FCC 47 CFR Parts 1 & 2
Published RF Exposure KDB Procedures
IEEE 1528-2013

SAR EVALUATION REPORT

For
GSM/WCDMA/LTE Tablet + Bluetooth, DTS/UNII a/b/g/n/ac & ANT

Model: SM-T805
FCC ID: A3LSMT805

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1. Attestation of Test Results

Applicant	Samsung Electronics Co., Ltd.			
DUT description	GSM/WCDMA/LTE Tablet + Bluetooth, DTS/UNII a/b/g/n/ac & ANT			
Model	SM-T805			
Test device is	An identical prototype			
Device category	Portable			
Exposure category	General Population/Uncontrolled Exposure			
Date tested	2/5/2014 – 2/21/2014			
The highest reported SAR values	RF exposure condition	Licensed	DTS	UNII
	Standalone	0.958 W/kg	0.785 W/kg	0.732 W/kg
	Simultaneous Transmission	1.588 W/kg	1.588 W/kg	1.451 W/kg
Applicable Standards	FCC 47 CFR Parts 1 & 2 Published RF Exposure KDB Procedures, and TCB workshop updates IEEE 1528-2013			
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.

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2. Test Methodology

The tests documented in this report were performed in accordance with FCC 47 CFR Parts 1 & 2, IEEE 1528-2013, the following FCC Published RF exposure KDB procedures, and TCB workshop updates:

- 447498 D01 General RF Exposure Guidance v05r02
- 616217 D04 SAR for Laptop and Tablets v01r01
- 941225 D01 SAR test for 3G devices v02
- 941225 D02 HSPA and 1x Advanced v02r02
- 941225 D03 SAR Test Reduction GSM GPRS EDGE v01
- 941225 D04 SAR for GSM E GPRS Dual Xfer Mode v01
- 941225 D05 SAR for LTE Devices v02r03
- 248227 D01 SAR Meas for 802 11abg v01r02
- 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
- 865664 D02 SAR Reporting v01r01
- 690783 D01 SAR Listings on Grants v01r02

3. Facilities and Accreditation

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA.

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 F	

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

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4. Calibration and Uncertainty

4.1. Measuring Instrument Calibration

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.

Tissue Dielectric Properties

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
PNA Network Analyzer	Agilent	E8363C	MY49030443	12/3/2014
Network Analyzer	Agilent	E8363C	MY49030443	12/3/2014
Dielectronic Probe kit	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	Control Company	4242	122529163	9/19/2014

System Performance Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Synthesized Signal Generator	HP	8665B	3744A01084	5/7/2014
Power Meter	HP	437B	3125U12345	7/29/2014
Power Sensor	HP	8481A	1926A27048	7/29/2014
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1620606	N/A
Directional coupler	Werlatone	C8060-102	2141	N/A
DC Power Supply	AMETEK	XHR60-18	1318A00530	N/A
Thermometer	EXTECH	445703	T35480662	3/19/2014
E-Field Probe	SPEAG	EX3DV4	3902	7/12/2014
E-Field Probe	SPEAG	EX3DV4	3936	7/22/2014
Data Acquisition Electronics	SPEAG	DAE4	1377	7/15/2014
Data Acquisition Electronics	SPEAG	DAE4	1380	7/15/2014
System Validation Dipole	SPEAG	D835V2	4d142	9/17/2014
System Validation Dipole	SPEAG	D1900V2	5d163	9/17/2014
System Validation Dipole	SPEAG	D2450V2	706	5/29/2014
System Validation Dipole	SPEAG	D5GHzV2	1138	11/19/2014

Others

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Base Station Simulator	R & S	CMU200	106301	7/3/2014
Base Station Simulator	R & S	CMW500	124594-HX	7/2/2014
Power Meter	Agilent	N1912A	MY53040016	4/4/2014
Power Sensor Ch A	Agilent	N1921A	MY52020011	5/13/2014
Power Sensor Ch B	Agilent	N1921A	MY52200012	5/13/2014

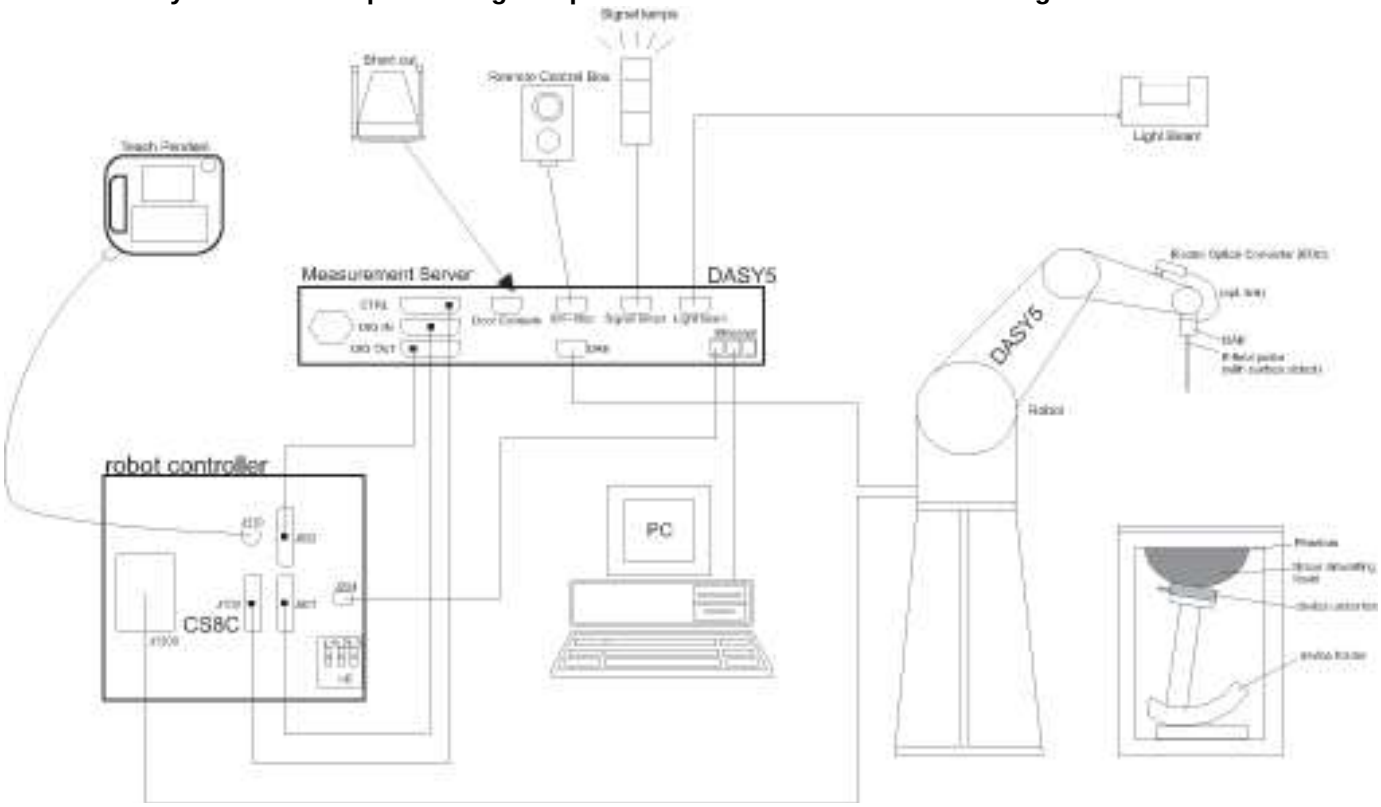
4.2. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03 Section 2.8.1., 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 1528-2003 is not required in SAR reports submitted for equipment approval.

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5. Measurement System Description and Setup

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.

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6. SAR Measurement Procedure

6.1. Normal SAR Measurement Procedure

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 v01r03

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

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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 v01r03

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* 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.

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6.2. Volume Scan Procedures

Step 1: Repeat Step 1-4 in Section 6.1

Step 2: Volume Scan
Volume Scans are used to assess peak SAR and averaged SAR measurements in largely extended 3-dimensional volumes within any phantom. This measurement does not need any previous area scan. The grid can be anchored to a user specific point or to the current probe location.

Step 3: 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.

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7. Device Under Test

7.1. General Information

Operating Configuration(s)	Stand-alone
Mobile Hotspot	Wi-Fi Hotspot mode permits the device to share its cellular data connection with other Wi-Fi-enabled devices. ☒ Mobile Hotspot (Wi-Fi 2.4 GHz) ☐ Mobile Hotspot (Wi-Fi 5 GHz)
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other ☒ Wi-Fi Direct (Wi-Fi 2.4 GHz) ☒ Wi-Fi Direct (Wi-Fi 5 GHz), but limited to Ch. 149 in the 5 GHz spectrum
RF Exposure Condition(s)	Stand-alone
Device dimension	Overall (Length x Width): 246.5mm x 176.4mm Overall Diagonal: 303.12mm Display Diagonal: 267.2mm
Back Cover	☒ Normal Battery Cover ☐ Wireless Charger Battery Cover ☐ Normal Battery Cover with NFC
Accessory	☒ Headset
Battery Options	☒ Standard – Lithium-ion battery, Rating 4.35Vdc, 30.02Wh ☐ Extended (large capacity)

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7.2. Wireless Technologies

Wireless Technology and Frequency Bands	GSM: 850 / 1900 W-CDMA Band: II / V LTE Band 5 Wi-Fi: 2.4 / 5 GHz Bluetooth: 2.4 GHz.
Mode	GSM - ☒ GPRS (GMSK) - ☒ EGPRS (8PSK) W-CDMA - ☒ UMTS Rel. 99 - ☒ HSDPA (Rel. 5) - ☒ HSUPA (Rel. 6) - ☒ DC-HSDPA (Rel. 8) LTE - ☒ QPSK - ☒ 16QAM Wi-Fi 2.4GHz - ☒ 802.11b - ☒ 802.11g - ☒ 802.11n (20MHz) Wi-Fi 5GHz - ☒ 802.11a - ☒ 802.11n (20MHz) - ☒ 802.11n (40MHz) - ☒ 802.11ac (20MHz) - ☒ 802.11ac (40MHz) - ☒ 802.11ac (80MHz) Bluetooth Ver. 4.0 (LE)
Duty Cycle	GSM GPRS 1 Slot: 12.5%; 2 Slots: 25%, 3 Slots: 37.5%,4 Slots: 50%, W-CDMA: 100% LTE: 100% Wi-Fi 802.11a/b/g/n/ac: 100% Bluetooth: 32.25% (DH1), 66.68% (DH3), 77.52% (DH5)
GPRS Multi-Slot Class	☐ Class 8 - One Up ☐ Class 10 - Two Up ☐ Class 12 - Four Up ☒ Class 33 - Four Up

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7.3. Output Power Tune-up Limit

RF Air Interface	Mode		Full Power (dBm)			With Power Reduction		
			Lower Limit Tolerance (dB) : -1.5	Target Power	Upper Limit Tolerance (dB) : 0.5	Lower Limit Tolerance (dB) : -1.5	Target Power	Upper Limit Tolerance (dB) : 0.5
GSM 850	GPRS	1 Slot	31.0	32.5	**33.0**	25.0	26.5	**27.0**
		2 Slots	30.0	31.5	**32.0**	24.0	25.5	**26.0**
		3 Slots	27.5	29.0	**29.5**	23.0	24.5	**25.0**
		4 Slots	26.5	28.0	**28.5**	21.5	23.0	**23.5**
	EGPRS	1 Slot	25.5	27.0	**27.5**	24.5	26.0	**26.5**
		2 Slots	24.5	26.0	**26.5**	23.5	25.0	**25.5**
		3 Slots	23.5	25.0	**25.5**	22.5	24.0	**24.5**
		4 Slots	22.0	23.5	**24.0**	20.5	22.0	**22.5**
GSM 1900	GPRS	1 Slot	27.5	29.0	**29.5**	22.5	24.0	**24.5**
		2 Slots	25.5	27.0	**27.5**	19.5	21.0	**21.5**
		3 Slots	23.5	25.0	**25.5**	17.5	19.0	**19.5**
		4 Slots	21.5	23.0	**23.5**	16.5	18.0	**18.5**
	EGPRS	1 Slot	24.0	25.5	**26.0**	19.5	21.0	**21.5**
		2 Slots	23.0	24.5	**25.0**	18.5	20.0	**20.5**
		3 Slots	22.0	23.5	**24.0**	17.5	19.0	**19.5**
		4 Slots	20.5	22.0	**22.5**	16.0	17.5	**18.0**
W-CDMA Band V	Rel. 99	RMC	21.0	22.5	**23.0**	16.5	18.0	**18.5**
	HSDPA Rel. 5	Subtest 1	21.0	22.5	**23.0**	16.5	18.0	**18.5**
		Subtest 2	21.0	22.5	**23.0**	16.5	18.0	**18.5**
		Subtest 3	21.0	22.5	**23.0**	16.5	18.0	**18.5**
		Subtest 4	21.0	22.5	**23.0**	16.5	18.0	**18.5**
	HSUPA Rel. 6	Subtest 1	20.5	22.0	**22.5**	15.5	17.0	**17.5**
		Subtest 2	20.5	22.0	**22.5**	15.5	17.0	**17.5**
		Subtest 3	20.5	22.0	**22.5**	15.5	17.0	**17.5**
		Subtest 4	20.5	22.0	**22.5**	15.5	17.0	**17.5**
		Subtest 5	20.5	22.0	**22.5**	15.5	17.0	**17.5**
	DC-HSPA Rel. 8	Subtest 1	21.0	22.5	**23.0**	16.5	18.0	**18.5**
		Subtest 2	21.0	22.5	**23.0**	16.5	18.0	**18.5**
		Subtest 3	20.5	22.0	**22.5**	16.5	18.0	**18.5**
		Subtest 4	20.5	22.0	**22.5**	16.5	18.0	**18.5**
W-CDMA Band II	Rel. 99	RMC	20.5	22.0	**22.5**	13.5	15.0	**15.5**
	HSDPA Rel. 5	Subtest 1	20.5	22.0	**22.5**	13.5	15.0	**15.5**
		Subtest 2	20.5	22.0	**22.5**	13.5	15.0	**15.5**
		Subtest 3	20.5	22.0	**22.5**	13.5	15.0	**15.5**
		Subtest 4	20.5	22.0	**22.5**	13.5	15.0	**15.5**
	HSUPA Rel. 6	Subtest 1	19.5	21.0	**21.5**	13.5	15.0	**15.5**
		Subtest 2	19.5	21.0	**21.5**	13.5	15.0	**15.5**
		Subtest 3	19.5	21.0	**21.5**	13.5	15.0	**15.5**
		Subtest 4	19.5	21.0	**21.5**	13.5	15.0	**15.5**
		Subtest 5	19.5	21.0	**21.5**	13.5	15.0	**15.5**
	DC-HSPA Rel. 8	Subtest 1	20.5	22.0	**22.5**	13.5	15.0	**15.5**
		Subtest 2	20.5	22.0	**22.5**	13.5	15.0	**15.5**
		Subtest 3	20.5	22.0	**22.5**	13.5	15.0	**15.5**
		Subtest 4	20.5	22.0	**22.5**	13.5	15.0	**15.5**
LTE Band 5	QPSK	1 RB	21.0	22.5	**23.0**	16.0	17.5	**18.0**
		1.4 BW 50% RB	21.0	22.5	**23.0**	16.0	17.5	**18.0**
		>1.4 BW 50% RB	21.0	22.5	**23.0**	16.0	17.5	**18.0**
		100% RB	21.0	22.5	**23.0**	16.0	17.5	**18.0**
	16QAM	1 RB	20.5	22.0	**22.5**	16.0	17.5	**18.0**
		1.4 BW 50% RB	20.5	22.0	**22.5**	16.0	17.5	**18.0**
		>1.4 BW 50% RB	20.0	21.5	**22.0**	15.5	17.0	**17.5**
		100% RB	20.0	21.5	**22.0**	15.5	17.0	**17.5**
Wi-Fi 2.4 GHz	802.11b	20MHz	12.5	14.0	**14.5**			
	802.11g	20MHz	10.5	12.0	**12.5**			
	802.11n	HT20	10.5	12.0	**12.5**			
Wi-Fi 5 GHz	802.11a	802.11a	8.5	10.0	**10.5**			
	802.11n	HT20	8.5	10.0	**10.5**			
		HT40	8.5	10.0	**10.5**			
	802.11ac	VHT20	8.5	10.0	**10.5**			
		VHT40	8.5	10.0	**10.5**			
		VHT80	8.5	10.0	**10.5**			
Bluetooth	802.15.1	V3.0	8.5	10.0	**10.5**			
		V4.0 LE	8.5	10.0	**10.5**			

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7.4. Simultaneous Transmission Conditions

RF Exposure Condition	Capable Transmit Configurations
Body	**Wi-Fi and BT** 1. 2.4GHz (Wi-Fi 2) + BT (Wi-Fi 1) 2. 5GHz (Wi-Fi 2) + BT (Wi-Fi 1) 3. 2.4GHz (Wi-Fi 1) + 2.4GHz (Wi-Fi 2) 4. 5GHz (Wi-Fi 1) + 5GHz (Wi-Fi 2) **WWAN, Wi-Fi and BT** 5. WWAN + BT (Wi-Fi 1) 6. WWAN + 2.4GHz (Wi-Fi 1) 7. WWAN + 2.4GHz (Wi-Fi 2) 8. WWAN + 5GHz (Wi-Fi 1) 9. WWAN + 5GHz (Wi-Fi 2) 10. WWAN + 2.4GHz (Wi-Fi 2) + BT (Wi-Fi 1) 11. WWAN + 5GHz (Wi-Fi 2) + BT (Wi-Fi 1) 12. WWAN + 2.4GHz (Wi-Fi 1) + 2.4GHz (Wi-Fi 2) 13. WWAN + 5GHz (Wi-Fi 1) + 5GHz (Wi-Fi 2)
Refer to Appendix for antenna locations Wi-Fi MIMO: - Is not possible between 2.4 GHz and 5 GHz. - Is supported in all Wi-Fi bands and is possible during WWAN transmission.	

7.5. General LTE SAR Test and Reporting Considerations

Item	Description						
	Band 5	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
LTE transmitter and antenna implementation	LTE antenna is used for Tx/Rx for LTE and other wireless modes (GPRS/EGPRS/W-CDMA).						
Maximum power reduction (MPR)	**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3**						
	Modulation	Channel bandwidth / Transmission bandwidth (RB)					MPR (dB)
		1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
	16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
	MPR Built-in by design A-MPR (additional MPR) was disabled during SAR testing						
Power reduction	Yes, refer to Section 7.6.						
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.						

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7.6. Power Reduction by Proximity Sensing

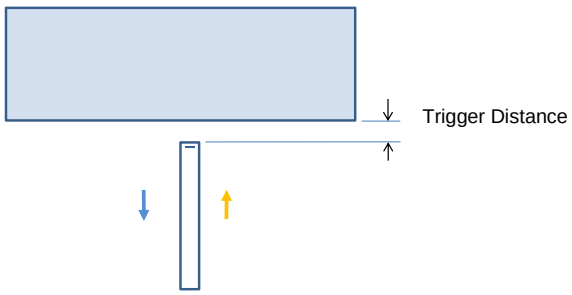
7.6.1. Proximity Sensor Triggering Distance (KDB 616217 §6.2)

Edge 1 of the DUT was placed directly below the flat phantom. The DUT was moved toward the phantom in accordance with the steps outlined in KDB 616217 §6.2 to determine the trigger distance for enabling power reduction. The DUT was moved away from the phantom to determine the trigger distance for resuming full power.

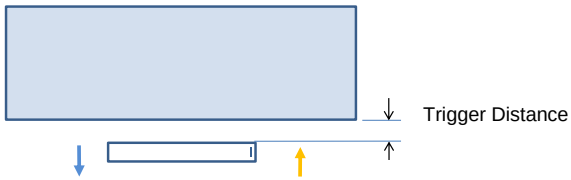
The measurement was then repeated for the Rear surface.

The DUT featured a visual indicator on its display that showed the status of the proximity sensor (Triggered or not triggered). This was used to determine the status of the sensor during the proximity sensor assessment as monitoring the output power directly was not practical without affecting the measurement.

It was confirmed separately that the output power was altered according to the proximity sensor status indication. This was achieved by observing the proximity sensor status at the same time as monitoring the conducted power. Section 9 contains both the full and reduced conducted power measurements.



