0.663	0.059	0.873	No	1.142	No	1.201	No
	Left Tilt	0.260	0.999	1.099	0.064	1.259	No	1.359	No	1.423	No
	Right Touch	0.373	0.999	1.099	0.131	1.372	No	1.472	No	1.603	Yes
	Right Tilt	0.243	0.892	1.069	0.111	1.135	No	1.312	No	1.423	No
Body-worn & Hotspot	Rear	0.509	0.356	0.379	0.050	0.865	No	0.888	No	0.938	No
	Front	0.619	0.356	0.379	0.030	0.975	No	0.998	No	1.028	No
Hotspot	Edge 2	0.202	0.356	0.379	0.050	0.558	No	0.581	No	0.631	No
	Edge 3	0.479	0.356	0.379	0.050	0.835	No	0.858	No	0.908	No
	Edge 4	0.464	0.356	0.379	0.050	0.820	No	0.843	No	0.893	No

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Worst-case combination		$\sum$ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	②+③ U-NII +BT						
Right Touch	0.373	1.230	① + ② + ③	1.603	251.0	0.01	No	9

12.7. Sum of the SAR for CDMA BC1 & Wi-Fi & BT

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN + DTS		①+③ WWAN + U-NII		①+③+④ WWAN + U-NII + BT	
						Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.479	0.394	0.663	0.059	0.873	No	1.142	No	1.201	No
	Left Tilt	0.261	0.999	1.099	0.064	1.260	No	1.360	No	1.424	No
	Right Touch	0.898	0.999	1.099	0.131	1.897	Yes	1.997	Yes	2.128	Yes
	Right Tilt	0.379	0.892	1.069	0.111	1.271	No	1.448	No	1.559	No
Body-worn & Hotspot	Rear	0.649	0.356	0.379	0.050	1.005	No	1.028	No	1.078	No
	Front	0.770	0.356	0.379	0.030	1.126	No	1.149	No	1.179	No
Hotspot	Edge 2	0.879	0.356	0.379	0.050	1.235	No	1.258	No	1.308	No
	Edge 3	0.521	0.356	0.379	0.050	0.877	No	0.900	No	0.950	No
	Edge 4	0.879	0.356	0.379	0.050	1.235	No	1.258	No	1.308	No

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Worst-case combination			Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS	③ U-NII						
Right Touch	0.898	0.999		① + ②	1.897	81.8	0.03	No	10
	0.898		1.099	① + ③	1.997	87.1	0.03	No	11
Test Position	Worst-case combination		Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure	
	① WWAN	② + ③ U-NII + BT							
Right Touch	0.898	1.230	① + ② + ③	2.128	79.4	0.04	No	12	

12.8. Sum of the SAR for CDMA BC10 & Wi-Fi & BT

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN + DTS		①+③ WWAN + U-NII		①+③+④ WWAN + U-NII + BT	
						Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.466	0.394	0.663	0.059	0.860	No	1.129	No	1.188	No
	Left Tilt	0.259	0.999	1.099	0.064	1.258	No	1.358	No	1.422	No
	Right Touch	0.371	0.999	1.099	0.131	1.370	No	1.470	No	1.601	Yes
	Right Tilt	0.233	0.892	1.069	0.111	1.125	No	1.302	No	1.413	No
Body-worn & Hotspot	Rear	0.582	0.356	0.379	0.050	0.938	No	0.961	No	1.011	No
	Front	0.629	0.356	0.379	0.030	0.985	No	1.008	No	1.038	No
Hotspot	Edge 2	0.261	0.356	0.379	0.050	0.617	No	0.640	No	0.690	No
	Edge 3	0.443	0.356	0.379	0.050	0.799	No	0.822	No	0.872	No
	Edge 4	0.544	0.356	0.379	0.050	0.900	No	0.923	No	0.973	No

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Worst-case combination		Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	②+③ U-NII + BT						
Right Touch	0.371	1.230	① + ② + ③	1.601	252.1	0.01	No	13

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

Covered by LTE Band 25 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN + DTS		①+③ WWAN + U-NII		①+③+④ WWAN + U-NII + BT	
						Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.393	0.394	0.663	0.059	0.787	No	1.056	No	1.115	No
	Left Tilt	0.254	0.999	1.099	0.064	1.253	No	1.353	No	1.417	No
	Right Touch	0.767	0.999	1.099	0.131	1.766	Yes	1.866	Yes	1.997	Yes
	Right Tilt	0.297	0.892	1.069	0.111	1.189	No	1.366	No	1.477	No
Body-worn & Hotspot	Rear	0.753	0.356	0.379	0.050	1.109	No	1.132	No	1.182	No
	Front	0.752	0.356	0.379	0.030	1.108	No	1.131	No	1.161	No
Hotspot	Edge 2	0.634	0.356	0.379	0.050	0.990	No	1.013	No	1.063	No
	Edge 3	0.559	0.356	0.379	0.050	0.915	No	0.938	No	0.988	No
	Edge 4	0.753	0.356	0.379	0.050	1.109	No	1.132	No	1.182	No

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Worst-case combination			Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS	③ U-NII						
Right Touch	0.767	0.999		① + ②	1.766	78.7	0.03	No	14
	0.767		1.099	① + ③	1.866	84.1	0.03	No	15
Test Position	Worst-case combination		Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure	
	① WWAN	② + ③ U-NII + BT							
Right Touch	0.767	1.230	① + ② + ③	1.997	76.3	0.04	No	16	

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

Covered by LTE Band 26 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN + DTS		①+③ WWAN + U-NII		①+③+④ WWAN + U-NII + BT	
						Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.579	0.394	0.663	0.059	0.973	No	1.242	No	1.302	No
	Left Tilt	0.116	0.999	1.099	0.064	1.115	No	1.215	No	1.279	No
	Right Touch	0.262	0.999	1.099	0.131	1.261	No	1.361	No	1.492	No
	Right Tilt	0.141	0.892	1.069	0.111	1.033	No	1.210	No	1.322	No
Body-worn & Hotspot	Rear	0.548	0.356	0.379	0.050	0.904	No	0.927	No	0.978	No
	Front	0.636	0.356	0.379	0.030	0.992	No	1.015	No	1.046	No
Hotspot	Edge 2	0.076	0.356	0.379	0.050	0.432	No	0.455	No	0.505	No
	Edge 3	0.671	0.356	0.379	0.050	1.027	No	1.050	No	1.100	No
	Edge 4	0.433	0.356	0.379	0.050	0.789	No	0.812	No	0.862	No

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN + DTS		①+③ WWAN + U-NII		①+③+④ WWAN + U-NII + BT	
						Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.255	0.394	0.663	0.059	0.649	No	0.918	No	0.977	No
	Left Tilt	0.136	0.999	1.099	0.064	1.135	No	1.235	No	1.299	No
	Right Touch	0.200	0.999	1.099	0.131	1.199	No	1.299	No	1.430	No
	Right Tilt	0.118	0.892	1.069	0.111	1.010	No	1.187	No	1.298	No
Body-worn & Hotspot	Rear	0.391	0.356	0.379	0.050	0.747	No	0.770	No	0.820	No
	Front	0.315	0.356	0.379	0.030	0.671	No	0.694	No	0.724	No
Hotspot	Edge 2	0.313	0.356	0.379	0.050	0.669	No	0.692	No	0.742	No
	Edge 3	0.200	0.356	0.379	0.050	0.556	No	0.579	No	0.629	No
	Edge 4	0.542	0.356	0.379	0.050	0.898	No	0.921	No	0.971	No

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN + DTS		①+③ WWAN + U-NII		①+③+④ WWAN + U-NII + BT	
						Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.289	0.394	0.663	0.059	0.683	No	0.952	No	1.011	No
	Left Tilt	0.178	0.999	1.099	0.064	1.177	No	1.277	No	1.341	No
	Right Touch	0.211	0.999	1.099	0.131	1.210	No	1.310	No	1.441	No
	Right Tilt	0.153	0.892	1.069	0.111	1.045	No	1.222	No	1.333	No
Body-worn & Hotspot	Rear	0.399	0.356	0.379	0.050	0.755	No	0.778	No	0.828	No
	Front	0.365	0.356	0.379	0.030	0.721	No	0.744	No	0.774	No
Hotspot	Edge 2	0.194	0.356	0.379	0.050	0.550	No	0.573	No	0.623	No
	Edge 3	0.280	0.356	0.379	0.050	0.636	No	0.659	No	0.709	No
	Edge 4	0.465	0.356	0.379	0.050	0.821	No	0.844	No	0.894	No

