SAR EVALUATION REPORT

FCC 47 CFR § 2.1093
IEEE Std 1528-2013

For
GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, GPS & NFC

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Revision History

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V1	7/24/2017	Initial Issue	--

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1. Attestation of Test Results

Applicant Name	SONY MOBILE COMMUNICATIONS INC.			
FCC ID	PY7-65365K			
Applicable Standards	FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013			
Exposure Category	SAR Limits (W/Kg)			
	Peak spatial-average(1g of tissue)		Extremities (hands, wrists, ankles, etc.) (10g of tissue)	
General population / Uncontrolled exposure	1.6		4	
RF Exposure Conditions	Equipment Class - Highest Reported SAR (W/kg)			
	PCE	DTS	NII	DSS
Head	0.197	0.939	0.575	N/A
Body-worn	0.326	0.058	0.064	N/A
Hotspot/Wi-Fi Direct	0.759	0.127	N/A	N/A
Extremity	N/A	N/A	0.227	N/A
Simultaneous TX 1-g	1.518	1.518	1.518	1.005
Simultaneous TX 10-g	N/A	N/A	0.689	0.689
Date Tested	7/5/2017 to 7/13/2017			
Test Results	Pass			

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.

Approved & Released By:	Prepared By:
David Weaver Program Manager UL Verification Services Inc.	AJ Newcomer Laboratory Engineer UL Verification Services Inc.

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2. Test Specification, Methods and Procedures

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

- 248227 D01 802.11 Wi-Fi SAR v02r02
- 447498 D01 General RF Exposure Guidance v06
- 447498 D03 Supplement C Cross-Reference v01
- 648474 D04 Handset SAR v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02
- 941225 D01 3G SAR Procedures v03r01
- 941225 D05 SAR for LTE Devices v02r05
- 941225 D05A LTE Rel.10 KDB Inquiry Sheet v01r02
- 941225 D06 Hotspot Mode v02r01
- 941225 D07 UMPC Mini Tablet v01r02

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

- TCB workshop October, 2014; Page 36, RF Exposure Procedures Update (Overlapping LTE Bands)
- TCB workshop October, 2014; Page 37, RF Exposure Procedures Update (Other LTE Considerations)
- TCB workshop October, 2015; Page 6, RF Exposure Procedures (KDB 941225 D05A)
- TCB workshop April, 2016; Page 13, RF Exposure Procedures (LTE Carrier Aggregation)

3. Facilities and Accreditation

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

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

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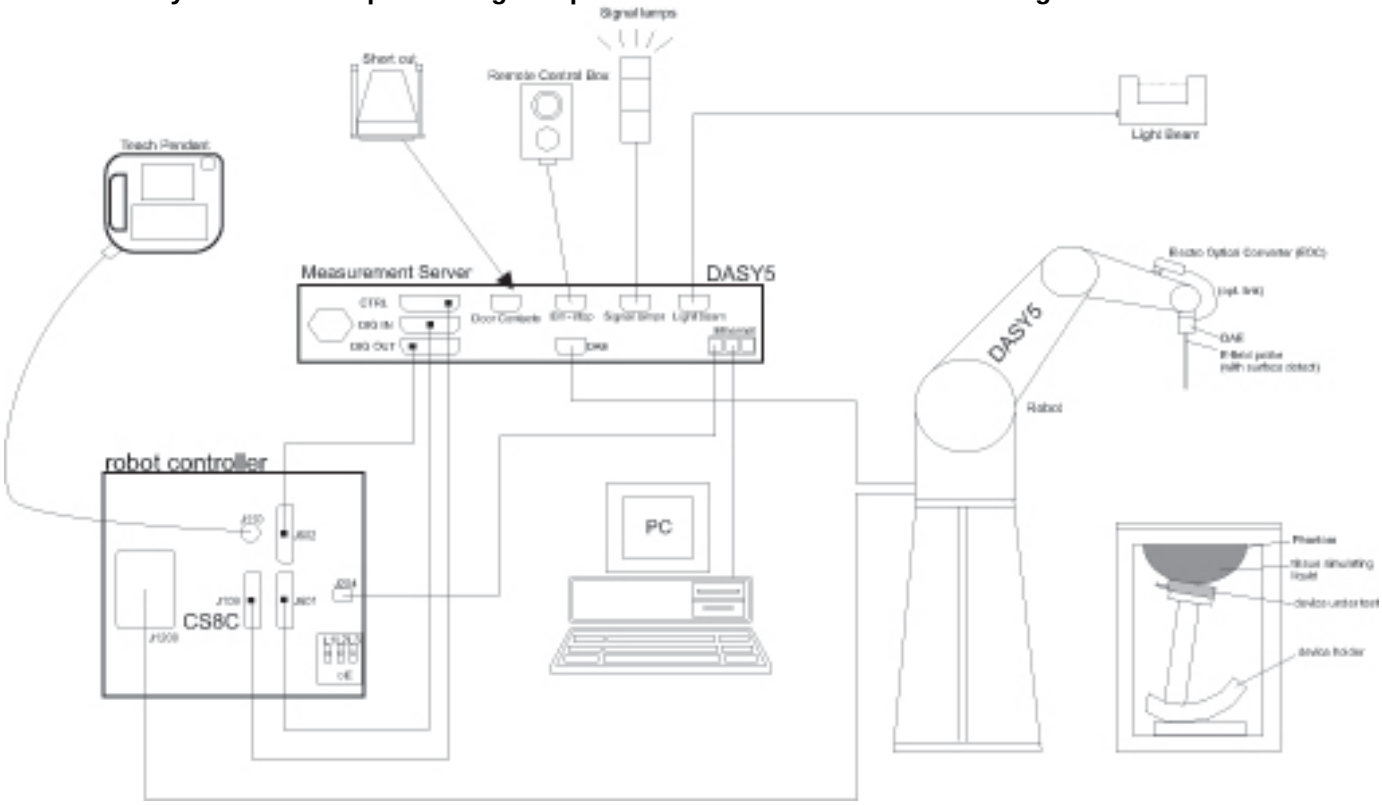
4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

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



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

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4.2. SAR Scan Procedures

Step 1: Power Reference Measurement

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

Step 2: Area Scan

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

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

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	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

			≤ 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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4.3. Test Equipment

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

Dielectric Property Measurements

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
S-Parameter Network Analyzer	Agilent	8753ES	MY40000980	5/10/2018
Dielectric Probe kit	SPEAG	DAK-3.5	2097	8/28/2018
Shorting block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	11/8/2017
Thermometer	Control Company	Traceable 4242	122529162	11/11/2017

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Synthesized Signal Generator	HP	8665B	3546A00784	9/2/2017
Power Meter	HP	437B	3125U11347	8/30/2017
Power Meter	HP	437B	3125u09516	9/27/2017
Power Sensor	Agilent	8481A	1926A16917	10/7/2017
Power Sensor	Agilent	8481A	2702A7622B	9/14/2017
Amplifier	MITEQ	147117-1E	1808938	N/A
Bi-directional coupler	Werlatone, Inc.	C8060-102	2710	N/A
DC Power Supply	HP	6296A	2841A-05955	N/A
Synthesized Signal Generator	Agilent	N5181A	MY50140610	5/31/2018
Power Meter	HP	437B	3125U11364	8/30/2017
Power Meter	HP	437B	3125U09248	9/14/2017
Power Sensor	Agilent	8481A	3318A95392	9/29/2017
Power Sensor	Agilent	8481A	2349A36506	9/29/2017
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1795093	N/A
Bi-directional coupler	Werlatone, Inc.	C8060-102	2710	N/A
DC Power Supply	HP	6296A	2841A-05955	N/A

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Lab Equipment

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
E-Field Probe (SAR Lab 1)	SPEAG	EX3DV4	3751	11/17/2017
E-Field Probe (SAR Lab 2)	SPEAG	EX3DV4	3686	8/25/2017
E-Field Probe (SAR Lab 3)	SPEAG	EX3DV4	3871	8/25/2017
E-Field Probe (SAR Lab 4)	SPEAG	EX3DV4	3990	3/15/2018
Data Acquisition Electronics (SAR Lab 1)	SPEAG	DAE4	1259	1/20/2018
Data Acquisition Electronics (SAR Lab 2)	SPEAG	DAE4	1433	3/8/2018
Data Acquisition Electronics (SAR Lab 3)	SPEAG	DAE4	1343	8/15/2017
Data Acquisition Electronics (SAR Lab 4)	SPEAG	DAE4	1380	7/25/2017
System Validation Dipole	SPEAG	D750V3	1024	5/12/2018
System Validation Dipole	SPEAG	D835V2	4d142	9/22/2017
System Validation Dipole	SPEAG	D1750V2	1053	8/16/2017
System Validation Dipole	SPEAG	D1900V2	5d163	9/19/2017
System Validation Dipole	SPEAG	D2450V2	899	3/10/2018
System Validation Dipole	SPEAG	D2600V2	1036	3/10/2017
System Validation Dipole	SPEAG	D5GHzV2	1138	9/22/2017
Thermometer (SAR Lab 1)	EXTECH	445703	80666	4/13/2018
Thermometer (SAR Lab 2)	Traceable	15557603	160643193	7/25/2017
Thermometer (SAR Lab 3)	Traceable	15557603	160643167	7/25/2017
Thermometer (SAR Lab 4)	Traceable	15557603	170024385	12/23/2017

Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Power Meter*	Agilent	N1912A	MY55196004	7/8/2017
Power Meter*	Agilent	N1912A	MY55196007	7/8/2017
Power Sensor	Agilent	N1921A	MY52260009	1/5/2018
Power Sensor	Agilent	N1921A	MY53020038	4/13/2018
Base Station Simulator	R & S	CMW500	132909	3/14/2018
Base Station Simulator	R & S	CMW500	137876	8/5/2017
Base Station Simulator	R & S	CMW500	125236	3/6/2018
Base Station Simulator*	R & S	CMW500	137873	7/8/2017
Base Station Simulator	R & S	CMW500	135393	5/15/2018
Base Station Simulator	Agilent	E5515C	GB47050526	2/21/2018

Note(s):

*Equipment not used past Calibration due date.

5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

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6. Device Under Test (DUT) Information

6.1. DUT Description

Device Dimension	Overall (Length x Width): 147.9 mm x 73.4 mm Overall Diagonal: 163.1 mm Display Diagonal: 130.85 mm
Back Cover	☒ The Back Cover is not removable.
Battery Options	☒The rechargeable battery is not user accessible.
Accessory	Headset
Wireless Router (Hotspot)	Wi-Fi Hotspot mode permits the device to share its cellular data connection with other Wi-Fi-enabled devices. ☒ 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)
Test sample information	**S/N** / **Technology** / **Notes** BH9000CM82 / FCC SAR GSM/UMTS / Conducted BH90009582 / FCC SAR LTE (LB/MB) / Conducted BH9000D382 / FCC SAR LTE (HB) / Conducted BH9000B482 / WLAN/BT 2.4GHz #1 / Conducted BH9000BU82 / WLAN 5GHz #1 / Conducted BH9000NW81 / SAR GSM/UMTS #1 / Radiated BH9000BQ81 / SAR GSM/UMTS #2 / Radiated BH9000N181 / SAR LTE (LB/MB) #1 / Radiated BH9000LX81 / SAR LTE (LB/MB) #2 / Radiated BH9000RD81 / SAR LTE (HB) #1 / Radiated BH9000M581 / SAR LTE (HB) #2 / Radiated BH9000SN81 / SAR WLAN/BT 2.4GHz #1 / Radiated BH9000BP81 / SAR WLAN/BT 2.4GHz #2 / Radiated BH9000SE81 / SAR WLAN 5GHz #1 / Radiated BH9000L281 / SAR WLAN 5GHz #2 / Radiated BH9000DF81 / SAR WLAN 5GHz #3 / Radiated BH9000D381 / SAR WLAN 5GHz #4 / Radiated
Hardware Version	A
Software Version	0.92