Proximity Sensor Trigger Distance Assessment
KDB 616217 §6.2, **Edge 1**



Proximity Sensor Trigger Distance Assessment
KDB 616217 §6.2, **Rear**

LEGEND

Direction of DUT travel for determination of power reduction triggering point

Direction of DUT travel for determination of full power resumption triggering point

Summary of Trigger Distances

Tissue simulating liquid	Trigger distance - Edge 1		Trigger distance - Rear	
	Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom
850 muscle	15 mm	15 mm	15 mm	15 mm
1900 muscle	15 mm	15 mm	15 mm	15 mm

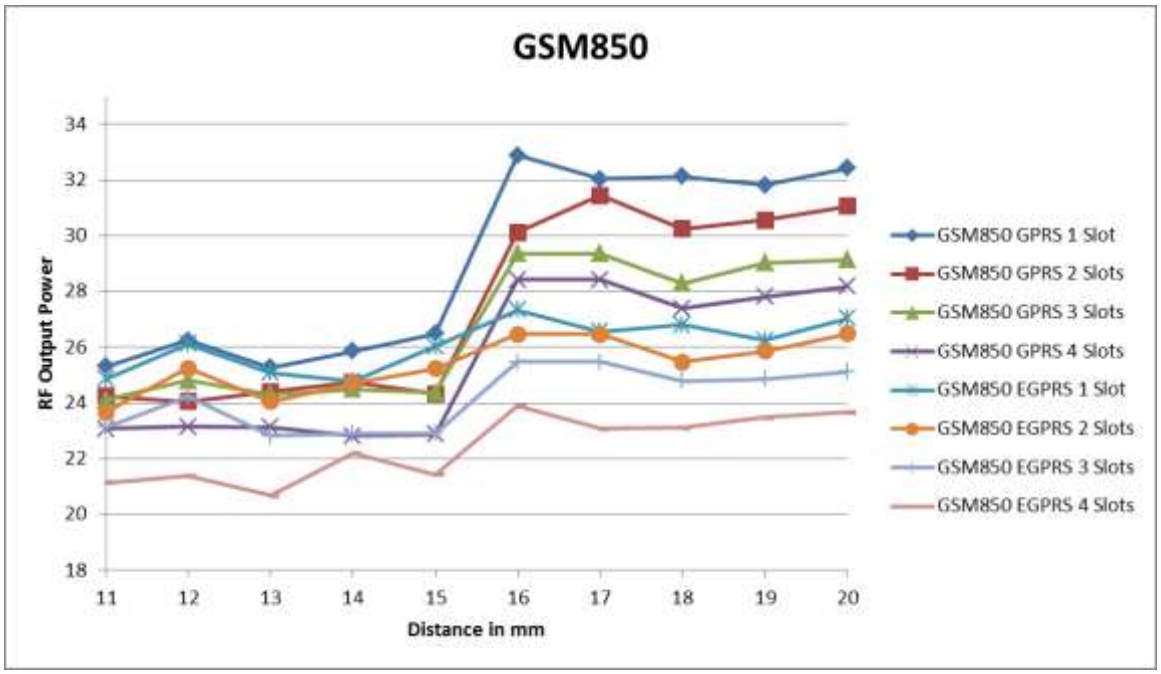
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7.6.2. Proximity Sensor Triggering Distance Measurement Results

GSM850

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

Distance to DUT vs. Output Power in dBm										
Distance	20	19	18	17	16	15	14	13	12	11
GSM850 GPRS 1 Slot	32.42	31.8	32.13	32.03	32.87	26.48	25.86	25.27	26.24	25.3
GSM850 GPRS 2 Slots	31.05	30.56	30.25	31.44	30.12	24.33	24.73	24.4	24.05	24.24
GSM850 GPRS 3 Slots	29.13	29.03	28.29	29.35	29.35	24.37	24.5	24.31	24.81	24.11
GSM850 GPRS 4 Slots	28.18	27.8	27.38	28.41	28.41	22.87	22.82	23.13	23.15	23.08
GSM850 EGPRS 1 Slot	27.03	26.25	26.8	26.55	27.33	26.03	24.77	25.08	26.12	24.86
GSM850 EGPRS 2 Slots	26.48	25.86	25.46	26.47	26.47	25.22	24.72	24.04	25.24	23.66
GSM850 EGPRS 3 Slots	25.12	24.86	24.78	25.46	25.46	22.9	22.89	22.82	24.23	23.12
GSM850 EGPRS 4 Slots	23.66	23.47	23.11	23.08	23.88	21.44	22.19	20.67	21.38	21.13

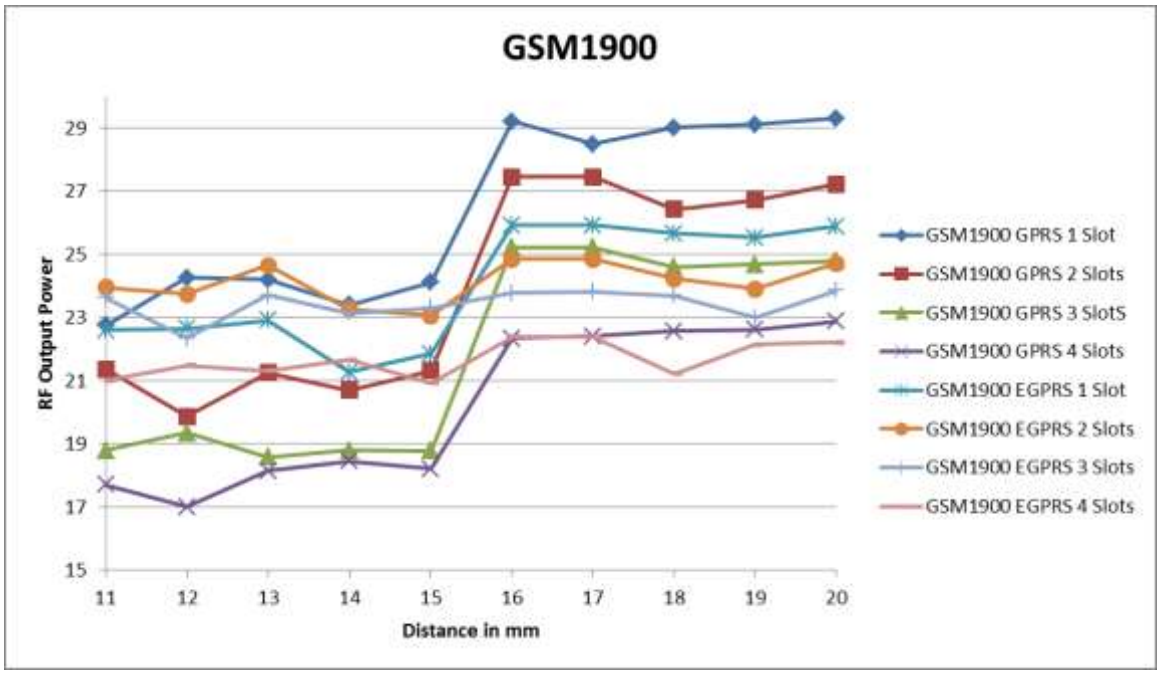


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GSM1900

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

Distance to DUT vs. Output Power in dBm										
Distance	20	19	18	17	16	15	14	13	12	11
GSM1900 GPRS 1 Slot	29.3	29.1	29.01	28.48	29.2	24.11	23.4	24.19	24.25	22.75
GSM1900 GPRS 2 Slots	27.21	26.72	26.42	27.45	27.45	21.31	20.7	21.24	19.87	21.37
GSM1900 GPRS 3 SlotS	24.8	24.68	24.6	25.21	25.21	18.77	18.8	18.58	19.35	18.8
GSM1900 GPRS 4 Slots	22.88	22.61	22.57	22.41	22.34	18.21	18.45	18.15	17	17.71
GSM1900 EGPRS 1 Slot	25.88	25.53	25.66	25.92	25.92	21.85	21.26	22.9	22.65	22.6
GSM1900 EGPRS 2 Slots	24.71	23.9	24.23	24.85	24.85	23.06	23.26	24.65	23.73	23.94
GSM1900 EGPRS 3 Slots	23.85	22.98	23.68	23.81	23.77	23.29	23.14	23.7	22.33	23.62
GSM1900 EGPRS 4 Slots	22.2	22.15	21.22	22.39	22.39	20.93	21.65	21.32	21.48	21

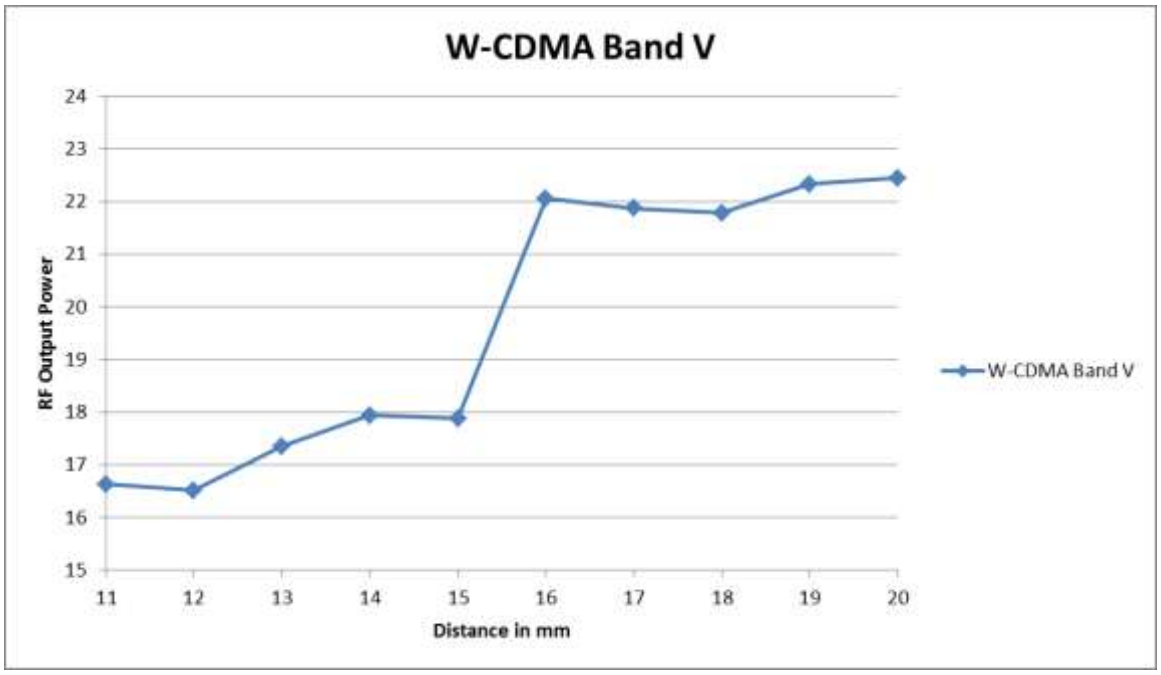


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W-CDMA Band V

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

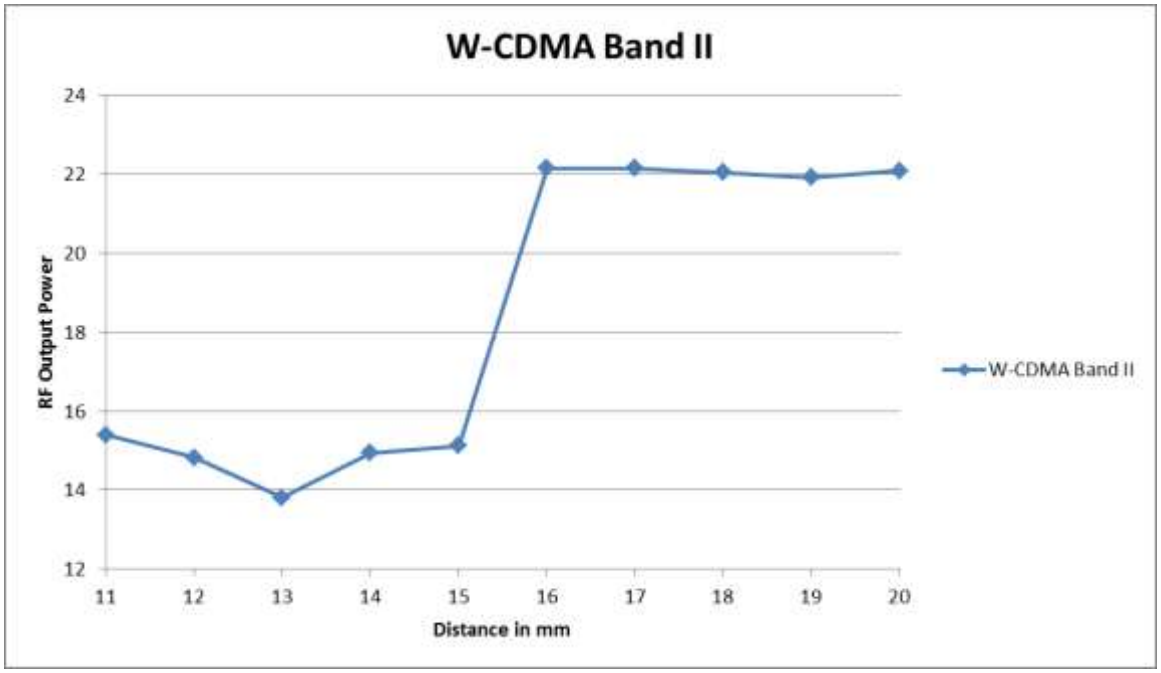
Distance to DUT vs. Output Power in dBm										
Distance	20	19	18	17	16	15	14	13	12	11
W-CDMA Band V	22.45	22.33	21.78	21.87	22.06	17.88	17.94	17.35	16.51	16.63



W-CDMA Band II

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

Distance to DUT vs. Output Power in dBm										
Distance	20	19	18	17	16	15	14	13	12	11
W-CDMA Band II	22.08	21.91	22.05	22.15	22.15	15.12	14.94	13.81	14.82	15.4

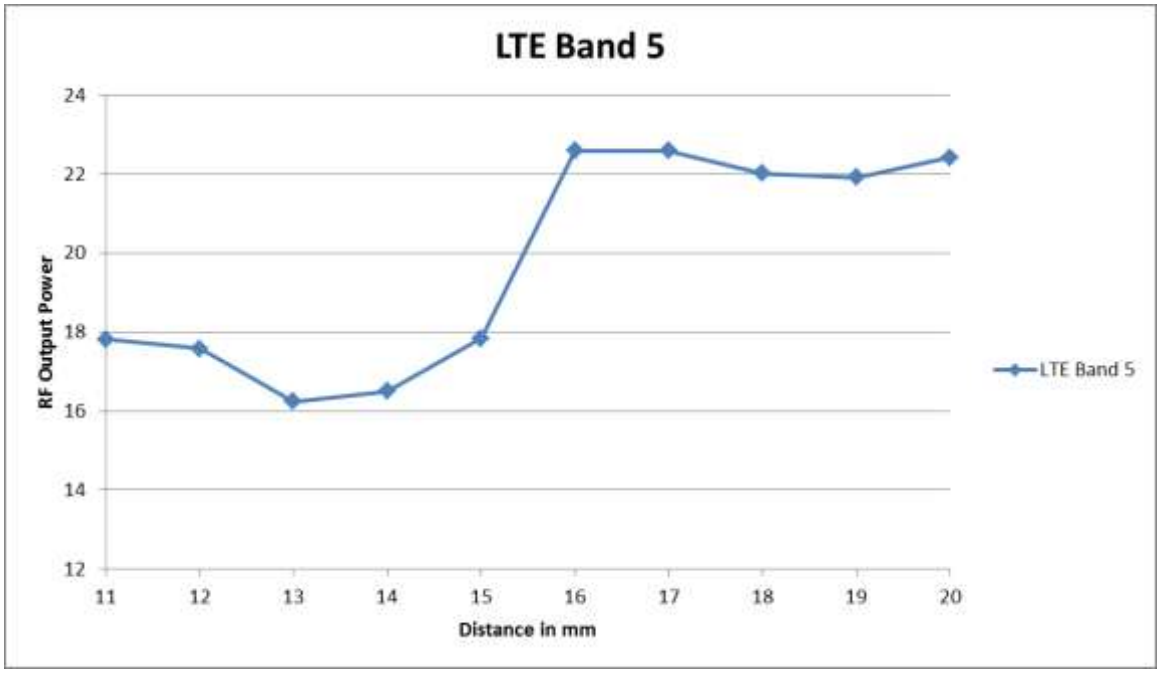


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LTE Band 5

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

Distance to DUT vs. Output Power in dBm										
Distance	20	19	18	17	16	15	14	13	12	11
LTE Band 5	22.42	21.91	22.02	22.59	22.59	17.85	16.5	16.25	17.58	17.82



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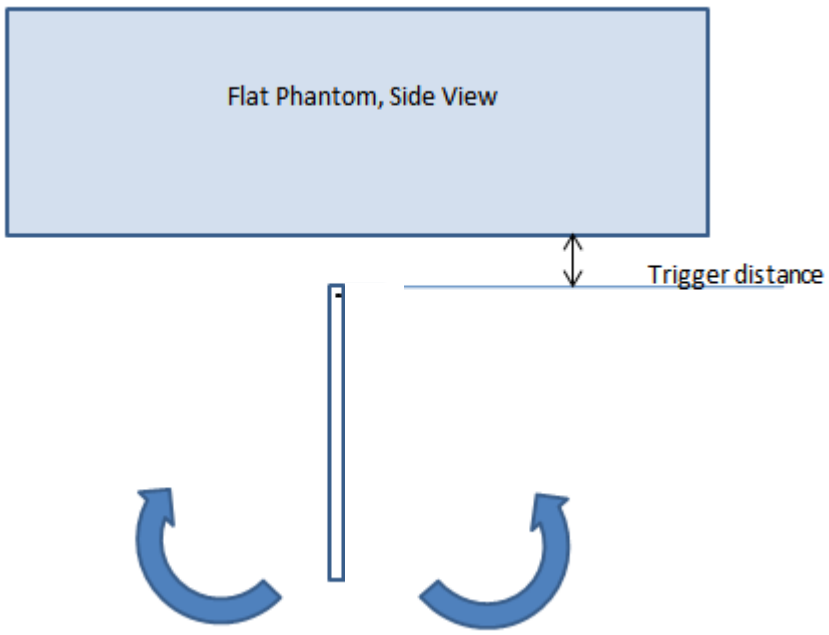
7.6.3. Proximity Sensor Coverage (KDB 616217 §6.3)

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

7.6.4. Proximity Sensor Tilt Angle Assessment (KDB 616217 §6.4)

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

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



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

Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering

Band (MHz)	Minimum trigger distance measured according to KDB 616217 §6.2	Minimum distance at which power reduction was maintained over +/-45°	Power reduction status										
			-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
850	15 mm	15 mm	On	On	On	On	On	On	On	On	On	On	On
1900	15 mm	15 mm	On	On	On	On	On	On	On	On	On	On	On

The minimum trigger distance measured for any of the steps required in KDB 616217 §6.2, §6.3 and §6.4 was 15 mm. Full Power SAR measurements for the Rear and Edge 1 were performed at 14mm separation distance from the phantom.

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8. RF Exposure Conditions

The EUT implements the power reduction scheme for SAR compliance, for specific device configuration and orientations, as described below. The complete description of the implementation and functionality is provided in the "Operational Description of Power Reduction" exhibit.

8.1. Standalone SAR Test Exclusion Considerations

Since the *Dedicated Host Approach* is applied, the standalone SAR test exclusion procedure in KDB 447498 § 4.3.1 is applied in conjunction with KDB 616217 § 4.3 to determine the minimum test separation distance:

- When the separation distance from the antenna to an adjacent edge is ≤ 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.
- When the separation distance from the antenna to an adjacent edge is > 5 mm, the actual antenna-to-edge separation distance is applied to determine SAR test exclusion.