12.15. Sum of the SAR for LTE Band 17 & Wi-Fi & BT

Covered by LTE Band 12 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

12.16. Sum of the SAR for LTE Band 25 & Wi-Fi & BT

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN + DTS		①+③ WWAN + U-NII		①+③+④ WWAN + U-NII + BT	
						Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.448	0.394	0.663	0.059	0.842	No	1.111	No	1.170	No
	Left Tilt	0.233	0.999	1.099	0.064	1.232	No	1.332	No	1.396	No
	Right Touch	0.873	0.999	1.099	0.131	1.872	Yes	1.972	Yes	2.103	Yes
	Right Tilt	0.333	0.892	1.069	0.111	1.225	No	1.402	No	1.513	No
Body-worn & Hotspot	Rear	0.873	0.356	0.379	0.050	1.229	No	1.252	No	1.302	No
	Front	1.000	0.356	0.379	0.030	1.356	No	1.379	No	1.409	No
Hotspot	Edge 2	0.685	0.356	0.379	0.050	1.041	No	1.064	No	1.114	No
	Edge 3	0.416	0.356	0.379	0.050	0.772	No	0.795	No	0.845	No
	Edge 4	1.000	0.356	0.379	0.050	1.356	No	1.379	No	1.429	No

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Worst-case combination			Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS	③ U-NII						
Right Touch	0.873	0.999		① + ②	1.872	84.0	0.03	No	17
	0.873		1.099	① + ③	1.972	89.4	0.03	No	18
Test Position	Worst-case combination			Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	②+③ U-NII + BT							
Right Touch	0.873	1.230		① + ② + ③	2.103	81.6	0.04	No	19

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN + DTS		①+③ WWAN + U-NII		①+③+④ WWAN + U-NII + BT	
						Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.430	0.394	0.663	0.059	0.824	No	1.093	No	1.152	No
	Left Tilt	0.235	0.999	1.099	0.064	1.234	No	1.334	No	1.398	No
	Right Touch	0.325	0.999	1.099	0.131	1.324	No	1.424	No	1.555	No
	Right Tilt	0.216	0.892	1.069	0.111	1.108	No	1.285	No	1.396	No
Body-worn & Hotspot	Rear	0.483	0.356	0.379	0.050	0.839	No	0.862	No	0.912	No
	Front	0.506	0.356	0.379	0.030	0.862	No	0.885	No	0.915	No
Hotspot	Edge 2	0.187	0.356	0.379	0.050	0.543	No	0.566	No	0.616	No
	Edge 3	0.409	0.356	0.379	0.050	0.765	No	0.788	No	0.838	No
	Edge 4	0.479	0.356	0.379	0.050	0.835	No	0.858	No	0.908	No

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN + DTS		①+③ WWAN + U-NII		①+③+④ WWAN + U-NII + BT	
						Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.500	0.394	0.663	0.059	0.894	No	1.163	No	1.223	No
	Left Tilt	0.098	0.999	1.099	0.064	1.097	No	1.197	No	1.260	No
	Right Touch	0.186	0.999	1.099	0.131	1.185	No	1.285	No	1.417	No
	Right Tilt	0.135	0.892	1.069	0.111	1.027	No	1.204	No	1.315	No
Body-worn & Hotspot	Rear	0.356	0.356	0.379	0.050	0.712	No	0.735	No	0.786	No
	Front	0.544	0.356	0.379	0.030	0.900	No	0.923	No	0.954	No
Hotspot	Edge 2	0.058	0.356	0.379	0.050	0.414	No	0.437	No	0.487	No
	Edge 3	0.472	0.356	0.379	0.050	0.828	No	0.851	No	0.901	No
	Edge 4	0.342	0.356	0.379	0.050	0.698	No	0.721	No	0.771	No

Conclusion:

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

Figure (1)

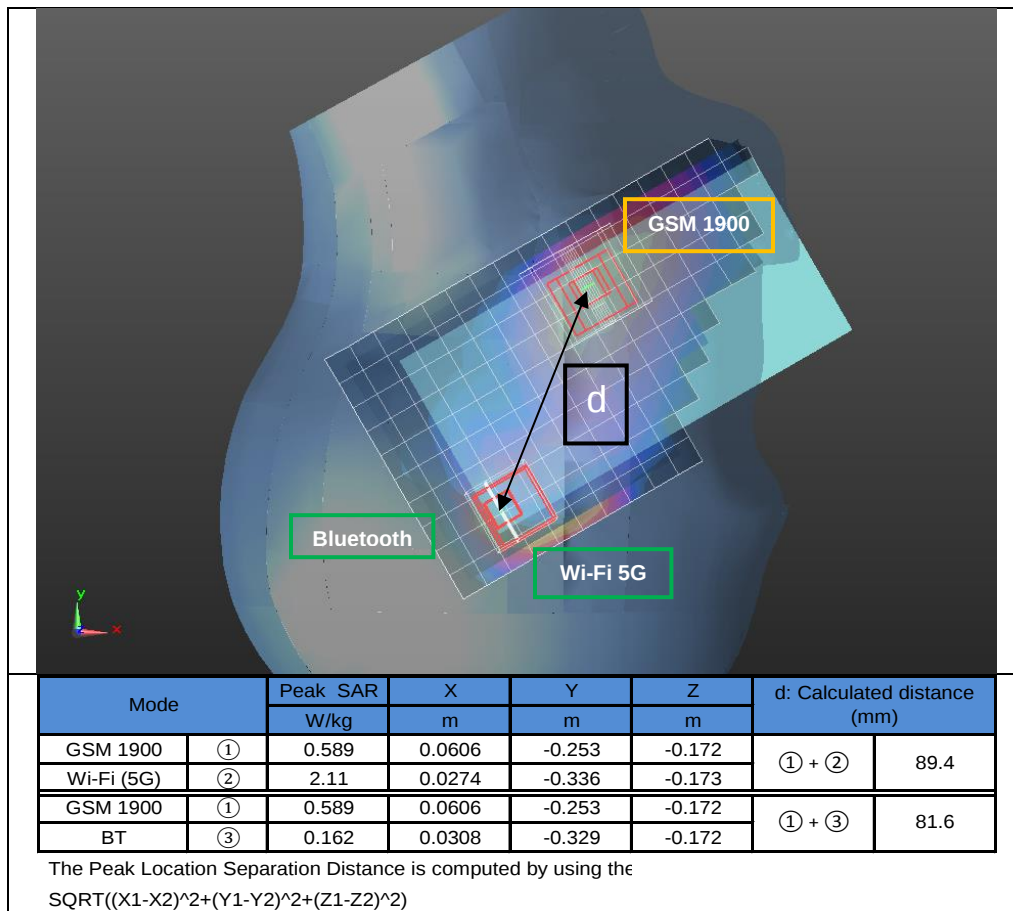


Figure (2)

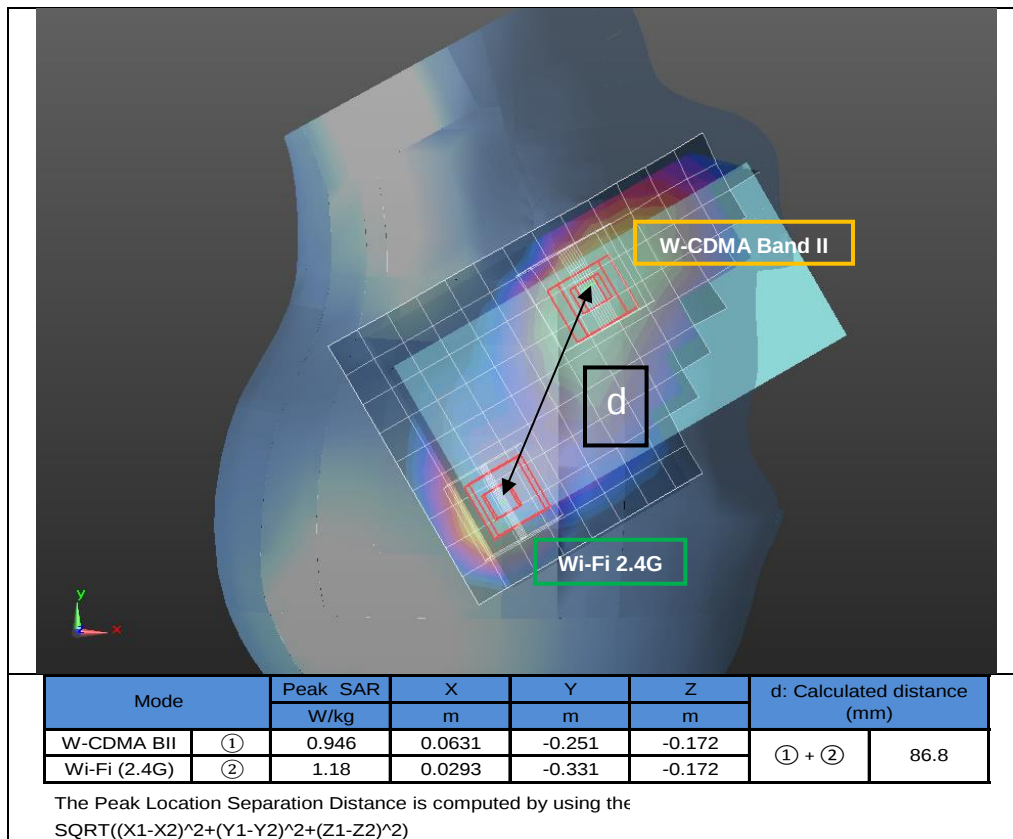


Figure (3)

