SAR EVALUATION REPORT

IEEE STD 1528-2013

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

FCC ID: PY7-62883W

Report Number: 14177661-S1V3
Issue Date: 4/15/2022

Prepared for
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Revision History

Rev.	Date	Revisions	Revised By
V1	4/7/2022	Initial Issue	--
V2	4/15/2022	Section 9: Added note for LTE Band 17	Coltyce Sanders
V3	4/15/2022	Updated section 2.	Devin Chang

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1. Attestation of Test Results

Applicant Name	Sony Corporation			
FCC ID	PY7-62883W			
Applicable Standards	Published RF exposure KDB procedures IEEE STD 1528-2013			
Exposure Category	SAR Limits (W/Kg)			
	Peak spatial-average (1g of tissue)		Extremities (hands, wrists, ankles, etc.) (10g of tissue)	
General population / Uncontrolled exposure	1.6		4	
RF Exposure Conditions	Equipment Class - Highest Reported SAR (W/kg)			
	PCE	DTS	NII	DSS
Head	0.050	N/A	N/A	N/A
Body-worn*	0.314	N/A	N/A	N/A
Hotspot/BT Tethering	0.376	N/A	N/A	N/A
Extremity (10g)	N/A	N/A	N/A	N/A
Simultaneous TX	0.871	N/A	N/A	N/A
Date Tested	3/14/2022 to 3/17/2022			
Test Results	Pass			

Note: The proposed Permissive Change requires SAR testing for enabled LTE Bands 2 and 12. This report only contains the SAR values for the enabled LTE Bands 2 and 12. WLAN and Bluetooth SAR results from the original filling (lead model) have been used in this report for Simultaneous Transmission analysis only. Refer to §12 for Simultaneous SAR Analysis. Please refer to original filling (UL report 14176139-S1) for SAR measurement results and the highest SAR values for WLAN and Bluetooth.

Note: The Body-worn minimum separation distance is 10 mm. To cover both body-worn and hotspot RF exposure conditions testing was performed at a separation distance of 10 mm.

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

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

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

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Approved & Released By:	Prepared By
Devin Chang Senior Test Engineer UL Verification Services Inc.	Remi Rodberg Laboratory Technician UL Verification Services Inc.

2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE STD 1528-2013, ANSI C63.26-2015, the following FCC Published RF exposure KDB procedures:

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

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

- o TCB Workshop October 2014; RF Exposure Procedures (Other LTE Considerations)
- o TCB Workshop April 2015; RF Exposure Procedures (Overlapping LTE Bands)
- o TCB Workshop October 2015; RF Exposure Procedures (KDB 941225 D05A)
- o TCB Workshop October 2016; RF Exposure Procedures (DUT Holder Perturbations)
- o TCB Workshop May 2017; RF Exposure Procedures (Broadband Liquid Above 3 GHz)
- o TCB Workshop April 2019; RF Exposure Procedures (Tissue Simulating Liquids (TSL))
- o TCB Workshop April 2021; RF Exposure Procedures (Extension of Frequency Range down to 4 MHz and up to 10 GHz)

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 9
SAR Lab B	SAR Lab 2	SAR Lab 10
SAR Lab C	SAR Lab 3	SAR Lab 11
SAR Lab D	SAR Lab 4	SAR Lab 12
SAR Lab E	SAR Lab 5	SAR Lab 13
SAR Lab F	SAR Lab 6	
SAR Lab G	SAR Lab 7	
SAR Lab H	SAR Lab 8	