SAR Test Exclusion Calculations for WWAN

Antennas < 50mm to adjacent edges

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Full Power, Proximity Sensor Off. A sensor triggering of 14 mm is included for both Rear and Edge 1																
Cellular	GPRS 2 Slots	848.8	32.00	396	15	14.69	20.97	164	168.5		24.3 -MEASURE-	24.3 -MEASURE-	17.4 -MEASURE-	>50 mm	>50 mm	
Cellular	GPRS 3 Slots	1909.8	25.50	133	15	14.69	20.97	164	168.5		12.3 -MEASURE-	12.3 -MEASURE-	8.8 -MEASURE-	>50 mm	>50 mm	
Cellular	W-CDMA V	846.6	23.00	200	15	14.69	20.97	164	168.5		12.3 -MEASURE-	12.3 -MEASURE-	8.8 -MEASURE-	>50 mm	>50 mm	
Cellular	W-CDMA II	1907.6	22.50	178	15	14.69	20.97	164	168.5		16.4 -MEASURE-	16.4 -MEASURE-	11.7 -MEASURE-	>50 mm	>50 mm	
Cellular	LTE Band 5	844	23.00	200	15	14.69	20.97	164	168.5		12.2 -MEASURE-	12.2 -MEASURE-	8.7 -MEASURE-	>50 mm	>50 mm	
Power Back-off, Grip Sensor On																
Cellular	GPRS 2 Slots	848.8	25.50	89	5	4.69					16.4 -MEASURE-	16.4 -MEASURE-				
Cellular	GPRS 4 Slots	1909.8	18.50	35	5	4.69					9.7 -MEASURE-	9.7 -MEASURE-				
Cellular	W-CDMA V	846.6	18.50	71	5	4.69					13.1 -MEASURE-	13.1 -MEASURE-				
Cellular	W-CDMA II	1907.6	15.50	35	5	4.69					9.7 -MEASURE-	9.7 -MEASURE-				
Cellular	LTE Band 5	844	18.50	71	5	4.69					13 -MEASURE-	13 -MEASURE-				

Note(s):

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

Antennas > 50mm to adjacent edges

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Full Power, Proximity Sensor Off. A sensor triggering of 14 mm is included for both Rear and Edge 1																
Cellular	GPRS 2 Slots	848.8	32.00	396	15	14.69	20.97	164	168.5		<50 mm	<50 mm	<50 mm	807.9 mW -EXEMPT-	833.4 mW -EXEMPT-	
Cellular	GPRS 3 Slots	1909.8	25.50	133	15	14.69	20.97	164	168.5		<50 mm	<50 mm	<50 mm	1248.5 mW -EXEMPT-	1293.5 mW -EXEMPT-	
Cellular	W-CDMA V	846.6	23.00	200	15	14.69	20.97	164	168.5		<50 mm	<50 mm	<50 mm	806.4 mW -EXEMPT-	831.8 mW -EXEMPT-	
Cellular	W-CDMA II	1907.6	22.50	178	15	14.69	20.97	164	168.5		<50 mm	<50 mm	<50 mm	1248.6 mW -EXEMPT-	1293.6 mW -EXEMPT-	
Cellular	LTE Band 5	844	23.00	200	15	14.69	20.97	164	168.5		<50 mm	<50 mm	<50 mm	804.7 mW -EXEMPT-	830 mW -EXEMPT-	
Power Back-off, Grip Sensor On																
Cellular	GPRS 2 Slots	848.8	25.50	89	5	4.69					<50 mm	<50 mm				
Cellular	GPRS 4 Slots	1909.8	18.50	35	5	4.69					<50 mm	<50 mm				
Cellular	W-CDMA V	846.6	18.50	71	5	4.69					<50 mm	<50 mm				
Cellular	W-CDMA II	1907.6	15.50	35	5	4.69					<50 mm	<50 mm				
Cellular	LTE Band 5	844	18.50	71	5	4.69					<50 mm	<50 mm				

Note(s):

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

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SAR Test Exclusion Calculations for WLAN

Antennas < 50mm to adjacent edges

SISO

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Wi-Fi Antenna 1																
Main	Wi-Fi 2.4 GHz	2462	14.50	28	5	4.47	197.82	164	15.76		8.8 -MEASURE-	8.8 -MEASURE-	>50 mm	>50 mm	2.7 -EXEMPT-	
Main	Wi-Fi 5.2 GHz	5240	10.50	11	5	4.47	197.82	164	15.76		5 -MEASURE-	5 -MEASURE-	>50 mm	>50 mm	16 -EXEMPT-	
Main	Wi-Fi 5.3 GHz	5320	10.50	11	5	4.47	197.82	164	15.76		5.1 -MEASURE-	5.1 -MEASURE-	>50 mm	>50 mm	16 -EXEMPT-	
Main	Wi-Fi 5.5 GHz	5700	10.50	11	5	4.47	197.82	164	15.76		5.3 -MEASURE-	5.3 -MEASURE-	>50 mm	>50 mm	16 -EXEMPT-	
Main	Wi-Fi 5.8 GHz	5825	10.50	11	5	4.47	197.82	164	15.76		5.3 -MEASURE-	5.3 -MEASURE-	>50 mm	>50 mm	17 -EXEMPT-	
Main	Bluetooth	2480	10.50	11	5	4.47	197.82	164	15.76		3.5 -MEASURE-	3.5 -MEASURE-	>50 mm	>50 mm	11 -EXEMPT-	
Wi-Fi Antenna 2																
Auxiliary	Wi-Fi 2.4 GHz	2462	14.50	28	5	4.47	161	164	52.28		8.8 -MEASURE-	8.8 -MEASURE-	>50 mm	>50 mm	>50 mm	
Auxiliary	Wi-Fi 5.2 GHz	5240	10.50	11	5	4.47	161	164	52.28		5 -MEASURE-	5 -MEASURE-	>50 mm	>50 mm	>50 mm	
Auxiliary	Wi-Fi 5.3 GHz	5320	10.50	11	5	4.47	161	164	52.28		5.1 -MEASURE-	5.1 -MEASURE-	>50 mm	>50 mm	>50 mm	
Auxiliary	Wi-Fi 5.5 GHz	5700	10.50	11	5	4.47	161	164	52.28		5.3 -MEASURE-	5.3 -MEASURE-	>50 mm	>50 mm	>50 mm	
Auxiliary	Wi-Fi 5.8 GHz	5825	10.50	11	5	4.47	161	164	52.28		5.3 -MEASURE-	5.3 -MEASURE-	>50 mm	>50 mm	>50 mm	

MIMO

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Wi-Fi Antenna 1																
Main	Wi-Fi 2.4 GHz	2462	12.50	18	5	4.47	197.82	164	15.76		5.6 -MEASURE-	5.6 -MEASURE-	>50 mm	>50 mm	18 -EXEMPT-	
Main	Wi-Fi 5.2 GHz	5240	10.50	11	5	4.47	197.82	164	15.76		5 -MEASURE-	5 -MEASURE-	>50 mm	>50 mm	16 -EXEMPT-	
Main	Wi-Fi 5.3 GHz	5320	10.50	11	5	4.47	197.82	164	15.76		5.1 -MEASURE-	5.1 -MEASURE-	>50 mm	>50 mm	16 -EXEMPT-	
Main	Wi-Fi 5.5 GHz	5700	10.50	11	5	4.47	197.82	164	15.76		5.3 -MEASURE-	5.3 -MEASURE-	>50 mm	>50 mm	16 -EXEMPT-	
Main	Wi-Fi 5.8 GHz	5825	10.50	11	5	4.47	197.82	164	15.76		5.3 -MEASURE-	5.3 -MEASURE-	>50 mm	>50 mm	17 -EXEMPT-	
Wi-Fi Antenna 2																
Auxiliary	Wi-Fi 2.4 GHz	2462	12.50	18	5	4.47	161	164	52.28		5.6 -MEASURE-	5.6 -MEASURE-	>50 mm	>50 mm	>50 mm	
Auxiliary	Wi-Fi 5.2 GHz	5240	10.50	11	5	4.47	161	164	52.28		5 -MEASURE-	5 -MEASURE-	>50 mm	>50 mm	>50 mm	
Auxiliary	Wi-Fi 5.3 GHz	5320	10.50	11	5	4.47	161	164	52.28		5.1 -MEASURE-	5.1 -MEASURE-	>50 mm	>50 mm	>50 mm	
Auxiliary	Wi-Fi 5.5 GHz	5700	10.50	11	5	4.47	161	164	52.28		5.3 -MEASURE-	5.3 -MEASURE-	>50 mm	>50 mm	>50 mm	
Auxiliary	Wi-Fi 5.8 GHz	5825	10.50	11	5	4.47	161	164	52.28		5.3 -MEASURE-	5.3 -MEASURE-	>50 mm	>50 mm	>50 mm	

Note(s):

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

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Antennas > 50mm to adjacent edges

SISO

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Wi-Fi Antenna 1																
Main	Wi-Fi 2.4 GHz	2462	16.00	40	5	4.47	197.82	164	15.76		< 50 mm	< 50 mm	1573.8 mW -EXEMPT-	1235.6 mW -EXEMPT-	< 50 mm	
Main	Wi-Fi 5.2 GHz	5240	16.00	40	5	4.47	197.82	164	15.76		< 50 mm	< 50 mm	1543.7 mW -EXEMPT-	1205.5 mW -EXEMPT-	< 50 mm	
Main	Wi-Fi 5.3 GHz	5320	16.50	45	5	4.47	197.82	164	15.76		< 50 mm	< 50 mm	1543.2 mW -EXEMPT-	1205 mW -EXEMPT-	< 50 mm	
Main	Wi-Fi 5.5 GHz	5700	16.50	45	5	4.47	197.82	164	15.76		< 50 mm	< 50 mm	1541 mW -EXEMPT-	1202.8 mW -EXEMPT-	< 50 mm	
Main	Wi-Fi 5.8 GHz	5825	16.00	40	5	4.47	197.82	164	15.76		< 50 mm	< 50 mm	1540.4 mW -EXEMPT-	1202.2 mW -EXEMPT-	< 50 mm	
Main	Bluetooth	2480	13.00	20	5	4.47	197.82	164	15.76		< 50 mm	< 50 mm	1573.5 mW -EXEMPT-	1235.3 mW -EXEMPT-	< 50 mm	
Wi-Fi Antenna 2																
Auxiliary	Wi-Fi 2.4 GHz	2462	16.00	40	5	4.47	161	164	52.28		< 50 mm	< 50 mm	1205.6 mW -EXEMPT-	1235.6 mW -EXEMPT-	118.4 mW -EXEMPT-	
Auxiliary	Wi-Fi 5.2 GHz	5230	16.00	40	5	4.47	161	164	52.28		< 50 mm	< 50 mm	1175.6 mW -EXEMPT-	1205.6 mW -EXEMPT-	88.4 mW -EXEMPT-	
Auxiliary	Wi-Fi 5.3 GHz	5300	16.50	45	5	4.47	161	164	52.28		< 50 mm	< 50 mm	1175.2 mW -EXEMPT-	1205.2 mW -EXEMPT-	88 mW -EXEMPT-	
Auxiliary	Wi-Fi 5.5 GHz	5680	16.50	45	5	4.47	161	164	52.28		< 50 mm	< 50 mm	1172.9 mW -EXEMPT-	1202.9 mW -EXEMPT-	85.7 mW -EXEMPT-	
Auxiliary	Wi-Fi 5.8 GHz	5825	16.00	40	5	4.47	161	164	52.28		< 50 mm	< 50 mm	1172.2 mW -EXEMPT-	1202.2 mW -EXEMPT-	85 mW -EXEMPT-	

MIMO

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Wi-Fi Antenna 1																
Main	Wi-Fi 2.4 GHz	2462	12.50	18	5	4.47	197.82	164	15.76		< 50 mm	< 50 mm	1573.8 mW -EXEMPT-	1235.6 mW -EXEMPT-	< 50 mm	
Main	Wi-Fi 5.2 GHz	5240	10.50	11	5	4.47	197.82	164	15.76		< 50 mm	< 50 mm	1543.7 mW -EXEMPT-	1205.5 mW -EXEMPT-	< 50 mm	
Main	Wi-Fi 5.3 GHz	5320	10.50	11	5	4.47	197.82	164	15.76		< 50 mm	< 50 mm	1543.2 mW -EXEMPT-	1205 mW -EXEMPT-	< 50 mm	
Main	Wi-Fi 5.5 GHz	5700	10.50	11	5	4.47	197.82	164	15.76		< 50 mm	< 50 mm	1541 mW -EXEMPT-	1202.8 mW -EXEMPT-	< 50 mm	
Main	Wi-Fi 5.8 GHz	5825	10.50	11	5	4.47	197.82	164	15.76		< 50 mm	< 50 mm	1540.4 mW -EXEMPT-	1202.2 mW -EXEMPT-	< 50 mm	
Wi-Fi Antenna 2																
Auxiliary	Wi-Fi 2.4 GHz	2462	12.50	18	5	4.47	161	164	52.28		< 50 mm	< 50 mm	1205.6 mW -EXEMPT-	1235.6 mW -EXEMPT-	118.4 mW -EXEMPT-	
Auxiliary	Wi-Fi 5.2 GHz	5240	10.50	11	5	4.47	161	164	52.28		< 50 mm	< 50 mm	1175.5 mW -EXEMPT-	1205.5 mW -EXEMPT-	88.3 mW -EXEMPT-	
Auxiliary	Wi-Fi 5.3 GHz	5320	10.50	11	5	4.47	161	164	52.28		< 50 mm	< 50 mm	1175 mW -EXEMPT-	1205 mW -EXEMPT-	87.8 mW -EXEMPT-	
Auxiliary	Wi-Fi 5.5 GHz	5700	10.50	11	5	4.47	161	164	52.28		< 50 mm	< 50 mm	1172.8 mW -EXEMPT-	1202.8 mW -EXEMPT-	85.6 mW -EXEMPT-	
Auxiliary	Wi-Fi 5.8 GHz	5825	10.50	11	5	4.47	161	164	52.28		< 50 mm	< 50 mm	1172.2 mW -EXEMPT-	1202.2 mW -EXEMPT-	85 mW -EXEMPT-	

Note(s):

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

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8.2. Required Test Configurations

The table below identifies the standalone WWAN test configurations required for this device according to the findings in Section 8.1:

Test Configurations	Rear	Edge 1 (Top Edge)	Edge 2 (Right Edge)	Edge 3 (Bottom Edge)	Edge 4 (Left Edge)
GSM850 Full Power	Yes	Yes	Yes	No	No
GSM850 w/ Power Reduction	Yes	Yes	No	No	No
GSM1900 Full Power	Yes	Yes	Yes	No	No
GSM1900 w/ Power Reduction	Yes	Yes	No	No	No
W-CDMA Band V Full Power	Yes	Yes	Yes	No	No
W-CDMA Band V w/ Power Reduction	Yes	Yes	No	No	No
W-CDMA Band II Full Power	Yes	Yes	Yes	No	No
W-CDMA Band II w/ Power Reduction	Yes	Yes	No	No	No
LTE Band 5 Full Power	Yes	Yes	Yes	No	No
LTE Band 5 w/ Power Reduction	Yes	Yes	No	No	No
Wi-Fi 2.4 GHz Antenna 1 SISO	Yes	Yes	No	No	No
Wi-Fi 2.4 GHz Antenna 2 SISO	Yes	Yes	No	No	No
Wi-Fi 2.4 GHz MIMO	Yes	Yes	No	No	No
Wi-Fi 5 GHz Antenna 1 SISO	Yes	Yes	No	No	No
Wi-Fi 5 GHz Antenna 2 SISO	Yes	Yes	No	No	No
Wi-Fi 5 GHz MIMO	Yes	Yes	No	No	No
Bluetooth	Yes	Yes	No	No	No

Note(s):

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

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9. RF Output Power Measurement

9.1. GSM

GSM850

Full Power

GPRS (GMSK) - Coding Scheme: CS1						
Band	Ch No.	Freq. (MHz)	1 slot	2 slots	3 slots	4 slots
850	Burst Power (dBm)					
	128	824.2	32.7	**31.6**	29.5	28.1
	190	836.6	32.7	**31.6**	29.5	28.1
	251	848.8	32.7	**31.6**	29.5	28.1
	Frame Power (dBm)					
	128	824.2	23.7	**25.6**	25.2	25.1
	190	836.6	23.7	**25.6**	25.2	25.1
	251	848.8	23.7	**25.6**	25.2	25.1
EGPRS (8PSK) - Coding Scheme: MCS5						
Band	Ch No.	Freq. (MHz)	1 slot	2 slots	3 slots	4 slots
850	Burst Power (dBm)					
	128	824.2	27.3	26.3	25.3	23.7
	190	836.6	27.2	26.2	25.2	23.6
	251	848.8	27.0	26.1	25.0	23.4
	Frame Power (dBm)					
	128	824.2	18.3	20.3	21.0	20.7
	190	836.6	18.2	20.2	20.9	20.6
	251	848.8	18.0	20.1	20.7	20.4

With Power Reduction

GPRS (GMSK) - Coding Scheme: CS1						
Band	Ch No.	Freq. (MHz)	1 slot	2 slots	3 slots	4 slots
850	Burst Power (dBm)					
	128	824.2	26.3	**25.7**	23.9	22.5
	190	836.6	26.4	**25.8**	24.0	22.7
	251	848.8	26.4	**25.7**	23.9	22.6
	Frame Power (dBm)					
	128	824.2	17.3	**19.7**	19.6	19.5
	190	836.6	17.4	**19.8**	19.7	19.7
	251	848.8	17.4	**19.7**	19.6	19.6
EGPRS (8PSK) - Coding Scheme: MCS5						
Band	Ch No.	Freq. (MHz)	1 slot	2 slots	3 slots	4 slots
850	Burst Power (dBm)					
	128	824.2	26.2	25.2	23.9	22.5
	190	836.6	26.1	25.1	24.0	22.5
	251	848.8	25.9	24.8	23.8	22.2
	Frame Power (dBm)					
	128	824.2	17.2	19.2	19.6	19.5
	190	836.6	17.1	19.1	19.7	19.5
	251	848.8	16.9	18.8	19.5	19.2

Notes:

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

- GMSK (GPRS) mode with 2 time slots for both full power and reduced 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

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GSM1900

Full Power

GPRS (GMSK) - Coding Scheme: CS1						
Band	Ch No.	Freq. (MHz)	1 slot	2 slots	3 slots	4 slots
1900	Burst Power (dBm)					
	512	1850.2	29.3	27.1	**25.3**	23.3
	661	1880	28.9	26.8	**25.1**	22.9
	810	1909.8	29.2	27.1	**25.4**	22.2
	Frame Power (dBm)					
	512	1850.2	20.3	21.1	**21.0**	20.3
	661	1880	19.9	20.8	**20.8**	19.9
	810	1909.8	20.2	21.1	**21.1**	19.2
EGPRS (8PSK) - Coding Scheme: MCS5						
Band	Ch No.	Freq. (MHz)	1 slot	2 slots	3 slots	4 slots
1900	Burst Power (dBm)					
	512	1850.2	25.9	24.0	22.0	20.5
	661	1880	26.0	24.1	22.1	20.5
	810	1909.8	26.0	24.0	22.0	20.5
	Frame Power (dBm)					
	512	1850.2	16.9	18.0	17.7	17.5
	661	1880	17.0	18.1	17.8	17.5
	810	1909.8	17.0	18.0	17.7	17.5

With Power Reduction

GPRS (GMSK) - Coding Scheme: CS1						
Band	Ch No.	Freq. (MHz)	1 slot	2 slots	3 slots	4 slots
1900	Burst Power (dBm)					
	512	1850.2	24.1	21.2	19.3	**18.3**
	661	1880	23.8	20.9	19.3	**18.0**
	810	1909.8	24.2	21.2	19.4	**18.5**
	Frame Power (dBm)					
	512	1850.2	15.1	15.2	15.0	**15.3**
	661	1880	14.8	14.9	15.0	**15.0**
	810	1909.8	15.2	15.2	15.1	**15.5**
EGPRS (8PSK) - Coding Scheme: MCS5						
Band	Ch No.	Freq. (MHz)	1 slot	2 slots	3 slots	4 slots
1900	Burst Power (dBm)					
	512	1850.2	21.5	20.5	19.3	18.0
	661	1880	21.5	20.5	19.3	18.0
	810	1909.8	21.4	20.4	19.2	17.9
	Frame Power (dBm)					
	512	1850.2	12.5	14.5	15.0	15.0
	661	1880	12.5	14.5	15.0	15.0
	810	1909.8	12.4	14.4	14.9	14.9

Notes:

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

- GMSK (GPRS) mode with 3 time slots and 4 time slots, respectively, for full power and reduced 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

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9.2. W-CDMA

Release 99

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 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	βc/βd	8/15

Measured Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)	
				Max. Power	with Pwr Reduction
W-CDMA Band V	Rel 99 (RMC, 12.2 kbps)	4132	826.4	22.3	17.7
		4183	836.6	22.3	17.8
		4233	846.6	22.4	17.8
W-CDMA Band II	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	21.7	15.4
		9400	1880.0	21.5	15.2
		9538	1907.6	21.8	15.4

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HSDPA

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-Set1			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs=βhs/βc	30/15			

Measured Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)	
				Max. Power	with Pwr Reduction
W-CDMA Band V	Subtest 1	4132	826.4	22.2	17.7
		4183	836.6	22.3	17.8
		4233	846.6	22.3	17.8
	Subtest 2	4132	826.4	21.7	17.5
		4183	836.6	21.7	17.5
		4233	846.6	21.8	17.5
	Subtest 3	4132	826.4	21.4	17.3
		4183	836.6	21.4	17.2
		4233	846.6	21.5	17.3
	Subtest 4	4132	826.4	21.2	17.0
		4183	836.6	21.2	17.0
		4233	846.6	21.3	17.1
W-CDMA Band II	Subtest 1	9262	1852.4	21.7	15.4
		9400	1880.0	21.4	15.2
		9538	1907.6	21.8	15.4
	Subtest 2	9262	1852.4	21.1	15.1
		9400	1880.0	20.9	14.9
		9538	1907.6	21.3	15.2
	Subtest 3	9262	1852.4	20.8	14.8
		9400	1880.0	20.6	14.6
		9538	1907.6	20.8	14.9
	Subtest 4	9262	1852.4	20.5	14.6
		9400	1880.0	20.5	14.4
		9538	1907.6	20.6	14.6

Maximum output power levels that are possible for all subtests reported.