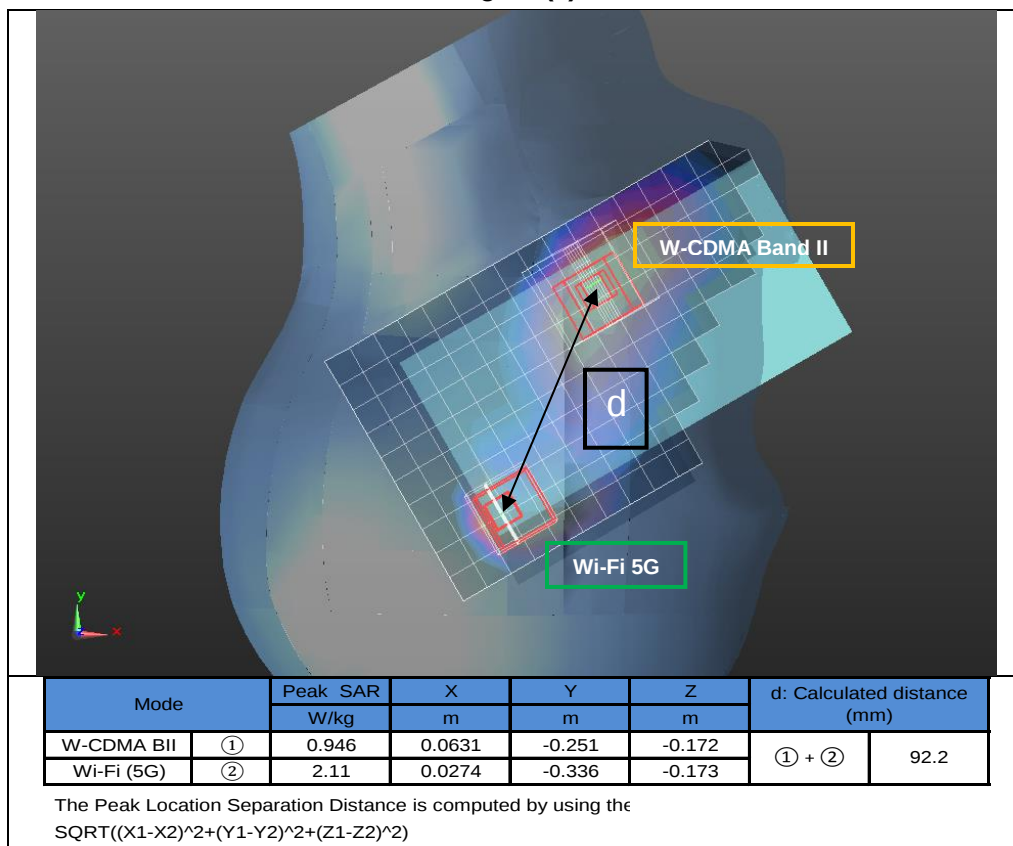


Figure (4)

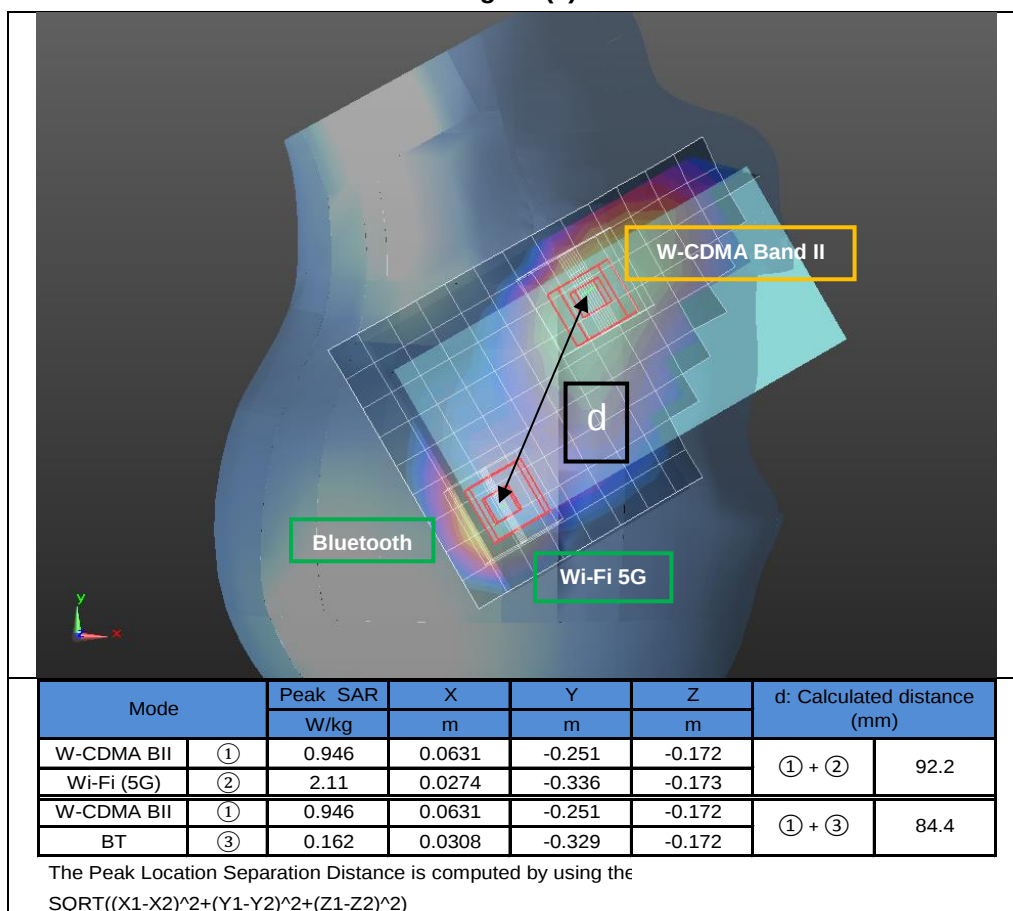


Figure (5)

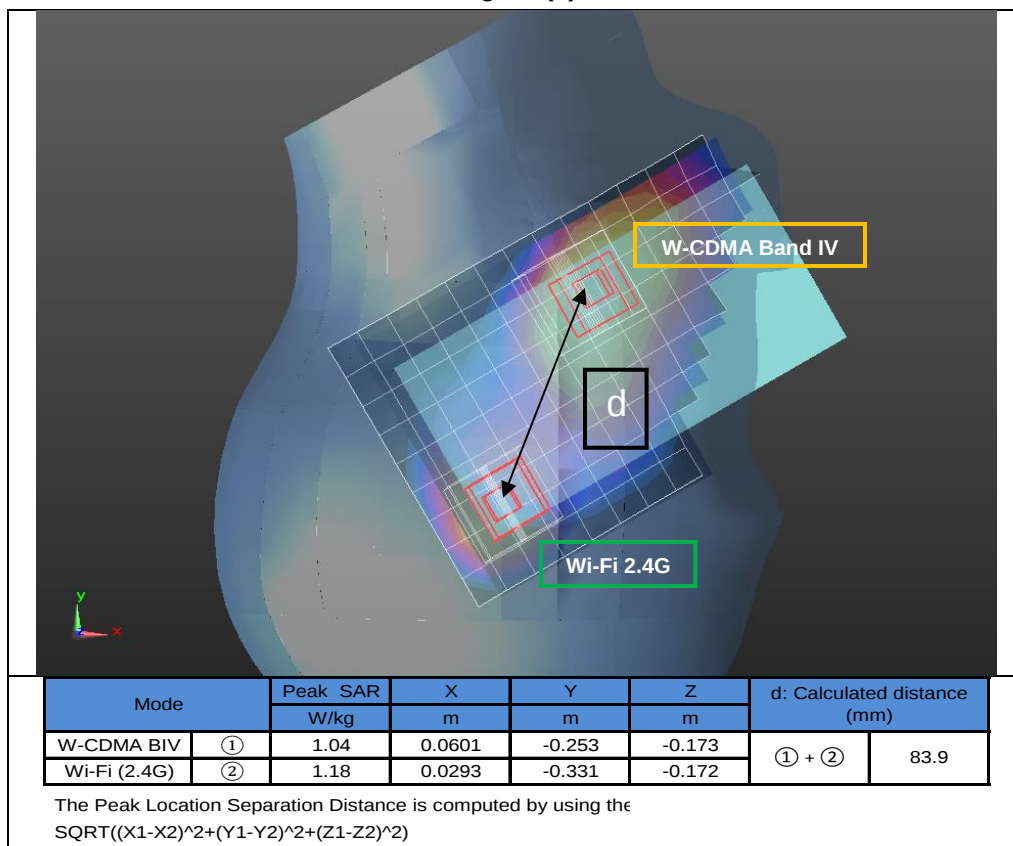


Figure (6)