UL Verification Services Inc. is accredited by A2LA, Certificate Number 0751.05

4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

The DASY system used for performing compliance tests consists of the following items:
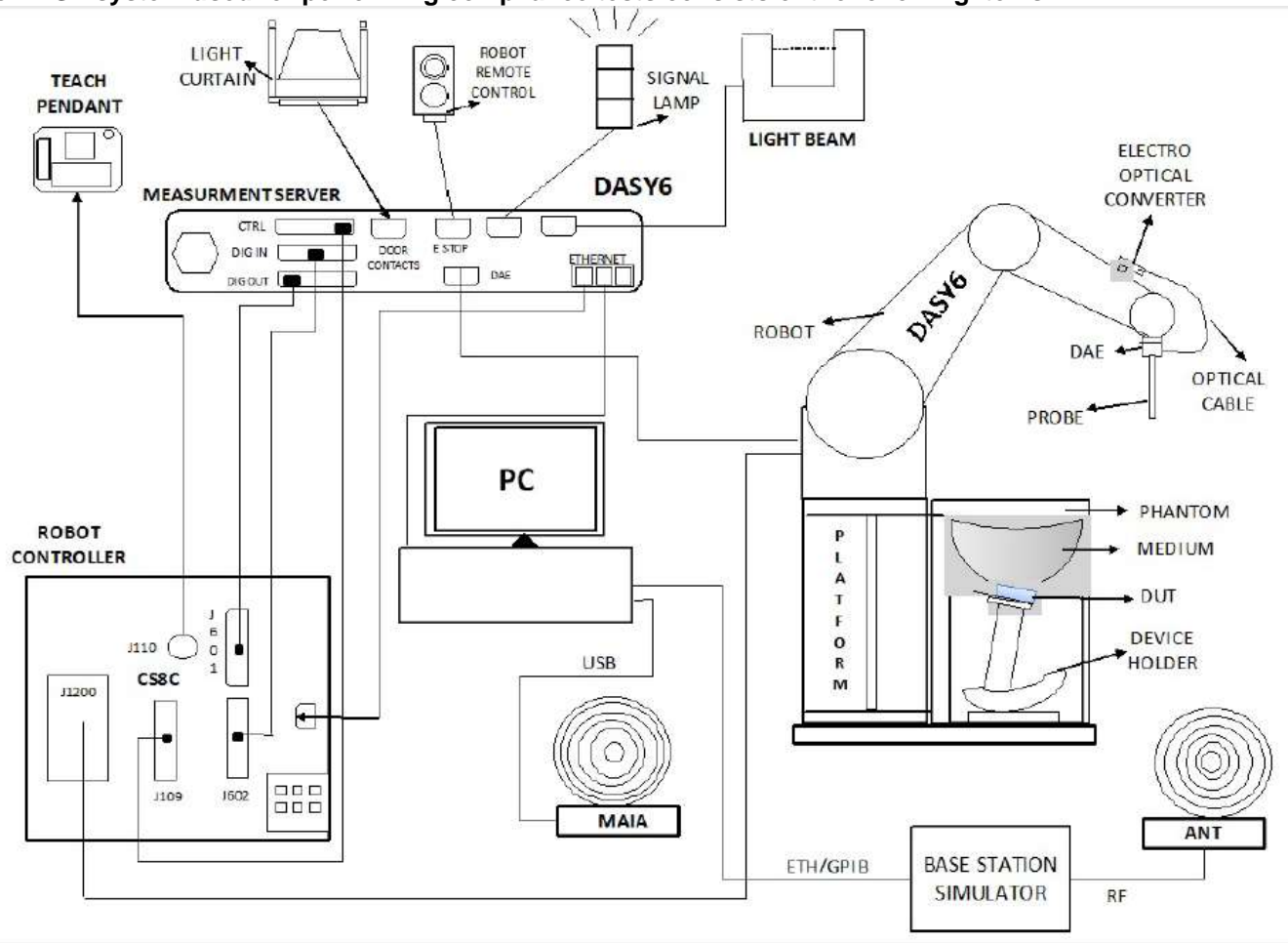
- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win7, Win10 and the DASY52[1] and DASY6[2] 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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[1] DASY52 software used: DASY52.10.4.1527 & S 14.6.14 and older generations.

[2] DASY6 software used: DASY6 V16.0.0.116 & S 14.6.14 and older generations.

4.2. SAR Scan Procedures

Step 1: Power Reference Measurement
The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2. Area Scan
The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE STD 1528-2013, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

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

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30° \pm 1°$	$20° \pm 1°$
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 $\leq$ 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	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
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.

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	R & S	ZNLE6	101274-mn	2/15/2023
Dielectric Probe kit	SPEAG	DAK-3.5	1059	9/19/2022
Shorting Block	SPEAG	DAK-3.5 Short	SM DAK 200 DA	9/19/2022
Thermometer	Fisher Scientific	Traceable	170064398	9/1/2022

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Signal Generator	Rohde & Schwarz	SMB100A03	180969	2/17/2023
3-Path Diode Power Sensor	Rohde & Schwarz	NRP18A	100992	2/17/2023

Lab Equipment

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
E-Field Probe (SAR Lab 3)	SPEAG	EX3DV4	7585	4/27/2022
Data Acquisition Electronics (SAR Lab 3)	SPEAG	DAE4	1540	1/11/2023
Thermometer (SAR Lab 3)	TRACEABLE	6530CC	7603	3/30/2022
System Validation Dipole	SPEAG	D750V3	1024	5/11/2022
System Validation Dipole	SPEAG	D1900V2	5d140	4/13/2022

Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
3-Path Diode Power Sensor	Rohde & Schwarz	NRP18A	100994	2/16/2023
Base Station Simulator	R & S	CMW 500	125236	2/18/2023
DC Power Supply	Sorensen	TX-15 4	1802A01877	N/A

5. Measurement Uncertainty

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

6. Device Under Test (DUT) Information

6.1. DUT Description

Device Dimension	Overall (Length x Width): 164.8 mm x 70.9 mm Overall Diagonal: 175.4 mm Display Diagonal: 162 mm This is a Phablet Device (display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm)
Back Cover	The Back Cover is not removable
Battery Options	The rechargeable battery is not user accessible.
Accessory	Headset & Wireless Charger
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 5.2GHz & 5.8GHz Only)
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other Per Manufacturer, the DUT support only as a group client and not support as a group owner.
Bluetooth Tethering (Hotspot)	BT Tethering mode permits the device to share its cellular data connection with other devices. ☒ BT Tethering (Bluetooth 2.4 GHz)
Test sample information	**S/N** **IMEI** **Notes** QV77002CAQ 004402543018844 (Conducted) Cell Low Band QV7700BUBB 004402543243368 (Conducted) Cell Mid Band QV77009JBX 004402543515104 (Radiated) Cell Low/Mid Band
Software Version	(WWAN) 64.0.C.0.493 & 64.0.C.0.363 (WLAN) 64.0.C.0.428 & 64.0.C.0.354

