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: PY7-17565F

Report Number: R14311589-S1V3
Issue Date: 8/22/2022

Prepared for

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ACCREDITED
CERT #0751.06

Revision History

Rev.	Date	Revisions	Revised By
V1	8/12/2022	Initial Issue	--
V2	8/17/2022	Corrected 8.2 10g zoom scan result for 1750 MHz (2A -- 07/27/2022). Revised output power tables for 9.1 GSM 850 DTM, 9.3 LTE Band 2, and 9.3 LTE Band 4. Changed RB 50/50 measured power for 10.5 LTE Band 2 to correctly match output power table and updated corresponding highest SAR plots in Appendix C. Updated 10.6 LTE Band 4 table for RB 1/99 with the new measured power and updated highest SAR plot in Appendix C. For section 10.8 the title was updated to include Bluetooth, test position was changed to right touch (instead of right cheek), and all the output power rounding and the leveraged data scaling was corrected. Added LTE Band 17 to supported list, and removed TDD references.	Lindsay Ryan
V3	8/22/2022	Updated DUT information in § 6	Richard Jankovics
V3	8/22/2022	Updated Section 1: BT reported SAR. Updated Section 12.2 and 12.4 BT result.	Devin Chang

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1. Attestation of Test Results

Applicant Name	Sony Corporation			
FCC ID	PY7-17565F			
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	0.188	0.580	0.284	0.210
Body-worn*	0.575	0.122	0.099	0.045
Hotspot/BT Tethering	0.631	0.232	0.116	0.070
Extremity (10g)	N/A	N/A	0.440	N/A
Simultaneous TX	0.819	0.819	0.819	0.769
Date Tested	7/25/2022 to 8/3/2022			
Test Results	Pass			

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.

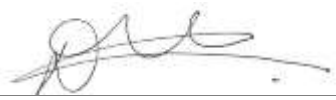
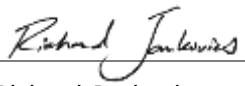
Note: WLAN and Bluetooth SAR data is referenced from FCC ID: **PY7-93060R** (UL report # 14311585-S1) and is leveraged to cover variant FCC ID: **PY7-17565F**. All circuitry and features for WLAN and Bluetooth operations are identical between the two variants. The data reuse test plan was approved via manufacturer, with spot check measurements on worst case conditions. Worst case SAR results for WLAN and Bluetooth from referenced variant FCC ID: **PY7-93060R** are listed above. WLAN and Bluetooth SAR results from FCC ID: **PY7-93060R** have been used in this report for Simultaneous Transmission analysis.

UL LLC 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 LLC 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.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC 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 A2LA, NIST, or any agency of the U.S. Government, or any agency of the U.S. government.

Approved & Released By:	Prepared By
	
Dave Weaver Operations Leader UL Verification Services Inc.	Richard Jankovics Operations Leader UL LLC

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; RF Exposure Procedures (Other LTE Considerations)
- TCB Workshop April 2015; RF Exposure Procedures (Overlapping LTE Bands)
- TCB Workshop October 2015; RF Exposure Procedures (KDB 941225 D05A)
- TCB Workshop October 2016; RF Exposure Procedures (Bluetooth Duty Factor)
- TCB Workshop October 2016; RF Exposure Procedures (DUT Holder Perturbations)
- TCB Workshop May 2017; RF Exposure Procedures (Broadband Liquid Above 3 GHz)
- TCB Workshop April 2019; RF Exposure Procedures (Tissue Simulating Liquids (TSL))
- TCB Workshop April 2019; RF Exposure Procedures (802.11ax SAR Testing)

3. Facilities and Accreditation

The test sites and measurement facilities used to collect data are located at 2800 Perimeter Park Dr, Morrisville, NC, USA.