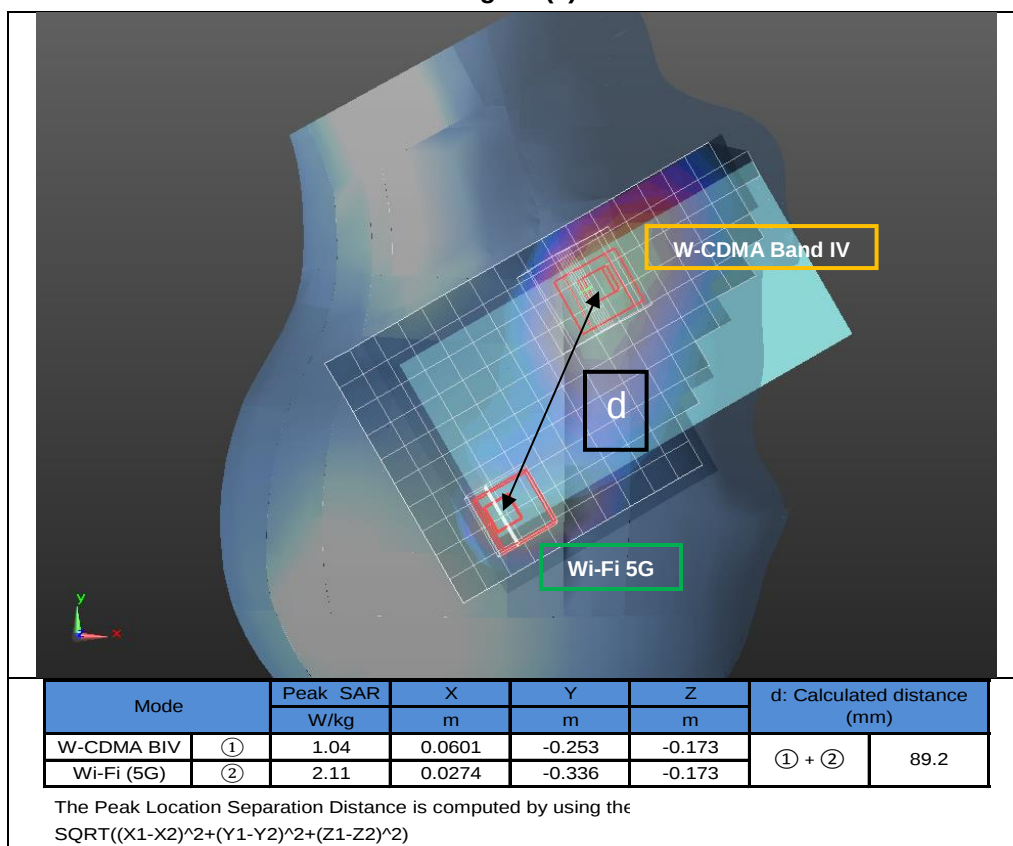


Figure (7)

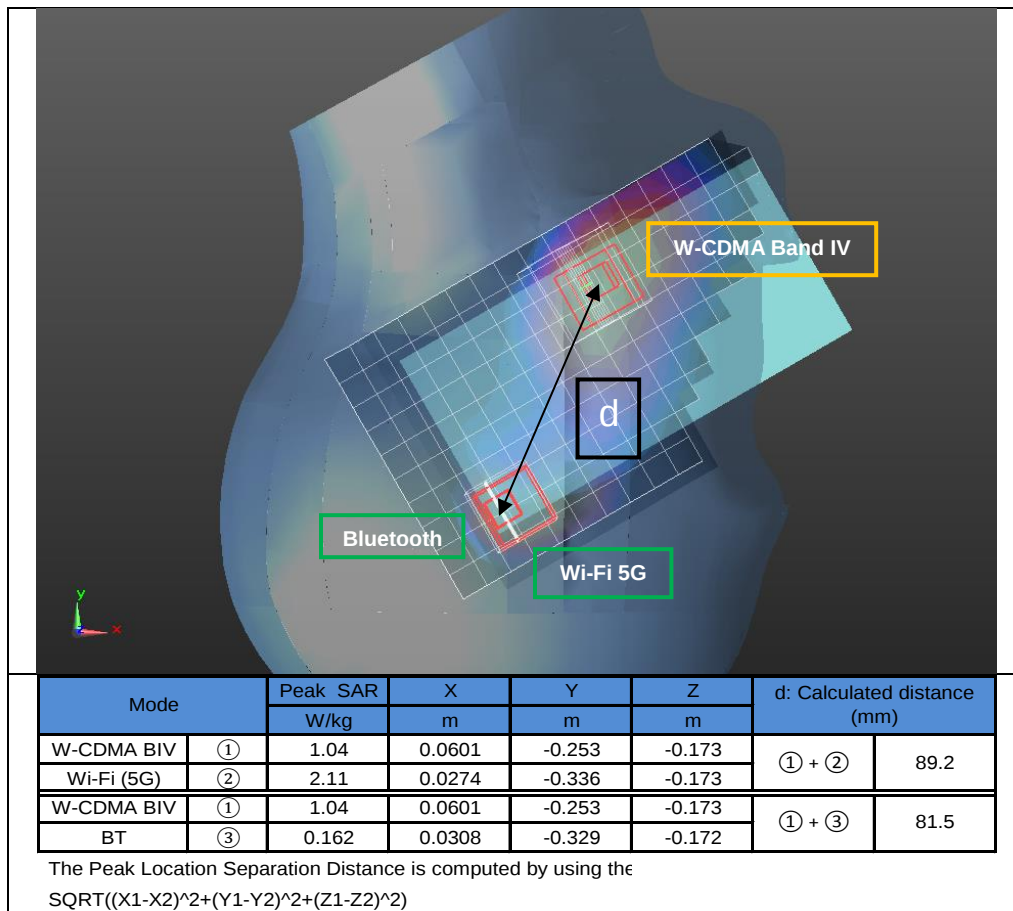


Figure (8)