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6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode		Duty Cycle used for SAR testing
GSM	850 1900	Voice (GMSK) GPRS (GMSK) EGPRS (8PSK)	GPRS Multi-Slot Class: ☐ Class 8 - 1 Up, 4 Down ☐ Class 10 - 2 Up, 4 Down ☐ Class 12 - 4 Up, 4 Down ☒ Class 33 - 4 Up, 5 Down	GSM Voice: 12.5% (E)GPRS: 1 Slot: 12.5% 2 Slots: 25% 3 Slots: 37.5% 4 Slots: 50%
	Does this device support DTM (Dual Transfer Mode)? ☒ Yes ☐ No			
W-CDMA (UMTS)	Band V	UMTS Rel. 99 (Voice & Data) HSDPA (Rel. 5) HSUPA (Rel. 6) HSPA+ (Rel. 7)		100%
LTE	FDD Band 4 FDD Band 5 FDD Band 7 FDD Band 12 FDD Band 13 FDD Band 17 TDD Band 38 TDD Band 41	QPSK 16QAM ☒ Rel. 11 Does not support Carrier Aggregation (CA)		100% (FDD) 63.3% (TDD)
	Does this device support SV-LTE (1xRTT-LTE)? ☐ Yes ☒ No			
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20)		100%
	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40) 802.11ac (VHT20) 802.11ac (VHT40) 802.11ac (VHT80)		100%
	Does this device support bands 5.60 ~ 5.65 GHz? ☒ Yes ☐ No			
	Does this device support Band gap channel(s)? ☒ Yes ☐ No			
Bluetooth	2.4 GHz	Version 5.0 LE		N/A

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6.3. Maximum Output Power from Tune-up Procedure

Per KDB 941225 D01 3G SAR Procedures:

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

RF Air interface	Mode	Time Slots	Max. RF Output Power (dBm)	
			Tune-up Limit	Frame Pwr
GSM850	Voice/GPRS	1	33.7	24.67
	GPRS	2	32.2	26.18
	GPRS	3	30.2	25.94
	GPRS	4	29.2	26.19
	EGPRS	1	28.0	18.97
	EGPRS	2	26.5	20.48
	EGPRS	3	24.5	20.24
	EGPRS	4	23.6	20.59
GSM1900	Voice/GPRS	1	27.2	18.17
	GPRS	2	26.0	19.98
	GPRS	3	24.8	20.54
	GPRS	4	23.0	19.99
	EGPRS	1	27.0	17.97
	EGPRS	2	25.4	19.38
	EGPRS	3	23.3	19.04
	EGPRS	4	22.5	19.49

RF Air interface	Mode	Time Slots	Max. RF Output Power (dBm)			
			CS		PS	
			Tune-up Limit	Frame Pwr	Tune-up Limit	Frame Pwr
DTM GSM850	Voice + GPRS	1	33.7	24.7		
	Voice + GPRS	2	32.2	26.2	32.2	26.2
	Voice + GPRS	3	30.2	25.9	30.2	25.9
	Voice + EGPRS	1	33.7	24.7		
	Voice + EGPRS	2	32.2	26.2	26.5	20.5
	Voice + EGPRS	3	30.2	25.9	24.5	20.2
DTM GSM1900	Voice + GPRS	1	27.2	18.2		
	Voice + GPRS	2	26.0	20.0	26.0	20.0
	Voice + GPRS	3	24.8	20.5	24.8	20.5
	Voice + EGPRS	1	27.2	18.2		
	Voice + EGPRS	2	26.0	20.0	25.4	19.4
	Voice + EGPRS	3	24.8	20.5	23.3	19.0

RF Air interface	Mode		Max. RF Output Power (dBm)
W-CDMA Band V	Release 99		24.7
	HSDPA	Subtest 1/2	24.2
		Subtest 3/4	23.7
	HSUPA	Subtest 1/5	23.9
		Subtest 2/4	22.2
		Subtest 3	23.2

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RF Air interface	Mode	Max. RF Output Power (dBm)
LTE Band 4	QPSK	20.5
	16QAM	20.5
LTE Band 5	QPSK	25.0
	16QAM	24.0
LTE Band 7	QPSK	25.0
	16QAM	24.0
LTE Band 12	QPSK	25.0
	16QAM	24.0
LTE Band 13	QPSK	24.0
	16QAM	23.0
LTE Band 17	QPSK	25.0
	16QAM	24.0
LTE Band 38	QPSK	25.0
	16QAM	24.0
LTE Band 41	QPSK	25.0
	16QAM	24.0

RF Air interface	Mode	Channel	Max. RF Output Power (dBm)	
			Chain 0	Chain 1
WiFi 2.4 GHz	802.11b	1-12	15.00	13.80
		13	12.70	12.03
	802.11g	1	8.96	7.85
		2-11	15.00	13.80
		12	10.16	9.41
		13	3.66	2.91
	802.11n HT20	1	8.96	7.85
		2-11	15.00	13.80
		12	9.20	8.37
		13	3.70	2.87
WiFi 5 GHz	802.11a	All	14.50	12.50
	802.11n HT20	All	14.50	12.50
	802.11n HT40	All	14.50	12.50
	802.11ac VHT20	All	14.50	12.50
	802.11ac VHT40	All	14.50	12.50
	802.11ac VHT80	All	14.50	12.50
Bluetooth		Low	10.09	
		Mid	11.83	
		High	11.84	
Bluetooth LE		Low	3.10	
		Mid	5.28	
		High	6.43	

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6.4. General LTE SAR Test and Reporting Considerations

Item	Description						
Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 4	Frequency range: 1710 - 1755 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	20050/ 1720	20025/ 1717.5	20000/ 1715	19975/ 1712.5	19965/ 1711.5	19957/ 1710.7
	Mid	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5
	High	20300/ 1745	20325/ 1747.5	20350/ 1750	20375/ 1752.5	20385/ 1753.5	20393/ 1754.3
	Band 5	Frequency range: 824 - 849 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low			20450/ 829	20425/ 826.5	20415/ 825.5	20407/ 824.7
	Mid			20525/ 836.5	20525/ 836.5	20525/ 836.5	20525/ 836.5
	High			20600/ 844	20625/ 846.5	20635/ 847.5	20643/ 848.3
	Band 7	Frequency range: 2500 - 2570 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	20850 2510	20825 2507.5	20800 2505	20775 2502.5		
	Mid	21100 2535	21100 2535	21100 2535	21100 2535		
	High	21350 2560	21375 2562.5	21400 2565	21425 2567.5		
	Band 12	Frequency range: 699 – 716 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low			23060/ 704	23035/ 701.5	23025/ 700.5	23017/ 699.7
	Mid			23095/ 707.5	23095/ 707.5	23095/ 707.5	23095/ 707.5
	High			23130/ 711	23155/ 713.5	23165/ 714.5	23173/ 715.3
	Band 13	Frequency range: 777 - 787 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low				23205/ 779.5		
	Mid			23230/ 782	23230/ 782		
	High				23255/ 784.5		

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General LTE SAR Test and Reporting Considerations (Continued)

<table>
<tr><td rowspan="20">Frequency range, Channel Bandwidth, Numbers and Frequencies</td><td rowspan="2">Band 17</td><td colspan="6">Frequency range: 704 - 716 MHz</td></tr>
<tr><td colspan="6">Channel Bandwidth</td></tr>
<tr><td>20 MHz</td><td>15 MHz</td><td>10 MHz</td><td>5 MHz</td><td>3 MHz</td><td>1.4 MHz</td></tr>
<tr><td>Low</td><td></td><td></td><td>23780/ 709</td><td>23755/ 706.5</td><td></td><td></td></tr>
<tr><td>Mid</td><td></td><td></td><td>23790/ 710</td><td>23790/ 710</td><td></td><td></td></tr>
<tr><td>High</td><td></td><td></td><td>23800/ 711</td><td>23825/ 713.5</td><td></td><td></td></tr>
<tr><td rowspan="2">Band 38</td><td colspan="6">Frequency range: 2570 - 2620 MHz</td></tr>
<tr><td colspan="6">Channel Bandwidth</td></tr>
<tr><td>20 MHz</td><td>15 MHz</td><td>10 MHz</td><td>5 MHz</td><td>3 MHz</td><td>1.4 MHz</td></tr>
<tr><td>Low</td><td>37850/ 2580</td><td>37825/ 2577.5</td><td>37800/ 2575</td><td>37775/ 2572.5</td><td></td><td></td></tr>
<tr><td>Mid</td><td>38000/ 2595</td><td>38000/ 2595</td><td>38000/ 2595</td><td>38000/ 2595</td><td></td><td></td></tr>
<tr><td>High</td><td>38150 2610</td><td>38175/ 2612.5</td><td>38200/ 2615</td><td>38225/ 2617.5</td><td></td><td></td></tr>
<tr><td rowspan="2">Band 41</td><td colspan="6">Frequency range: 2496 - 2690 MHz</td></tr>
<tr><td colspan="6">Channel Bandwidth</td></tr>
<tr><td>20 MHz</td><td>15 MHz</td><td>10 MHz</td><td>5 MHz</td><td>3 MHz</td><td>1.4 MHz</td></tr>
<tr><td>Low</td><td colspan="4">39750 / 2506.0</td><td></td><td></td></tr>
<tr><td>Low-Mid</td><td colspan="4">40185 / 2549.5</td><td></td><td></td></tr>
<tr><td>Mid</td><td colspan="4">40620 / 2593.0</td><td></td><td></td></tr>
<tr><td>Mid-High</td><td colspan="4">41055 / 2636.5</td><td></td><td></td></tr>
<tr><td>High</td><td colspan="4">41490 / 2680.0</td><td></td><td></td></tr>
<tr><td>LTE transmitter and antenna implementation</td><td colspan="7">Refer to Appendix A.</td></tr>
<tr><td>Maximum power reduction (MPR)</td><td colspan="7">
Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th><th rowspan="2">MPR (dB)</th></tr>
<tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr>
<tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr>
</table>
MPR Built-in by design
The manufacturer MPR values are always within the 3GPP maximum MPR allowance but may not follow the default MPR values.
A-MPR (additional MPR) was disabled during SAR testing
</td></tr>
<tr><td>Power reduction</td><td colspan="7">No</td></tr>
<tr><td>Spectrum plots for RB configurations</td><td colspan="7">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.</td></tr>
</table>

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6.5. LTE (TDD) Considerations

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

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

Table 4.2-1: Configuration of Special Subframe (lengths of DwPTS/GP/UpPTS).

Special Subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

Calculated Duty Cycle

Uplink-Downlink Configuration	Downlink-to-Uplink Switch-point Periodicity	Subframe Number										Calculated Duty Cycle (%)
		0	1	2	3	4	5	6	7	8	9	
0	5 ms	D	S	U	U	U	D	S	U	U	U	63.33
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.33
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.33
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.67
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.67
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.67
6	5 ms	D	S	U	U	U	D	S	U	U	D	53.33

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

Example for Calculated Duty Cycle for Uplink-Downlink Configuration 0:
Calculated Duty Cycle = 5120 x [1/(15000 x 2048)] x 2 + 6 ms = 63.33%
where
T_s = 1/(15000 x 2048) seconds

Note(s):
This device supports uplink-downlink configurations 0-6. The configuration with highest duty cycle was used for SAR Testing: configuration 0 at 63.3% duty cycle and Special Subframe 7.