6.2.   Wireless Technologies

Wireless technologies	Frequency bands	Operating mode		Duty Cycle used for SAR testing[1]
GSM	850 1900	Voice (GMSK) GPRS (GMSK) EDGE (8PSK)	GSM Class : A Multi-Slot Class: Class 33 - 4 Up, 5 Down	GSM Voice: 12.5% (E)GPRS: 1 Slot: 12.5% 2 Slots: 25% 3 Slots: 37.5% 4 Slots: 50%
	Does this device support DTM (Dual Transfer Mode)? ☒ Yes ☐ No			
W-CDMA (UMTS)	Band II Band IV	UMTS Rel. 99 (Voice & Data) HSDPA (Rel. 5) HSUPA (Rel. 6)		100%
LTE	FDD Band 2 FDD Band 4 FDD Band 12 FDD Band 17	QPSK 16QAM 64QAM Rel. 10 Does not support Carrier Aggregation (CA)		100% (FDD) 63.3% (TDD) [1]Power Class 3
	Does this device support SV-LTE (1xRTT-LTE)? ☐ Yes ☒ No			
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20) 802.11ax (HE20)		99.92% (802.11b Chain 0) 99.92% (802.11b Chain 1)
	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40) 802.11ac (VHT20) 802.11ac (VHT40) 802.11ac (VHT80) 802.11ac (VHT160) 802.11ax (HE20) 802.11ax (HE40) 802.11ax (HE80) 802.11ax(HE160)		99.67% (802.11ac 80MHz BW Chain 0) 99.72% (802.11ac 160MHz BW Chain 0) 99.67% (802.11ac 80MHz BW Chain 1) 99.63% (802.11ac 160MHz BW Chain 1)
	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	BR, EDR, LE		76.8% (GFSK Chain 0) 77.2% (GFSK Chain 1)
NFC	13.56 MHz	Type A/B/F/V		N/A

Notes:

1.   This permissive change only requires testing for the enabled LTE bands 2 and 12. Refer to Note in §1.

6.3.   General LTE SAR Test and Reporting Considerations

Item	Description					
Frequency range, Channel Bandwidth, Numbers and Frequencies	**Band 2**	Frequency range: 1850 - 1910 MHz (BW = 60 MHz)				
		Channel Bandwidth				
		20 MHz [1]	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	**18700 /1860**	18675/ 1857.5	18650/ 1855	18625/ 1852.5	18615/ 1851.5	18607/ 1850.7
	Mid	**18900/ 1880**	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880
	High	**19100/ 1900**	19125/ 1902.5	19150/ 1905	19175/ 1907.5	19185/ 1908.5	19193/ 1909.3
	Band 12	Frequency range: 699 – 716 MHz (BW = 17 MHz)				
		Channel Bandwidth				
		20 MHz	15 MHz	10 MHz [1]	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

Item	Description
LTE transmitter and antenna implementation	Refer to Appendix A.
Maximum power reduction (MPR)	Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3

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

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

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

Item	Description
Power reduction	No
Spectrum plots for RB configurations	A properly configured base station simulator was used for the SAR and power measurements; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.

Notes:

1. Maximum bandwidth does not support at least three non-overlapping channels in certain channel bandwidths. When a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing per KDB 941225 D05 SAR for LTE Devices.
2. LTE band 41 test channels in accordance with October 2014 TCB workshop for all channels bandwidths.
3. SAR Testing for LTE was performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

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6.4. Power Back-off Operation

The DUT supports power reduction when Simultaneous WLAN transmission is active (i.e. WLAN Chain 0 and Chain 1 transmitting simultaneously).

Power Back-off mode	Technologies Supported	Exposure Conditions Active			
		Head	Body-worn	Hotspot	Phablet SAR (Extremity 10g)
WLAN Simultaneous Tx	Wi-Fi 2.4GHz Wi-Fi 5GHz	✓	✓	✓	✓

Note(s):
Tune-Up Limits for WLAN (Simultaneous 2G_5G state) is Reduced Average Power. Please refer to §9 for all conducted power measurements.

Phablet SAR (Extremity 10g):
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 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.

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.

Antenna	Band	Head	Rear	Front	Edge 1 (Top Edge)	Edge 2 (Right Edge)	Edge 3 (Bottom Edge)	Edge 4 (Left Edge)	Extremity (0 mm)
Cellular Main Antenna 1	LTE Band 12	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Cellular Main Antenna 2	LTE Band 2	Yes	Yes	Yes	No	Yes	Yes	No	Yes

Notes:
1. SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR.
2. The Body-worn minimum separation distance is 10 mm. To cover both body-worn and hotspot RF exposure conditions testing was performed at a separation distance of 10 mm.
3. 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 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.

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

Dielectric Property Measurements Results:

SAR Lab	Date	Band (MHz)	Tissue Type	Frequency (MHz)	Relative Permittivity (εr)			Conductivity (σ)		
					Measured	Target	Delta (%)	Measured	Target	Delta (%)
3	3/14/2022	750	Head	750	43.71	41.96	4.17	0.88	0.89	-1.35
				660	43.85	42.42	3.36	0.85	0.89	-3.87
				800	43.45	41.71	4.18	0.89	0.90	-0.24
3	3/17/2022	1900	Head	1900	39.74	40.00	-0.65	1.39	1.40	-0.50
				1850	39.81	40.00	-0.47	1.36	1.40	-2.79
				1920	39.68	40.00	-0.80	1.40	1.40	-0.07

8.2. System Check

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

System Performance Check Measurement Conditions:

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

System Check Results

The 1-g and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within ±10% of the manufacturer calibrated dipole SAR target. Refer to Appendix B for the SAR System Check Plots.