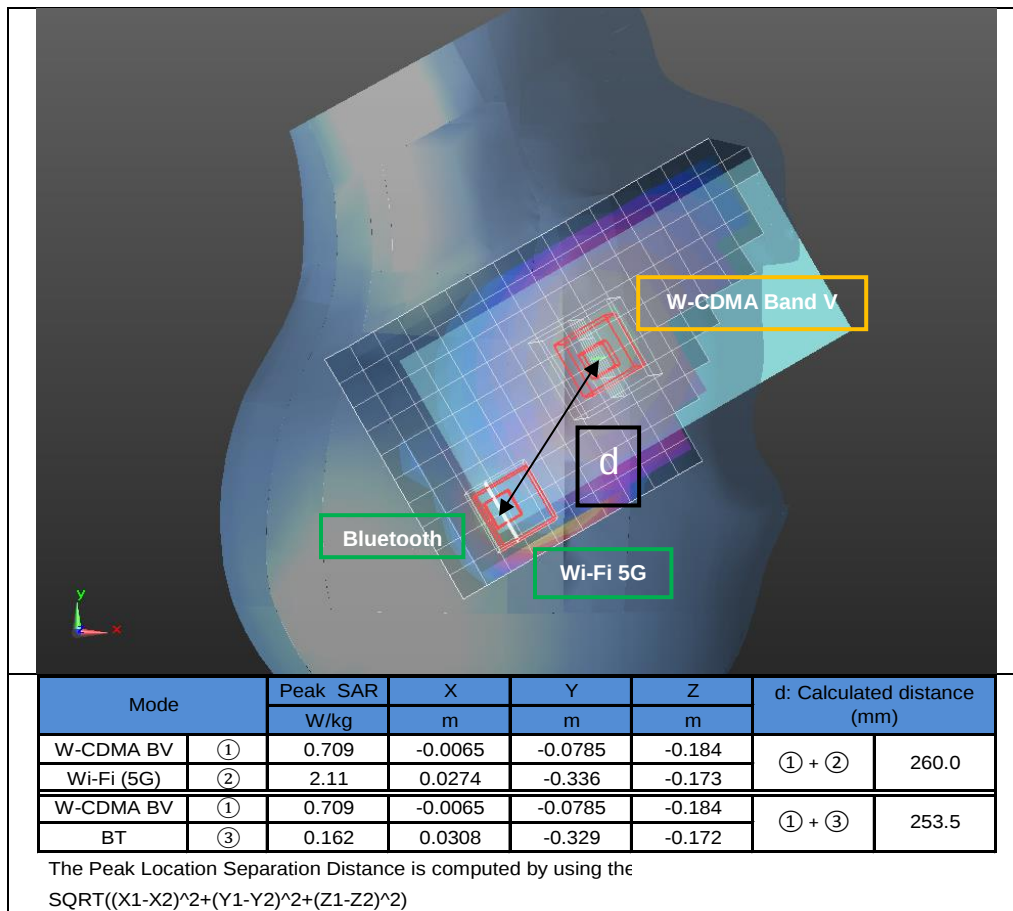


Figure (9)

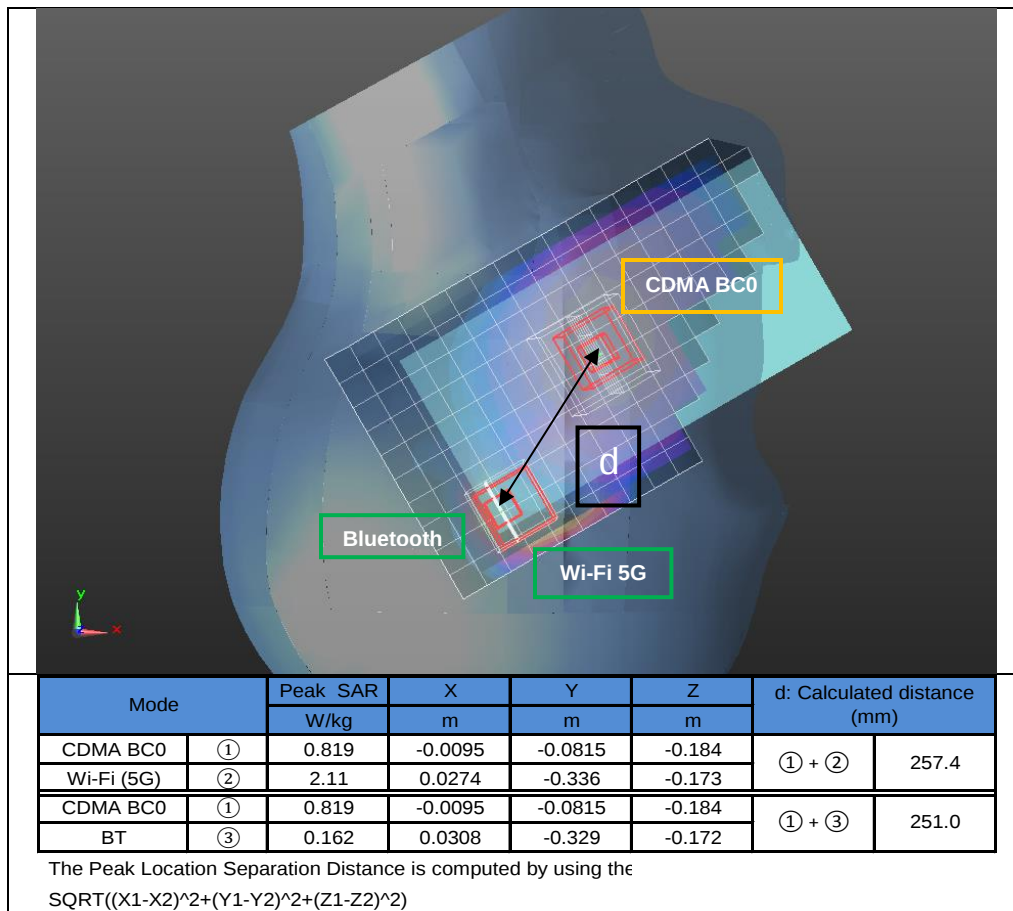


Figure (10)

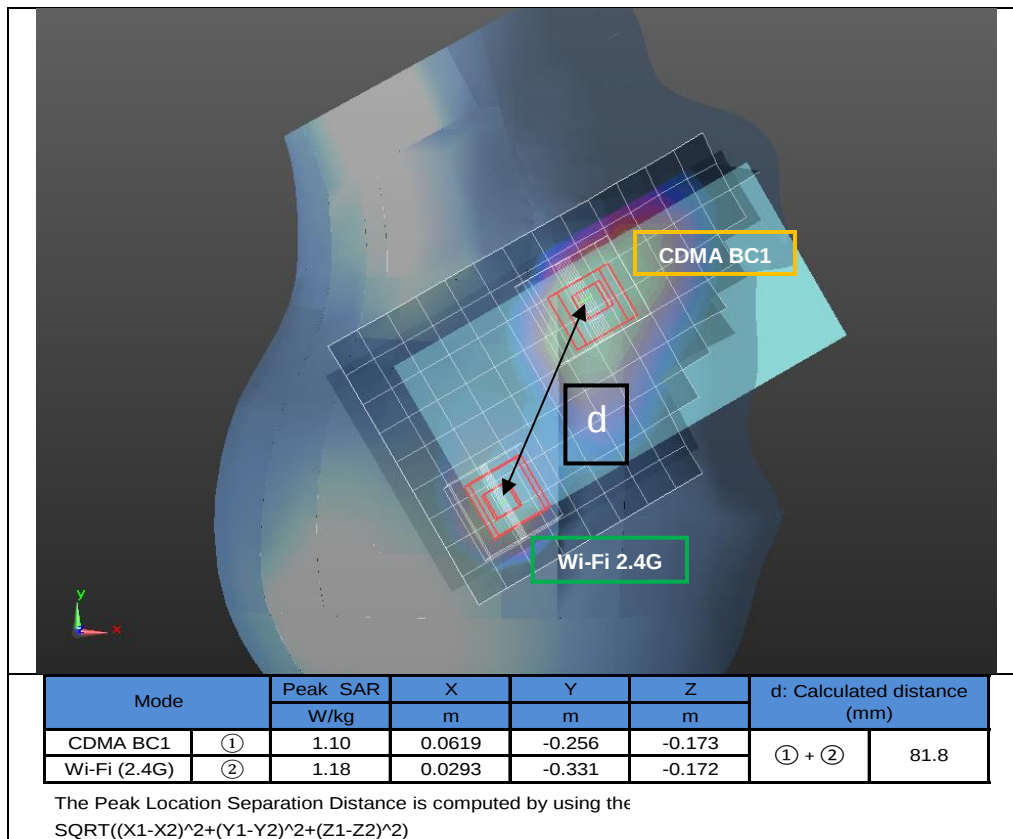


Figure (11)