- SAR Lab 1A
- SAR Lab 2A
- SAR Lab 2B

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
☒	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

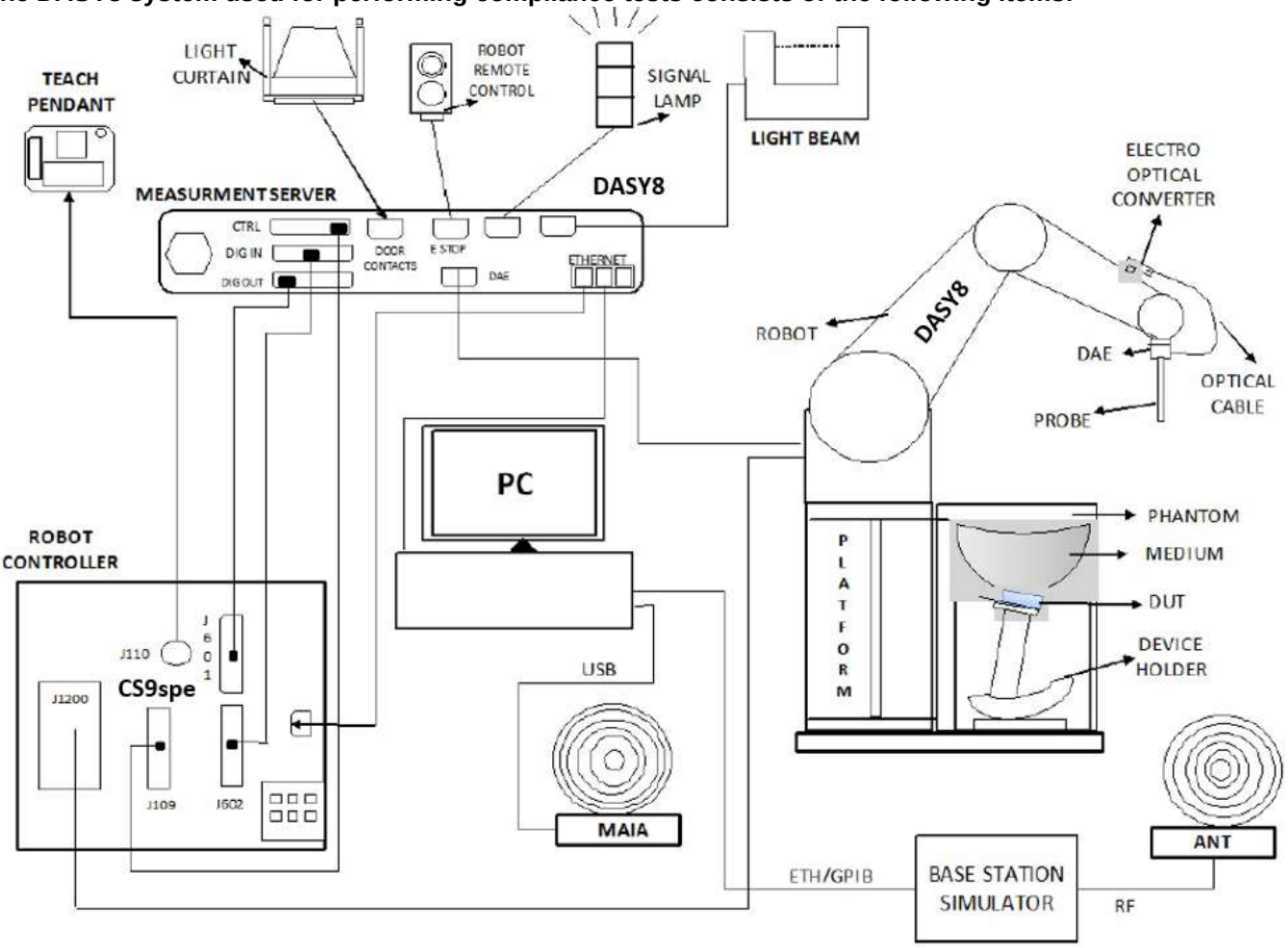
UL LLC is accredited by A2LA, Certificate Number #0751.06

The Test Lab Conformity Assessment Body Identifier (CABID)

4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

The DASY8 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 Win10 and the DASY8[1] 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.

[1] DASY8 software used: DASY16.0.2.83 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	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.	