SAR Lab	Date	Tissue Type	Dipole Type _Serial #	Dipole Cal. Due Data	Measured Results for 1g SAR				Measured Results for 10g SAR				Plot No.
					Zoom Scan to 100 mW	Normalize to 1 W	Target (Ref. Value)	Delta ±10 %	Zoom Scan to 100 mW	Normalize to 1 W	Target (Ref. Value)	Delta ±10 %	
3	3/14/2022	Head	D750V3 SN:1024	5/11/2022	0.840	8.40	8.60	**-2.33**	0.552	5.52	5.69	-2.99	1
3	3/17/2022	Head	D1900V2 SN:5d140	4/13/2022	4.180	41.80	41.40	**0.97**	2.160	21.60	21.50	0.47	2

9. Conducted Output Power Measurements

Tune-Up Power Limits provided by the manufacturer are used to scale measured SAR values.

9.1. LTE

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

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

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

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

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

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

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

Maximum Output Power (Tune-up Limit) for LTE

According to April 2015 TCB workshop, SAR test exclusion can be applied for testing overlapping LTE bands as follows:
   a) The maximum output power, including tolerance, for the smaller band must be ≤ the larger band to qualify for the SAR test exclusion.
   b) The channel bandwidth and other operating parameters for the smaller band must be fully supported by the larger band.
      • LTE Band 17 (704-716 MHz) is covered by LTE Band 12 (699-716 MHz)

For some LTE Bands, certain channel bandwidths do not support at least three non-overlapping channels. When a device supports overlapping channel assignments in a channel bandwidth configuration, the middle channel of the group of overlapping channels is selected for testing per KDB 941225 D05 SAR for LTE Devices.

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

Please refer to §6.3. for a detailed list of LTE test channels.

RF Air interface	Mode	Tune-up PowerLimit (dBm)	
		Main Ant 1	Main Ant 2
		Maximum	Maximum
LTE Band 2	QPSK	////////	20.0
LTE Band 12	QPSK	22.0	////////

Notes:

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

LTE Band 2 Main Ant 2 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				18700 1860 MHz	18900 1880 MHz	19100 1900 MHz		
20 MHz	QPSK	1	0	19.5	19.6	19.6	0	20
		1	49	19.5	19.6	19.5	0	20
		1	99	19.5	19.5	19.4	0	20
		50	0	19.5	19.6	19.6	0	20
		50	24	19.6	19.6	19.6	0	20
		50	50	19.5	19.6	19.5	0	20
		100	0	19.6	19.6	19.6	0	20
	16QAM	1	0	19.8	19.9	19.9	0	20
		1	49	19.9	20.0	20.0	0	20
		1	99	19.7	20.0	19.7	0	20
		50	0	19.5	19.6	19.6	0	20
		50	24	19.6	19.6	19.6	0	20
		50	50	19.6	19.6	19.5	0	20
		100	0	19.6	19.6	19.6	0	20
	64QAM	1	0	19.9	19.8	19.8	0	20
		1	49	20.0	20.0	19.9	0	20
		1	99	19.9	19.8	19.6	0	20
		50	0	19.6	19.6	19.6	0	20
		50	24	19.6	19.6	19.6	0	20
		50	50	19.6	19.6	19.6	0	20
		100	0	19.6	19.6	19.6	0	20

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				18675 1857.5 MHz	18900 1880 MHz	19125 1902.5 MHz		
15 MHz	QPSK	1	0	19.5	19.6	19.5	0	20
		1	37	19.6	19.6	19.5	0	20
		1	74	19.5	19.5	19.4	0	20
		36	0	19.5	19.6	19.6	0	20
		36	20	19.6	19.6	19.5	0	20
		36	39	19.5	19.5	19.5	0	20
		75	0	19.5	19.5	19.5	0	20
	16QAM	1	0	19.8	19.9	19.8	0	20
		1	37	19.9	19.9	19.8	0	20
		1	74	19.8	19.7	19.7	0	20
		36	0	19.5	19.6	19.6	0	20
		36	20	19.6	19.6	19.6	0	20
		36	39	19.6	19.6	19.5	0	20
		75	0	19.5	19.6	19.5	0	20
	64QAM	1	0	19.8	20.0	19.7	0	20
		1	37	19.8	20.0	19.7	0	20
		1	74	19.7	19.9	19.6	0	20
		36	0	19.5	19.6	19.6	0	20
		36	20	19.6	19.6	19.6	0	20
		36	39	19.6	19.6	19.5	0	20
		75	0	19.6	19.6	19.6	0	20