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HSPA (HSDPA & HSUPA)

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	HSPA	HSPA	HSPA	HSPA
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	15/15
	βec	209/225	12/15	30/15	2/15	24/15
	βc/βd	11/15	6/15	15/9	2/15	15/15
	βhs	22/15	12/15	30/15	4/15	30/15
	βed	1309/225	94/75	47/15 47/15	56/75	134/15
	CM (dB)	1.0	3.0	2.0	3.0	1.0
	MPR (dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = βhs/βc	30/15				
HSUPA Specific Settings	D E-DPCCH	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	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27	

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Measured Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)	
				Max. Power	with Pwr Reduction
W-CDMA Band V	Subtest 1	4132	826.4	21.5	17.4
		4183	836.6	21.5	17.5
		4233	846.6	21.7	17.5
	Subtest 2	4132	826.4	20.6	16.0
		4183	836.6	20.6	16.3
		4233	846.6	20.7	16.1
	Subtest 3	4132	826.4	21.1	16.6
		4183	836.6	21.1	16.6
		4233	846.6	21.3	16.7
	Subtest 4	4132	826.4	20.6	16.0
		4183	836.6	20.7	16.1
		4233	846.6	20.7	16.1
	Subtest 5	4132	826.4	22.1	17.5
		4183	836.6	22.1	17.4
		4233	846.6	22.2	17.5
W-CDMA Band II	Subtest 1	9262	1852.4	21.4	15.1
		9400	1880.0	21.1	14.8
		9538	1907.6	21.4	14.8
	Subtest 2	9262	1852.4	20.0	13.6
		9400	1880.0	20.1	13.5
		9538	1907.6	20.0	13.6
	Subtest 3	9262	1852.4	20.4	14.2
		9400	1880.0	20.2	13.9
		9538	1907.6	20.5	14.2
	Subtest 4	9262	1852.4	20.0	13.7
		9400	1880.0	20.1	13.5
		9538	1907.6	20.1	13.6
	Subtest 5	9262	1852.4	21.4	15.1
		9400	1880.0	21.1	14.8
		9538	1907.6	21.4	15.2

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DC-HSDPA (Rel 8)

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.		

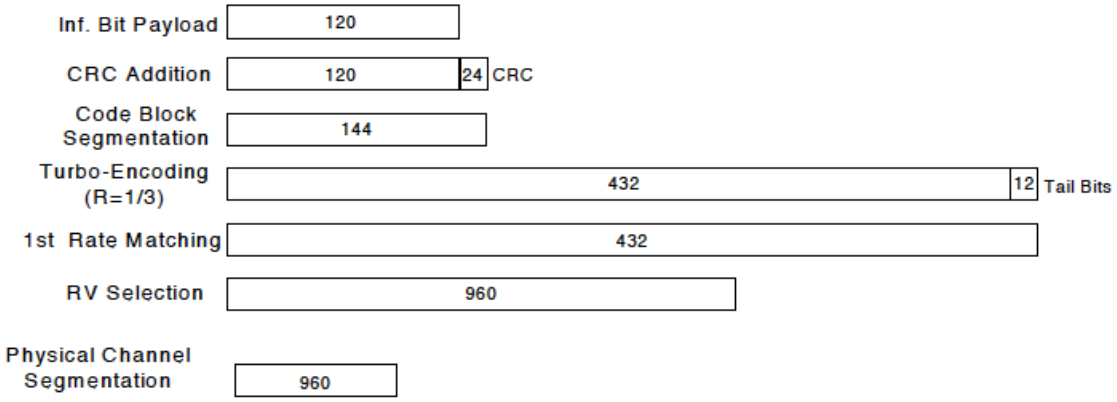


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

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

	Mode	DC-HSDPA	DC-HSDPA	DC-HSDPA	DC-HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack Repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs = βhs/ βc	30/15			

Up commands are set continuously to set the UE to Max power.

Measured Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)	
				Max. Power	with Pwr Reduction
W-CDMA Band V	Subtest 1	4132	826.4	22.3	17.5
		4183	836.6	22.3	17.6
		4233	846.6	22.4	17.4
	Subtest 2	4132	826.4	22.0	17.4
		4183	836.6	22.0	17.4
		4233	846.6	22.0	17.5
	Subtest 3	4132	826.4	20.8	17.0
		4183	836.6	20.8	17.0
		4233	846.6	21.1	17.0
	Subtest 4	4132	826.4	20.6	17.0
		4183	836.6	21.0	17.0
		4233	846.6	21.1	17.0
W-CDMA Band II	Subtest 1	9262	1852.4	21.6	15.3
		9400	1880.0	21.4	15.2
		9538	1907.6	21.7	15.3
	Subtest 2	9262	1852.4	21.7	15.1
		9400	1880.0	21.4	15.0
		9538	1907.6	21.7	15.1
	Subtest 3	9262	1852.4	21.4	14.9
		9400	1880.0	21.1	14.7
		9538	1907.6	21.4	14.9
	Subtest 4	9262	1852.4	21.3	14.7
		9400	1880.0	21.1	14.6
		9538	1907.6	21.5	14.8

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9.3. LTE

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

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

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

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

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

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LTE Band 5 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB Size	Target MPR	Avg Pwr (dBm)					
						Full Power			with Power Reduction		
						20450	20525	20600	20450	20525	20600
						829 MHz	836.5 MHz	844 MHz	829 MHz	836.5 MHz	844 MHz
LTE Band 5	10	QPSK	1	0	0	22.3	22.3	22.2	17.8	17.7	17.8
			1	24	0	22.2	22.1	22.1	17.7	17.6	17.7
			1	49	0	22.1	22.0	22.0	17.5	17.5	17.6
			25	0	1	21.3	21.2	21.1	16.9	16.8	16.7
			25	12	1	21.2	21.1	21.0	16.8	16.7	16.6
			25	24	1	21.1	21.1	21.0	16.7	16.7	16.6
			50	0	1	21.2	21.1	21.0	16.8	16.7	16.7
		16QAM	1	0	1	21.2	21.1	21.0	16.8	16.7	16.5
			1	24	1	21.1	21.1	20.9	16.7	16.7	16.4
			1	49	1	20.9	20.9	20.8	16.5	16.5	16.3
			25	0	2	20.3	20.2	20.1	16.0	15.9	15.8
			25	12	2	20.2	20.1	20.0	15.9	15.8	15.7
			25	24	2	20.1	20.1	20.0	15.9	15.8	15.7
			50	0	2	20.2	20.1	20.0	15.8	15.8	15.7
Band	BW (MHz)	Mode	RB Allocation	RB Size	Target MPR	Avg Pwr (dBm)			Avg Pwr (dBm)		
						20425	20525	20625	20425	20525	20625
						826.5 MHz	836.5 MHz	846.5 MHz	826.5 MHz	836.5 MHz	846.5 MHz
LTE Band 5	5	QPSK	1	0	0	22.5	22.4	22.2	18.0	17.9	17.8
			1	12	0	22.5	22.3	22.2	18.0	17.8	17.7
			1	24	0	22.4	22.2	22.1	18.0	17.8	17.7
			12	0	1	21.4	21.2	21.1	16.9	16.8	16.7
			12	6	1	21.3	21.1	21.0	16.9	16.7	16.7
			12	11	1	21.3	21.1	21.0	16.8	16.7	16.6
			25	0	1	21.3	21.1	21.0	16.8	16.8	16.6
		16QAM	1	0	1	21.4	21.2	21.1	17.0	16.6	16.5
			1	12	1	21.4	21.2	21.1	17.0	16.6	16.4
			1	24	1	21.4	21.1	21.1	16.9	16.5	16.4
			12	0	2	20.4	20.2	20.0	15.9	15.8	15.6
			12	6	2	20.4	20.1	20.0	15.9	15.7	15.6
			12	11	2	20.3	20.1	20.0	15.9	15.7	15.6
			25	0	2	20.3	20.2	20.1	15.9	15.8	15.7
Band	BW (MHz)	Mode	RB Allocation	RB Size	Target MPR	Avg Pwr (dBm)			Avg Pwr (dBm)		
						20415	20525	20635	20415	20525	20635
						825.5 MHz	836.5 MHz	847.5 MHz	825.5 MHz	836.5 MHz	847.5 MHz
LTE Band 5	3	QPSK	1	0	0	22.3	22.1	22.0	18.0	17.9	17.6
			1	7	0	22.3	22.1	22.0	18.0	17.8	17.5
			1	14	0	22.3	22.1	22.0	17.9	17.8	17.4
			8	0	1	21.3	21.1	21.0	16.8	16.7	16.7
			8	4	1	21.3	21.1	21.0	16.9	16.7	16.6
			8	7	1	21.3	21.1	21.0	16.8	16.7	16.6
			15	0	1	21.3	21.1	21.0	16.9	16.8	16.6
		16QAM	1	0	1	21.1	21.1	21.3	16.6	17.0	16.5
			1	7	1	21.2	21.1	21.3	16.6	17.0	16.5
			1	14	1	21.1	21.0	21.3	16.5	17.0	16.5
			8	0	2	20.4	20.1	20.0	15.8	15.8	15.7
			8	4	2	20.4	20.1	20.0	15.8	15.8	15.7
			8	7	2	20.4	20.1	20.0	15.9	15.8	15.7
			15	0	2	20.3	20.1	20.0	15.8	15.8	15.7

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LTE Band 5 Measured Results continued

Band	BW (MHz)	Mode	RB Allocation	RB Size	Target MPR	Avg Pwr (dBm)					
						Full Power			with Power Reduction		
						20407	20525	20643	20407	20525	20643
						824.7 MHz	836.5 MHz	848.3 MHz	824.7 MHz	836.5 MHz	848.3 MHz
LTE Band 5	1.4	QPSK	1	0	0	22.4	22.3	22.2	18.0	17.9	17.6
			1	2	0	22.4	22.2	22.1	18.0	17.8	17.6
			1	5	0	22.4	22.2	22.2	18.0	17.9	17.6
			3	0	0	22.3	22.2	22.1	18.0	17.8	17.7
			3	1	0	22.4	22.2	22.1	18.0	17.8	17.7
			3	2	0	22.4	22.2	22.0	18.0	17.8	17.7
			6	0	1	21.3	21.1	21.0	16.9	16.8	16.7
		16QAM	1	0	1	21.3	21.3	21.1	16.7	16.6	17.0
			1	2	1	21.3	21.2	21.1	16.7	16.6	17.0
			1	5	1	21.3	21.2	21.1	16.7	16.6	17.0
			3	0	1	21.5	21.2	21.1	17.0	17.0	17.0
			3	1	1	21.5	21.2	21.0	16.9	17.0	17.0
			3	2	1	21.5	21.2	21.1	16.9	17.0	17.0
			6	0	2	20.4	20.3	20.1	16.0	16.0	15.5

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9.4. Wi-Fi (2.4 GHz Band)

Required Test Channels per KDB 248227 D01

Mode	Band	GHz	Channel	"Default Test Channels"	
				802.11b	802.11g
802.11b/g	2.4 GHz	**2.412**	1#	√	∇
		2.437	6	√	∇
		2.462	11#	√	∇

Notes:
√ = "default test channels"
∇ = possible 802.11g channels with maximum average output ¼ dB ≥ the "default test channels"
= when output power is reduced for channel 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested.

Measured Results

Band (GHz)	Mode	Data Rate	No. of Transmitters	Ch #	Freq. (MHz)	Avg Pwr (dBm)		SAR Test (Yes/No)
						Wi-Fi 1	Wi-Fi 2	
2.4 (DTS)	802.11b	1 Mbps	1 Tx	1	2412	13.7	13.7	Yes
				6	2437	14.3	14.3	
				11	2462	13.6	13.9	
			2 Tx	1	2412	13.6	12.7	Yes
				6	2437	14.3	13.4	
				11	2462	13.7	12.8	
	802.11g	6 Mbps	1 Tx	1	2412	11.9	11.8	No
				6	2437	12.5	12.3	
				11	2462	12.0	11.9	
			2 Tx	1	2412	11.8	10.9	No
				6	2437	12.3	11.6	
				11	2462	12.0	11.2	
	802.11n (HT20)	MCS0	1 Tx	1	2412	10.7	10.6	No
				6	2437	11.3	11.4	
				11	2462	11.0	10.9	
			2 Tx	1	2412	11.4	10.5	No
				6	2437	12.1	11.2	
				11	2462	11.6	10.7	

Note(s):
Per KDB 248227 D01, SAR is not required for 802.11g/HT20 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

Power measurements to determine worst-case data rates

Mode	Ch #	Freq. (MHz)	Data Rate	Avg Pwr		SAR test (Yes/No)
				Wi-Fi 1	Wi-Fi 2	
802.11b	6	2437	1 Mbps	14.3	14.3	Yes
			2 Mbps	14.3	14.3	No
			5.5 Mbps	14.2	14.3	No
			11 Mbps	14.0	14.0	No

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9.5. Wi-Fi (5 GHz Bands)

Required Test Channels per KDB 248227 D01

Mode		Band	GHz	Channel	"Default Test Channels"	
					802.11a	
802.11a	UNII (15.407)	5.2 GHz	5.180	36	√	
			5.200	40		*
			2.220	44		*
			5.240	48	√	
		5.3 GHz	5.260	52	√	
			5.280	56		*
			5.300	60		*
			5.320	64	√	
		5.5 GHz	5.500	100		
			5.520	104	√	
			5.540	108		*
			5.560	112		*
			5.580	116	√	
			5.600	120		*
			5.620	124	√	
			5.640	128		*
			5.660	132		*
			5.680	136	√	
			5.700	140		*
	DTS (15.247)	5.8 GHz	5.745	149	√	
			5.765	153		*
			5.785	157	√	
			5.805	161		*
			5.825	165	√	

√ = "default test channels"

* = possible 802.11a channels with maximum average output > the "default test channels"

= when output power is reduced for channel 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested.

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Wi-Fi 5.2 GHz Band Measured Results

Band (GHz)	Mode	Data Rate	No. of Transmitters	Ch #	Freq. (MHz)	Avg Pwr (dBm)		SAR Test (Yes/No)
						Wi-Fi 1	Wi-Fi 2	
5.2 (UNII)	802.11a	6 Mbps	1 Tx	36	5180	10.5	10.5	Yes
				40	5200	10.4	10.5	
				44	5220	10.4	10.4	
				48	5240	10.5	10.5	
			2 Tx	36	5180	10.5	10.5	Yes
				40	5200	10.4	10.5	
				44	5220	10.4	10.5	
				48	5240	10.5	10.5	
	802.11n (HT20)	MCS 0	1 Tx	36	5180	10.3	10.4	No
				40	5200	10.3	10.5	
				48	5240	10.4	10.5	
			2 Tx	36	5180	10.0	10.2	No
				40	5200	10.0	10.1	
				48	5240	10.2	10.2	
	802.11n (HT40)	MCS 0	1 Tx	38	5190	10.4	10.4	No
				46	5230	10.5	10.5	
			2 Tx	38	5190	10.0	10.2	No
				46	5230	10.0	10.1	
	802.11ac (20 MHz)	MCS 0	1 Tx	36	5180	10.3	10.5	No
				40	5200	10.3	10.4	
				48	5240	10.3	10.3	
			2 Tx	36	5180	10.1	10.2	Yes
				40	5200	10.1	10.2	
				48	5240	10.3	10.1	
	802.11ac (40 MHz)	MCS 0	1 Tx	38	5190	10.5	9.6	No
				46	5230	10.5	9.5	
			2 Tx	38	5190	9.9	10.1	No
				46	5230	10.0	10.2	
	802.11ac (80 MHz)	MCS 0	1 Tx	42	5210	10.4	10.4	No
			2 Tx	42	5210	9.6	9.7	

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Wi-Fi 5.3 GHz Band Measured Results

Band (GHz)	Mode	Data Rate	No. of Transmitters	Ch #	Freq. (MHz)	Avg Pwr (dBm)		SAR Test (Yes/No)
						Wi-Fi 1	Wi-Fi 2	
5.3 (UNII)	802.11a	6 Mbps	1 Tx	52	5260	9.7	9.5	Yes
				56	5280	9.8	9.5	
				60	5300	9.9	9.4	
				64	5320	9.8	9.6	
			2 Tx	52	5260	9.7	9.6	Yes
				56	5280	9.8	9.6	
				60	5300	9.8	9.6	
				64	5320	9.9	9.7	
	802.11n (HT20)	MCS 0	1 Tx	52	5260	9.7	9.4	No
				60	5300	9.7	9.4	
				64	5320	9.8	9.5	
			2 Tx	52	5260	9.3	9.3	No
				60	5300	9.4	9.2	
				64	5320	9.4	9.3	
	802.11n (HT40)	MCS 0	1 Tx	54	5270	9.7	9.5	No
				62	5310	9.7	9.6	
			2 Tx	54	5270	9.2	9.2	No
				62	5310	9.3	9.2	
	802.11ac (20 MHz)	MCS 0	1 Tx	52	5260	9.7	9.4	No
				60	5300	9.7	9.5	
				64	5320	9.8	9.5	
			2 Tx	52	5260	10.3	10.1	Yes
				60	5300	10.3	10.2	
				64	5320	10.4	10.3	
	802.11ac (40 MHz)	MCS 0	1 Tx	54	5270	9.7	9.5	No
				62	5310	9.7	9.5	
			2 Tx	54	5270	9.2	9.1	No
				62	5310	9.3	9.1	
	802.11ac (80 MHz)	MCS 0	1 Tx	58	5290	9.5	9.3	No
			2 Tx	58	5290	9.7	9.6	

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Wi-Fi 5.5 GHz Band Measured Results

Band (GHz)	Mode	Data Rate	No. of Transmitters	Ch #	Freq. (MHz)	Avg Pwr (dBm)		SAR Test (Yes/No)
						Wi-Fi 1	Wi-Fi 2	
5.5 (UNII)	802.11a	6 Mbps	1 Tx	100	5500	9.9	9.7	Yes
				104	5520	9.9	9.7	
				108	5540	9.8	9.6	
				112	5560	9.8	9.6	
				116	5580	9.9	9.6	
				120	5600	9.8	9.6	
				124	5620	9.8	9.6	
				128	5640	9.8	9.6	
				132	5660	9.7	9.6	
				136	5680	9.6	9.6	
				140	5700	9.8	9.5	
			2 Tx	100	5500	9.9	9.9	Yes
				104	5520	10.1	10.0	
				108	5540	9.8	9.8	
				112	5560	9.8	9.8	
				116	5580	9.8	9.8	
				120	5600	9.8	9.8	
				124	5620	9.8	9.8	
				128	5640	9.8	9.8	
				132	5660	9.7	9.9	
				136	5680	9.7	9.9	
				140	5700	9.6	9.9	
	802.11n (HT20)	MCS0	1 Tx	100	5500	9.7	9.7	No
				116	5580	9.7	9.5	
				140	5700	9.6	9.7	
			2 Tx	100	5500	9.4	9.3	No
				116	5580	9.3	9.3	
				140	5700	9.3	9.3	
	802.11n (HT40)	MCS0	1 Tx	102	5510	9.9	9.7	No
				118	5590	9.8	9.6	
				134	5670	9.7	9.6	
			2 Tx	102	5510	9.2	9.2	No
				118	5590	9.2	9.3	
				134	5670	9.2	9.3	
	802.11ac (20 MHz)	MCS0	1 Tx	100	5500	9.7	9.6	No
				120	5600	9.7	9.5	
				140	5700	9.6	9.7	
			2 Tx	100	5500	10.4	10.3	Yes
				120	5600	10.3	10.3	
				140	5700	10.2	10.3	
	802.11ac (40 MHz)	MCS0	1 Tx	102	5510	9.9	9.5	No
				118	5590	9.8	9.6	
				134	5670	9.7	9.7	
			2 Tx	102	5510	9.2	9.3	No
				118	5590	9.2	9.3	
				134	5670	9.2	9.3	
	802.11ac (80 MHz)	MCS0	1 Tx	106	5530	9.5	9.6	No
				138	5690	9.6	9.6	
			2 Tx	106	5530	10.0	9.9	No
				138	5690	9.7	10.1	

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Wi-Fi 5.8 GHz Band Measured Results

Band (GHz)	Mode	Data Rate	No. of Transmitters	Ch #	Freq. (MHz)	Avg Pwr (dBm)		SAR Test (Yes/No)
						Wi-Fi 1	Wi-Fi 2	
5.8 (DTS)	802.11a	6 Mbps	1 Tx	149	5745	9.6	9.9	Yes
				153	5765	9.6	9.8	
				157	5785	9.5	9.7	
				161	5805	9.5	9.7	
				165	5825	9.4	9.6	
			2 Tx	149	5745	10.5	10.5	Yes
				153	5765	10.4	10.5	
				157	5785	10.4	10.5	
				161	5805	10.4	10.5	
				165	5825	10.4	10.4	
	802.11n (HT20)	MCS0	1 Tx	149	5745	9.3	9.6	No
				157	5785	9.3	9.6	
				165	5825	9.3	9.5	
			2 Tx	149	5745	9.2	9.3	No
				157	5785	9.2	9.3	
				165	5825	9.2	9.3	
	802.11n (HT40)	MCS0	1 Tx	151	5755	9.4	9.8	No
				159	5795	9.4	9.7	
			2 Tx	151	5755	9.1	8.9	No
				159	5795	8.8	9.1	
	802.11ac (20 MHz)	MCS0	1 Tx	149	5745	9.4	9.6	No
				157	5785	9.4	9.6	
				165	5825	9.4	9.6	
			2 Tx	149	5745	10.1	10.4	Yes
				157	5785	10.0	10.3	
				165	5825	10.4	10.3	
	802.11ac (40 MHz)	MCS0	1 Tx	151	5755	9.4	9.8	No
				159	5795	9.4	9.8	
			2 Tx	151	5755	9.1	9.0	No
				159	5795	8.9	9.2	
	802.11ac (40 MHz)	MCS0	1 Tx	155	5775	9.3	9.5	No
			2 Tx	155	5775	9.7	9.9	No

Note(s):

Per KDB 248227, SAR is not required for 802.11n HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a channels.