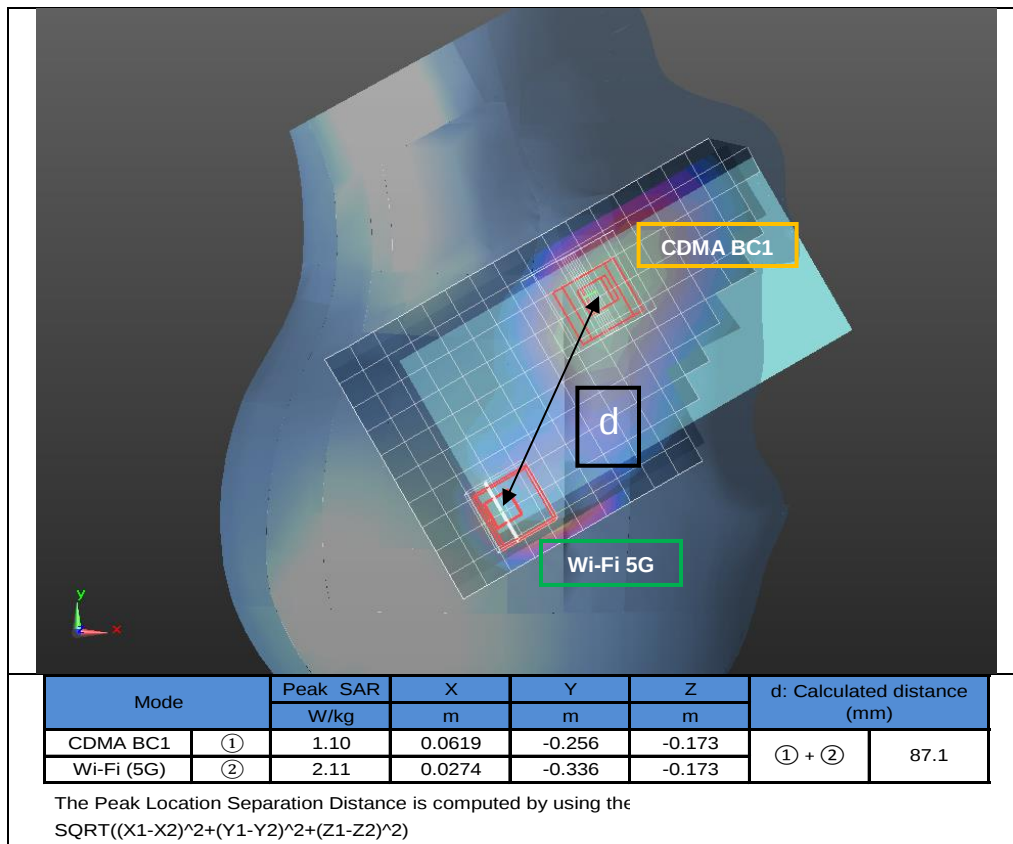


Figure (12)

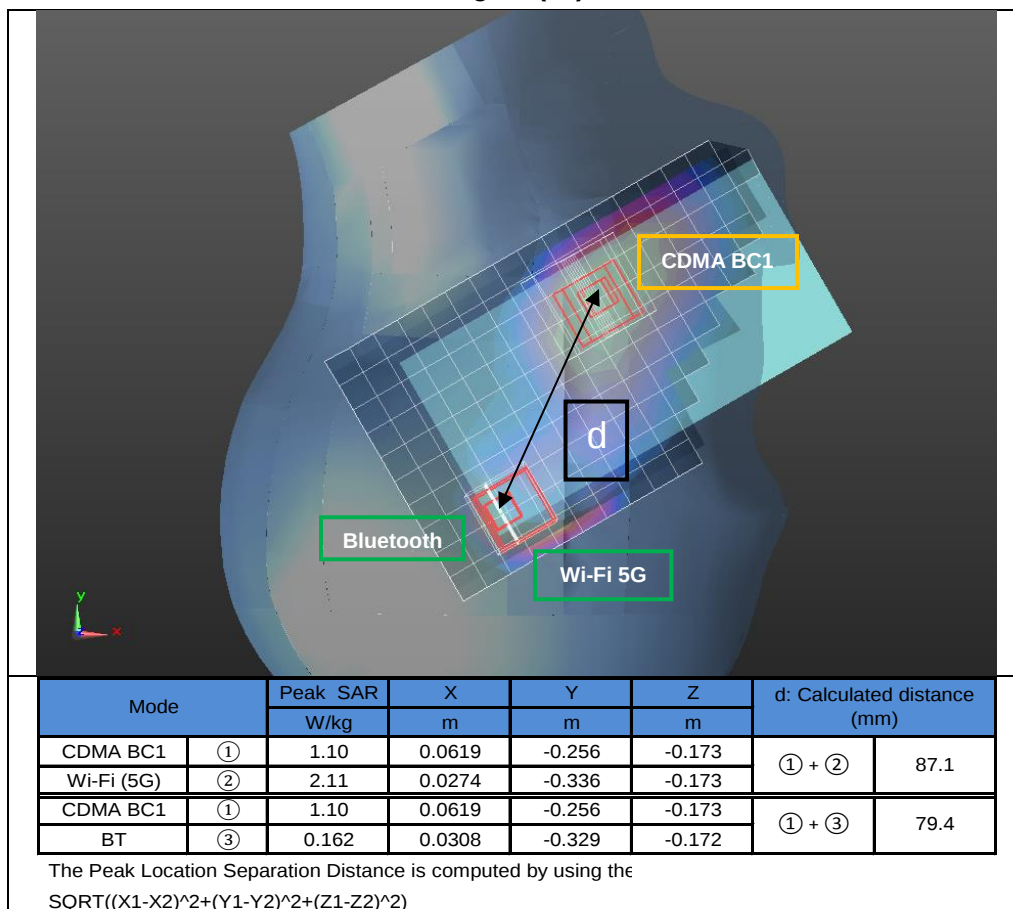


Figure (13)

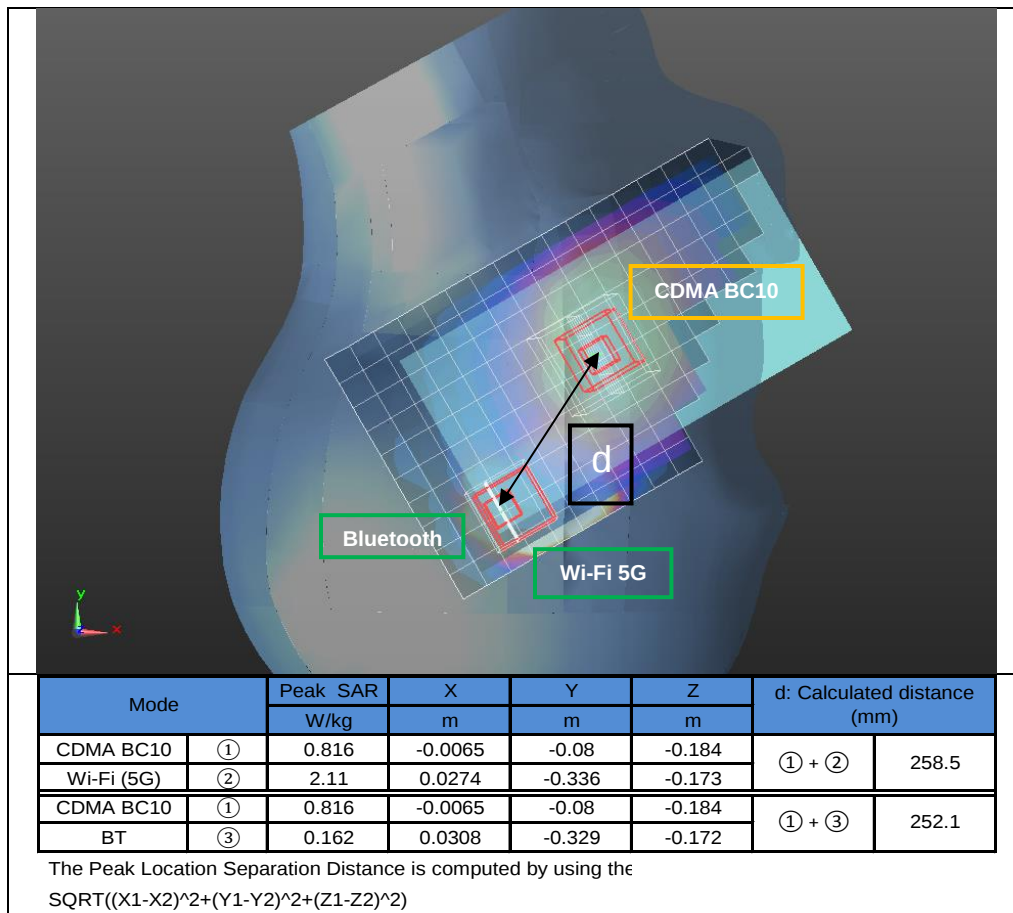


Figure (14)