LTE Band 2 Main Ant 2 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				18650	18900	19150		
				1855 MHz	1880 MHz	1905 MHz		
10 MHz	QPSK	1	0	19.6	19.7	19.6	0	20
		1	25	19.6	19.7	19.6	0	20
		1	49	19.5	19.6	19.5	0	20
		25	0	19.7	19.7	19.7	0	20
		25	12	19.6	19.7	19.6	0	20
		25	25	19.6	19.6	19.6	0	20
		50	0	19.6	19.7	19.6	0	20
	16QAM	1	0	19.9	20.0	20.0	0	20
		1	25	20.0	20.0	19.9	0	20
		1	49	19.9	19.9	20.0	0	20
		25	0	19.6	19.7	19.7	0	20
		25	12	19.6	19.7	19.7	0	20
		25	25	19.6	19.7	19.6	0	20
		50	0	19.6	19.7	19.7	0	20
	64QAM	1	0	19.9	20.0	19.9	0	20
		1	25	19.8	20.0	19.9	0	20
		1	49	19.8	19.9	19.9	0	20
		25	0	19.7	19.7	19.7	0	20
		25	12	19.7	19.7	19.7	0	20
		25	25	19.6	19.7	19.6	0	20
		50	0	19.7	19.7	19.7	0	20

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				18625	18900	19175		
				1852.5 MHz	1880 MHz	1907.5 MHz		
5 MHz	QPSK	1	0	19.6	19.7	19.6	0	20
		1	12	19.7	19.8	19.6	0	20
		1	24	19.5	19.7	19.5	0	20
		12	0	19.7	19.7	19.7	0	20
		12	7	19.7	19.7	19.6	0	20
		12	13	19.6	19.7	19.6	0	20
		25	0	19.6	19.6	19.6	0	20
	16QAM	1	0	20.0	20.0	20.0	0	20
		1	12	20.0	20.0	20.0	0	20
		1	24	20.0	20.0	19.9	0	20
		12	0	19.7	19.8	19.7	0	20
		12	7	19.7	19.8	19.7	0	20
		12	13	19.6	19.8	19.6	0	20
		25	0	19.6	19.7	19.7	0	20
	64QAM	1	0	20.0	20.0	19.9	0	20
		1	12	20.0	20.0	19.9	0	20
		1	24	20.0	19.9	19.9	0	20
		12	0	19.7	19.8	19.6	0	20
		12	7	19.6	19.8	19.6	0	20
		12	13	19.5	19.8	19.5	0	20
		25	0	19.7	19.7	19.6	0	20

LTE Band 2 Main Ant 2 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				18615 1851.5 MHz	18900 1880 MHz	19185 1908.5 MHz		
3 MHz	QPSK	1	0	19.6	19.6	19.6	0	20
		1	8	19.6	19.7	19.6	0	20
		1	14	19.4	19.5	19.4	0	20
		8	0	19.7	19.7	19.6	0	20
		8	4	19.6	19.7	19.6	0	20
		8	7	19.6	19.7	19.6	0	20
		15	0	19.6	19.6	19.6	0	20
	16QAM	1	0	19.9	20.0	20.0	0	20
		1	8	19.9	20.0	20.0	0	20
		1	14	19.7	20.0	19.8	0	20
		8	0	19.7	19.7	19.8	0	20
		8	4	19.7	19.7	19.8	0	20
		8	7	19.6	19.8	19.7	0	20
		15	0	19.6	19.6	19.6	0	20
	64QAM	1	0	19.8	20.0	19.9	0	20
		1	8	19.8	20.0	19.9	0	20
		1	14	19.6	19.9	19.8	0	20
		8	0	19.7	19.7	19.7	0	20
		8	4	19.7	19.7	19.6	0	20
		8	7	19.7	19.8	19.6	0	20
		15	0	19.7	19.7	19.6	0	20

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				18607 1850.7 MHz	18900 1880 MHz	19193 1909.3 MHz		
1.4 MHz	QPSK	1	0	19.6	19.7	19.6	0	20
		1	3	19.6	19.7	19.6	0	20
		1	5	19.5	19.6	19.5	0	20
		3	0	19.6	19.7	19.6	0	20
		3	1	19.6	19.7	19.5	0	20
		3	3	19.6	19.7	19.5	0	20
		6	0	19.6	19.7	19.5	0	20
	16QAM	1	0	19.8	20.0	20.0	0	20
		1	3	19.8	20.0	20.0	0	20
		1	5	19.7	20.0	19.9	0	20
		3	0	19.8	19.9	19.7	0	20
		3	1	19.8	19.9	19.8	0	20
		3	3	19.8	19.9	19.8	0	20
		6	0	19.6	19.7	19.7	0	20
	64QAM	1	0	20.0	19.9	20.0	0	20
		1	3	20.0	20.0	19.9	0	20
		1	5	19.8	19.8	19.9	0	20
		3	0	19.7	19.9	19.8	0	20
		3	1	19.7	19.9	19.8	0	20
		3	3	19.7	19.9	19.7	0	20
		6	0	19.7	19.7	19.6	0	20

LTE Band 12 Main Ant 1 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				23095 707.5 MHz				
10 MHz	QPSK	1	0	21.3			0	22
		1	25	21.3			0	22
		1	49	21.4			0	22
		25	0	21.3			0	22
		25	12	21.4			0	22
		25	25	21.3			0	22
		50	0	21.3			0	22
	16QAM	1	0	21.7			0	22
		1	25	21.6			0	22
		1	49	21.7			0	22
		25	0	21.3			0	22
		25	12	21.3			0	22
		25	25	21.3			0	22
		50	0	21.3			0	22
	64QAM	1	0	21.5			0	22
		1	25	21.5			0	22
		1	49	21.5			0	22
		25	0	21.2			0	22
		25	12	21.3			0	22
		25	25	21.3			0	22
		50	0	21.2			0	22