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7. RF Exposure Conditions (Test Configurations)

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

Wireless technologies	RF Exposure Conditions	DUT-to-User Separation	Test Position	Antenna-to-edge/surface	SAR Required
WWAN	Head	0 mm	Left Touch	N/A	Yes
			Left Tilt (15°)	N/A	Yes
			Right Touch	N/A	Yes
			Right Tilt (15°)	N/A	Yes
	Body-worn	15 mm	Rear	N/A	Yes
			Front	N/A	Yes
	Hotspot	10 mm	Rear	< 25 mm	Yes
			Front	< 25 mm	Yes
			Edge 1 (Top)	> 25 mm	No
			Edge 2 (Right)	< 25 mm	Yes
			Edge 3 (Bottom)	< 25 mm	Yes
			Edge 4 (Left)	< 25 mm	Yes
	Extremity	0 mm	Rear	< 25 mm	Yes
			Front	< 25 mm	Yes
			Edge 1 (Top)	> 25 mm	No
			Edge 2 (Right)	< 25 mm	Yes
			Edge 3 (Bottom)	< 25 mm	Yes
			Edge 4 (Left)	< 25 mm	Yes
WLAN/BT Main (Chain 0)	Head	0 mm	Left Touch	N/A	Yes
			Left Tilt (15°)	N/A	Yes
			Right Touch	N/A	Yes
			Right Tilt (15°)	N/A	Yes
	Body-worn	15 mm	Rear	N/A	Yes
			Front	N/A	Yes
	Hotspot / Wi-Fi Direct	10 mm	Rear	< 25 mm	Yes
			Front	< 25 mm	Yes
			Edge 1 (Top)	< 25 mm	Yes
			Edge 2 (Right)	> 25 mm	No
			Edge 3 (Bottom)	> 25 mm	No
			Edge 4 (Left)	< 25 mm	Yes
	Extremity	0 mm	Rear	< 25 mm	Yes
			Front	< 25 mm	Yes
			Edge 1 (Top)	< 25 mm	Yes
			Edge 2 (Right)	> 25 mm	No
			Edge 3 (Bottom)	> 25 mm	No
			Edge 4 (Left)	< 25 mm	Yes

Notes:

1. SAR is not required when the distance from the antenna to the edge is > 25 mm per KDB 941225 D06 Hot Spot SAR.
2. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg. When Hotspot Mode is not supported, 10-g Extremity SAR is required for all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions.

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RF Exposure Conditions (Test Configurations) continued:

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

Notes:

1. SAR is not required when the distance from the antenna to the edge is > 25 mm per KDB 941225 D06 Hot Spot SAR.
2. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg. When Hotspot Mode is not supported, 10-g Extremity SAR is required for all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions.

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8. Dielectric Property Measurements & System Check

8.1. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 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.
The dielectric constant (εr) and conductivity (σ) of typical tissue-equivalent media recipes are expected to be within ± 5% of the required target values; but for SAR measurement systems that have implemented the SAR error compensation algorithms documented in IEEE Std 1528-2013, to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, the tolerance for εr and σ may be relaxed to ± 10%. This is limited to frequencies ≤ 3 GHz.

Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

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

IEEE Std 1528-2013

Refer to Table 3 within the IEEE Std 1528-2013

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Dielectric Property Measurements Results:

SAR Lab	Date	Band (MHz)	Tissue Type	Frequency (MHz)	Relative Permittivity (εr)			Conductivity (σ)		
					Measured	Target	Delta (%)	Measured	Target	Delta (%)
1	7/5/2017	1900	Body	1900	51.39	53.30	-3.58	1.54	1.52	1.38
				1850	51.49	53.30	-3.40	1.52	1.52	0.07
				1920	51.24	53.30	-3.86	1.57	1.52	3.03
1	7/11/2017	750	Body	750	54.15	55.55	-2.51	0.92	0.96	-4.56
				695	53.46	55.76	-4.12	0.97	0.96	0.98
				790	53.14	55.39	-4.07	1.01	0.97	4.12
1	7/12/2017	2450	Body	2450	53.93	52.70	2.33	1.90	1.95	-2.67
				2400	53.40	52.77	1.19	1.81	1.90	-4.43
				2480	53.75	52.66	2.07	1.91	1.99	-4.12
2	7/10/2017	2600	Body	2600	51.30	52.51	-2.31	2.23	2.16	3.16
				2495	51.64	52.64	-1.91	2.11	2.01	4.86
				2690	51.05	52.40	-2.57	2.34	2.29	2.39
2	7/11/2017	2600	Head	2600	37.80	39.01	-3.10	2.02	1.96	2.79
				2495	37.99	39.14	-2.95	1.90	1.85	2.89
				2690	37.45	38.90	-3.72	2.13	2.06	3.52
2	7/12/2017	2450	Head	2450	39.87	39.20	1.71	1.82	1.80	1.06
				2400	40.07	39.30	1.97	1.74	1.75	-0.49
				2480	39.82	39.16	1.68	1.85	1.83	0.69
3	7/5/2017	1750	Head	1750	39.86	40.08	-0.56	1.39	1.37	1.32
				1710	39.96	40.15	-0.46	1.34	1.35	-0.18
				1755	39.83	40.08	-0.62	1.39	1.37	0.96
3	7/5/2017	1750	Body	1750	52.28	53.44	-2.17	1.51	1.49	1.67
				1710	52.44	53.54	-2.06	1.45	1.46	-0.79
				1755	52.26	53.43	-2.19	1.52	1.49	1.93
3	7/7/2017	1900	Head	1900	39.93	40.00	-0.18	1.42	1.40	1.14
				1850	40.18	40.00	0.45	1.36	1.40	-2.57
				1920	39.87	40.00	-0.33	1.44	1.40	2.57
3	7/12/2017	750	Head	750	43.05	41.96	2.59	0.83	0.89	-6.60
				695	44.18	42.24	4.58	0.82	0.89	-7.70
				790	42.48	41.76	1.73	0.86	0.90	-3.72

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SAR Lab	Date	Band (MHz)	Tissue Type	Frequency (MHz)	Relative Permittivity (εr)			Conductivity (σ)		
					Measured	Target	Delta (%)	Measured	Target	Delta (%)
4	7/5/2017	5200	Body	5200	47.27	49.02	-3.57	5.50	5.29	3.90
				5150	47.17	49.09	-3.91	5.42	5.24	3.43
				5350	46.79	48.82	-4.15	5.68	5.47	3.88
4	7/5/2017	5600	Body	5600	46.48	48.48	-4.12	5.97	5.76	3.64
				5500	46.59	48.61	-4.16	5.88	5.64	4.12
				5725	46.40	48.31	-3.95	6.13	5.91	3.80
4	7/5/2017	5800	Body	5800	46.32	48.20	-3.90	6.24	6.00	3.92
				5700	46.51	48.34	-3.79	6.09	5.88	3.60
				5850	46.27	48.20	-4.00	6.28	6.00	4.62
4	7/5/2017	5200	Head	5200	37.57	35.99	4.39	4.44	4.65	-4.51
				5150	37.71	36.05	4.61	4.42	4.60	-3.95
				5350	37.43	35.82	4.50	4.60	4.80	-4.30
4	7/5/2017	5600	Head	5600	36.99	35.53	4.10	4.83	5.06	-4.59
				5500	37.23	35.65	4.44	4.76	4.96	-4.07
				5725	36.89	35.39	4.23	4.93	5.19	-4.90
4	7/5/2017	5800	Head	5800	36.85	35.30	4.39	5.01	5.27	-4.91
				5700	36.95	35.42	4.32	4.93	5.16	-4.49
				5850	36.72	35.30	4.02	5.06	5.27	-4.02
4	7/11/2017	835	Head	835	41.73	41.50	0.55	0.93	0.90	3.68
				805	42.08	41.68	0.96	0.90	0.90	0.71
				915	40.71	41.50	-1.90	1.00	0.98	2.14
4	7/11/2017	835	Body	835	53.19	55.20	-3.64	0.99	0.97	2.09
				805	53.41	55.33	-3.48	0.96	0.97	-1.18
				905	52.44	55.00	-4.65	1.05	1.05	-0.14

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8.2. System Check

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

System Performance Check Measurement Conditions:

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

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System Check Results

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

SAR Lab	Date	Tissue Type	Dipole Type _Serial #	Dipole Cal. Due Data	Measured Results for 1g SAR				Measured Results for 10g SAR				Plot No.
					Zoom Scan to 100 mW	Normalize to 1 W	Target (Ref. Value)	Delta ±10 %	Zoom Scan to 100 mW	Normalize to 1 W	Target (Ref. Value)	Delta ±10 %	
1	7/5/2017	Body	D1900V2 SN:5d163	9/19/2017	4.150	41.50	39.60	**4.80**	2.200	22.00	21.00	4.76	1,2
1	7/11/2017	Body	D750V3 SN:1024	5/12/2018	0.812	8.12	8.59	**-5.47**	0.542	5.42	5.65	-4.07	3,4
1	7/12/2017	Body	D2450V2 SN:899	3/10/2018	5.230	52.30	50.30	**3.98**	2.390	23.90	23.70	0.84	5,6
2	7/10/2017	Body	D2600V2 SN:1036	3/10/2018	5.940	59.40	54.60	**8.79**	2.590	25.90	24.50	5.71	7,8
2	7/11/2017	Head	D2600V2 SN:1036	3/10/2018	5.480	54.80	57.50	-4.70	2.430	24.30	25.60	-5.08	
2	7/12/2017	Head	D2450V2 SN:899	3/10/2018	5.130	51.30	52.60	**-2.47**	2.350	23.50	24.60	-4.47	9,10
3	7/5/2017	Head	D1750V2 SN:1053	8/16/2017	3.610	36.10	37.40	**-3.48**	1.930	19.30	19.70	-2.03	11,12
3	7/5/2017	Body	D1750V2 SN:1053	8/16/2017	3.730	37.30	37.40	-0.27	1.980	19.80	19.70	0.51	
3	7/7/2017	Head	D1900V2 SN:5d163	9/19/2017	3.920	39.20	39.80	**-1.51**	2.040	20.40	21.00	-2.86	13,14
3	7/12/2017	Head	D750V3 SN:1024	5/12/2018	0.792	7.92	8.47	**-6.49**	0.525	5.25	5.53	-5.06	15,16
4	7/5/2017	Body	D5GHzV2 SN:1138 (5.2 GHz)	9/22/2017	7.940	79.40	74.20	7.01	2.240	22.40	20.90	7.18	
4	7/5/2017	Body	D5GHzV2 SN:1138 (5.6 GHz)	9/22/2017	8.520	85.20	78.80	8.12	2.380	23.80	22.00	8.18	
4	7/5/2017	Body	D5GHzV2 SN:1138 (5.8 GHz)	9/22/2017	8.140	81.40	75.70	7.53	2.280	22.80	21.10	8.06	
4	7/5/2017	Head	D5GHzV2 SN:1138 (5.2 GHz)	9/22/2017	7.230	72.30	78.30	-7.66	2.040	20.40	22.40	-8.93	
4	7/5/2017	Head	D5GHzV2 SN:1138 (5.6 GHz)	9/22/2017	7.700	77.00	82.30	-6.44	2.190	21.90	23.50	-6.81	
4	7/5/2017	Head	D5GHzV2 SN:1138 (5.8 GHz)	9/22/2017	7.250	72.50	79.40	**-8.69**	2.070	20.70	22.70	-8.81	17,18
4	7/11/2017	Head	D835V2 SN:4d142	9/22/2017	0.973	9.73	9.30	4.62	0.639	6.39	6.07	5.27	
4	7/11/2017	Body	D835V2 SN:4d142	9/22/2017	1.020	10.20	9.32	**9.44**	0.678	6.78	6.18	9.71	19,20

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9. Conducted Output Power Measurements

9.1. GSM

GSM850 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Max. Meas. Avg Pwr	
						Burst (dBm)	Frame (dBm)
850	GPRS (GMSK)	CS4	1	128	824.2	33.5	24.5
				190	836.6	33.5	24.5
				251	848.8	33.7	24.7
			2	128	824.2	31.9	25.9
				190	836.6	31.8	25.8
				251	848.8	31.7	25.7
			3	128	824.2	29.8	25.5
				190	836.6	29.9	25.6
				251	848.8	29.9	25.6
			4	128	824.2	28.6	25.6
				190	836.6	28.8	25.8
				251	848.8	28.9	25.9
	EGPRS (8PSK)	MCS9	1	128	824.2	27.0	18.0
				190	836.6	27.2	18.2
				251	848.8	27.2	18.2
			2	128	824.2	25.5	19.5
				190	836.6	25.7	19.7
				251	848.8	25.8	19.8
			3	128	824.2	24.0	19.7
				190	836.6	24.1	19.8
				251	848.8	24.2	19.9
			4	128	824.2	23.5	20.5
				190	836.6	23.4	20.4
				251	848.8	23.4	20.4

Notes:

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

- GMSK (GPRS) mode with 4 time slots, based on the Tune-up Procedure. Refer to §6.3.
- SAR is not required for EGPRS (8PSK) mode because the maximum output power and tune-up limit is ≤ 1/4db higher than GMSK GPRS or the adjusted SAR of the highest reported SAR of GMSK GPRS is ≤ 1.2W/kg.