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

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

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
Network Analyzer	Keysight	E5063A	MY54100681	08/20/2022
Dielectric Probe	SPEAG	DAKS-3.5	1051	11/16/2022
Shorting Block	SPEAG	DAK-3.5 Short	SMDAK 200 DA	11/16/2022
Thermometer	Fisher Scientific	15-078-181	210204689	03/13/2023

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Signal Generator	Keysight	N5181A	MY50140788	12/09/2022
Signal Generator	Agilent	83640B	3844A00978	08/18/2022
Signal Generator	Keysight	N5182B	MY51350128	05/19/2023
Power Meter[1]	Keysight	N1912A	MY55136012	07/31/2022
Power Meter[1]	Keysight	N1912A	MY55116004	07/31/2022
Power Sensor	Keysight	N1921A	MY55090023	03/22/2023
Power Sensor	Keysight	N1921A	MY55090025	09/07/2022
Amplifier	MITEQ	AMF-4D-00400600-50-30P	N/A	N/A
Directional coupler	Mini-Circuits	ZUDC10-183+	1438	NA
DC Power Supply	Miteq	PS 15V1	1990186	N/A
RF Power Source	Speag	PowerSource1	4278	06/21/2023

Note(s):

1) Equipment not used past calibration due date.

Lab Equipment

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
E-Field Probe	SPEAG	EX3DV4	7549	02/21/2023
E-Field Probe	SPEAG	EX3DV4	7709	02/25/2023
E-Field Probe	SPEAG	EX3DV4	7711	03/11/2023
Data Acquisition Electronics	SPEAG	DAE4	1716	03/08/2023
Data Acquisition Electronics	SPEAG	DAE4	1714	02/23/2023
Data Acquisition Electronics	SPEAG	DAE4	1715	02/22/2023
System Validation Dipole	SPEAG	D750V3	1139	10/06/2022
System Validation Dipole	SPEAG	D900V2	1d180	10/06/2022
System Validation Dipole	SPEAG	D1750V2	1136	10/12/2022
System Validation Dipole	SPEAG	D1900V2	5d202	10/06/2022
System Validation Dipole	SPEAG	D2450V2	963	10/06/2022
System Validation Dipole	SPEAG	D5GHzV2	1213	10/12/2022
Environmental Indicator	Control Company	06-662-4	200037610	02/24/2023
Environmental Indicator	Control Company	06-662-4	200037635	02/24/2023

Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
3-Path Diode Power Sensor	Rohde & Schwarz	NRP8S	112236	5/31/2023
3-Path Diode Power Sensor	Rohde & Schwarz	NRP8S	112237	5/31/2023
RF Power Meter	Keysight	N1911a	MY55116001	7/07/2023
RF Power Meter	Keysight	N1911a	MY55116003	8/17/2022
RF Power Sensor	Keysight	N1921a	MY55090047	12/17/2022
RF Power Sensor	ETS Lindgren	7002-006	151058	3/09/2023
RF Power Sensor	ETS Lindgren	7002-006	160130	3/11/2023
RF Power Sensor	Boonton Electronics	RTP5008	12001	10/01/2022
RF Power Sensor	Boonton Electronics	RTP5008	12002	10/01/2022
Base Station Simulator	R & S	CMW 500	170733	11/15/2022
Base Station Simulator	R & S	CMW 500	170732	11/18/2022
Base Station Simulator	R & S	CMW 500	170193	4/29/2023
Base Station Simulator	R & S	CMW 500	170194	5/05/2023
Base Station Simulator	Anritsu	MT8821C	6262116751	5/14/2023
Base Station Simulator	Anritsu	MT8821C	6262287681	7/8/2023
DC Power Supply	Keysight	E3633A	MY58426145	N/A
DC Power Supply	Keysight	E3633A	MY62176088	N/A
DC Power Supply	Keysight	E3633A	MY62176089	N/A
DC Power Supply	Keysight	E3633A	MY61466084	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	This is a Phablet Device (display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm) Refer to Appendix A
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 5.2GHz & 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** QV7700H6D8 / 00440254-382366-4 / Radiated WWAN QV7700F8D8 / 00440254-382380-5 / Radiated WWAN QV770089D8 / 00440254-382368-0 / Radiated WLAN QV7700B7D8 / 00440254-382128-8 / Conducted WWAN QV7700BYD8 / 00440254-382144-5 / Conducted WWAN QV7700DLD8 / 00440254-381670-0 / Conducted WLAN
Hardware Version	A
Software Version	(WWAN) 0.42 (WLAN) 2.36