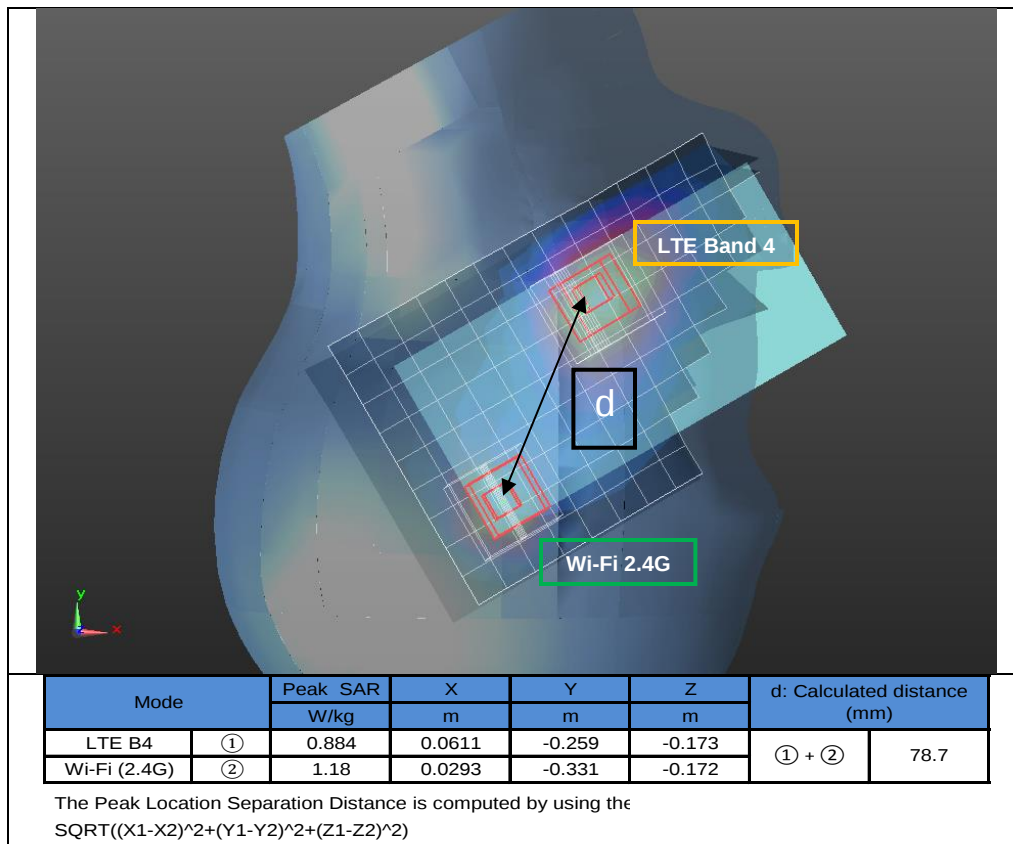


Figure (15)

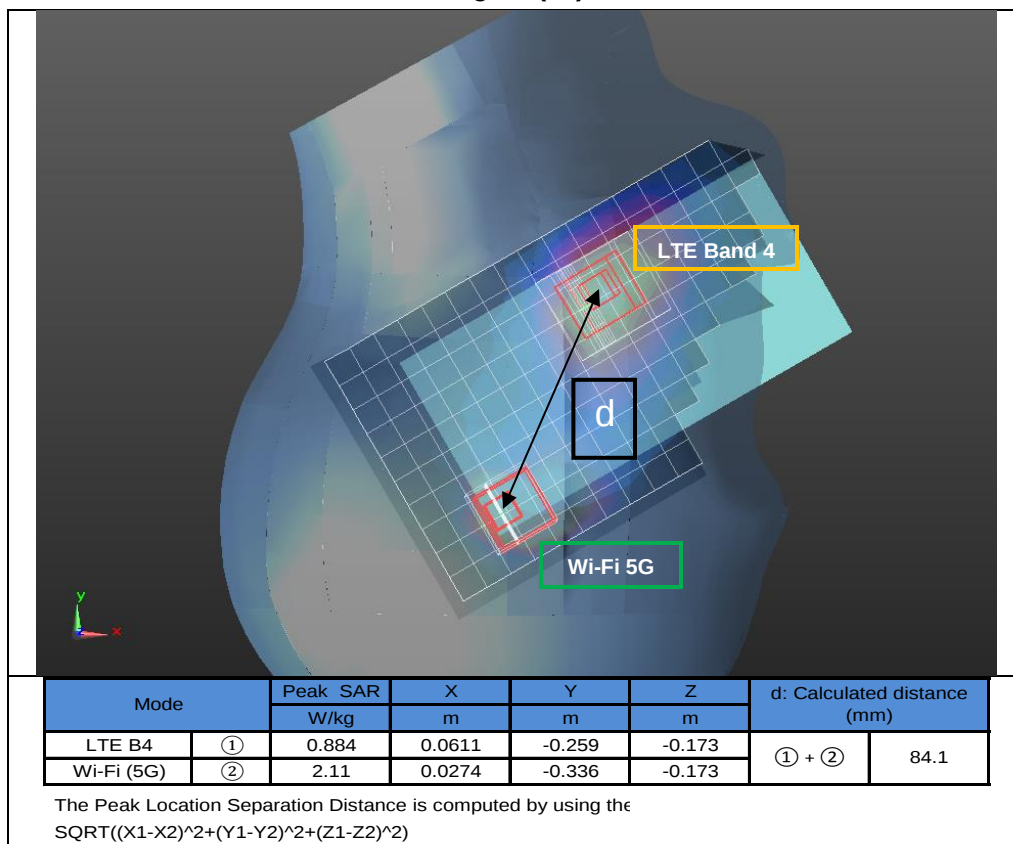


Figure (16)

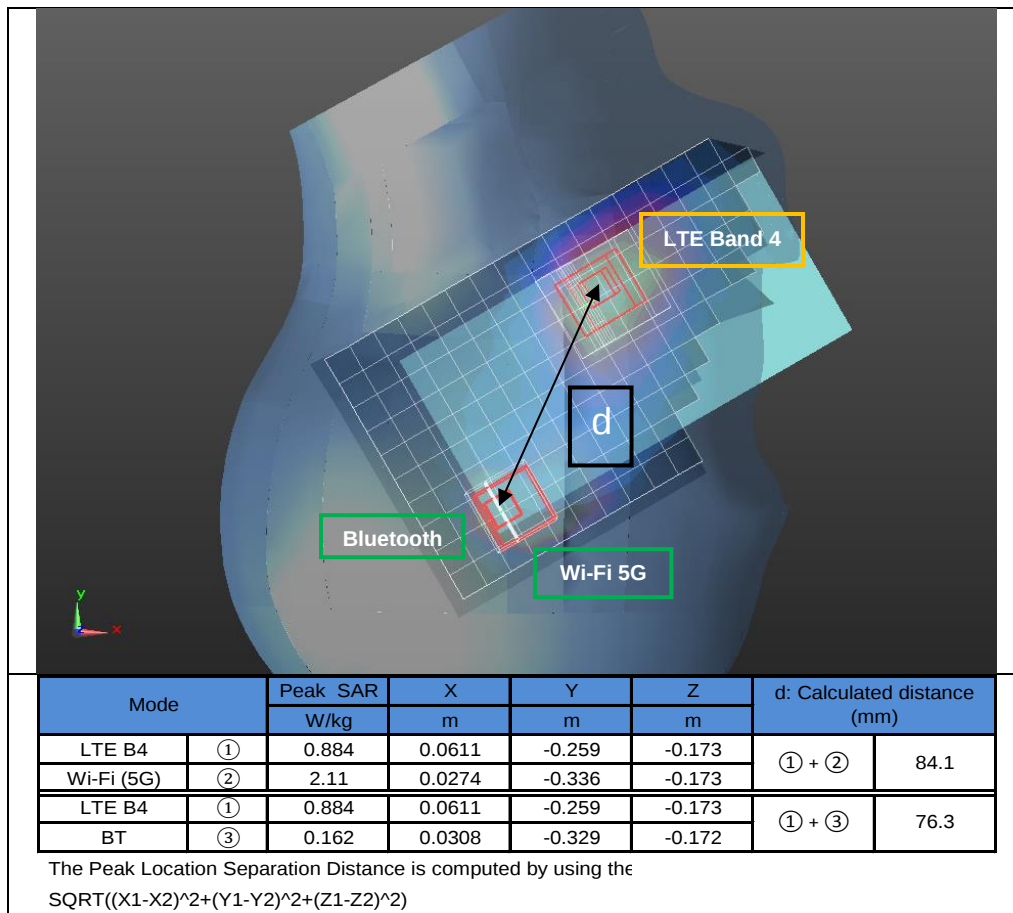


Figure (17)