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GSM1900 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Max. Meas. Avg Pwr	
						Burst (dBm)	Frame (dBm)
1900	GPRS (GMSK)	CS4	1	512	1850.2	26.5	17.5
				661	1880.0	26.4	17.4
				810	1909.8	26.8	17.8
			2	512	1850.2	25.6	19.6
				661	1880.0	25.5	19.5
				810	1909.8	25.7	19.7
			3	512	1850.2	24.3	20.0
				661	1880.0	24.2	19.9
				810	1909.8	24.3	20.0
			4	512	1850.2	22.8	19.8
				661	1880.0	22.8	19.8
				810	1909.8	23.0	20.0
	EGPRS (8PSK)	MCS9	1	512	1850.2	26.1	17.1
				661	1880.0	26.0	17.0
				810	1909.8	26.1	17.1
			2	512	1850.2	24.6	18.6
				661	1880.0	24.4	18.4
				810	1909.8	24.6	18.6
			3	512	1850.2	22.2	17.9
				661	1880.0	22.2	17.9
				810	1909.8	22.3	18.0
			4	512	1850.2	21.0	18.0
				661	1880.0	21.0	18.0
				810	1909.8	21.0	18.0

Notes:

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

- GMSK (GPRS) mode with 3 time slots, based on the Tune-up Procedure. Refer to §6.3.
- SAR is not required for EGPRS (8PSK) mode because the maximum output power and tune-up limit is ≤ 1/4db higher than GMSK GPRS or the adjusted SAR of the highest reported SAR of GMSK GPRS is ≤ 1.2W/kg.

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GSM850 DTM Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Max Meas. Avg Pwr			
						CS		PS	
						Burst (dBm)	Frame (dBm)	Burst (dBm)	Frame (dBm)
850	GSM(Voice) + GPRS(GMSK)	CS4	1	128	824.2	33.5	24.5		
				190	836.6	33.5	24.5		
				251	848.8	33.7	24.7		
			2	128	824.2	31.5	25.5	31.6	25.6
				190	836.6	31.7	25.7	31.7	25.7
				251	848.8	31.8	25.8	31.8	25.8
			3	128	824.2	29.7	25.4	29.7	25.4
				190	836.6	29.8	25.5	29.8	25.5
				251	848.8	29.9	25.6	29.9	25.6
	GSM(Voice) + EGPRS(8PSK)	MCS9	1	128	824.2	33.5	24.5		
				190	836.6	33.5	24.5		
				251	848.8	33.7	24.7		
			2	128	824.2	31.7	25.7	25.1	19.1
				190	836.6	31.8	25.8	25.2	19.2
				251	848.8	31.9	25.9	25.3	19.3
			3	128	824.2	29.8	25.5	23.1	18.8
				190	836.6	30.0	25.7	23.2	18.9
				251	848.8	30.1	25.8	23.3	19.0

Notes:

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

- GSM(Voice) with 1 time slot + GMSK(GPRS) mode with 1 time slot, based on the Tune-up Procedure. Refer to §6.3.
- SAR is not required for GSM(Voice) + EGPRS (8PSK) mode because the maximum output power and tune-up limit is ≤ 1/4db higher than that of GSM(Voice) + GMSK (GPRS) mode or the adjusted SAR of the highest reported SAR of GSM(Voice) + GMSK (GPRS) is ≤ 1.2W/kg.

GSM1900 DTM Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Max Meas. Avg Pwr			
						CS		PS	
						Burst (dBm)	Frame (dBm)	Burst (dBm)	Frame (dBm)
1900	GSM(Voice) + GPRS(GMSK)	CS4	1	512	1850.2	26.5	17.5		
				661	1880.0	26.4	17.4		
				810	1909.8	26.8	17.8		
			2	512	1850.2	25.2	19.2	25.6	19.6
				661	1880.0	25.1	19.1	25.5	19.5
				810	1909.8	25.3	19.3	25.7	19.7
			3	512	1850.2	23.9	19.6	24.3	20.0
				661	1880.0	24.0	19.7	24.2	19.9
				810	1909.8	24.2	19.9	24.6	20.3
	GSM(Voice) + EGPRS(8PSK)	MCS9	1	512	1850.2	26.5	17.5		
				661	1880.0	26.4	17.4		
				810	1909.8	26.8	17.8		
			2	512	1850.2	25.3	19.3	24.5	18.5
				661	1880.0	25.1	19.1	24.4	18.4
				810	1909.8	25.3	19.3	24.5	18.5
			3	512	1850.2	23.8	19.5	22.3	18.0
				661	1880.0	23.7	19.4	22.2	17.9
				810	1909.8	24.0	19.7	22.3	18.0

Notes:

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

- GSM(Voice) with 1 time slot + GMSK(GPRS) mode with 2 time slots, based on the Tune-up Procedure. Refer to §6.3.
- SAR is not required for GSM(Voice) + EGPRS (8PSK) mode because the maximum output power and tune-up limit is ≤ 1/4db higher than that of GSM(Voice) + GMSK (GPRS) mode or the adjusted SAR of the highest reported SAR of GSM(Voice) + GMSK (GPRS) is ≤ 1.2W/kg.

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9.2. W-CDMA

Release 99 Setup Procedures used to establish the test signals

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

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

HSDPA Setup Procedures used to establish the test signals

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

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subtest	1	2	3	4
W-CDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set 1			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	11/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	11/15	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			

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

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

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

HSPA+

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

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W-CDMA Band V Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Max. Meas. Avg Pwr (dBm)
W-CDMA Band V	Rel 99	RMC, 12.2 kbps	4132	826.4	N/A	24.4
			4183	836.6	N/A	24.6
			4233	846.6	N/A	24.7
	HSDPA	Subtest 1	4132	826.4	0	23.4
			4183	836.6	0	23.5
			4233	846.6	0	23.8
		Subtest 2	4132	826.4	0	23.5
			4183	836.6	0	23.6
			4233	846.6	0	23.9
		Subtest 3	4132	826.4	0.5	22.8
			4183	836.6	0.5	23.1
			4233	846.6	0.5	22.8
		Subtest 4	4132	826.4	0.5	23.0
			4183	836.6	0.5	23.1
			4233	846.6	0.5	23.3
	HSUPA	Subtest 1	4132	826.4	0	23.3
			4183	836.6	0	23.6
			4233	846.6	0	23.8
		Subtest 2	4132	826.4	2	21.2
			4183	836.6	2	21.4
			4233	846.6	2	21.8
		Subtest 3	4132	826.4	1	22.4
			4183	836.6	1	22.5
			4233	846.6	1	22.8
		Subtest 4	4132	826.4	2	21.2
			4183	836.6	2	21.4
			4233	846.6	2	21.8
		Subtest 5	4132	826.4	0	23.3
			4183	836.6	0	23.6
			4233	846.6	0	23.8

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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 4 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						1720 MHz	1732.5 MHz	1745 MHz
LTE Band 4	20	QPSK	1	0	0		20.3	
			1	49	0		20.2	
			1	99	0		20.1	
			50	0	0		20.3	
			50	24	0		20.3	
			50	50	0		20.2	
			100	0	0		20.3	
		16QAM	1	0	0		20.3	
			1	49	0		20.2	
			1	99	0		20.1	
			50	0	0		19.9	
			50	24	0		19.8	
			50	50	0		19.7	
			100	0	0		19.8	

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						1717.5 MHz	1732.5 MHz	1747.5 MHz
LTE Band 4	15	QPSK	1	0	0	20.5	20.4	20.2
			1	37	0	20.2	20.2	20.0
			1	74	0	20.2	20.2	19.9
			36	0	0	20.5	20.3	20.2
			36	20	0	20.3	20.3	20.1
			36	39	0	20.3	20.2	20.0
			75	0	0	20.4	20.3	20.2
		16QAM	1	0	0	20.5	20.2	19.6
			1	37	0	20.1	20.1	19.4
			1	74	0	20.1	20.0	19.4
			36	0	0	19.9	19.9	19.8
			36	20	0	19.8	19.9	19.6
			36	39	0	19.8	19.8	19.6
			75	0	0	19.9	19.8	19.7

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						1715 MHz	1732.5 MHz	1750 MHz
LTE Band 4	10	QPSK	1	0	0	20.2	20.3	20.2
			1	25	0	20.0	20.2	19.9
			1	49	0	20.0	20.2	19.9
			25	0	0	20.2	20.3	20.1
			25	12	0	20.1	20.2	20.0
			25	25	0	20.1	20.2	20.1
			50	0	0	20.1	20.3	20.0
		16QAM	1	0	0	19.8	20.2	19.6
			1	25	0	19.5	20.0	19.4
			1	49	0	19.5	20.0	19.4
			25	0	0	19.9	19.8	19.6
			25	12	0	19.7	19.8	19.5
			25	25	0	19.7	19.8	19.6
			50	0	0	19.6	19.8	19.6

Note(s):

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

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LTE Band 4 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						1712.5 MHz	1732.5 MHz	1752.5 MHz
LTE Band 4	5	QPSK	1	0	0	20.4	20.3	20.1
			1	12	0	20.3	20.2	20.1
			1	24	0	20.2	20.2	20.0
			12	0	0	20.3	20.2	20.1
			12	7	0	20.3	20.3	20.1
			12	13	0	20.3	20.2	20.1
			25	0	0	20.3	20.2	20.1
		16QAM	1	0	0	20.0	20.3	19.7
			1	12	0	19.9	20.2	19.7
			1	24	0	19.8	20.2	19.6
			12	0	0	19.9	19.9	19.7
			12	7	0	19.9	19.9	19.7
			12	13	0	19.8	19.9	19.7
			25	0	0	19.8	19.8	19.6

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						1711.5 MHz	1732.5 MHz	1753.5 MHz
LTE Band 4	3	QPSK	1	0	0	20.2	20.2	20.0
			1	8	0	20.3	20.3	20.0
			1	14	0	20.2	20.2	19.9
			8	0	0	20.3	20.2	20.1
			8	4	0	20.3	20.2	20.1
			8	7	0	20.3	20.2	20.0
			15	0	0	20.3	20.2	20.0
		16QAM	1	0	0	19.9	20.1	19.5
			1	8	0	19.9	20.2	19.5
			1	14	0	19.8	20.1	19.3
			8	0	0	19.8	19.8	19.7
			8	4	0	19.9	19.8	19.7
			8	7	0	19.9	19.8	19.6
			15	0	0	19.8	19.7	19.5

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						1710.7 MHz	1732.5 MHz	1754.3 MHz
LTE Band 4	1.4	QPSK	1	0	0	20.2	20.1	19.9
			1	3	0	20.2	20.2	20.0
			1	5	0	20.2	20.1	19.9
			3	0	0	20.2	20.2	19.9
			3	1	0	20.2	20.2	19.9
			3	3	0	20.3	20.2	19.9
			6	0	0	20.2	20.1	19.9
		16QAM	1	0	0	19.7	20.0	19.5
			1	3	0	19.8	20.0	19.6
			1	5	0	19.7	20.0	19.5
			3	0	0	19.9	19.8	19.5
			3	1	0	19.9	19.9	19.5
			3	3	0	19.9	19.8	19.5
			6	0	0	19.9	19.6	19.5

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LTE Band 5 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						829 MHz	836.5 MHz	844 MHz
LTE Band 5	10	QPSK	1	0	0		24.2	
			1	25	0		24.2	
			1	49	0		24.1	
			25	0	1		23.2	
			25	12	1		23.2	
			25	25	1		23.1	
			50	0	1		23.2	
		16QAM	1	0	1		23.6	
			1	25	1		23.6	
			1	49	1		23.4	
			25	0	2		22.2	
			25	12	2		22.2	
			25	25	2		22.2	
			50	0	2		22.2	