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Power measurements to determine worst-case data rates

Band	Mode	Ch #	Freq. (MHz)	Data Rate	Avg Pwr (dBm)		SAR test (Yes/No)
					Wi-Fi 1	Wi-Fi 2	
5.2 GHz (UNII)	802.11a	36	5180	6 Mbps	10.5	10.5	Yes
				9 Mbps	10.5	10.5	No
				12 Mbps	10.4	10.5	No
				18 Mbps	10.4	10.4	No
				24 Mbps	10.4	10.4	No
				36 Mbps	10.3	10.3	No
				48 Mbps	10.3	10.3	No
				54 Mbps	10.3	10.2	No
5.3 GHz (UNII)	802.11a	56	5280	6 Mbps	9.8	9.6	Yes
				9 Mbps	9.8	9.6	No
				12 Mbps	9.8	9.6	No
				18 Mbps	9.7	9.5	No
				24 Mbps	9.7	9.5	No
				36 Mbps	9.7	9.5	No
				48 Mbps	9.6	9.4	No
				54 Mbps	9.6	9.4	No
5.5 GHz (UNII)	802.11a	116	5580	6 Mbps	9.9	9.7	Yes
				9 Mbps	9.9	9.7	No
				12 Mbps	9.8	9.6	No
				18 Mbps	9.8	9.6	No
				24 Mbps	9.8	9.6	No
				36 Mbps	9.7	9.6	No
				48 Mbps	9.7	9.6	No
				54 Mbps	9.7	9.5	No
5.8 GHz (DTS)	802.11a	149	5745	6 Mbps	9.6	9.9	Yes
				9 Mbps	9.6	9.8	No
				12 Mbps	9.5	9.7	No
				18 Mbps	9.5	9.7	No
				24 Mbps	9.4	9.6	No
				36 Mbps	9.4	9.6	No
				48 Mbps	9.4	9.6	No
				54 Mbps	9.4	9.6	No

9.6. Bluetooth

Band (MHz)	Mode	Ch #	Freq. (MHz)	Conducted Avg Power	
				(dBm)	(mW)
2.4	V3.0 + EDR, GFSK	0	2402	9.2	8.32
		39	2441	9.9	9.77
		78	2480	9.9	9.77
	V3.0 + EDR, π/4 DQPSK	0	2402	5.7	3.72
		39	2441	7.5	5.62
		78	2480	6.0	3.98
	V3.0 + EDR, 8-DPSK	0	2402	5.7	3.72
		39	2441	7.5	5.62
		78	2480	5.9	3.89
	V4.0 LE, GFSK	0	2402	6.1	4.07
		19	2440	7.6	5.75
		39	2480	5.4	3.47

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10. Tissue Dielectric Properties

IEEE Std 1528-2013

Target Frequency (MHz)	Head	
	ε_r	σ (S/m)
300	45.3	0.87
450	43.5	0.87
750	41.9	0.89
835	41.5	0.90
900	41.5	0.97
1450	40.5	1.20
1500	40.4	1.23
1640	40.2	1.31
1750	40.1	1.37
1800	40.0	1.40
1900	40.0	1.40
2000	40.0	1.40
2100	39.8	1.49
2300	39.5	1.67
2450	39.2	1.80
2600	39.0	1.96
3000	38.5	2.40
3500	37.9	2.91
4000	37.4	3.43
4500	36.8	3.94
5000	36.2	4.45
5200	36.0	4.66
5400	35.8	4.86
5600	35.5	5.07
5800	35.3	5.27
600	35.1	5.48

NOTE—For convenience, permittivity and conductivity values at some frequencies that are not part of the original data from Drossos et al. [B60] or the extension to 5800 MHz are provided (i.e., the values shown in italics). These values were linearly interpolated between the values in this table that are immediately above and below these values, except the values at 6000 MHz that were linearly extrapolated from the values at 3000 MHz and 5800 MHz.

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03

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

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10.1. Composition of Ingredients for the Tissue Material Used in the SAR Tests

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
Water: De-ionized, 16 MΩ+ resistivity HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

MSL/HSL750 (Body and Head liquids for 700 – 800 MHz)

Item	Head Tissue Simulation Liquids HSL750 Muscle (body) Tissue Simulation Liquids MSL750
Type No	SL AAH 075
Manufacturer	SPEAG
The item is composed of the following ingredients:	
H^2O	Water, 35 – 58%
Sucrese	Sugar, white, refined, 40-60%
NaCl	Sodium Chloride, 0-6%
Hydroxyethel-cellulsoe	Medium Viscosity (CAS# 9004-62-0), <0.3%
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyyl-3(2H)-isothiazolone, 0.1-0.7%

MSL/HSL1750 (Body and Head liquids for 1700 – 1800 MHz)

Item	Head Tissue Simulation Liquids HSL1750 Muscle (body) Tissue Simulation Liquids MSL1750
Type No	SL AAM 175
Manufacturer	SPEAG
-The item is composed of the following ingredients:	
H^2O	Water, 52 – 75%
C8H18O3	Diethylene glycol monobutyl ether (DGBE), 25-48%
NaCl	Sodium Chloride, <1.0%

Simulating Liquids for 5 GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	78
Mineral oil	11
Emulsifiers	9
Additives and Salt	2

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10.2. Tissue Dielectric Parameter Check Results

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 2°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.

SAR Room 3

Date Tested	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
2/6/2014	Body 2450	e'	51.7900	Relative Permittivity (ϵ_r):	51.79	52.70	-1.73	5
		e"	14.1400	Conductivity (σ):	1.93	1.95	-1.22	5
	Body 2410	e'	51.9000	Relative Permittivity (ϵ_r):	51.90	52.76	-1.63	5
		e"	14.0200	Conductivity (σ):	1.88	1.91	-1.51	5
	Body 2475	e'	51.6800	Relative Permittivity (ϵ_r):	51.68	52.67	-1.88	5
		e"	14.2200	Conductivity (σ):	1.96	1.99	-1.42	5
2/10/2014	Body 5180	e'	47.9400	Relative Permittivity (ϵ_r):	47.94	49.05	-2.26	5
		e"	18.6800	Conductivity (σ):	5.38	5.27	2.07	5
	Body 5200	e'	47.9400	Relative Permittivity (ϵ_r):	47.94	49.02	-2.20	5
		e"	18.7200	Conductivity (σ):	5.41	5.29	2.23	5
	Body 5600	e'	47.2400	Relative Permittivity (ϵ_r):	47.24	48.48	-2.55	5
		e"	19.0700	Conductivity (σ):	5.94	5.76	3.07	5
	Body 5800	e'	47.0100	Relative Permittivity (ϵ_r):	47.01	48.20	-2.47	5
		e"	19.3900	Conductivity (σ):	6.25	6.00	4.22	5
	Body 5825	e'	46.9300	Relative Permittivity (ϵ_r):	46.93	48.20	-2.63	5
		e"	19.3400	Conductivity (σ):	6.26	6.00	4.40	5
2/13/2014	Body 5180	e'	48.8600	Relative Permittivity (ϵ_r):	48.86	49.05	-0.38	5
		e"	18.5100	Conductivity (σ):	5.33	5.27	1.14	5
	Body 5200	e'	48.8500	Relative Permittivity (ϵ_r):	48.85	49.02	-0.35	5
		e"	18.5800	Conductivity (σ):	5.37	5.29	1.46	5
	Body 5600	e'	48.1400	Relative Permittivity (ϵ_r):	48.14	48.48	-0.70	5
		e"	19.0500	Conductivity (σ):	5.93	5.76	2.96	5
	Body 5800	e'	47.8200	Relative Permittivity (ϵ_r):	47.82	48.20	-0.79	5
		e"	19.3000	Conductivity (σ):	6.22	6.00	3.74	5
	Body 5825	e'	47.7700	Relative Permittivity (ϵ_r):	47.77	48.20	-0.89	5
		e"	19.2800	Conductivity (σ):	6.24	6.00	4.08	5
2/18/2014	Body 2450	e'	51.6600	Relative Permittivity (ϵ_r):	51.66	52.70	-1.97	5
		e"	14.8200	Conductivity (σ):	2.02	1.95	3.53	5
	Body 2410	e'	51.8100	Relative Permittivity (ϵ_r):	51.81	52.76	-1.80	5
		e"	14.6400	Conductivity (σ):	1.96	1.91	2.85	5
	Body 2475	e'	51.5700	Relative Permittivity (ϵ_r):	51.57	52.67	-2.09	5
		e"	14.9300	Conductivity (σ):	2.05	1.99	3.50	5

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SAR Room 4

Date Tested	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
2/6/2014	Body 835	e'	57.5900	Relative Permittivity (ϵ_r):	57.59	55.20	4.33	5
		e''	21.5700	Conductivity (σ):	1.00	0.97	3.24	5
	Body 820	e'	57.8000	Relative Permittivity (ϵ_r):	57.80	55.28	4.56	5
		e''	21.5700	Conductivity (σ):	0.98	0.97	1.55	5
	Body 850	e'	57.3400	Relative Permittivity (ϵ_r):	57.34	55.16	3.96	5
		e''	21.5400	Conductivity (σ):	1.02	0.99	3.13	5
2/7/2014	Body 1900	e'	51.6600	Relative Permittivity (ϵ_r):	51.66	53.30	-3.08	5
		e''	14.2400	Conductivity (σ):	1.50	1.52	-1.03	5
	Body 1850	e'	51.8600	Relative Permittivity (ϵ_r):	51.86	53.30	-2.70	5
		e''	14.0900	Conductivity (σ):	1.45	1.52	-4.65	5
	Body 1910	e'	51.6400	Relative Permittivity (ϵ_r):	51.64	53.30	-3.11	5
		e''	14.2700	Conductivity (σ):	1.52	1.52	-0.30	5
2/10/2014	Body 1900	e'	51.2000	Relative Permittivity (ϵ_r):	51.20	53.30	-3.94	5
		e''	14.5200	Conductivity (σ):	1.53	1.52	0.92	5
	Body 1850	e'	51.4000	Relative Permittivity (ϵ_r):	51.40	53.30	-3.56	5
		e''	14.3500	Conductivity (σ):	1.48	1.52	-2.89	5
	Body 1910	e'	51.1500	Relative Permittivity (ϵ_r):	51.15	53.30	-4.03	5
		e''	14.5600	Conductivity (σ):	1.55	1.52	1.73	5
2/10/2014	Body 835	e'	53.4200	Relative Permittivity (ϵ_r):	53.42	55.20	-3.22	5
		e''	21.6600	Conductivity (σ):	1.01	0.97	3.67	5
	Body 820	e'	53.6000	Relative Permittivity (ϵ_r):	53.60	55.28	-3.03	5
		e''	21.7400	Conductivity (σ):	0.99	0.97	2.35	5
	Body 850	e'	53.2700	Relative Permittivity (ϵ_r):	53.27	55.16	-3.42	5
		e''	21.5700	Conductivity (σ):	1.02	0.99	3.27	5
2/12/2014	Body 2450	e'	52.2700	Relative Permittivity (ϵ_r):	52.27	52.70	-0.82	5
		e''	14.4100	Conductivity (σ):	1.96	1.95	0.67	5
	Body 2410	e'	52.4100	Relative Permittivity (ϵ_r):	52.41	52.76	-0.66	5
		e''	14.2700	Conductivity (σ):	1.91	1.91	0.25	5
	Body 2475	e'	52.1700	Relative Permittivity (ϵ_r):	52.17	52.67	-0.95	5
		e''	14.5200	Conductivity (σ):	2.00	1.99	0.66	5

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11. System Performance 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 remeasured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

11.1. 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 ± 0.5 cm for SAR measurements ≤ 3 GHz and ≥ 10.0 cm ± 0.5 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.

11.2. Reference SAR Values for System Performance Check

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 (mW/g)		
				1g/10g	Head	Body
D835V2	4d142	9/17/2013	835	1g	9.44	9.36
				10g	6.12	6.20
D1900V2	5d163	9/17/2013	1900	1g	40.9	40.1
				10g	21.2	21.2
D2450V2	706	5/29/2013	2450	1g	53.7	49.9
				10g	25.0	23.3
D5GHzV2	1138	11/19/2013	5200	1g	78.5	72.9
				10g	22.5	20.4
			5600	1g	82.7	78.3
				10g	23.5	21.7
			5800	1g	78.3	72.8
				10g	22.4	20.1

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11.3. System Performance 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 Room 3

Date Tested	System Dipole		T.S. Liquid		Measured Results			Target (Ref. Value)	Delta ±10 %	Est./Zoom Ratio ±3 %	Plot No.
	Type	Serial #			Area Scan	Zoom Scan	Normalize to 1 W				
2/6/2014	D2450V2	706	Body	1g	5.13	5.17	51.70	49.90	3.61	-0.78	1, 2
				10g	2.240	2.400	24.00	23.30	3.00		
2/10/2014	D5GV2 5.2	1138	Body	1g	6.98	7.58	75.80	72.90	3.98	-8.60	3, 4
				10g	1.990	2.140	21.40	20.40	4.90		
2/10/2014	D5GV2 5.6	1138	Body	1g	7.21	7.86	78.60	78.30	0.38	-9.02	
				10g	2.050	2.20	22.00	21.70	1.38		
2/10/2014	D5GV2 5.8	1138	Body	1g	6.49	7.16	71.60	72.80	-1.65	-10.32	5, 6
				10g	1.840	1.990	19.90	20.10	-1.00		
2/13/2014	D5GV2 5.2	1138	Body	1g	7.12	7.56	75.60	72.90	3.70	-6.18	
				10g	2.040	2.130	21.30	20.40	4.41		
2/13/2014	D5GV2 5.6	1138	Body	1g	7.27	7.69	76.90	78.30	-1.79	-5.78	7, 8
				10g	2.050	2.16	21.60	21.70	-0.46		
2/13/2014	D5GV2 5.8	1138	Body	1g	6.80	7.28	72.80	72.80	0.00	-7.06	
				10g	1.930	2.040	20.40	20.10	1.49		
2/18/2014	D2450V2	706	Body	1g	5.14	5.13	51.3	49.90	2.81	0.19	
				10g	2.23	2.360	23.6	23.30	1.29		

SAR Room 4

Date Tested	System Dipole		T.S. Liquid		Measured Results			Target (Ref. Value)	Delta ±10 %	Est./Zoom Ratio ±3 %	Plot No.
	Type	Serial #			Area Scan	Zoom Scan	Normalize to 1 W				
2/6/2014	D835V2	4d142	Body	1g	1.04	1.01	10.10	9.36	7.91	2.88	9,10
				10g	0.696	0.666	6.66	6.20	7.42		
2/7/2014	D1900V2	5d163	Body	1g	3.88	3.86	38.60	40.10	-3.74	0.52	11,12
				10g	1.96	2.03	20.30	21.20	-4.25		
2/10/2014	D835V2	4d142	Body	1g	0.959	0.929	9.29	9.36	-0.75	3.13	
				10g	0.640	0.612	6.12	6.20	-1.29		
2/10/2014	D1900V2	5d163	Body	1g	3.97	3.94	39.40	40.10	-1.75	0.76	
				10g	2.01	2.06	20.60	21.20	-2.83		
2/12/2014	D2450V2	706	Body	1g	4.80	4.85	48.50	49.90	-2.81	-1.04	13,14
				10g	2.08	2.25	22.50	23.30	-3.43		

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12. SAR Test Results

SAR Test Reduction criteria are as follows:

KDB 447498 D01 General RF Exposure Guidance v05r02:
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 Section 2.3:
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 v02 (pg.12):
Body SAR is also measured for HSPA when the maximum average output of each RF channel with HSPA active is at least ¼ dB higher than that measured without HSPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is above 75% of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 with power control algorithm 2.

KDB 941225 D05 SAR for LTE Devices v02r03:
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.

April 2013 TCB Workshop Updates:
Apply usual 802.11 test exclusion considerations, but include 802.11ac SAR for highest 802.11a configuration in each frequency band and each exposure condition.

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12.1. GSM850

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
GPRS 2 slots	On	0	Rear	190	836.6	26.0	25.8	0.711	0.745	1
GPRS 2 slots	On	0	Edge 1	190	836.6	26.0	25.8	0.376	0.394	
GPRS 2 slots	Off	14	Rear	190	836.6	32.0	31.6	0.271	0.297	
GPRS 2 slots	Off	14	Edge 1	190	836.6	32.0	31.6	0.254	0.279	
GPRS 2 slots	Off	0	Edge 2	190	836.6	32.0	31.6	0.249	0.273	

12.2. GSM1900

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
GPRS 4 slots	On	0	Rear	810	1909.8	18.5	18.5	0.460	0.460	
GPRS 4 slots	On	0	Edge 1	810	1909.8	18.5	18.5	0.368	0.368	
GPRS 3 slots	Off	14	Rear	810	1909.8	25.5	25.4	0.558	0.571	
GPRS 3 slots	Off	14	Edge 1	512	1850.2	25.5	25.3	0.320	0.335	
				661	1880.0	25.5	25.1	0.455	0.499	
				810	1909.8	25.5	25.4	0.936	**0.958**	2
GPRS 3 slots	Off	0	Edge 2	810	1909.8	25.5	25.4	0.010	0.010	

12.3. W-CDMA Band V

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Rel 99 RMC	On	0	Rear	4132	826.4	18.5	17.7	0.639	0.768	
				4183	836.6	18.5	17.8	0.678	0.797	
				4233	846.6	18.5	17.8	0.690	0.803	3
Rel 99 RMC	On	0	Edge 1	4183	836.6	18.5	17.8	0.365	0.429	
Rel 99 RMC	Off	14	Rear	4183	836.6	23.0	22.3	0.146	0.170	
Rel 99 RMC	Off	14	Edge 1	4183	836.6	23.0	22.3	0.138	0.161	
Rel 99 RMC	Off	0	Edge 2	4183	836.6	23.0	22.3	0.126	0.147	

12.4. W-CDMA Band II

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Rel 99 RMC	On	0	Rear	9400	1880	15.5	15.2	0.657	0.702	
Rel 99 RMC	On	0	Edge 1	9400	1880	15.5	15.2	0.637	0.681	
Rel 99 RMC	Off	14	Rear	9400	1880	22.5	21.5	0.452	0.568	
Rel 99 RMC	Off	14	Edge 1	9400	1880	22.5	21.5	0.614	0.771	4
Rel 99 RMC	Off	0	Edge 2	9400	1880	22.5	21.5	0.015	0.019	

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12.5. LTE Band 5 (BW=10 MHz)

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offest	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
QPSK	On	0	Rear	20525	836.6	1	0	18.0	17.7	0.714	0.765	5
						25	0	17.0	16.8	0.566	0.591	
QPSK	On	0	Edge 1	20525	836.6	1	0	18.0	17.7	0.311	0.333	
						25	0	17.0	16.8	0.252	0.263	
QPSK	Off	14	Rear	20525	836.6	1	0	23.0	22.3	0.138	0.164	
						25	0	22.0	21.2	0.104	0.126	
QPSK	Off	14	Edge 1	20525	836.6	1	0	23.0	22.3	0.114	0.135	
						25	0	22.0	21.2	0.092	0.112	
QPSK	Off	0	Edge 2	20525	836.6	1	0	23.0	22.3	0.084	0.100	
						25	0	22.0	21.2	0.069	0.084	

12.6. Wi-Fi DTS Band

Wi-Fi 2.4 GHz Band

Antenna	Dist. (mm)	Test Position	Mode		Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
1	0	Rear	802.11b	2.4	6	2437	14.5	14.3	0.447	0.468	6
	0	Edge 1	802.11b	2.4	6	2437	14.5	14.3	0.096	0.101	
2	0	Rear	802.11b	2.4	6	2437	14.5	14.3	0.182	0.191	
	0	Edge 1	802.11b	2.4	6	2437	14.5	14.3	0.001	0.001	
1 + 2	0	Rear	802.11b	2.4	6	2437	14.5	14.3	0.440	0.461	
	0	Edge 1, Antenna 1	802.11b	2.4	6	2437	14.5	14.2	0.101	0.108	
	0	Edge 1, Antenna 2	802.11b	2.4	6	2437	14.5	13.4	0.091	0.117	