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				23035 701.5 MHz	23095 707.5 MHz	23155 713.5 MHz		
5 MHz	QPSK	1	0	21.3	21.3	21.4	0	22
		1	12	21.4	21.4	21.4	0	22
		1	24	21.3	21.3	21.3	0	22
		12	0	21.4	21.3	21.4	0	22
		12	7	21.4	21.4	21.4	0	22
		12	13	21.3	21.3	21.4	0	22
		25	0	21.3	21.3	21.3	0	22
	16QAM	1	0	21.7	21.6	21.8	0	22
		1	12	21.7	21.7	21.9	0	22
		1	24	21.7	21.6	21.8	0	22
		12	0	21.4	21.3	21.4	0	22
		12	7	21.4	21.5	21.4	0	22
		12	13	21.3	21.4	21.4	0	22
		25	0	21.4	21.3	21.3	0	22
	64QAM	1	0	21.6	21.5	21.7	0	22
		1	12	21.6	21.5	21.8	0	22
		1	24	21.6	21.5	21.7	0	22
		12	0	21.3	21.2	21.2	0	22
		12	7	21.3	21.3	21.2	0	22
		12	13	21.2	21.3	21.3	0	22
		25	0	21.2	21.2	21.2	0	22

LTE Band 12 Main Ant 1 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				23025 700.5 MHz	23095 707.5 MHz	23165 714.5 MHz		
3 MHz	QPSK	1	0	21.3	21.2	21.3	0	22
		1	8	21.3	21.3	21.4	0	22
		1	14	21.1	21.2	21.3	0	22
		8	0	21.3	21.3	21.4	0	22
		8	4	21.3	21.4	21.4	0	22
		8	7	21.3	21.3	21.4	0	22
		15	0	21.3	21.3	21.3	0	22
	16QAM	1	0	21.6	21.6	21.6	0	22
		1	8	21.6	21.7	21.7	0	22
		1	14	21.5	21.6	21.6	0	22
		8	0	21.4	21.3	21.4	0	22
		8	4	21.4	21.4	21.4	0	22
		8	7	21.4	21.4	21.4	0	22
		15	0	21.3	21.3	21.3	0	22
	64QAM	1	0	21.6	21.5	21.4	0	22
		1	8	21.6	21.6	21.6	0	22
		1	14	21.5	21.5	21.4	0	22
		8	0	21.3	21.2	21.3	0	22
		8	4	21.3	21.3	21.3	0	22
		8	7	21.2	21.2	21.4	0	22
		15	0	21.2	21.2	21.2	0	22

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				23017 699.7 MHz	23095 707.5 MHz	23173 715.3 MHz		
1.4 MHz	QPSK	1	0	21.3	21.3	21.4	0	22
		1	3	21.3	21.3	21.4	0	22
		1	5	21.2	21.3	21.3	0	22
		3	0	21.3	21.3	21.3	0	22
		3	1	21.3	21.3	21.3	0	22
		3	3	21.3	21.3	21.3	0	22
		6	0	21.3	21.3	21.3	0	22
	16QAM	1	0	21.5	21.6	21.8	0	22
		1	3	21.5	21.7	21.7	0	22
		1	5	21.4	21.6	21.6	0	22
		3	0	21.4	21.5	21.5	0	22
		3	1	21.5	21.5	21.5	0	22
		3	3	21.4	21.4	21.5	0	22
		6	0	21.3	21.3	21.4	0	22
	64QAM	1	0	21.5	21.5	21.7	0	22
		1	3	21.5	21.6	21.8	0	22
		1	5	21.5	21.5	21.6	0	22
		3	0	21.5	21.4	21.4	0	22
		3	1	21.4	21.4	21.4	0	22
		3	3	21.5	21.3	21.4	0	22
		6	0	21.3	21.2	21.2	0	22

10.   Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:
- Reported SAR(W/kg) for WWAN and Bluetooth = Measured SAR *Tune-up Scaling Factor
- Reported SAR(W/kg) for Wi-Fi = Measured SAR * Tune-up scaling factor * Duty Cycle scaling factor
- Duty Cycle scaling factor = 1 / Duty cycle (%)

KDB 447498 D01 General RF Exposure Guidance:
Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:
- ≤ 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):
For smart phones, with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm.
When hotspot mode does not apply, 10-g Extremity SAR is required for all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg; however, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold.

KDB 941225 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.

10.1. LTE Band 2 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offest	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	QPSK	Main Ant 2	0	Left Touch	18900	1880.0	1	0	20.0	19.6	0.046	**0.050**	1
							50	0	20.0	19.6	0.046	0.050	
				Left Tilt	18900	1880.0	1	0	20.0	19.6	0.025	0.028	
							50	0	20.0	19.6	0.025	0.028	
				Right Touch	18900	1880.0	1	0	20.0	19.6	0.041	0.045	
							50	0	20.0	19.6	0.040	0.044	
				Right Tilt	18900	1880.0	1	0	20.0	19.6	0.039	0.042	
							50	0	20.0	19.6	0.037	0.041	
Body-worn & Hotspot	QPSK	Main Ant 2	10	Rear	18900	1880.0	1	0	20.0	19.6	0.286	**0.314**	2
							50	0	20.0	19.6	0.283	0.310	
				Front	18900	1880.0	1	0	20.0	19.6	0.260	0.285	
							50	0	20.0	19.6	0.253	0.277	
Hotspot	QPSK	Main Ant 2	10	Edge 2	18900	1880.0	1	0	20.0	19.6	0.110	0.121	
							50	0	20.0	19.6	0.107	0.117	
				Edge 3	18900	1880.0	1	0	20.0	19.6	0.343	**0.376**	3
							50	0	20.0	19.6	0.343	0.376	