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						826.5 MHz	836.5 MHz	846.5 MHz
LTE Band 5	5	QPSK	1	0	0	24.3	24.2	23.9
			1	12	0	24.2	24.1	23.9
			1	24	0	24.2	24.1	23.8
			12	0	1	23.2	23.2	22.8
			12	7	1	23.2	23.2	22.8
			12	13	1	23.2	23.1	22.8
			25	0	1	23.2	23.2	22.8
		16QAM	1	0	1	23.4	23.7	23.0
			1	12	1	23.3	23.7	22.9
			1	24	1	23.3	23.6	22.9
			12	0	2	22.3	22.3	21.9
			12	7	2	22.3	22.3	21.9
			12	13	2	22.2	22.3	21.9
			25	0	2	22.1	22.2	21.8

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						825.5 MHz	836.5 MHz	847.5 MHz
LTE Band 5	3	QPSK	1	0	0	24.2	24.2	23.8
			1	8	0	24.3	24.3	23.8
			1	14	0	24.1	24.2	23.7
			8	0	1	23.2	23.2	22.8
			8	4	1	23.2	23.2	22.8
			8	7	1	23.2	23.2	22.8
			15	0	1	23.2	23.2	22.8
		16QAM	1	0	1	23.3	23.6	22.7
			1	8	1	23.3	23.6	22.8
			1	14	1	23.2	23.5	22.7
			8	0	2	22.2	22.3	22.0
			8	4	2	22.3	22.3	21.9
			8	7	2	22.2	22.2	21.9
			15	0	2	22.1	22.2	21.9

Note(s):

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

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LTE Band 5 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						824.7 MHz	836.5 MHz	848.3 MHz
LTE Band 5	1.4	QPSK	1	0	0	24.6	24.3	23.7
			1	3	0	24.6	24.3	23.7
			1	5	0	24.5	24.3	23.7
			3	0	0	24.6	24.3	23.7
			3	1	0	24.6	24.3	23.7
			3	3	0	24.6	24.3	23.7
			6	0	1	23.6	23.3	22.7
		16QAM	1	0	1	24.0	23.4	22.7
			1	3	1	24.0	23.5	22.8
			1	5	1	24.0	23.4	22.7
			3	0	1	23.8	23.3	22.9
			3	1	1	23.9	23.4	22.9
			3	3	1	23.8	23.4	22.9
			6	0	2	22.5	22.4	21.9

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LTE Band 7 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						2510 MHz	2535 MHz	2560 MHz
LTE Band 7	20	QPSK	1	0	0	24.7	24.9	24.9
			1	49	0	24.0	24.8	24.9
			1	99	0	24.0	24.7	24.8
			50	0	1	23.5	23.9	23.9
			50	24	1	22.8	23.9	24.0
			50	50	1	22.6	23.9	23.9
			100	0	1	23.4	23.8	23.8
		16QAM	1	0	1	24.0	24.0	24.0
			1	49	1	23.2	24.0	24.0
			1	99	1	23.6	24.0	23.8
			50	0	2	22.7	22.9	22.9
			50	24	2	22.2	23.0	23.0
			50	50	2	22.0	22.9	23.0
			100	0	2	22.5	23.0	23.0
Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						2507.5 MHz	2535 MHz	2562.5 MHz
LTE Band 7	15	QPSK	1	0	0	24.8	24.8	24.9
			1	37	0	24.2	24.8	24.8
			1	74	0	23.6	24.8	24.8
			36	0	1	23.6	23.8	23.8
			36	20	1	23.3	24.0	23.9
			36	39	1	22.9	23.9	24.0
			75	0	1	23.2	23.9	23.9
		16QAM	1	0	1	24.0	23.8	23.8
			1	37	1	24.0	23.8	23.8
			1	74	1	23.1	23.7	23.7
			36	0	2	22.8	22.8	22.8
			36	20	2	22.6	23.0	23.0
			36	39	2	22.2	22.9	22.9
			75	0	2	22.5	22.9	22.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						2505 MHz	2535 MHz	2565 MHz
LTE Band 7	10	QPSK	1	0	0	24.7	24.9	25.0
			1	25	0	24.4	24.9	24.9
			1	49	0	23.8	24.9	24.3
			25	0	1	23.6	23.9	24.0
			25	12	1	23.6	23.9	24.0
			25	25	1	23.3	23.9	23.8
			50	0	1	23.4	23.9	23.9
		16QAM	1	0	1	23.9	24.0	24.0
			1	25	1	23.8	24.0	23.9
			1	49	1	23.0	24.0	23.3
			25	0	2	23.0	22.9	23.0
			25	12	2	23.0	23.0	23.0
			25	25	2	22.7	22.9	23.0
			50	0	2	22.7	23.0	23.0

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LTE Band 7 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						2502.5 MHz	2535 MHz	2567.5 MHz
LTE Band 7	5	QPSK	1	0	0	24.7	24.8	24.9
			1	12	0	24.6	24.9	24.6
			1	24	0	24.5	24.8	24.3
			12	0	1	23.9	23.8	24.0
			12	7	1	23.9	23.9	23.8
			12	13	1	23.8	23.9	23.7
			25	0	1	23.7	23.9	23.8
		16QAM	1	0	1	24.0	24.0	24.0
			1	12	1	24.0	23.7	23.5
			1	24	1	23.8	24.0	23.6
			12	0	2	23.0	23.0	23.0
			12	7	2	23.0	23.0	23.0
			12	13	2	23.0	23.0	22.9
			25	0	2	22.9	23.0	23.0

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LTE Band 12 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						704 MHz	707.5 MHz	711 MHz
LTE Band 12	10	QPSK	1	0	0		24.9	
			1	25	0		25.0	
			1	49	0		25.0	
			25	0	1		24.0	
			25	12	1		24.0	
			25	25	1		24.0	
			50	0	1		24.0	
		16QAM	1	0	1		23.9	
			1	25	1		24.0	
			1	49	1		24.0	
			25	0	2		23.0	
			25	12	2		23.0	
			25	25	2		23.0	
			50	0	2		23.0	

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						701.5 MHz	707.5 MHz	713.5 MHz
LTE Band 12	5	QPSK	1	0	0	25.0	25.0	25.0
			1	12	0	24.9	25.0	25.0
			1	24	0	24.9	25.0	24.9
			12	0	1	23.9	24.0	23.9
			12	7	1	23.9	24.0	23.9
			12	13	1	23.9	24.0	24.0
			25	0	1	23.9	24.0	24.0
		16QAM	1	0	1	24.0	24.0	24.0
			1	12	1	23.9	24.0	24.0
			1	24	1	23.9	24.0	24.0
			12	0	2	23.0	23.0	23.0
			12	7	2	23.0	23.0	23.0
			12	13	2	22.9	23.0	23.0
			25	0	2	22.8	23.0	23.0

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						700.5 MHz	707.5 MHz	714.5 MHz
LTE Band 12	3	QPSK	1	0	0	24.8	25.0	25.0
			1	8	0	24.9	25.0	25.0
			1	14	0	24.8	25.0	24.8
			8	0	1	23.9	24.0	24.0
			8	4	1	23.9	24.0	24.0
			8	7	1	23.9	24.0	24.0
			15	0	1	23.9	24.0	24.0
		16QAM	1	0	1	23.9	23.9	23.9
			1	8	1	24.0	24.0	24.0
			1	14	1	23.8	24.0	23.7
			8	0	2	22.9	23.0	23.0
			8	4	2	23.0	23.0	23.0
			8	7	2	22.9	23.0	23.0
			15	0	2	22.8	23.0	23.0

Note(s):

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

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LTE Band 12 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)		
						699.7 MHz	707.5 MHz	715.3 MHz
LTE Band 12	1.4	QPSK	1	0	0	24.8	25.0	24.9
			1	3	0	24.8	25.0	24.9
			1	5	0	24.8	25.0	24.7
			3	0	0	24.8	25.0	24.9
			3	1	0	24.8	25.0	24.9
			3	3	0	24.8	25.0	24.8
			6	0	1	23.8	24.0	24.0
		16QAM	1	0	1	23.8	24.0	24.0
			1	3	1	23.9	24.0	24.0
			1	5	1	23.8	24.0	23.8
			3	0	1	23.9	24.0	24.0
			3	1	1	24.0	24.0	24.0
			3	3	1	24.0	24.0	24.0
			6	0	2	23.0	22.9	23.0

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LTE Band 13 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)
						782 MHz
LTE Band 13	10	QPSK	1	0	0	23.9
			1	25	0	23.7
			1	49	0	23.7
			25	0	1	22.9
			25	12	1	22.8
			25	25	1	22.8
			50	0	1	22.8
		16QAM	1	0	1	22.8
			1	25	1	22.7
			1	49	1	22.6
			25	0	2	21.9
			25	12	2	21.8
			25	25	2	21.9
			50	0	2	21.8
Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)
						782 MHz
LTE Band 13	5	QPSK	1	0	0	23.9
			1	12	0	23.8
			1	24	0	23.9
			12	0	1	22.8
			12	7	1	22.8
			12	13	1	22.8
			25	0	1	22.8
		16QAM	1	0	1	23.0
			1	12	1	22.9
			1	24	1	23.0
			12	0	2	21.9
			12	7	2	21.9
			12	13	2	21.9
			25	0	2	21.8

Note(s):

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

LTE Band 17 Measured Results

SAR for LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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LTE Band 38 Measured Results

SAR for LTE Band 38 (Frequency range: 2570-2620 MHz) is covered by LTE Band 41 (Frequency range: 2496-2690 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 41 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)				
						2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz
LTE Band 41	20	QPSK	1	0	0	24.8	24.8	25.0	25.0	24.7
			1	49	0	24.5	24.5	24.9	24.9	24.8
			1	99	0	24.4	24.6	24.8	24.8	24.6
			50	0	1	23.7	23.7	24.0	23.7	23.5
			50	24	1	23.5	23.5	24.0	23.7	23.6
			50	50	1	23.4	23.5	24.0	23.5	23.5
			100	0	1	23.5	23.5	24.0	23.5	23.1
		16QAM	1	0	1	23.7	23.7	24.0	24.0	23.7
			1	49	1	23.4	23.4	23.9	23.7	23.9
			1	99	1	23.4	23.5	23.7	23.6	23.8
			50	0	2	22.6	22.8	23.0	23.0	22.7
			50	24	2	22.5	22.7	23.0	22.7	22.7
			50	50	2	22.4	22.6	23.0	22.6	22.6
			100	0	2	22.5	22.6	23.0	22.4	22.5
Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)				
						2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz
LTE Band 41	15	QPSK	1	0	0	25.0	24.6	25.0	25.0	24.9
			1	37	0	24.9	24.3	24.9	24.9	24.2
			1	74	0	24.9	24.5	24.9	24.6	24.7
			36	0	1	24.0	23.5	24.0	23.6	23.4
			36	20	1	24.0	23.5	24.0	23.4	23.4
			36	39	1	24.0	23.6	24.0	23.4	23.5
			75	0	1	24.0	23.5	24.0	23.4	23.3
		16QAM	1	0	1	24.0	23.8	24.0	24.0	23.8
			1	37	1	24.0	23.7	24.0	23.8	23.7
			1	74	1	23.8	23.6	23.8	23.7	23.7
			36	0	2	23.0	22.8	23.0	22.8	22.6
			36	20	2	23.0	22.6	23.0	22.7	22.5
			36	39	2	23.0	22.6	23.0	22.5	22.6
			75	0	2	23.0	22.7	23.0	22.4	22.4
Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)				
						2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz
LTE Band 41	10	QPSK	1	0	0	25.0	24.6	24.9	23.0	24.6
			1	25	0	25.0	24.5	25.0	24.8	24.7
			1	49	0	24.9	24.6	24.9	24.7	24.5
			25	0	1	24.0	23.6	24.0	23.6	23.7
			25	12	1	24.0	23.6	24.0	23.5	23.7
			25	25	1	24.0	23.5	24.0	23.3	23.6
			50	0	1	24.0	23.6	24.0	23.3	23.6
		16QAM	1	0	1	23.9	23.7	23.9	24.0	23.5
			1	25	1	23.9	23.6	23.9	23.8	23.6
			1	49	1	23.9	23.7	23.9	23.7	23.5
			25	0	2	23.0	22.6	23.0	22.9	22.6
			25	12	2	23.0	22.7	23.0	22.6	22.7
			25	25	2	23.0	22.6	23.0	22.5	22.6
			50	0	2	23.0	22.6	23.0	22.3	22.6