Wi-Fi 5.8 GHz Band

Antenna	Dist. (mm)	Test Position	Mode		Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
1	0	Rear	802.11a	5.8	149	5745	10.5	9.6	0.343	0.422	
	0	Edge 1	802.11a	5.8	149	5745	10.5	9.6	<0.001	<0.001	
2	0	Rear	802.11a	5.8	149	5745	10.5	9.9	0.425	0.488	
	0	Edge 1	802.11a	5.8	149	5745	10.5	9.9	0.264	0.303	
1 + 2	0	Rear, Antenna 1	802.11a	5.8	149	5745	10.5	10.5	0.652	0.652	
			802.11a	5.8	157	5785	10.5	10.4	0.719	0.736	
			802.11a	5.8	165	5825	10.5	10.4	0.767	**0.785**	7
	0	Rear, Antenna 2	802.11a	5.8	149	5745	10.5	10.5	0.645	0.645	
			802.11a	5.8	157	5785	10.5	10.5	0.648	0.648	
			802.11a	5.8	165	5825	10.5	10.4	0.731	0.748	
	0	Edge 1	802.11a	5.8	149	5745	10.5	10.5	0.368	0.368	

Worst-Case Spot-Check for 802.11ac Mode (VHT20)

Antenna	Dist. (mm)	Test Position	Mode		Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
1 + 2	0	Rear, Antenna 1	802.11ac	5.8	165	5825	10.5	10.4	0.754	0.772	
	0	Rear, Antenna 2	802.11ac	5.8	165	5825	10.5	10.3	0.713	0.747	

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12.7. Wi-Fi UNII Band

Antenna	Dist. (mm)	Test Position	Mode		Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
1	0	Rear	802.11a	5.2	48	5240	10.5	10.5	0.182	0.182	
			802.11a	5.3	64	5320	10.5	9.8	0.161	0.189	
			802.11a	5.5	104	5520	10.5	9.9	0.193	0.222	
	0	Edge 1	802.11a	5.2	48	5240	10.5	10.5	0.024	0.024	
			802.11a	5.3	64	5320	10.5	9.8	0.007	0.008	
			802.11a	5.5	104	5520	10.5	9.9	<0.001	<0.001	
2	0	Rear	802.11a	5.2	48	5240	10.5	10.5	0.206	0.206	
			802.11a	5.3	64	5320	10.5	9.6	0.374	0.460	
			802.11a	5.5	104	5520	10.5	9.7	0.529	0.636	
			802.11a	5.5	116	5580	10.5	9.6	0.493	0.607	
			802.11a	5.5	124	5620	10.5	9.6	0.595	**0.732**	8
			802.11a	5.5	136	5680	10.5	9.6	0.532	0.655	
	0	Edge 1	802.11a	5.2	48	5240	10.5	10.5	0.238	0.238	
			802.11a	5.3	64	5320	10.5	9.6	0.162	0.199	
			802.11a	5.5	104	5520	10.5	9.7	0.214	0.257	
1 + 2	0	Rear, Antenna 1	802.11a	5.2	48	5240	10.5	10.5	0.419	0.419	
			802.11a	5.3	64	5320	10.5	9.9	0.322	0.370	
			802.11a	5.5	104	5520	10.5	10.1	0.338	0.371	
			802.11a	5.5	116	5580	10.5	9.8	0.394	0.463	
			802.11a	5.5	124	5620	10.5	9.8	0.410	0.482	
			802.11a	5.5	136	5680	10.5	9.7	0.539	0.648	
	0	Rear, Antenna 2	802.11a	5.2	48	5240	10.5	10.5	0.478	0.478	9
			802.11a	5.3	64	5320	10.5	9.7	0.441	0.530	10
			802.11a	5.5	104	5520	10.5	10.0	0.455	0.511	
			802.11a	5.5	116	5580	10.5	9.8	0.515	0.605	
			802.11a	5.5	124	5620	10.5	9.8	0.513	0.603	
			802.11a	5.5	136	5680	10.5	9.9	0.520	0.597	
	0	Edge 1	802.11a	5.2	48	5240	10.5	10.5	0.253	0.253	
			802.11a	5.3	64	5320	10.5	9.9	0.174	0.200	
			802.11a	5.5	104	5520	10.5	10.1	0.221	0.242	

Worst-Case Spot-Check for 802.11ac Mode (VHT20)

Antenna	Dist. (mm)	Test Position	Mode		Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
1 + 2	0	Rear, Antenna 1	802.11ac	5.2	48	5240	10.5	10.3	0.302	0.316	
			802.11ac	5.3	64	5320	10.5	10.4	0.249	0.255	
			802.11ac	5.5	140	5700	10.5	10.2	0.431	0.462	
	0	Rear, Antenna 2	802.11ac	5.2	48	5240	10.5	10.1	0.408	0.447	
			802.11ac	5.3	64	5320	10.5	10.3	0.375	0.393	
			802.11ac	5.5	140	5700	10.5	10.3	0.500	0.524	

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12.8. Bluetooth

Antenna	Dist. (mm)	Test Position	Mode		Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
1	0	Rear	Bluetooth	2.4	39	2441	10.5	9.9	0.389	0.447	11
	0	Edge 1	Bluetooth	2.4	39	2441	10.5	9.9	0.124	0.142	

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13. SAR Measurement Variability

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

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

13.1. The Highest Measured SAR Configuration in Each Frequency Band

Frequency Band (MHz)	Air Interface	Stand-alone (W/kg)	Repeated SAR (Yes/No)
850	GSM850	0.728	No
	W-CDMA Band V	0.690	No
	LTE Band 5	0.714	No
1900	GSM1900	0.936	Yes
	W-CDMA Band II	0.614	No
2400	Wi-Fi 802.11b/g/n	0.447	No
	Bluetooth	0.000	No
5200	Wi-Fi 802.11a/n/ac	0.478	No
5300	Wi-Fi 802.11a/n/ac	0.441	No
5500	Wi-Fi 802.11a/n/ac	0.539	No
5800	Wi-Fi 802.11a/n/ac	0.767	No

13.2. Repeated Measurement Results

Frequency band	Test Position	Mode	Pwr Back-off	Dist. (mm)	Ch #.	Freq. (MHz)	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio
							Original	Repeated	
GSM1900	Edge 1	GPRS 3 Slots	Off	10	810	1909.8	0.936	0.933	1.00

Note(s):

1. 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.

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14. Simultaneous Transmission SAR Analysis

14.1. Estimated SAR for Simultaneous Transmission SAR Analysis

Considerations for SAR estimation

1. When standalone SAR test exclusion applies, standalone SAR must also be estimated to determine simultaneous transmission SAR test exclusion.
2. Dedicated Host Approach criteria for SAR test exclusion is likewise applied to SAR estimation, with certain distinctions between test exclusion and SAR estimation:
   - When the separation distance from the antenna to an adjacent edge is ≤ 5 mm, a distance of 5 mm is applied for SAR estimation; this is the same between test exclusion and SAR estimation calculations.
   - When the separation distance from the antenna to an adjacent edge is > 5 mm but ≤ 50 mm, the actual antenna-to-edge separation distance is applied for SAR estimation.
   - When the minimum test separation distance is > 50 mm, the estimated SAR value is 0.4 W/kg
3. Test positions Edge 3 and Edge 4 are inherently compliant as they consist of only estimated SAR values for all applicable transmitters and consequently will always have sum of SAR values < 1.2 W/kg. Simultaneous transmission SAR analysis was therefore not performed for these test positions.

14.1.1. Estimated SAR for WWAN

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Estimated 1-g SAR Value (W/kg)					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Full Power, Proximity Sensor Off. A sensor triggering of 14 mm is included for both Rear and Edge 1																
Cellular	GPRS 2 Slots	848.8	32.00	396	15	14.69	20.97	164	168.5		-MEASURE-	-MEASURE-	-MEASURE-	0.400	0.400	
Cellular	GPRS 3 Slots	1909.8	25.50	133	15	14.69	20.97	164	168.5		-MEASURE-	-MEASURE-	-MEASURE-	0.400	0.400	
Cellular	W-CDMA V	846.6	23.00	200	15	14.69	20.97	164	168.5		-MEASURE-	-MEASURE-	-MEASURE-	0.400	0.400	
Cellular	W-CDMA II	1907.6	22.50	178	15	14.69	20.97	164	168.5		-MEASURE-	-MEASURE-	-MEASURE-	0.400	0.400	
Cellular	LTE Band 5	844	23.00	200	15	14.69	20.97	164	168.5		-MEASURE-	-MEASURE-	-MEASURE-	0.400	0.400	

14.1.2. Estimated SAR for WLAN

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Estimated 1-g SAR Value (W/kg)					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Wi-Fi Antenna 1																
Wi-Fi 1	Wi-Fi 2.4 GHz	2462	14.50	28	5	4.47	197.82	164	15.76		-MEASURE-	-MEASURE-	0.400	0.400	0.366	
Wi-Fi 1	Wi-Fi 5.2 GHz	5230	10.50	11	5	4.47	197.82	164	15.76		-MEASURE-	-MEASURE-	0.400	0.400	0.210	
Wi-Fi 1	Wi-Fi 5.3 GHz	5300	10.50	11	5	4.47	197.82	164	15.76		-MEASURE-	-MEASURE-	0.400	0.400	0.211	
Wi-Fi 1	Wi-Fi 5.5 GHz	5680	10.50	11	5	4.47	197.82	164	15.76		-MEASURE-	-MEASURE-	0.400	0.400	0.218	
Wi-Fi 1	Wi-Fi 5.8 GHz	5825	10.50	11	5	4.47	197.82	164	15.76		-MEASURE-	-MEASURE-	0.400	0.400	0.221	
Wi-Fi 1	Bluetooth	2441	10.50	11	5	4.47	197.82	164	15.76		-MEASURE-	-MEASURE-	0.400	0.400	0.143	
Wi-Fi Antenna 2																
Wi-Fi 2	Wi-Fi 2.4 GHz	2462	14.50	28	5	4.47	161	164	52.28		-MEASURE-	-MEASURE-	0.400	0.400	0.400	
Wi-Fi 2	Wi-Fi 5.2 GHz	5230	10.50	11	5	4.47	161	164	52.28		-MEASURE-	-MEASURE-	0.400	0.400	0.400	
Wi-Fi 2	Wi-Fi 5.3 GHz	5300	10.50	11	5	4.47	161	164	52.28		-MEASURE-	-MEASURE-	0.400	0.400	0.400	
Wi-Fi 2	Wi-Fi 5.5 GHz	5680	10.50	11	5	4.47	161	164	52.28		-MEASURE-	-MEASURE-	0.400	0.400	0.400	
Wi-Fi 2	Wi-Fi 5.8 GHz	5825	10.50	11	5	4.47	161	164	52.28		-MEASURE-	-MEASURE-	0.400	0.400	0.400	

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14.2. Sum of the SAR for GSM850, Wi-Fi, and BT

Simultaneous Transmission Scenario		Standalone SAR Values								∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Position	Combination	GSM850	Wi-Fi 1 DTS Band	Wi-Fi 1 UNII Band	Wi-Fi 2 DTS Band	Wi-Fi 2 UNII Band	Wi-Fi 1 + 2 DTS Band	Wi-Fi 1 + 2 UNII Band	Wi-Fi 1 Bluetooth		
Rear	WWAN + Wi-Fi 1	0.745	0.468							1.213	No
		0.745		0.222						0.967	No
	WWAN + Wi-Fi 2 + BT	0.745			0.488				0.447	1.680	**Yes**
		0.745				0.732			0.447	1.924	**Yes**
	WWAN + Wi-Fi 1 + Wi-Fi 2	0.745					0.785			1.530	No
		0.745						0.648		1.393	No
Edge 1	WWAN + Wi-Fi 1	0.496	0.101							0.597	No
		0.496		0.024						0.520	No
	WWAN + Wi-Fi 2 + BT	0.496			0.303				0.142	0.941	No
		0.496				0.257			0.142	0.895	No
	WWAN + Wi-Fi 1 + Wi-Fi 2	0.496					0.368			0.864	No
		0.496						0.253		0.749	No
Edge 2	WWAN + Wi-Fi 1	0.273	0.400							0.673	No
		0.273		0.400						0.673	No
	WWAN + Wi-Fi 2 + BT	0.273			0.400				0.400	1.073	No
		0.273				0.400			0.400	1.073	No
	WWAN + Wi-Fi 1 + Wi-Fi 2	0.273					0.400			0.673	No
		0.273						0.400		0.673	No

SAR to Peak Location Separation Ratio (SPLSR)

Simutlaneous Transmission Scenario		Standalone SAR Values						∑ 1-g SAR (mW/g)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
Position	Combination	GSM850	Wi-Fi 2 DTS Band	Wi-Fi 2 UNII Band	Wi-Fi 1 + 2 DTS Band	Wi-Fi 1 + 2 UNII Band	Bluetooth					
Rear	WWAN + Wi-Fi 2 DTS + BT	0.745	0.488				0.447	1.680				
		0.745	0.488					1.233	84.3	0.016	No	1
		0.745					0.447	1.192	125.1	0.010	No	1
			0.488				0.447	0.935	41.1	0.022	No	1
	WWAN + Wi-Fi 2 UNII + BT	0.745		0.732			0.447	1.924				
		0.745		0.732				1.477	82.7	0.022	No	2
		0.745					0.447	1.192	125.1	0.010	No	2
				0.732			0.447	1.179	42.6	0.030	No	2

Multi-Band Volume Scan Combined Results

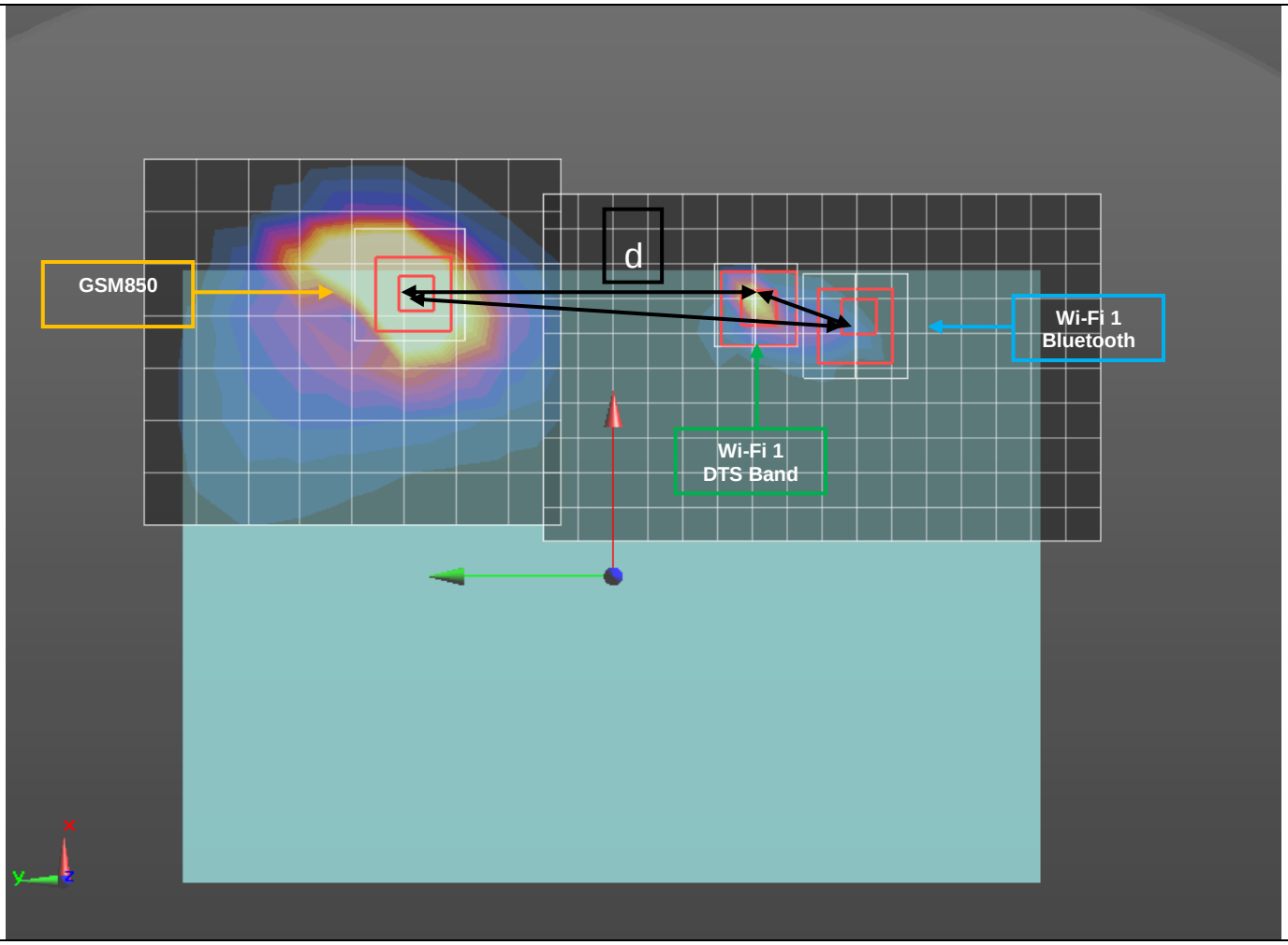
N/A

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.

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Figure (1)



Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
GSM850	1.41	0.0824	0.0553	-0.184
Wi-Fi 2 DTS Band	2.78	0.0828	-0.029	-0.183
Wi-Fi 1 Bluetooth	0.796	0.077	-0.0696	-0.181

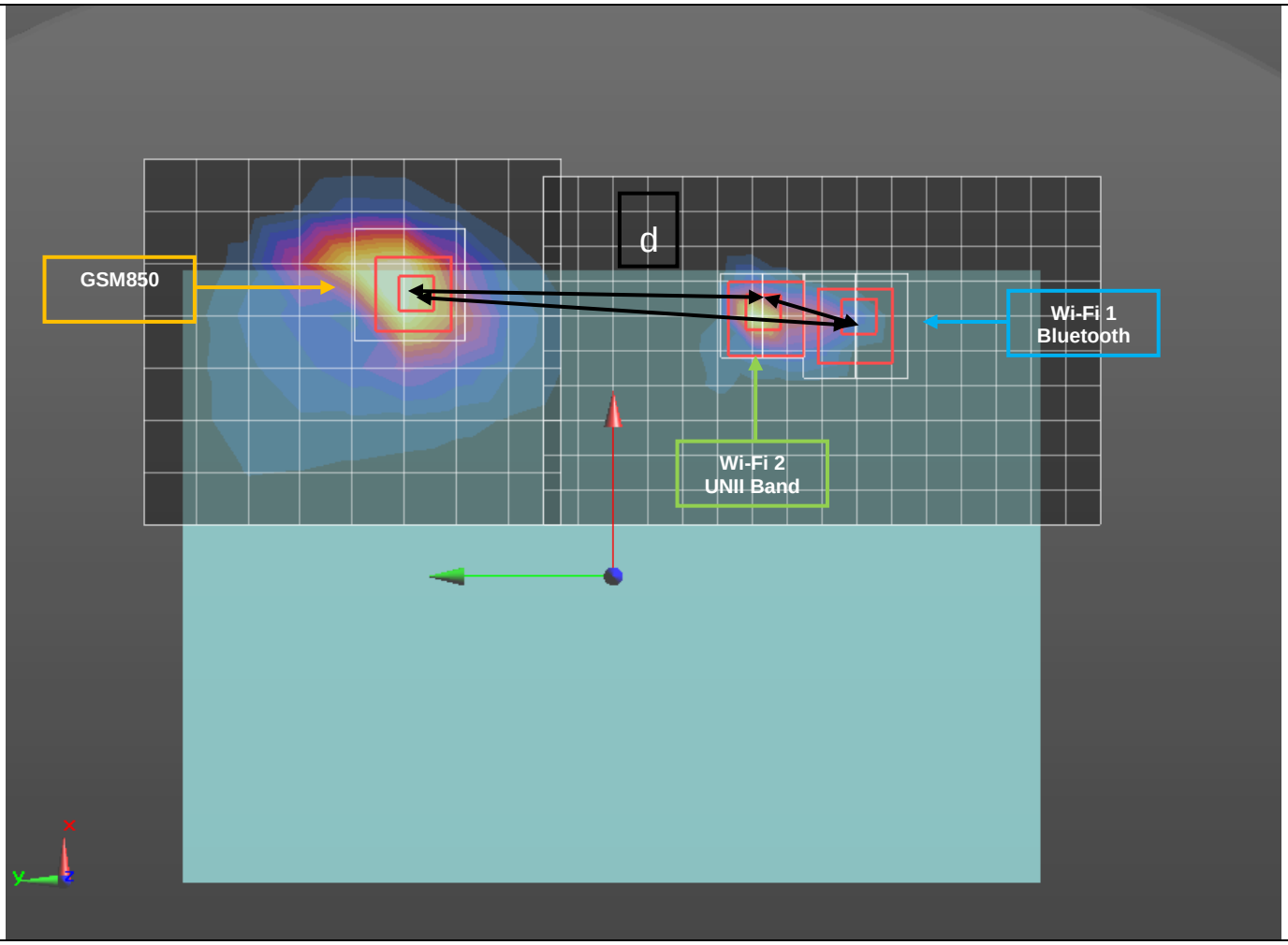
d: Calculated distance (mm)	WWAN to Wi-Fi DTS	84.3
	WWAN to Bluetooth	125.1
	Wi-Fi DTS to Bluetooth	41.1