Notes:

10-g extremity SAR is not required since hotspot mode 1-g reported SAR < 1.2 W/kg

10.2. LTE Band 12 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offest	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	QPSK	Main Ant 1	0	Left Touch	23095	707.5	1	49	22.0	21.4	0.013	0.015	
							25	12	22.0	21.4	0.012	0.014	
				Left Tilt	23095	707.5	1	49	22.0	21.4	0.005	0.006	
							25	12	22.0	21.4	0.005	0.006	
				Right Touch	23095	707.5	1	49	22.0	21.4	0.015	**0.017**	4
							25	12	22.0	21.4	0.013	0.015	
				Right Tilt	23095	707.5	1	49	22.0	21.4	0.005	0.005	
							25	12	22.0	21.4	0.004	0.005	
Body-worn & Hotspot	QPSK	Main Ant 1	10	Rear	23095	707.5	1	49	22.0	21.4	0.120	**0.138**	5
							25	12	22.0	21.4	0.110	0.126	
				Front	23095	707.5	1	49	22.0	21.4	0.093	0.107	
							25	12	22.0	21.4	0.085	0.098	
Hotspot	QPSK	Main Ant 1	10	Edge 3	23095	707.5	1	49	22.0	21.4	0.062	0.071	
							25	12	22.0	21.4	0.056	0.064	
				Edge 4	23095	707.5	1	49	22.0	21.4	0.046	0.053	
							25	12	22.0	21.4	0.041	0.047	

Notes:

10-g extremity SAR is not required since hotspot mode 1-g reported SAR < 1.2 W/kg

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.

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

12.   Simultaneous Transmission Conditions

RF Exposure Conditions	Tx Mode	WWAN Main Ant 1/ Ant	WLAN/BT Chain 0			WLAN/BT Chain 1		
			2.4 GHz	5 GHz	BT	2.4 GHz	5 GHz	BT
Head & Body-worn & Hotspot	1	X	X			X		
	2	X		X			X	
	3	X		X	X		X	
	4	X		X			X	X
	5	X	X	X		X	X	
Extremity	6	X	X			X		
	7	X		X			X	
	8	X		X	X		X	
	9	X		X			X	X
	10	X	X	X		X	X	

Note(s):

- Cellular Main Antenna 1 and Cellular Main Antenna 2 can not transmit simultaneously

- WLAN 2.4GHz and Bluetooth radio can not transmit simultaneously

- WLAN 2.4GHz and WLAN 5GHz radio can transmit simultaneously

- 10-g extremity SAR is not required since hotspot mode 1-g reported SAR < 1.2 W/kg for all bands that supports hotspot

12.1.   Simultaneous transmission SAR test exclusion considerations

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

Sum of SAR

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

12.2.   Sum of the SAR for WWAN Main Ant 1 & Wi-Fi Normal State & BT

RF Exposure conditions	Test Position	Standalone SAR (W/kg)							∑ 1-g SAR (W/kg)			
		WWAN	DTS		U-NII		BT		WWAN + DTS	WWAN + U-NII	WWAN + UNII + BT	WWAN + UNII + BT
		Main Ant 1 ①	Chain 0 ②	Chain 1 ③	Chain 0 ④	Chain 1 ⑤	Chain 0 ⑥	Chain 1 ⑦	①+②+③	①+④+⑤	①+④+⑤+⑥	①+④+⑤+⑦
Head	Left Touch	0.015	0.122	0.010	0.353	0.010	0.084	0.010	0.147	0.378	0.462	0.388
	Left Tilt	0.006	0.122	0.010	0.353	0.010	0.016	0.010	0.138	0.369	0.385	0.379
	Right Touch	0.017	0.816	0.010	0.353	0.010	0.333	0.010	0.843	0.380	0.713	0.390
	Right Tilt	0.005	0.122	0.010	0.353	0.010	0.066	0.010	0.137	0.368	0.434	0.378
Body-worn & Hotspot	Rear	0.138	0.139	0.082	0.026	0.155	0.061	0.015	0.359	0.319	0.380	0.334
	Front	0.107	0.139	0.004	0.017	0.155	0.047	0.010	0.250	0.279	0.326	0.289
Hotspot	Edge 1		0.139		0.106		0.002		0.139	0.106	0.108	0.106
	Edge 3	0.071		0.004		0.155		0.010	0.075	0.226	0.226	0.236
	Edge 4	0.053	0.232	0.004	0.106	0.155	0.109	0.010	0.289	0.314	0.423	0.324

Notes:

- WLAN and Bluetooth SAR results from UL report # 14176139-S1 have been used in this report for Simultaneous Transmission analysis. Refer to note in §1
- Simultaneous transmission SAR measurement (Volume Scan) is not required because either the sum of the 1-g SAR is < 1.6 W/kg.