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LTE Band 41 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Max. Meas. Avg Pwr (dBm)				
						2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz
LTE Band 41	10	QPSK	1	0	0	24.7	24.6	25.0	25.0	24.7
			1	25	0	24.6	24.7	25.0	25.0	24.8
			1	49	0	24.6	24.6	25.0	24.8	24.7
			25	0	1	23.6	23.6	24.0	23.6	23.7
			25	12	1	23.6	23.6	24.0	23.6	23.7
			25	25	1	23.6	23.7	24.0	23.6	23.7
			50	0	1	23.5	23.5	24.0	23.4	23.5
		16QAM	1	0	1	23.5	23.5	24.0	24.0	23.9
			1	25	1	23.5	23.6	23.9	23.9	23.9
			1	49	1	23.4	23.5	23.9	23.9	23.8
			25	0	2	22.6	22.7	23.0	22.9	22.7
			25	12	2	22.6	22.8	23.0	22.8	22.8
			25	25	2	22.6	22.7	23.0	22.7	22.8
			50	0	2	22.6	22.7	23.0	22.8	22.6

9.4. Wi-Fi 2.4GHz (DTS Band)

Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Meas. Avg Pwr (dBm)		Max Output Power (dBm)		SAR Test (Yes/No)
					Chain 0	Chain 1	Chain 0	Chain 1	
2.4	802.11b	1 Mbps	1	2412	13.6	12.3	15.0	13.8	Yes
			6	2437	13.7	12.3			
			11	2462	13.7	12.4			
	802.11g	6 Mbps	2	2417	13.5	12.5	15.0	13.8	No
			6	2437	13.5	12.4			
			11	2462	13.5	12.4			
	802.11n (HT20)	6.5 Mbps	2	2417	13.5	12.4	15.0	13.8	No
			6	2437	13.7	12.4			
			11	2462	13.7	12.4			

Note(s):

1. SAR not required for 802.11g/n modes when the adjusted SAR for 802.11b is < 1.2 W/kg.

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

Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Meas. Avg Pwr (dBm)		Max Output Power (dBm)		SAR Test (Yes/No)
					Chain 0	Chain 1	Chain 0	Chain 1	
5.3 U-NII-2A	802.11a	6 Mbps	52	5260	Not Required	Not Required	14.5	12.5	Yes
			56	5280					
			60	5300					
			64	5320					
	802.11n (HT20)	6.5 Mbps	52	5260			14.5	12.5	No
			56	5280					
			60	5300					
			64	5320					
	802.11n (HT40)	13.5 Mbps	54	5270			14.5	12.5	No
			62	5310					
	802.11ac (VHT20)	6.5 Mbps	52	5260			14.5	12.5	No
			56	5280					
			60	5300					
			64	5320					
	802.11ac (VHT40)	13.5 Mbps	54	5270			14.5	12.5	No
			62	5310					
	802.11ac (VHT80)	29.3 Mbps	58	5290	13.5	11.2	14.5	12.5	No
5.5 U-NII-2C	802.11a	6 Mbps	100	5500	Not Required	Not Required	14.5	12.5	No
			116	5580					
			124	5620					
			140	5700					
	802.11n (HT20)	6.5 Mbps	100	5500			14.5	12.5	No
			116	5580					
			124	5620					
			140	5700					
	802.11n (HT40)	13.5 Mbps	102	5510			14.5	12.5	No
			118	5590					
			134	5670					
	802.11ac (VHT20)	6.5 Mbps	100	5500			14.5	12.5	No
			116	5580					
			124	5620					
			140	5700					
	802.11ac (VHT40)	13.5 Mbps	102	5510			14.5	12.5	No
			118	5590					
			134	5670					
	802.11ac (VHT80)	29.3 Mbps	106	5530	13.3	11.1	14.5	12.5	Yes
			122	5610	13.7	11.1			
			138	5690	13.6	11.0			
5.8 U-NII-3	802.11a	6 Mbps	149	5745	Not Required	Not Required	14.5	12.5	No
			157	5785					
			165	5825					
	802.11n (HT20)	6.5 Mbps	149	5745			14.5	12.5	No
			157	5785					
			165	5825					
	802.11n (HT40)	13.5 Mbps	151	5755			14.5	12.5	No
			159	5795					
	802.11ac (VHT20)	6.5 Mbps	149	5745			14.5	12.5	No
			157	5785					
			165	5825					
	802.11ac (VHT40)	13.5 Mbps	151	5755			14.5	12.5	No
			159	5795					
	802.11ac (VHT80)	29.3 Mbps	155	5775	13.4	11.0	14.5	12.5	Yes

Note(s):

1. For “Not required”, SAR Test reduction was applied per KDB 248227.
2. When multiple channel bandwidth configurations in a frequency band have the same specified maximum output power, the largest channel bandwidth configuration is selected for SAR evaluation.
3. When the specified maximum output power is the same for both UNII band I and UNII band 2A, begin SAR measurement in UNII band 2A; and if the highest *reported* SAR for UNII band 2A is
   - o ≤ 1.2 W/kg, SAR is not required for UNII band I
   - o > 1.2 W/kg, both bands should be tested independently for SAR.

9.6. Bluetooth

Maximum tune-up tolerance limit is 11.84 dBm. This power level qualifies for exclusion of SAR testing. Refer to §10.21 for Standalone SAR Test Exclusion Considerations & Estimated SAR.

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10. Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

KDB 447498 D01 General RF Exposure Guidance:
Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

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

KDB 648474 D04 Handset SAR:
With headset attached, when the reported SAR for body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

KDB 648474 D04 Handset SAR (Phablet Only):
When hotspot mode does not apply, 10-g Extremity SAR is required for all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.

KDB 941225 D01 SAR test for 3G devices:
When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode

KDB 941225 D05 SAR for LTE Devices:
SAR test reduction is applied using the following criteria:

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

KDB 248227 D01 SAR meas for 802.11:
SAR test reduction for 802.11 Wi-Fi transmission mode configurations are considered separately for DSSS and OFDM. An initial test position is determined to reduce the number of tests required for certain exposure configurations with multiple test positions. An initial test configuration is determined for each frequency band and aggregated band according to maximum output power, channel bandwidth, wireless mode configurations and other operating parameters to streamline the measurement requirements. For 2.4 GHz DSSS, either the initial test position or DSSS procedure is applied to reduce the number of SAR tests; these are mutually exclusive. For OFDM, an initial test position is only applicable to next to the ear, UMPC mini-tablet and hotspot mode configurations, which is tested using the initial test configuration to facilitate test reduction. For other exposure conditions with a fixed test position, SAR test reduction is determined using only the initial test configuration.

The multiple test positions require SAR measurements in head, hotspot mode or UMPC mini-tablet configurations may be reduced according to the highest reported SAR determined using the ***initial test position(s)*** by applying the DSSS or OFDM SAR

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measurement procedures in the required wireless mode test configuration(s). The ***initial test position(s)*** is measured using the highest measured maximum output power channel in the required wireless mode test configuration(s). When the ***reported*** SAR for the ***initial test position*** is:

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

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

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10.1. GSM850

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	GPRS 4 Slots	0	Left Touch	190	836.6	29.2	28.8	0.170	0.186	
			Left Tilt	190	836.6	29.2	28.8	0.088	0.096	
			Right Touch	190	836.6	29.2	28.8	0.180	**0.197**	1
			Right Tilt	190	836.6	29.2	28.8	0.088	0.096	
Body-worn	GPRS 4 Slots	15	Rear	190	836.6	29.2	28.8	0.158	0.173	
			Front	190	836.6	29.2	28.8	0.223	**0.245**	2
Hotspot	GPRS 4 Slots	10	Rear	190	836.6	29.2	28.8	0.231	0.253	
			Front	190	836.6	29.2	28.8	0.290	0.318	
			Edge 2	190	836.6	29.2	28.8	0.159	0.174	
			Edge 3	190	836.6	29.2	28.8	0.239	0.262	
			Edge 4	190	836.6	29.2	28.8	0.063	0.069	
	DTM CS+PS 1 Slot	10	Front	190	836.6	32.2	31.7	0.322	**0.361**	3

10.2. GSM1900

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	GPRS 3 Slots	0	Left Touch	661	1880.0	24.8	24.2	0.028	0.032	
			Left Tilt	661	1880.0	24.8	24.2	0.004	0.005	
			Right Touch	661	1880.0	24.8	24.2	0.029	**0.033**	4
			Right Tilt	661	1880.0	24.8	24.2	0.007	0.008	
Body-worn	GPRS 3 Slots	15	Rear	661	1880.0	24.8	24.2	0.090	0.103	
			Front	661	1880.0	24.8	24.2	0.284	**0.326**	5
Hotspot	GPRS 3 Slots	10	Rear	661	1880.0	24.8	24.2	0.176	0.202	
			Front	661	1880.0	24.8	24.2	0.601	0.690	
			Edge 2	661	1880.0	24.8	24.2	0.079	0.091	
			Edge 3	661	1880.0	24.8	24.2	0.661	**0.759**	6
			Edge 4	661	1880.0	24.8	24.2	0.115	0.132	
	DTM CS+PS 2 Slot	10	Edge 3	661	1880.0	24.8	24.2	0.610	0.700	

10.3. W-CDMA Band V

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC	0	Left Touch	4183	836.6	24.7	24.6	0.137	0.141	
			Left Tilt	4183	836.6	24.7	24.6	0.067	0.069	
			Right Touch	4183	836.6	24.7	24.6	0.159	**0.164**	7
			Right Tilt	4183	836.6	24.7	24.6	0.082	0.084	
Body-worn	Rel 99 RMC	15	Rear	4183	836.6	24.7	24.6	0.131	0.135	
			Front	4183	836.6	24.7	24.6	0.203	**0.209**	8
Hotspot	Rel 99 RMC	10	Rear	4183	836.6	24.7	24.6	0.214	0.221	
			Front	4183	836.6	24.7	24.6	0.325	**0.335**	9
			Edge 2	4183	836.6	24.7	24.6	0.212	0.218	
			Edge 3	4183	836.6	24.7	24.6	0.203	0.209	
			Edge 4	4183	836.6	24.7	24.6	0.049	0.050	

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10.4. LTE Band 4 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	20175	1732.5	1	0	20.5	20.3	0.039	**0.041**	10
						50	0	20.5	20.3	0.034	0.035	
			Left Tilt	20175	1732.5	1	0	20.5	20.3	0.009	0.010	
						50	0	20.5	20.3	0.008	0.008	
			Right Touch	20175	1732.5	1	0	20.5	20.3	0.023	0.024	
						50	0	20.5	20.3	0.021	0.022	
			Right Tilt	20175	1732.5	1	0	20.5	20.3	0.005	0.005	
						50	0	20.5	20.3	0.005	0.005	
Body-worn	QPSK	15	Rear	20175	1732.5	1	0	20.5	20.3	0.062	0.064	
						50	0	20.5	20.3	0.064	0.066	
			Front	20175	1732.5	1	0	20.5	20.3	0.262	0.272	
						50	0	20.5	20.3	0.266	**0.276**	11
Hotspot	QPSK	10	Rear	20175	1732.5	1	0	20.5	20.3	0.136	0.141	
						50	0	20.5	20.3	0.138	0.143	
			Front	20175	1732.5	1	0	20.5	20.3	0.652	0.678	
						50	0	20.5	20.3	0.662	**0.687**	12
			Edge 2	20175	1732.5	1	0	20.5	20.3	0.010	0.010	
						50	0	20.5	20.3	0.009	0.010	
			Edge 3	20175	1732.5	1	0	20.5	20.3	0.572	0.595	
						50	0	20.5	20.3	0.564	0.585	
			Edge 4	20175	1732.5	1	0	20.5	20.3	0.034	0.035	
						50	0	20.5	20.3	0.038	0.039	