The Peak Location Separation Distance is computed by using the formula below:

SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

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Figure (2)



Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
GSM850	1.41	0.0824	0.0553	-0.184
Wi-Fi 2 UNII Band	2.01	0.0746	-0.027	-0.181
Wi-Fi 1 Bluetooth	0.796	0.076	-0.0696	-0.181

d: Calculated distance (mm)	WWAN to Wi-Fi DTS	82.7
	WWAN to Bluetooth	125.1
	Wi-Fi DTS to Bluetooth	42.6

The Peak Location Separation Distance is computed by using the formula below:

SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

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14.3. Sum of the SAR for GSM1900, Wi-Fi, and BT

Simultaneous Transmission Scenario		Standalone SAR Values								∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Position	Combination	GSM1900	Wi-Fi 1 DTS Band	Wi-Fi 1 UNII Band	Wi-Fi 2 DTS Band	Wi-Fi 2 UNII Band	Wi-Fi 1 + 2 DTS Band	Wi-Fi 1 + 2 UNII Band	Wi-Fi 1 Bluetooth		
Rear	WWAN + Wi-Fi 1	0.571	0.468							1.039	No
		0.571		0.222						0.793	No
	WWAN + Wi-Fi 2 + BT	0.571			0.488				0.447	1.506	No
		0.571				0.732			0.447	1.750	**Yes**
	WWAN + Wi-Fi 1 + Wi-Fi 2	0.571					0.785			1.356	No
		0.571						0.648		1.219	No
Edge 1	WWAN + Wi-Fi 1	0.958	0.101							1.059	No
		0.958		0.024						0.982	No
	WWAN + Wi-Fi 2 + BT	0.958			0.303				0.142	1.403	No
		0.958				0.257			0.142	1.357	No
	WWAN + Wi-Fi 1 + Wi-Fi 2	0.958					0.368			1.326	No
		0.958						0.253		1.211	No
Edge 2	WWAN + Wi-Fi 1	0.010	0.400							0.410	No
		0.010		0.400						0.410	No
	WWAN + Wi-Fi 2 + BT	0.010			0.400				0.400	0.810	No
		0.010				0.400			0.400	0.810	No
	WWAN + Wi-Fi 1 + Wi-Fi 2	0.010					0.400			0.410	No
		0.010						0.400		0.410	No

SAR to Peak Location Separation Ratio (SPLSR)

Simutlaneous Transmission Scenario		Standalone SAR Values						∑ 1-g SAR (mW/g)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
Position	Combination	GSM1900	Wi-Fi 2 DTS Band	Wi-Fi 2 UNII Band	Wi-Fi 1 + 2 DTS Band	Wi-Fi 1 + 2 UNII Band	Bluetooth					
Rear	WWAN + Wi-Fi 2 UNII + BT	0.571		0.732			0.447	1.750				
		0.571		0.732				1.303	88.7	0.017	No	1
		0.571					0.447	1.018	131.2	0.008	No	1
				0.732			0.447	1.179	42.6	0.030	No	1

Multi-Band Volume Scan Combined Results

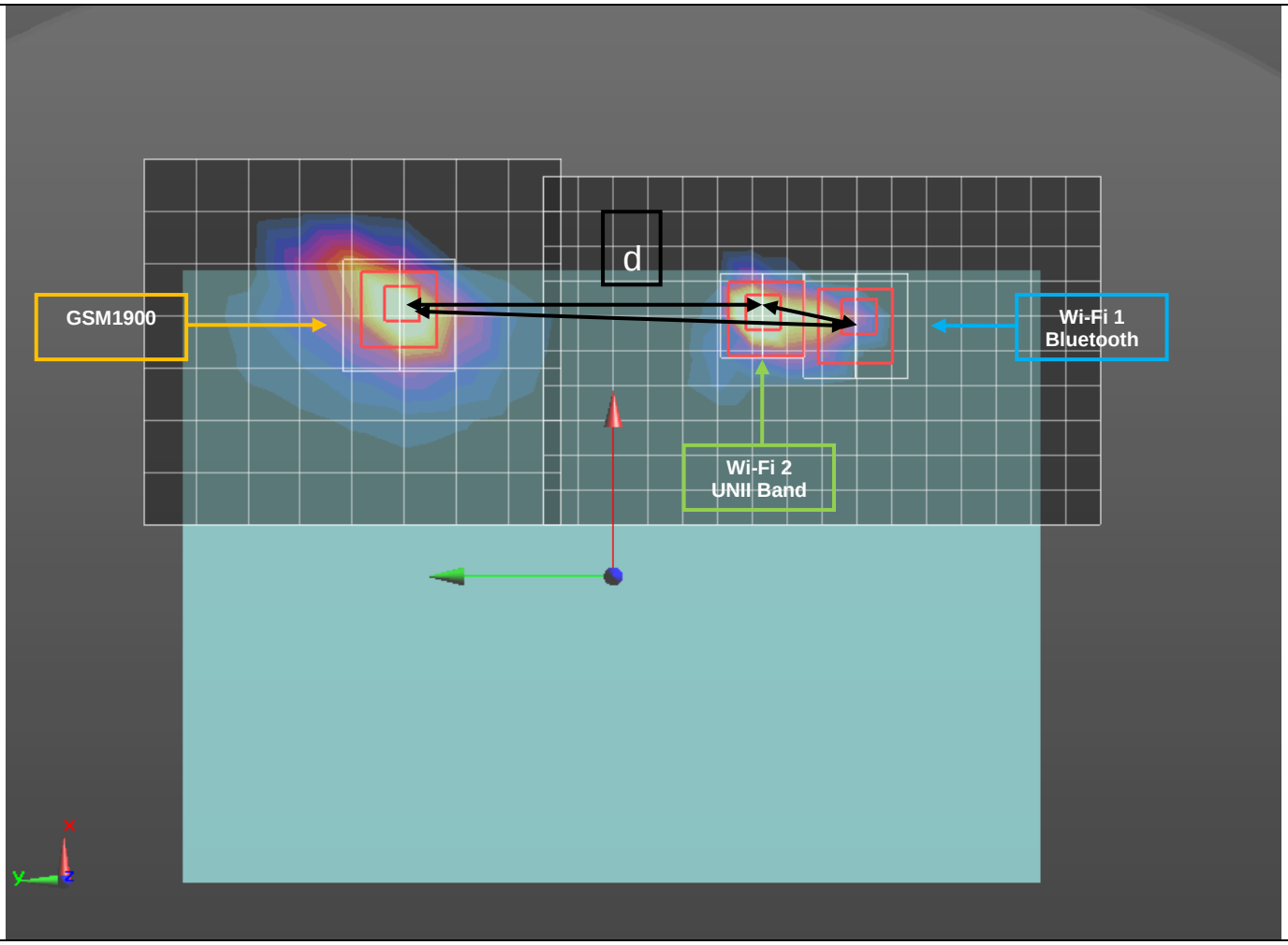
N/A

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.

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Figure (1)



Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
GSM1900	1.19	0.0798	0.0615	-0.183
Wi-Fi 2 UNII Band	2.01	0.0746	-0.027	-0.181
Wi-Fi 1 Bluetooth	0.796	0.076	-0.0696	-0.181

d: Calculated distance (mm)	WWAN to Wi-Fi DTS	88.7
	WWAN to Bluetooth	131.2
	Wi-Fi UNII to Bluetooth	42.6

The Peak Location Separation Distance is computed by using the formula below:

SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

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14.4. Sum of the SAR for W-CDMA Band V, Wi-Fi, and BT

Simultaneous Transmission Scenario		Standalone SAR Values								∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Position	Combination	W-CDMA Band V	Wi-Fi 1 DTS Band	Wi-Fi 1 UNII Band	Wi-Fi 2 DTS Band	Wi-Fi 2 UNII Band	Wi-Fi 1 + 2 DTS Band	Wi-Fi 1 + 2 UNII Band	Wi-Fi 1 Bluetooth		
Rear	WWAN + Wi-Fi 1	0.803	0.468							1.271	No
		0.803		0.222						1.025	No
	WWAN + Wi-Fi 2 + BT	0.803			0.488				0.447	1.738	**Yes**
		0.803				0.732			0.447	1.982	**Yes**
	WWAN + Wi-Fi 1 + Wi-Fi 2	0.803					0.785			**1.588**	No
		0.803						0.648		**1.451**	No
Edge 1	WWAN + Wi-Fi 1	0.429	0.101							0.530	No
		0.429		0.024						0.453	No
	WWAN + Wi-Fi 2 + BT	0.429			0.303				0.142	0.874	No
		0.429				0.257			0.142	0.828	No
	WWAN + Wi-Fi 1 + Wi-Fi 2	0.429					0.368			0.797	No
		0.429						0.253		0.682	No
Edge 2	WWAN + Wi-Fi 1	0.147	0.400							0.547	No
		0.147		0.400						0.547	No
	WWAN + Wi-Fi 2 + BT	0.147			0.400				0.400	0.947	No
		0.147				0.400			0.400	0.947	No
	WWAN + Wi-Fi 1 + Wi-Fi 2	0.147					0.400			0.547	No
		0.147						0.400		0.547	No

SAR to Peak Location Separation Ratio (SPLSR)

Simutlaneous Transmission Scenario		Standalone SAR Values						∑ 1-g SAR (mW/g)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
Position	Combination	W-CDMA Band V	Wi-Fi 2 DTS Band	Wi-Fi 2 UNII Band	Wi-Fi 1 + 2 DTS Band	Wi-Fi 1 + 2 UNII Band	Bluetooth					
Rear	WWAN + Wi-Fi 2 DTS + BT	0.803	0.488				0.447	1.738				
		0.803	0.488					1.291	82.7	0.018	No	1
		0.803					0.447	1.250	123.5	0.011	No	1
			0.488				0.447	0.935	41.1	0.022	No	1
	WWAN + Wi-Fi 2 UNII + BT	0.803		0.732			0.447	1.982				
		0.803		0.732				1.535	81.1	0.023	No	2
		0.803					0.447	1.250	123.5	0.011	No	2
				0.732			0.447	1.179	42.6	0.030	No	2

Multi-Band Volume Scan Combined Results

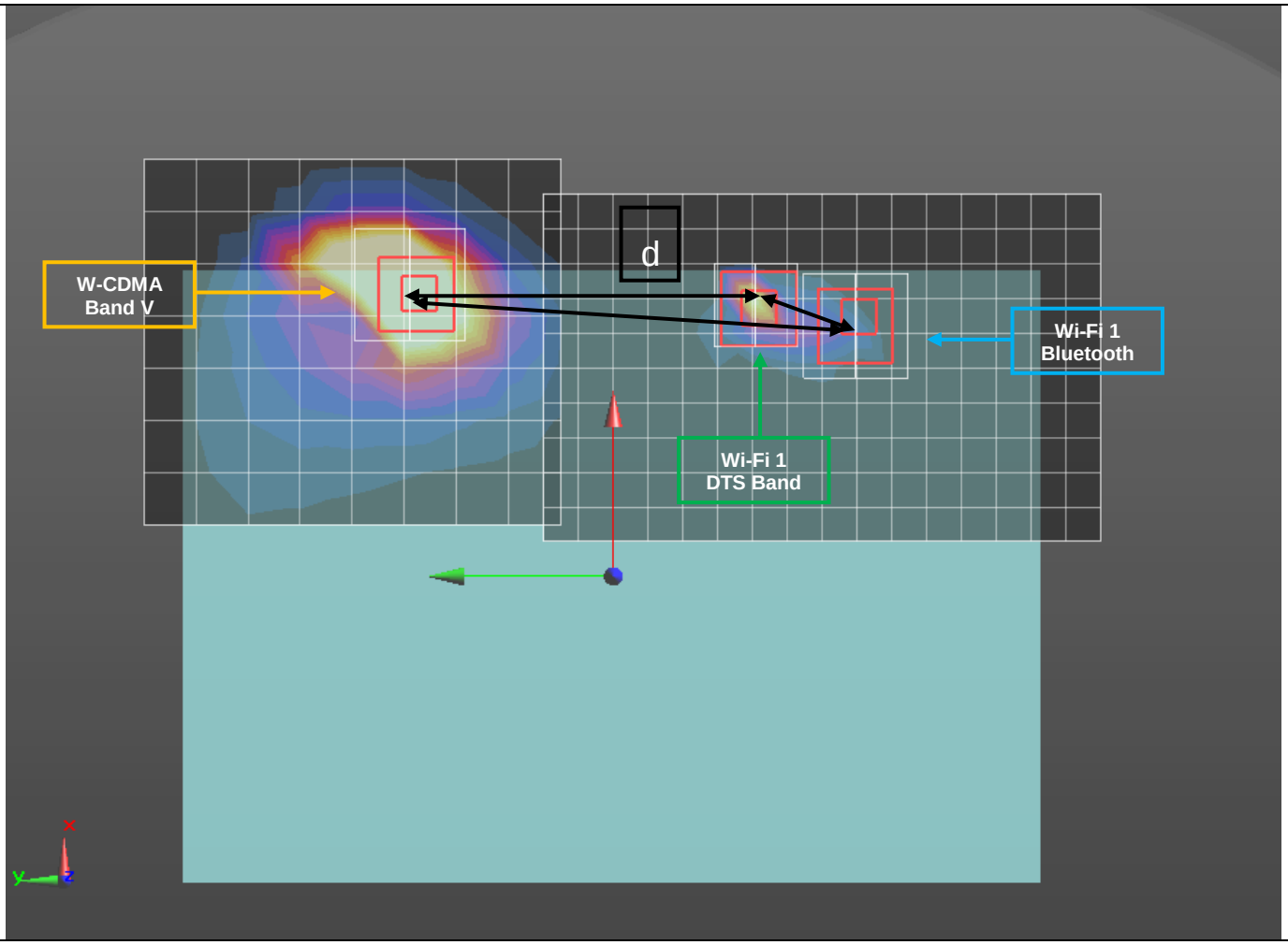
N/A

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.

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Figure (1)



Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
W-CDMA Band V	1.33	0.0824	0.0537	-0.184
Wi-Fi 2 DTS Band	2.78	0.0828	-0.029	-0.183
Wi-Fi 1 Bluetooth	0.796	0.077	-0.0696	-0.181

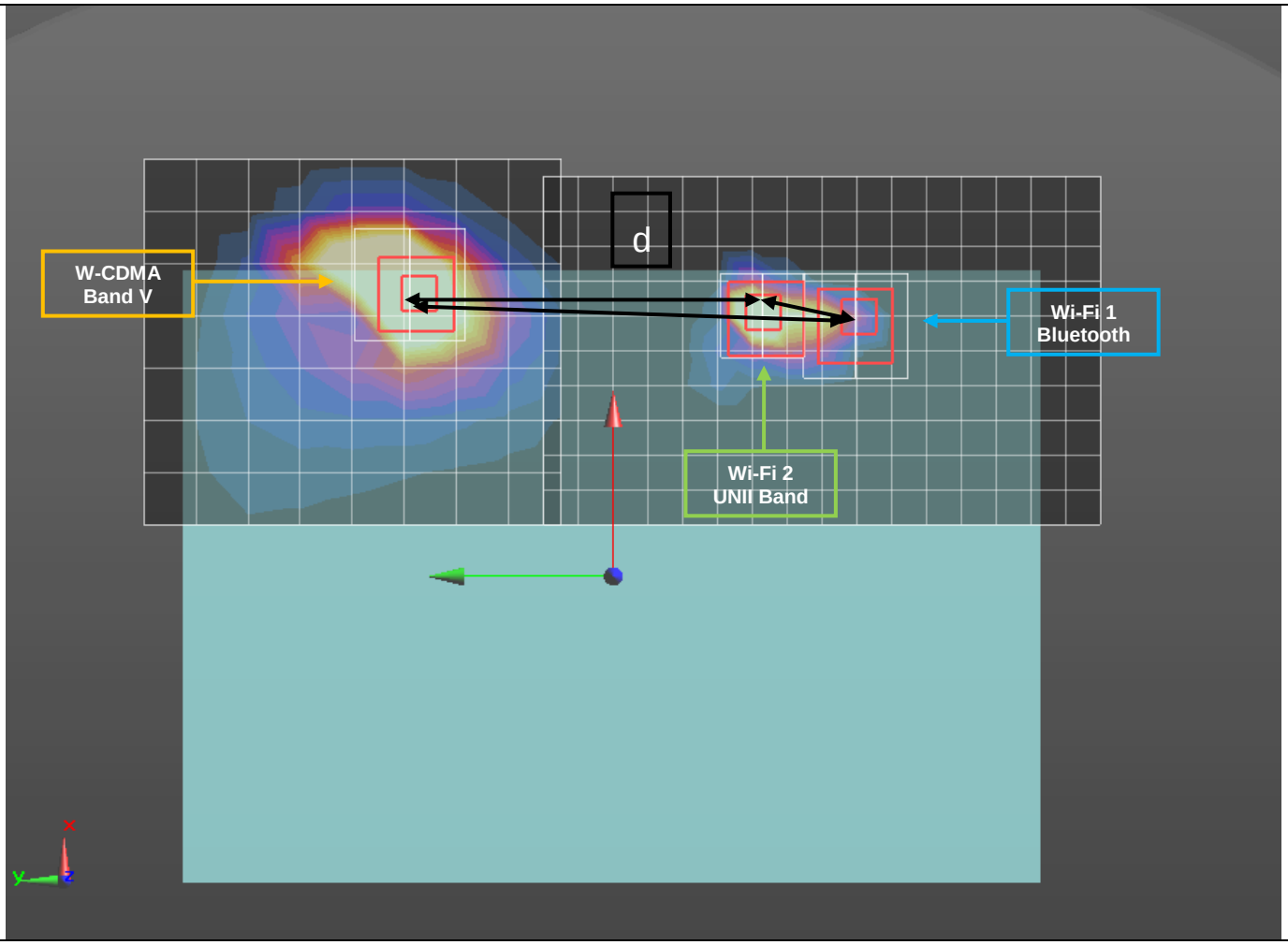
d: Calculated distance (mm)	WWAN to Wi-Fi DTS	82.7
	WWAN to Bluetooth	123.5
	Wi-Fi DTS to Bluetooth	41.1

The Peak Location Separation Distance is computed by using the formula below:

SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

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Figure (2)



Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
W-CDMA Band V	1.33	0.0824	0.0537	-0.184
Wi-Fi 2 UNII Band	2.01	0.0746	-0.027	-0.181
Wi-Fi 1 Bluetooth	0.796	0.076	-0.0696	-0.181

d: Calculated distance (mm)	WWAN to Wi-Fi DTS	81.1
	WWAN to Bluetooth	123.5
	Wi-Fi UNII to Bluetooth	42.6

The Peak Location Separation Distance is computed by using the formula below:

SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

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14.5. Sum of the SAR for W-CDMA Band II, Wi-Fi, and BT

Simultaneous Transmission Scenario		Standalone SAR Values								∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Position	Combination	W-CDMA Band II	Wi-Fi 1 DTS Band	Wi-Fi 1 UNII Band	Wi-Fi 2 DTS Band	Wi-Fi 2 UNII Band	Wi-Fi 1 + 2 DTS Band	Wi-Fi 1 + 2 UNII Band	Wi-Fi 1 Bluetooth		
Rear	WWAN + Wi-Fi 1	0.702	0.468							1.170	No
		0.702		0.222						0.924	No
	WWAN + Wi-Fi 2 + BT	0.702			0.488				0.447	1.637	**Yes**
		0.702				0.732			0.447	1.881	**Yes**
	WWAN + Wi-Fi 1 + Wi-Fi 2	0.702					0.785			1.487	No
		0.702						0.648		1.350	No
Edge 1	WWAN + Wi-Fi 1	0.771	0.101							0.872	No
		0.771		0.024						0.795	No
	WWAN + Wi-Fi 2 + BT	0.771			0.303				0.142	1.216	No
		0.771				0.257			0.142	1.170	No
	WWAN + Wi-Fi 1 + Wi-Fi 2	0.771					0.368			1.139	No
		0.771						0.253		1.024	No
Edge 2	WWAN + Wi-Fi 1	0.019	0.400							0.419	No
		0.019		0.400						0.419	No
	WWAN + Wi-Fi 2 + BT	0.019			0.400				0.400	0.819	No
		0.019				0.400			0.400	0.819	No
	WWAN + Wi-Fi 1 + Wi-Fi 2	0.019					0.400			0.419	No
		0.019						0.400		0.419	No

SAR to Peak Location Separation Ratio (SPLSR)

Simutlaneous Transmission Scenario		Standalone SAR Values						∑ 1-g SAR (mW/g)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
Position	Combination	W-CDMA Band II	Wi-Fi 2 DTS Band	Wi-Fi 2 UNII Band	Wi-Fi 1 + 2 DTS Band	Wi-Fi 1 + 2 UNII Band	Bluetooth					
Rear	WWAN + Wi-Fi 2 DTS + BT	0.702	0.488				0.447	1.637				
		0.702	0.488					1.190	90.5	0.014	No	1
		0.702					0.447	1.149	131.0	0.009	No	1
			0.488				0.447	0.935	41.1	0.022	No	1
	WWAN + Wi-Fi 2 UNII + BT	0.702		0.732			0.447	1.881				
		0.702		0.732				1.434	88.6	0.019	No	2
		0.702					0.447	1.149	131.1	0.009	No	2
				0.732			0.447	1.179	42.6	0.030	No	2