12.3. Sum of the SAR for WWAN Main Ant 1 & Wi-Fi Simultaneous 2G_5G State

RF Exposure conditions	Test Position	WWAN Main Ant 1 ①	DTS Chain 0 ②	DTS Chain 1 ③	U-NII Chain 0 ④	U-NII Chain 1 ⑤	∑ 1-g SAR (W/kg) WWAN + DTS + UNII ①+②+③+④+⑤
Head	Left Touch	0.015	0.330	0.010	0.171	0.010	0.536
Head	Left Tilt	0.006	0.330	0.010	0.171	0.010	0.527
Head	Right Touch	0.017	0.330	0.010	0.171	0.010	0.538
Head	Right Tilt	0.005	0.330	0.010	0.171	0.010	0.526
Body-worn & Hotspot	Rear	0.138	0.052	0.048	0.019	0.108	0.365
Body-worn & Hotspot	Front	0.107	0.052	0.048	0.065	0.108	0.380
Hotspot	Edge 1		0.103		0.065		0.168
Hotspot	Edge 3	0.071		0.010		0.108	0.189
Hotspot	Edge 4	0.053	0.103	0.010	0.065	0.108	0.339

Notes:
- WLAN and Bluetooth SAR results from UL report # 14176139-S1 have been used in this report for Simultaneous Transmission analysis. Refer to note in §1
- Simultaneous transmission SAR measurement (Volume Scan) is not required because either the sum of the 1-g SAR is < 1.6 W/kg.

12.4. Sum of the SAR for WWAN Main Ant 2 & Wi-Fi Normal State & BT

RF Exposure conditions	Test Position	WWAN Main Ant 2 ①	DTS Chain 0 ②	DTS Chain 1 ③	U-NII Chain 0 ④	U-NII Chain 1 ⑤	BT Chain 0 ⑥	BT Chain 1 ⑦	∑ 1-g SAR (W/kg) WWAN + DTS ①+②+③	WWAN + U-NII ①+④+⑤	WWAN + UNII + BT ①+④+⑤+⑥	WWAN + UNII + BT ①+④+⑤+⑦
Head	Left Touch	0.050	0.122	0.010	0.353	0.010	0.084	0.010	0.182	0.413	0.497	0.423
Head	Left Tilt	0.028	0.122	0.010	0.353	0.010	0.016	0.010	0.160	0.391	0.407	0.401
Head	Right Touch	0.045	0.816	0.010	0.353	0.010	0.333	0.010	**0.871**	0.408	0.741	0.418
Head	Right Tilt	0.042	0.122	0.010	0.353	0.010	0.066	0.010	0.174	0.405	0.471	0.415
Body-worn & Hotspot	Rear	0.314	0.139	0.082	0.026	0.155	0.061	0.015	0.535	0.495	0.556	0.510
Body-worn & Hotspot	Front	0.285	0.139	0.004	0.017	0.155	0.047	0.010	0.428	0.457	0.504	0.467
Hotspot	Edge 1		0.139		0.106		0.002		0.139	0.106	0.108	0.106
Hotspot	Edge 3	0.376		0.004		0.155		0.010	0.380	0.531	0.531	0.541
Hotspot	Edge 4		0.232	0.004	0.106	0.155	0.109	0.010	0.236	0.261	0.370	0.271

Notes:
- WLAN and Bluetooth SAR results from UL report # 14176139-S1 have been used in this report for Simultaneous Transmission analysis. Refer to note in §1
- Simultaneous transmission SAR measurement (Volume Scan) is not required because either the sum of the 1-g SAR is < 1.6 W/kg.

12.5. Sum of the SAR for WWAN Main Ant 2 & Wi-Fi Simultaneous 2G_5G State

RF Exposure conditions	Test Position	WWAN Main Ant 2 ①	DTS Chain 0 ②	DTS Chain 1 ③	U-NII Chain 0 ④	U-NII Chain 1 ⑤	∑ 1-g SAR (W/kg) WWAN + DTS + UNII ①+②+③+④+⑤
Head	Left Touch	0.050	0.330	0.010	0.171	0.010	0.571
Head	Left Tilt	0.028	0.330	0.010	0.171	0.010	0.549
Head	Right Touch	0.045	0.330	0.010	0.171	0.010	0.566
Head	Right Tilt	0.042	0.330	0.010	0.171	0.010	0.563
Body-worn & Hotspot	Rear	0.314	0.052	0.048	0.019	0.108	0.541
Body-worn & Hotspot	Front	0.285	0.052	0.048	0.065	0.108	0.558
Hotspot	Edge 1		0.103		0.065		0.168
Hotspot	Edge 3	0.376		0.010		0.108	0.494
Hotspot	Edge 4		0.103	0.010	0.065	0.108	0.286

Notes:
- WLAN and Bluetooth SAR results from UL report # 14176139-S1 have been used in this report for Simultaneous Transmission analysis. Refer to note in §1
- Simultaneous transmission SAR measurement (Volume Scan) is not required because either the sum of the 1-g SAR is < 1.6 W/kg.

Appendixes

Refer to separated files for the following appendixes.

Appendix A: SAR Setup Photos

Appendix B: SAR System Check Plots

Appendix C: SAR Highest Test Plots

Appendix D: SAR Tissue Ingredients

Appendix E: SAR Probe Certificates

Appendix F: SAR Dipole Certificates

END OF REPORT