10.5. LTE Band 5 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	20525	836.5	1	0	25.0	24.2	0.098	0.118	
						25	0	24.0	23.2	0.085	0.102	
			Left Tilt	20525	836.5	1	0	25.0	24.2	0.048	0.058	
						25	0	24.0	23.2	0.040	0.048	
			Right Touch	20525	836.5	1	0	25.0	24.2	0.127	**0.153**	13
						25	0	24.0	23.2	0.108	0.130	
			Right Tilt	20525	836.5	1	0	25.0	24.2	0.053	0.064	
						25	0	24.0	23.2	0.046	0.055	
Body-worn	QPSK	15	Rear	20525	836.5	1	0	25.0	24.2	0.113	0.136	
						25	0	24.0	23.2	0.096	0.115	
			Front	20525	836.5	1	0	25.0	24.2	0.169	**0.204**	14
						25	0	24.0	23.2	0.138	0.166	
Hotspot	QPSK	10	Rear	20525	836.5	1	0	25.0	24.2	0.112	0.135	
						25	0	24.0	23.2	0.146	0.175	
			Front	20525	836.5	1	0	25.0	24.2	0.262	**0.316**	15
						25	0	24.0	23.2	0.217	0.260	
			Edge 2	20525	836.5	1	0	25.0	24.2	0.104	0.126	
						25	0	24.0	23.2	0.086	0.103	
			Edge 3	20525	836.5	1	0	25.0	24.2	0.232	0.280	
						25	0	24.0	23.2	0.195	0.234	
			Edge 4	20525	836.5	1	0	25.0	24.2	0.043	0.052	
						25	0	24.0	23.2	0.034	0.041	

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10.6. LTE Band 7 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	21100	2535.0	1	0	25.0	24.9	0.025	0.026	
						50	24	24.0	23.9	0.017	0.017	
			Left Tilt	21100	2535.0	1	0	25.0	24.9	<0.001	<0.001	
						50	24	24.0	23.9	<0.001	<0.001	
			Right Touch	21100	2535.0	1	0	25.0	24.9	0.038	**0.039**	16
						50	24	24.0	23.9	0.019	0.019	
			Right Tilt	21100	2535.0	1	0	25.0	24.9	<0.001	<0.001	
						50	24	24.0	23.9	<0.001	<0.001	
Body-worn	QPSK	15	Rear	21100	2535.0	1	0	25.0	24.9	0.047	0.048	
						50	24	24.0	23.9	0.041	0.042	
			Front	21100	2535.0	1	0	25.0	24.9	0.071	**0.072**	17
						50	24	24.0	23.9	0.034	0.035	
Hotspot	QPSK	10	Rear	21100	2535.0	1	0	25.0	24.9	0.117	0.119	
						50	24	24.0	23.9	0.081	0.082	
			Front	21100	2535.0	1	0	25.0	24.9	0.169	0.173	
						50	24	24.0	23.9	0.167	0.170	
			Edge 2	21100	2535.0	1	0	25.0	24.9	0.077	0.079	
						50	24	24.0	23.9	0.058	0.059	
			Edge 3	21100	2535.0	1	0	25.0	24.9	0.197	**0.201**	18
						50	24	24.0	23.9	0.139	0.141	
			Edge 4	21100	2535.0	1	0	25.0	24.9	0.031	0.032	
						50	24	24.0	23.9	0.014	0.014	

10.7. LTE Band 12 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	23095	707.5	1	25	25.0	25.0	0.123	0.123	
						25	0	24.0	24.0	0.093	0.093	
			Left Tilt	23095	707.5	1	25	25.0	25.0	0.057	0.057	
						25	0	24.0	24.0	0.046	0.046	
			Right Touch	23095	707.5	1	25	25.0	25.0	0.135	**0.135**	19
						25	0	24.0	24.0	0.100	0.100	
			Right Tilt	23095	707.5	1	25	25.0	25.0	0.068	0.068	
						25	0	24.0	24.0	0.051	0.051	
Body-worn	QPSK	15	Rear	23095	707.5	1	25	25.0	25.0	0.154	0.154	
						25	0	24.0	24.0	0.120	0.120	
			Front	23095	707.5	1	25	25.0	25.0	0.254	**0.254**	20
						25	0	24.0	24.0	0.197	0.197	
Hotspot	QPSK	10	Rear	23095	707.5	1	25	25.0	25.0	0.181	0.181	
						25	0	24.0	24.0	0.141	0.141	
			Front	23095	707.5	1	25	25.0	25.0	0.306	**0.306**	21
						25	0	24.0	24.0	0.240	0.240	
			Edge 2	23095	707.5	1	25	25.0	25.0	0.222	0.222	
						25	0	24.0	24.0	0.179	0.179	
			Edge 3	23095	707.5	1	25	25.0	25.0	0.104	0.104	
						25	0	24.0	24.0	0.080	0.080	
			Edge 4	23095	707.5	1	25	25.0	25.0	0.211	0.211	
						25	0	24.0	24.0	0.161	0.161	

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10.8. LTE Band 13 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	23230	782.0	1	0	24.0	23.9	0.055	**0.057**	22
						25	0	23.0	22.9	0.039	0.040	
			Left Tilt	23230	782.0	1	0	24.0	23.9	0.025	0.026	
						25	0	23.0	22.9	0.019	0.020	
			Right Touch	23230	782.0	1	0	24.0	23.9	0.053	0.055	
						25	0	23.0	22.9	0.038	0.039	
			Right Tilt	23230	782.0	1	0	24.0	23.9	0.026	0.026	
						25	0	23.0	22.9	0.020	0.021	
Body-worn	QPSK	15	Rear	23230	782.0	1	0	24.0	23.9	0.151	0.156	
						25	0	23.0	22.9	0.117	0.121	
			Front	23230	782.0	1	0	24.0	23.9	0.208	**0.215**	23
						25	0	23.0	22.9	0.160	0.165	
Hotspot	QPSK	10	Rear	23230	782.0	1	0	24.0	23.9	0.186	0.193	
						25	0	23.0	22.9	0.148	0.153	
			Front	23230	782.0	1	0	24.0	23.9	0.268	**0.277**	24
						25	0	23.0	22.9	0.211	0.218	
			Edge 2	23230	782.0	1	0	24.0	23.9	0.153	0.158	
						25	0	23.0	22.9	0.120	0.124	
			Edge 3	23230	782.0	1	0	24.0	23.9	0.058	0.060	
						25	0	23.0	22.9	0.043	0.044	
			Edge 4	23230	782.0	1	0	24.0	23.9	0.090	0.093	
						25	0	23.0	22.9	0.071	0.073	

10.9. LTE Band 17 (10MHz Bandwidth)

SAR for LTE Band 17 (Frequency Range: 704-716 MHz) is covered by LTE Band 12 (Frequency Range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

10.10. LTE Band 38 (20MHz Bandwidth)

SAR for LTE Band 38 (Frequency range: 2570-2620 MHz) is covered by LTE Band 41 (Frequency range: 2496-2690 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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10.11. LTE Band 41 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	40620	2593.0	1	0	25.0	25.0	0.019	0.019	
						50	0	24.0	24.0	0.012	0.012	
			Left Tilt	40620	2593.0	1	0	25.0	25.0	0.011	0.011	
						50	0	24.0	24.0	0.010	0.010	
			Right Touch	40620	2593.0	1	0	25.0	25.0	0.024	**0.024**	25
						50	0	24.0	24.0	0.019	0.019	
			Right Tilt	40620	2593.0	1	0	25.0	25.0	0.009	0.009	
						50	0	24.0	24.0	0.009	0.009	
Body-worn	QPSK	15	Rear	40620	2593.0	1	0	25.0	25.0	0.026	0.026	
						50	0	24.0	24.0	0.021	0.021	
			Front	40620	2593.0	1	0	25.0	25.0	0.053	**0.053**	26
						50	0	24.0	24.0	0.041	0.041	
Hotspot	QPSK	10	Rear	40620	2593.0	1	0	25.0	25.0	0.053	0.053	
						50	0	24.0	24.0	0.042	0.042	
			Front	40620	2593.0	1	0	25.0	25.0	0.111	0.111	
						50	0	24.0	24.0	0.085	0.085	
			Edge 2	40620	2593.0	1	0	25.0	25.0	0.035	0.035	
						50	0	24.0	24.0	0.026	0.026	
			Edge 3	40620	2593.0	1	0	25.0	25.0	0.127	**0.127**	27
						50	0	24.0	24.0	0.097	0.097	
			Edge 4	40620	2593.0	1	0	25.0	25.0	0.022	0.022	
						50	0	24.0	24.0	0.018	0.018	

10.12. Wi-Fi (DTS Band)

Frequency Band	Antenna	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.	Meas.	Scaled	
2.4GHz	Chain 0	802.11b 1 Mbps	Head	0	Left Touch	6	2437.0	0.259	15.0	13.7	0.332	0.448	
					Left Tilt	6	2437.0	0.162	15.0	13.7			
					Right Touch	6	2437.0	1.020	15.0	13.7	0.596	0.804	
						11	2462.0	0.987	15.0	13.7	0.696	**0.939**	28
					Right Tilt	6	2437.0	0.455	15.0	13.7	0.308	0.415	
			Body-worn	15	Rear	6	2437.0	0.019	15.0	13.7			
					Front	6	2437.0	0.065	15.0	13.7	0.043	**0.058**	29
			Hotspot & Wi-Fi Direct	10	Rear	6	2437.0	0.032	15.0	13.7			
					Front	6	2437.0	0.154	15.0	13.7			
					Edge 1	6	2437.0	0.024	15.0	13.7			
					Edge 4	6	2437.0	0.176	15.0	13.7	0.094	**0.127**	30
2.4GHz	Chain 1	802.11b 1 Mbps	Head	0	Left Touch	11	2462.0	0.249	13.8	12.4	0.527	**0.727**	31
					Left Tilt	11	2462.0	0.238	13.8	12.4	0.211	0.291	
					Right Touch	11	2462.0	0.072	13.8	12.4	0.116	0.160	
					Right Tilt	11	2462.0	0.071	13.8	12.4			
			Body-worn	15	Rear	11	2462.0	0.014	13.8	12.4			
					Front	11	2462.0	0.027	13.8	12.4	0.016	**0.022**	32
			Hotspot & Wi-Fi Direct	10	Rear	11	2462.0	0.025	13.8	12.4			
					Front	11	2462.0	0.066	13.8	12.4	0.038	**0.052**	33
					Edge 1	11	2462.0	0.010	13.8	12.4			
					Edge 2	11	2462.0	0.051	13.8	12.4			

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10.13. Wi-Fi (U-NII Band)

Frequency Band	Antenna	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled	
5.3 GHz U-NII 2A	Chain 0	802.11ac VHT80 29.3 Mbps	Head	0	Left Touch	58	5290.0	0.231	14.5	13.5					
					Left Tilt	58	5290.0	0.172	14.5	13.5					
					Right Touch	58	5290.0	0.702	14.5	13.5	0.435	**0.548**	0.126	0.159	34
					Right Tilt	58	5290.0	0.363	14.5	13.5	0.168	0.211	0.047	0.059	
			Body-worn	15	Rear	58	5290.0	0.004	14.5	13.5					
					Front	58	5290.0	0.025	14.5	13.5	0.051	**0.064**	0.017	0.021	35
			Extemity	0	Rear	58	5290.0	0.174	14.5	13.5					
					Front	58	5290.0	1.970	14.5	13.5					
					Edge 1	58	5290.0	0.204	14.5	13.5					
					Edge 4	58	5290.0	2.050	14.5	13.5	0.821	1.034	0.167	**0.210**	36
5.3 GHz U-NII 2A	Chain 1	802.11ac VHT80 29.3 Mbps	Head	0	Left Touch	58	5290.0	0.631	12.5	11.2	0.283	**0.382**	0.089	0.120	37
					Left Tilt	58	5290.0	0.137	12.5	11.2					
					Right Touch	58	5290.0	0.164	12.5	11.2					
					Right Tilt	58	5290.0	0.084	12.5	11.2					
			Body-worn	15	Rear	58	5290.0	0.012	12.5	11.2					
					Front	58	5290.0	0.021	12.5	11.2	0.009	**0.012**	0.003	0.004	38
			Extemity	0	Rear	58	5290.0	0.124	12.5	11.2					
					Front	58	5290.0	1.630	12.5	11.2	0.579	0.781	0.168	**0.227**	39
					Edge 1	58	5290.0	0.106	12.5	11.2					
					Edge 2	58	5290.0	1.490	12.5	11.2					