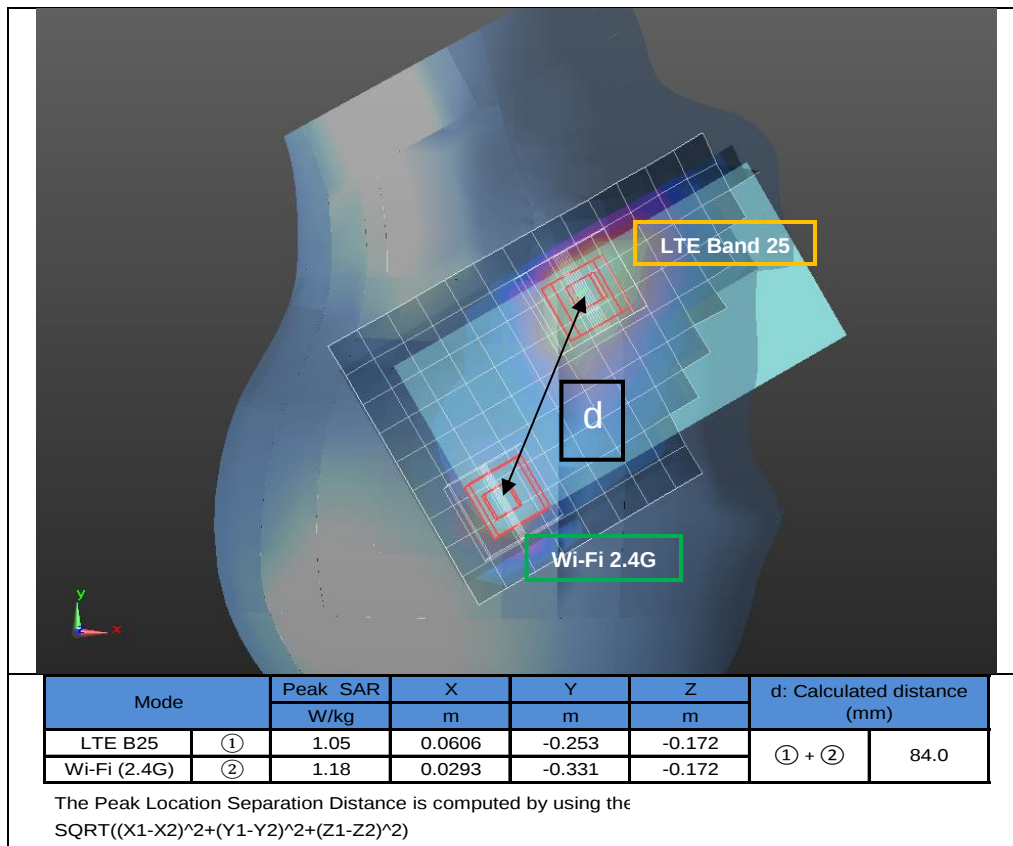


Figure (18)

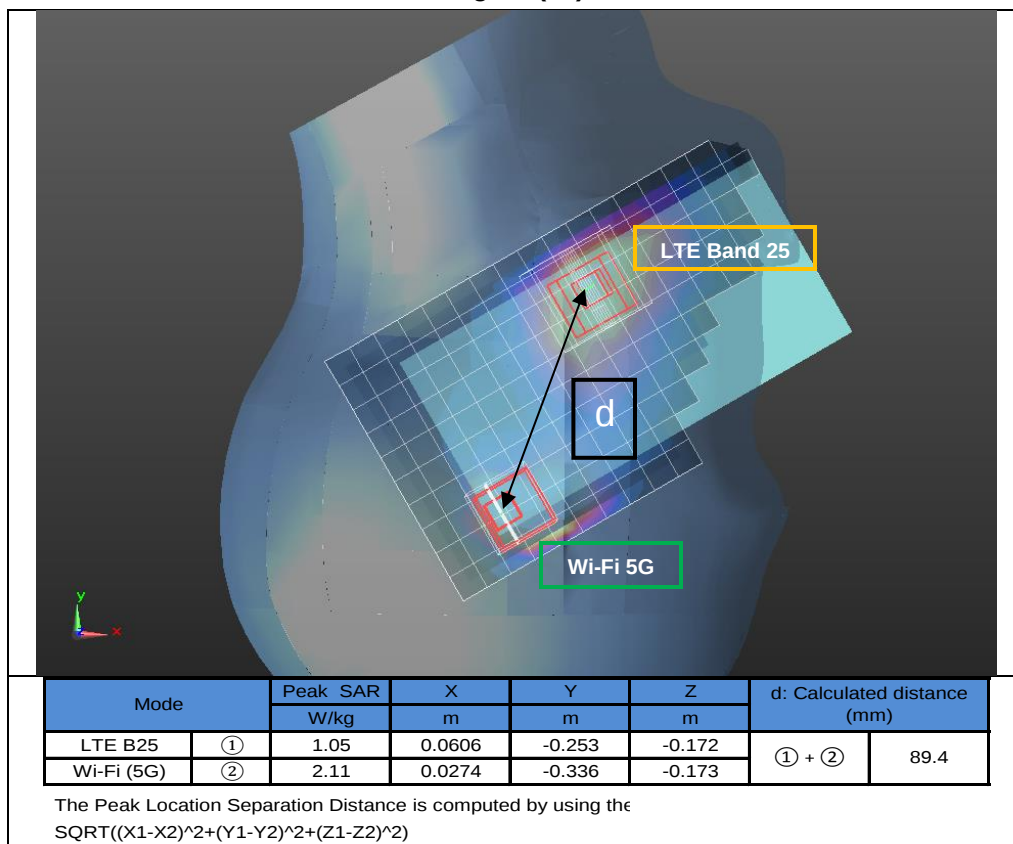
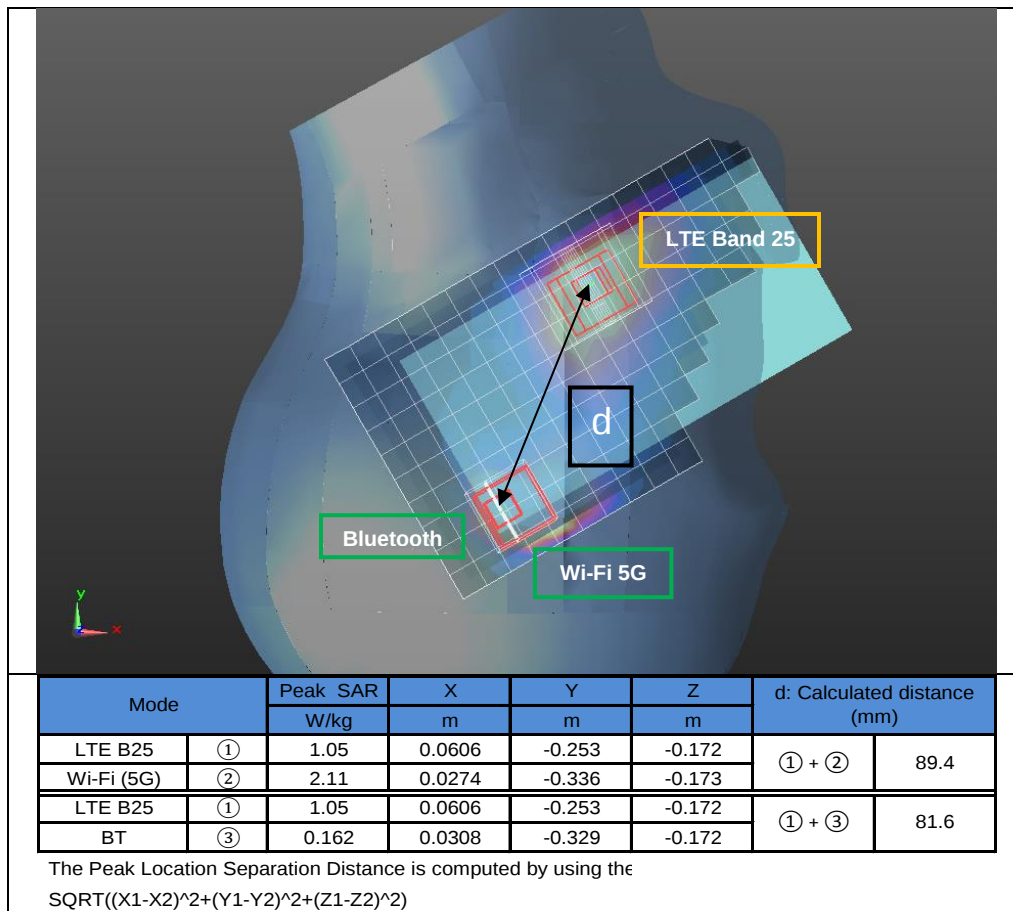


Figure (19)



Appendixes

Refer to separated files for the following appendixes.

15I21523-S1V1 SAR_App A Photos & Ant. Locations

15I21523-S1V1 SAR_App B System Check Plots

15I21523-S1V1 SAR_App C Highest Test Plots

15I21523-S1V1 SAR_App D Tissue Ingredients

15I21523-S1V1 SAR_App E Probe Cal. Certs

15I21523-S1V1 SAR_App F Dipole Cal. Certs

END OF REPORT