6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode		Duty Cycle used for SAR testing
GSM	850 1900	Voice (GMSK) GPRS (GMSK) EDGE (8PSK)	GSM Class : 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)
	Does this device support SV-LTE (1xRTT-LTE)? ☐ Yes ☒ No			
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20) 802.11ac (VHT20) 802.11ax (HE20)		99.92% (802.11b)[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)		99.63% (802.11ac 80MHz BW)[2] 99.65% (802.11ac 160MHz BW)[2]
	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)[3]

Notes:

1. Refer to §9.4 for Wi-Fi 2.4GHz Duty Cycle Measurement.
2. Refer to §9.5 for Wi-Fi 5GHz Duty Cycle Measurements.
3. Refer to §9.6 for Bluetooth Duty Cycle Measurement.

6.3. General LTE SAR Test and Reporting Considerations

Item	Description						
Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 2	Frequency range: 1710 - 1755 MHz (BW = 45 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	18165/ 1851.5	18067/ 1850.7
	Mid	**18900/ 1880**	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880
	High	**19100/ 1900**	19125/ 1902.5	19150/ 1905	19175/ 1907.5	19185/ 1908.5	19193/ 1909.3
	Band 4	Frequency range: 1710 - 1755 MHz (BW = 45 MHz)					
		Channel Bandwidth					
		20 MHz [1]	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 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
	Band 17	Frequency range: 704 - 716 MHz (BW = 12 MHz)					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz [1]	5 MHz [1]	3 MHz	1.4 MHz
	Low			23780/ 709	23755/ 706.5		
	Mid			**23790/ 710**	23790/ 710		
	High			23800/ 711	23825/ 713.5		

General LTE SAR Test and Reporting Considerations (continued)

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** 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
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.

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

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. SAR Testing for LTE was performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

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	GSM 850 LTE B12/17	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Cellular Main Antenna 2	GSM 1900 W-CDMA B2/4 LTE B2/4	Yes	Yes	Yes	No	Yes	Yes	No	Yes
WLAN/BT Chain 0	Wi-Fi 2.4GHz Wi-Fi 5GHz Bluetooth	Yes	Yes	Yes	Yes	No	No	Yes	Yes
WLAN/BT Chain 1	Wi-Fi 2.4GHz Wi-Fi 5GHz Bluetooth	Yes	Yes	Yes	No	No	Yes	Yes	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 (%)
1A	2022-08-01	5250	Head	5250	35.10	35.93	-2.32	4.70	4.70	-0.02
				5150	35.30	36.05	-2.07	4.59	4.60	-0.28
				5350	34.91	35.82	-2.54	4.81	4.80	0.20
1A	2022-08-01	5600	Head	5600	34.44	35.53	-3.08	5.11	5.06	0.90
				5500	34.62	35.65	-2.88	4.99	4.96	0.55
				5725	34.20	35.39	-3.37	5.25	5.19	1.13
1A	2022-08-02	900	Head	900	42.43	41.50	2.24	0.94	0.97	-2.87
				840	42.55	41.50	2.53	0.92	0.91	2.01
				915	42.35	41.50	2.05	0.95	0.98	-3.14
1A	2022-08-03	1900	Head	1900	38.49	40.00	-3.78	1.45	1.40	3.21
				1850	38.57	40.00	-3.58	1.42	1.40	1.14
				1920	38.46	40.00	-3.85	1.46	1.40	4.21
2A	2022-07-25	750	Head	750	40.98	41.96	-2.34	0.91	0.89	1.85
				660	41.27	42.42	-2.72	0.88	0.89	-0.88
				800	40.91	41.71	-1.91	0.92	0.90	2.87
2A	2022-07-25	1900	Head	1900	38.74	40.00	-3.15	1.45	1.40	3.86
				1850	38.84	40.00	-2.90	1.43	1.40	2.00
				1920	38.71	40.00	-3.23	1.47	1.40	4.86
2A	2022-08-02	750	Head	750	42.99	41.96	2.45	0.92	0.89	3.18
				660	43.29	42.42	2.04	0.89	0.89	0.65
				800	42.91	41.71	2.89	0.93	0.90	4.20
2B	2022-07-27	1750	Head	1750	38.32	40.08	-4.40	1.40	1.37	2.56
				1710	38.41	40.15	-4.32	1.38	1.35	2.20
				1755	38.31	40.08	-4.41	1.41	1.37	2.57
2B	2022-07-29	2450	Head	2450	37.88	39.20	-3.37	1.82	1.80	1.00
				2400	37.95	39.30	-3.43	1.78	1.75	1.73
				2480	37.85	39.16	-3.35	1.84	1.83	0.47
2B	2022-08-01	1750	Head	1750	38.47	40.08	-4.03	1.39	1.37	1.32
				1710	38.54	40.15	-4.00	1.36	1.35	1.01
				1755	38.47	40.08	-4.01	1.39	1.37	1.33