Multi-Band Volume Scan Combined Results

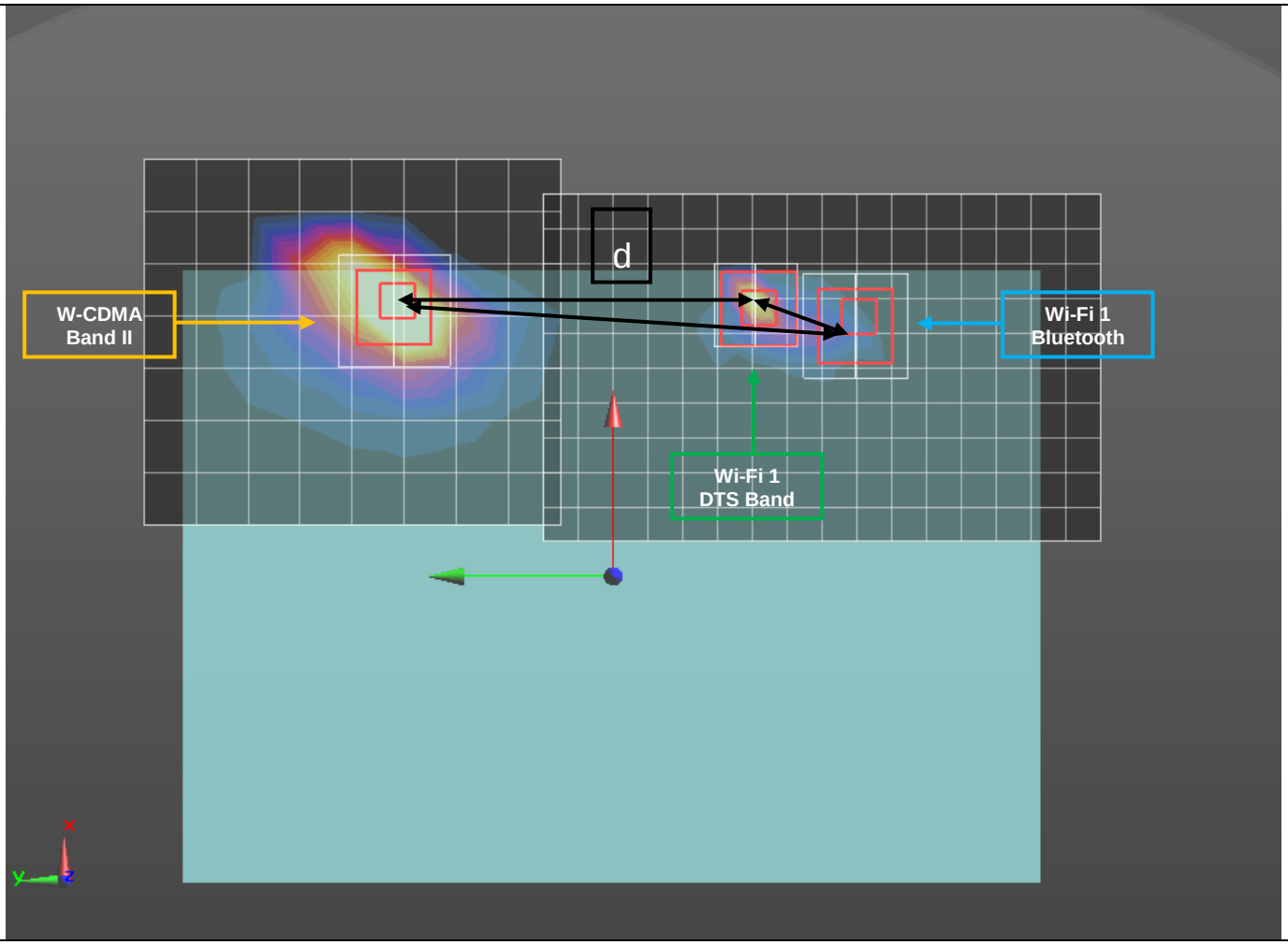
N/A

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.

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Figure (1)



Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
W-CDMA Band II	1.4	0.0797	0.0614	-0.183
Wi-Fi 2 DTS Band	2.78	0.0828	-0.029	-0.183
Wi-Fi 1 Bluetooth	0.796	0.077	-0.0696	-0.181

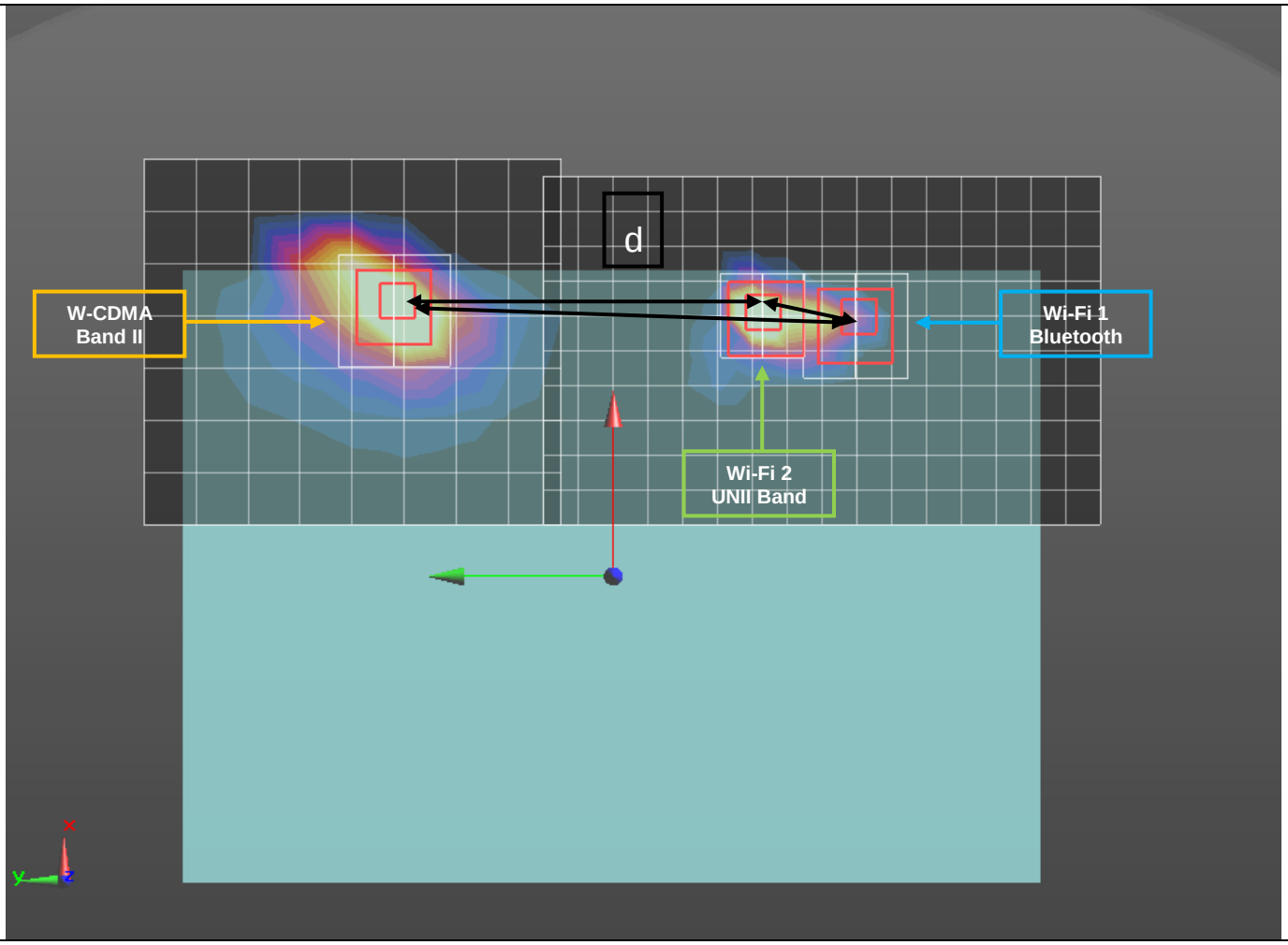
d: Calculated distance (mm)	WWAN to Wi-Fi DTS	90.5
	WWAN to Bluetooth	131.0
	Wi-Fi DTS to Bluetooth	41.1

The Peak Location Separation Distance is computed by using the formula below:

SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

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Figure (2)



Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
W-CDMA Band II	1.4	0.0797	0.0614	-0.183
Wi-Fi 2 UNII Band	2.01	0.0746	-0.027	-0.181
Wi-Fi 1 Bluetooth	0.796	0.076	-0.0696	-0.181

d: Calculated distance (mm)	WWAN to Wi-Fi DTS	88.6
	WWAN to Bluetooth	131.1
	Wi-Fi UNII to Bluetooth	42.6

The Peak Location Separation Distance is computed by using the formula below:

SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

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14.6. Sum of the SAR for LTE Band 5, Wi-Fi, and BT

Simultaneous Transmission Scenario		Standalone SAR Values								∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Position	Combination	LTE Band 5	Wi-Fi 1 DTS Band	Wi-Fi 1 UNII Band	Wi-Fi 2 DTS Band	Wi-Fi 2 UNII Band	Wi-Fi 1 + 2 DTS Band	Wi-Fi 1 + 2 UNII Band	Wi-Fi 1 Bluetooth		
Rear	WWAN + Wi-Fi 1	0.765	0.468							1.233	No
		0.765		0.222						0.987	No
	WWAN + Wi-Fi 2 + BT	0.765			0.488				0.447	1.700	**Yes**
		0.765				0.732			0.447	1.944	**Yes**
	WWAN + Wi-Fi 1 + Wi-Fi 2	0.765					0.785			1.550	No
		0.765						0.648		1.413	No
Edge 1	WWAN + Wi-Fi 1	0.333	0.101							0.434	No
		0.333		0.024						0.357	No
	WWAN + Wi-Fi 2 + BT	0.333			0.303				0.142	0.778	No
		0.333				0.257			0.142	0.732	No
	WWAN + Wi-Fi 1 + Wi-Fi 2	0.333					0.368			0.701	No
		0.333						0.253		0.586	No
Edge 2	WWAN + Wi-Fi 1	0.089	0.400							0.489	No
		0.089		0.400						0.489	No
	WWAN + Wi-Fi 2 + BT	0.089			0.400				0.400	0.889	No
		0.089				0.400			0.400	0.889	No
	WWAN + Wi-Fi 1 + Wi-Fi 2	0.089					0.400			0.489	No
		0.089						0.400		0.489	No

SAR to Peak Location Separation Ratio (SPLSR)

Simutlaneous Transmission Scenario		Standalone SAR Values						∑ 1-g SAR (mW/g)	Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
Position	Combination	LTE Band 5	Wi-Fi 2 DTS Band	Wi-Fi 2 UNII Band	Wi-Fi 1 + 2 DTS Band	Wi-Fi 1 + 2 UNII Band	Bluetooth					
Rear	WWAN + Wi-Fi 2 DTS + BT	0.765	0.488				0.447	1.700				
		0.765	0.488					1.253	84.3	0.017	No	1
		0.765					0.447	1.212	125.0	0.011	No	1
			0.488				0.447	0.935	41.1	0.022	No	1
	WWAN + Wi-Fi 2 UNII + BT	0.765		0.732			0.447	1.944				
		0.765		0.732				1.497	82.6	0.022	No	2
		0.765					0.447	1.212	125.0	0.011	No	2
				0.732			0.447	1.179	42.6	0.030	No	2

Multi-Band Volume Scan Combined Results

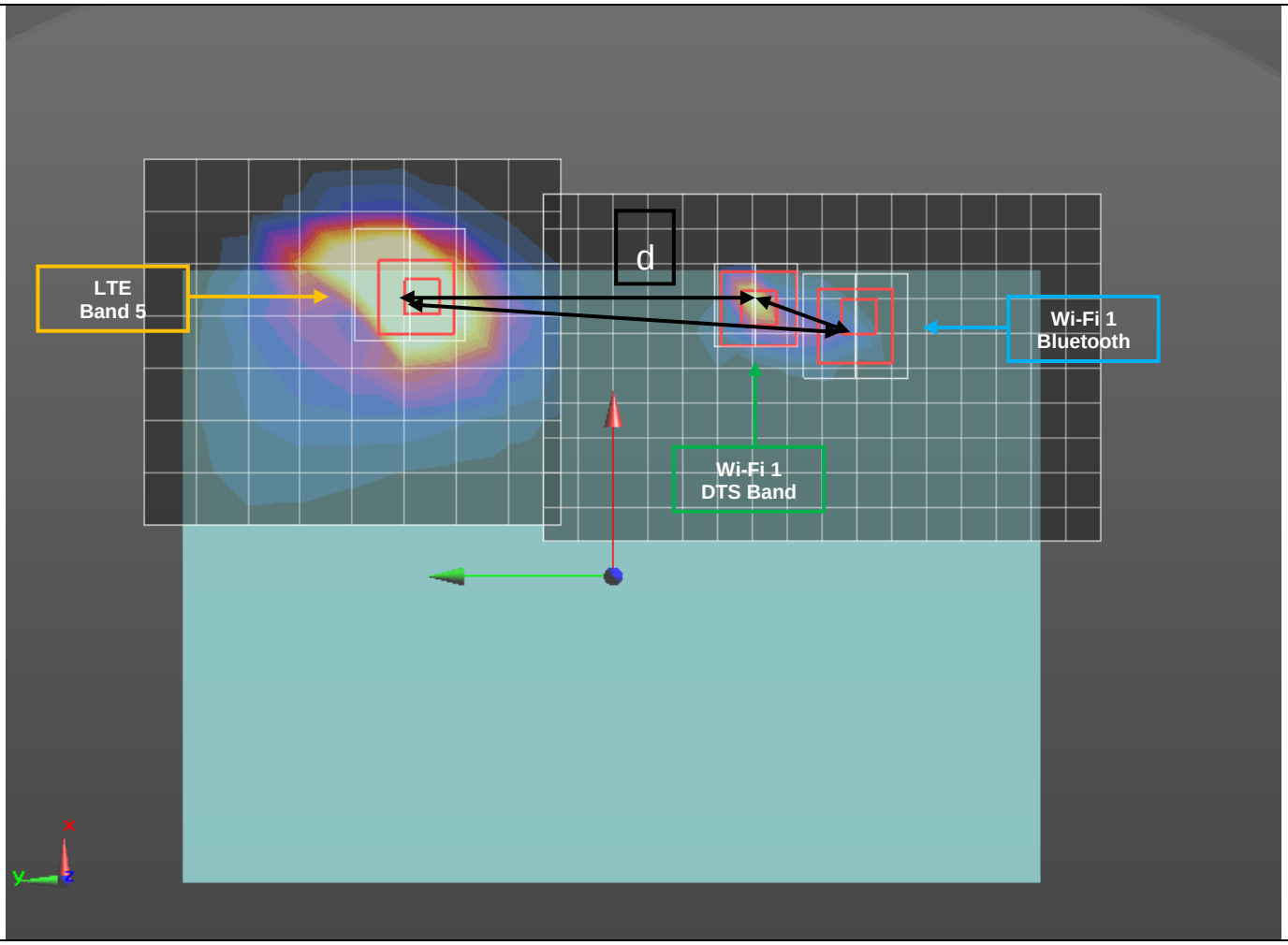
N/A

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.

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Figure (1)



Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 5	1.43	0.0808	0.0553	-0.184
Wi-Fi 2 DTS Band	2.78	0.0828	-0.029	-0.183
Wi-Fi 1 Bluetooth	0.796	0.077	-0.0696	-0.181

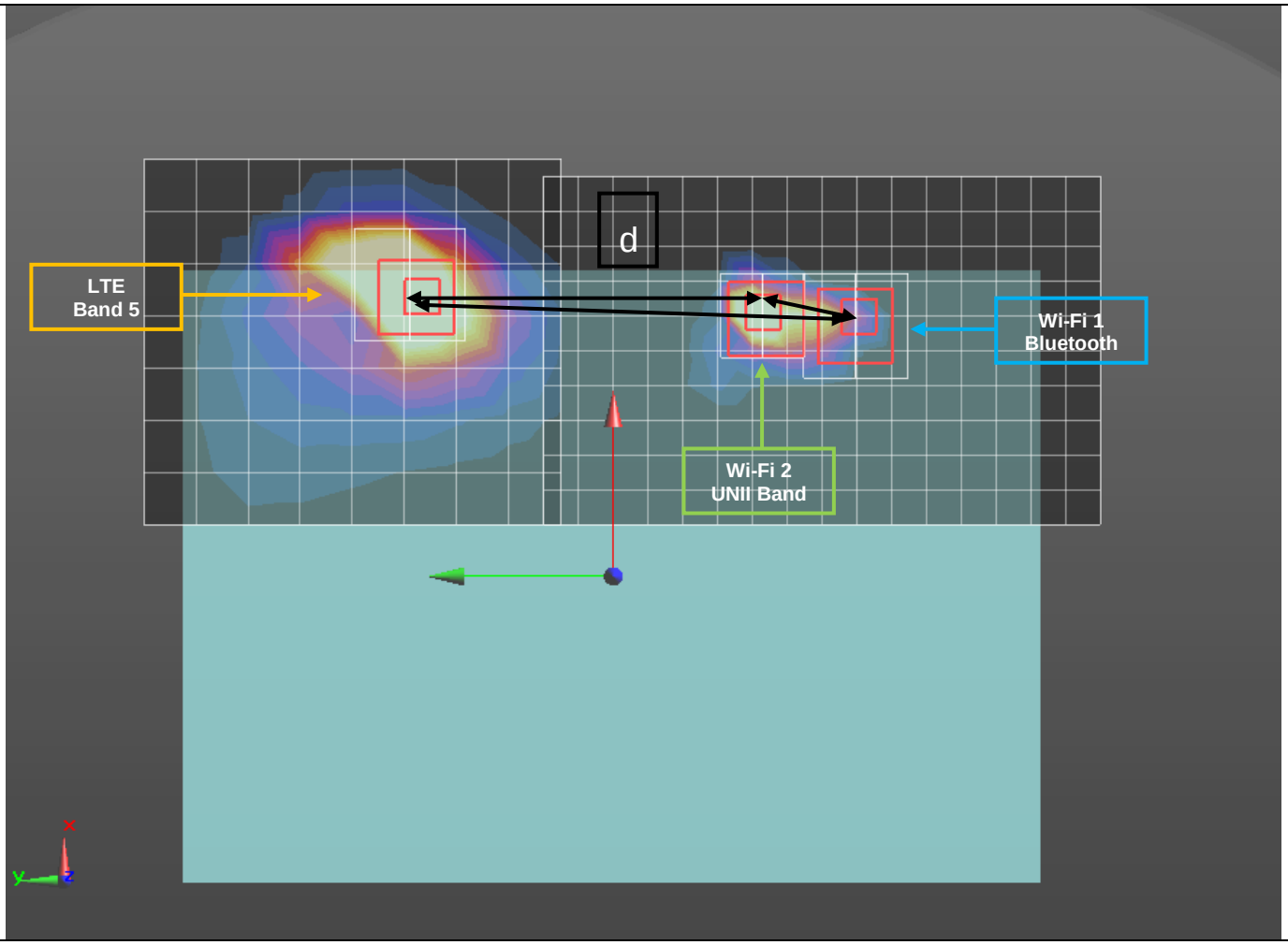
d: Calculated distance (mm)	WWAN to Wi-Fi DTS	84.3
	WWAN to Bluetooth	125.0
	Wi-Fi DTS to Bluetooth	41.1

The Peak Location Separation Distance is computed by using the formula below:

SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

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Figure (2)



Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 5	1.43	0.0808	0.0553	-0.184
Wi-Fi 2 UNII Band	2.01	0.0746	-0.027	-0.181
Wi-Fi 1 Bluetooth	0.796	0.076	-0.0696	-0.181

d: Calculated distance (mm)	WWAN to Wi-Fi DTS	82.6
	WWAN to Bluetooth	125.0
	Wi-Fi UNII to Bluetooth	42.6

The Peak Location Separation Distance is computed by using the formula below:

SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

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15. Appendixes

Refer to separated files for the following appendixes.

15.1. DUT and SAR setup Photos

15.2. System Performance Check Plots

15.3. Highest SAR Test Plots

15.4. Calibration Certificate for E-Field Probe EX3DV4 - SN 3902

15.5. Calibration Certificate for E-Field Probe EX3DV4 - SN 3936

15.6. Calibration Certificate for D835V2 - SN 4d142

15.7. Calibration Certificate for D1900V2 - SN 5d163

15.8. Calibration Certificate for D2450V2 - SN 706

15.9. Calibration Certificate for D5GHzV2 - SN 1138

END OF REPORT

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