Frequency Band	Antenna	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled	
5.5 GHz U-NII 2C	Chain 0	802.11ac VHT80 29.3 Mbps	Head	0	Left Touch	122	5610.0	0.500	14.5	13.7	0.089	0.107	0.025	0.030	
					Left Tilt	122	5610.0	0.443	14.5	13.7					
					Right Touch	122	5610.0	0.882	14.5	13.7	0.429	**0.516**	0.121	0.145	40
					Right Tilt	122	5610.0	0.399	14.5	13.7					
			Body-worn	15	Rear	122	5610.0	0.004	14.5	13.7					
					Front	122	5610.0	0.068	14.5	13.7	0.025	**0.030**	0.009	0.011	41
			Extemity	0	Rear	122	5610.0	0.098	14.5	13.7					
					Front	122	5610.0	1.590	14.5	13.7					
					Edge 1	122	5610.0	0.217	14.5	13.7					
					Edge 4	122	5610.0	1.950	14.5	13.7	0.599	0.720	0.117	**0.141**	42
5.5 GHz U-NII 2C	Chain 1	802.11ac VHT80 29.3 Mbps	Head	0	Left Touch	122	5610.0	0.270	12.5	11.1	0.145	**0.200**	0.047	0.065	43
					Left Tilt	122	5610.0	0.101	12.5	11.1					
					Right Touch	122	5610.0	0.075	12.5	11.1					
					Right Tilt	122	5610.0	0.055	12.5	11.1					
			Body-worn	15	Rear	122	5610.0	0.003	12.5	11.1					
					Front	122	5610.0	0.032	12.5	11.1	0.017	**0.023**	0.006	0.008	44
			Extemity	0	Rear	122	5610.0	0.098	12.5	11.1					
					Front	122	5610.0	0.922	12.5	11.1	0.349	0.482	0.097	**0.134**	45
					Edge 1	122	5610.0	0.235	12.5	11.1					
					Edge 2	122	5610.0	0.584	12.5	11.1					

Frequency Band	Antenna	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled	
5.8 GHz U-NII 3	Chain 0	802.11ac VHT80	Head	0	Left Touch	155	5775.0	0.378	14.5	13.4					
					Left Tilt	155	5775.0	0.267	14.5	13.4					
					Right Touch	155	5775.0	0.951	14.5	13.4	0.446	**0.575**	0.127	0.164	46
					Right Tilt	155	5775.0	0.473	14.5	13.4	0.234	0.301	0.070	0.090	
			Body-worn	15	Rear	155	5775.0	0.003	14.5	13.4					
					Front	155	5775.0	0.096	14.5	13.4	0.048	**0.062**	0.016	0.021	47
			Extremity	0	Rear	155	5775.0	0.112	14.5	13.4					
					Front	155	5775.0	1.320	14.5	13.4					
					Edge 1	155	5775.0	0.165	14.5	13.4					
					Edge 4	155	5775.0	1.720	14.5	13.4	0.794	1.023	0.159	**0.205**	48
5.8 GHz U-NII 3	Chain 1	802.11ac VHT80	Head	0	Left Touch	155	5775.0	0.264	12.5	11.0	0.124	**0.175**	0.042	0.059	49
					Left Tilt	155	5775.0	0.220	12.5	11.0					
					Right Touch	155	5775.0	0.121	12.5	11.0					
					Right Tilt	155	5775.0	0.109	12.5	11.0					
			Body-worn	15	Rear	155	5775.0	0.004	12.5	11.0					
					Front	155	5775.0	0.033	12.5	11.0	0.016	**0.023**	0.006	0.009	50
			Extremity	0	Rear	155	5775.0	0.137	12.5	11.0					
					Front	155	5775.0	0.790	12.5	11.0	0.384	0.542	0.117	**0.165**	51
					Edge 1	155	5775.0	0.062	12.5	11.0					
					Edge 2	155	5775.0	0.630	12.5	11.0					

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10.14. Bluetooth

Maximum tune-up tolerance limit is 11.84 dBm. This power level qualifies for exclusion of SAR testing. Refer to §10.21 for Standalone SAR Test Exclusion Considerations & Estimated SAR.

10.15. Standalone SAR Test Exclusion Considerations & Estimated SAR

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]·[√f(GHz)] ≤ 3.0, for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- $f_{(GHz)}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

When the standalone SAR test exclusion is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

- *(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]·[√f(GHz)/x]* W/kg for test separation distances ≤ 50 mm;
  where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.
- 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm.

Body-worn and Hotspot:

RF Air interface	RF Exposure Conditions	Frequency (GHz)	Max. tune-up tolerance Power		Min. test separation distance (mm)	SAR test exclusion Result*	Estimated 1-g SAR (W/kg)
			(dBm)	(mW)			
Bluetooth	Body-worn	2.480	11.84	15	15	1.6	0.210
Bluetooth	Hotspot	2.480	11.84	15	10	2.4	0.315

Conclusion:

*: The computed value is ≤ 3; therefore, this qualifies for Standalone SAR test exclusion.

Extremity:

RF Air interface	RF Exposure Conditions	Frequency (GHz)	Max. tune-up tolerance Power		Min. test separation distance (mm)	SAR test exclusion Result*	Estimated 10-g SAR (W/kg)
			(dBm)	(mW)			
Bluetooth	Extremity	2.480	11.84	15	0	4.7	0.252

Conclusion:

*: The computed value is ≤ 7.5; therefore, this qualifies for Standalone SAR test exclusion.

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11. SAR Measurement Variability

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

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

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)
700	LTE Band 12	Hotspot	Front	No	0.306
	LTE Band 13	Hotspot	Front	No	0.268
850	GSM 850	Hotspot	Front	No	0.322
	WCDMA Band V	Hotspot	Front	No	0.325
	LTE Band 5	Hotspot	Front	No	0.262
1750	LTE Band 4	Hotspot	Front	No	0.662
1900	GSM 1900	Hotspot	Edge 3	No	0.661
2400	Wi-Fi 802.11b/g/n	Head	Right Touch	No	0.696
2500	LTE Band 7	Hotspot	Edge 3	No	0.197
2600	LTE Band 41	Hotspot	Edge 3	No	0.127
5300	Wi-Fi 802.11a/n/ac	Head	Right Touch	No	0.435
5600	Wi-Fi 802.11a/n/ac	Head	Right Touch	No	0.429
5800	Wi-Fi 802.11a/n/ac	Head	Right Touch	No	0.446

Note(s):

Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the original and first repeated measurement is < 1.20.

Extremity:

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)
5300	Wi-Fi 802.11a/n/ac	Extremity	Front	No	0.168
5600	Wi-Fi 802.11a/n/ac	Extremity	Edge 4	No	0.117
5800	Wi-Fi 802.11a/n/ac	Extremity	Edge 4	No	0.159

Note(s):

Repeated Measurement is not required since measured SAR is < 2 W/kg.

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12. Simultaneous Transmission SAR Analysis

Simultaneous Transmission Condition

Case	Cellular	WLAN Chain 0 / BT	WLAN Chain 1
1	GSM/GPRS/Edge	BT/BLE	(None)
2	GSM/GPRS/Edge	WLAN 2.4G	(None)
3	GSM/GPRS/Edge	WLAN 2.4G	WLAN 2.4G
4	GSM/GPRS/Edge	WLAN 2.4G	WLAN 5G
5	GSM/GPRS/Edge	WLAN 5G	WLAN 5G
6	GSM/GPRS/Edge	BT WLAN 5G	WLAN 5G
7	UMTS/HSPA	BT/BLE	(None)
8	UMTS/HSPA	WLAN 2.4G	(None)
9	UMTS/HSPA	WLAN 2.4G	WLAN 2.4G
10	UMTS/HSPA	WLAN 2.4G	WLAN 5G
11	UMTS/HSPA	WLAN 5G	WLAN 5G
12	UMTS/HSPA	BT WLAN 5G	WLAN 5G
13	LTE	BT/BLE	(None)
14	LTE	WLAN 2.4G	(None)
15	LTE	WLAN 2.4G	WLAN 2.4G
16	LTE	WLAN 2.4G	WLAN 5G
17	LTE	WLAN 5G	WLAN 5G
18	LTE	BT WLAN 5G	WLAN 5G
19	(None)	BT WLAN 5G	WLAN 5G

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12.1. Sum of the 1-g SAR for WWAN & Wi-Fi & BT

RF Exposure conditions	Test Position	Standalone SAR (W/kg)						∑ 1-g SAR (W/kg)						
		WWAN	DTS		U-NII		BT	WWAN + BT	WWAN + DTS	WWAN + DTS	WWAN + U-NII	WWAN+DTS+U-NII	WWAN+U-NII+BT	U-NII+BT
		①	Chain 0 ②	Chain 1 ③	Chain 0 ④	Chain 1 ⑤	⑥	① + ⑥	① + ②	① + ② + ③	① + ④ + ⑤	① + ② + ⑤	① + ④ + ⑤ + ⑥	④ + ⑤ + ⑥
Head	Left Touch	0.186	0.448	0.727	0.107	0.382			0.634	1.361	0.675	1.016		0.489
	Left Tilt	0.096	0.448	0.291	0.107	0.382			0.544	0.835	0.585	0.926		0.489
	Right Touch	0.197	0.939	0.160	0.575	0.382			1.136	1.296	1.154	**1.518**		0.957
	Right Tilt	0.096	0.415	0.160	0.301	0.382			0.511	0.671	0.779	0.893		0.683
Body-worn	Rear	0.173	0.058	0.022	0.064	0.023	0.210	0.383	0.231	0.253	0.260	0.254	0.470	0.297
	Front	0.326	0.058	0.022	0.064	0.023	0.210	0.536	0.384	0.406	0.413	0.407	0.623	0.297
Hotspot	Rear	0.253	0.127	0.052			0.315	0.568	0.380	0.432				
	Front	0.690	0.127	0.052			0.315	**1.005**	0.817	0.869				
	Edge 1	0.000	0.127	0.052			0.315	0.315	0.127	0.179				
	Edge 2	0.222		0.052					0.222	0.274				
	Edge 3	0.759						0.759	0.759	0.759				
	Edge 4	0.211	0.127				0.315	0.526	0.338	0.338				

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the sum of the 1-g SAR is < 1.6 W/kg.

12.2. Sum of the 10-g SAR for Wi-Fi 5GHz & BT

RF Exposure conditions	Test Position	Standalone SAR (W/kg)			∑ 10-g SAR (W/kg)	
		U-NII		BT	U-NII	U-NII+BT
		Chain 0 ①	Chain 1 ②	③	① + ②	① + ② + ③
Extremity	Rear	0.210	0.227	0.252	0.437	**0.689**
	Front	0.210	0.227	0.252	0.437	0.689
	Edge 1	0.210	0.227	0.252	0.437	0.689
	Edge 2		0.227			
	Edge 4	0.210		0.252	0.210	0.462

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the sum of the 10-g SAR is < 4.0 W/kg.

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Appendixes

Refer to separated files for the following appendixes.

11785223-S1V1 SAR_App A Setup Photos

11785223-S1V1 SAR_App B System Check Plots

11785223-S1V1 SAR_App C Highest Test Plots

11785223-S1V1 SAR_App D Tissue Ingredients

11785223-S1V1 SAR_App E Probe Cal. Certificates

11785223-S1V1 SAR_App F Dipole Cal. Certificates

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