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 recorded and 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	Dipole Power (dBm)	Measured Results for 1g SAR				Measured Results for 10g SAR				Plot No.
						Zoom Scan	Normalize to 1 W	Target (Ref. Value)	Delta ±10 %	Zoom Scan	Normalize to 1 W	Target (Ref. Value)	Delta ±10 %	
1A	8/1/2022	Head	D5GHzV2 SN: 1213 (5.25 GHz)	10/12/2022	17.0	4.000	79.81	76.20	4.74	1.140	22.75	22.30	2.00	1
1A	8/1/2022	Head	D5GHzV2 SN: 1213 (5.60 GHz)	10/12/2022	17.0	4.260	85.00	81.80	3.91	1.200	23.94	23.60	1.45	2
1A	8/2/2022	Head	D900V2 SN: 1d180	10/6/2022	17.0	0.563	11.23	10.63	5.68	0.365	7.28	6.97	4.49	3
1A	8/3/2022	Head	D1900V2 SN: 5d202	10/6/2022	17.0	2.060	41.10	37.86	8.56	1.060	21.15	20.26	4.39	4
2A	7/25/2022	Head	D750V3 SN: 1139	10/6/2022	17.0	0.412	8.22	8.12	1.24	0.269	5.37	5.41	-0.79	
2A	7/26/2022	Head	D1900V2 SN: 5d202	10/6/2022	17.0	2.010	40.10	37.86	5.93	1.040	20.75	20.26	2.42	5
2A	8/2/2022	Head	D750V3 SN: 1139	10/6/2022	17.0	0.430	8.58	8.12	5.66	0.281	5.61	5.41	3.64	6
2B	7/27/2022	Head	D1750V2 SN: 1136	10/12/2022	17.0	1.870	37.31	34.44	8.34	0.984	19.61	18.63	5.28	7
2B	7/29/2022	Head	D2450V2 SN: 963	10/6/2022	17.0	2.660	53.07	51.36	3.34	1.230	24.54	24.56	-0.07	8
2B	8/1/2022	Head	D1750V2 SN: 1136	10/12/2022	17.0	1.850	36.91	34.44	7.18	0.969	19.33	18.63	3.78	

9. Conducted Output Power Measurements

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

9.1. GSM

Per KDB 941225 D01 3G SAR Procedures:

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

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

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

Per October 2013 TCB Workshop:
When the maximum frame-averaged powers levels are within 0.25 dB of each other, test the configuration with the most number of time slots.

GSM 850 Main Ant 1 Measured Results

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			
					Measured		Tune-up Limit	
					Burst Pwr	Frame Pwr	Burst Pwr	Frame Pwr
GPRS/EDGE (GMSK)	CS1	1	128	824.2	32.1	23.1	33.2	24.2
			190	836.6	32.2	23.2		
			251	848.8	32.6	23.6		
		2	128	824.2	28.9	22.9	30.2	24.2
			190	836.6	29.0	23.0		
			251	848.8	29.2	23.1		
		3	128	824.2	27.2	22.9	28.4	24.1
			190	836.6	27.3	23.0		
			251	848.8	27.4	23.1		
		4	128	824.2	26.1	23.1	27.2	**24.2**
			190	836.6	26.2	23.2		
			251	848.8	26.5	23.5		
EDGE (8PSK)	MCS5	1	128	824.2	26.6	17.6	27.7	18.7
			190	836.6	27.2	18.1		
			251	848.8	26.8	17.8		
		2	128	824.2	23.6	17.6	24.7	18.7
			190	836.6	23.6	17.6		
			251	848.8	23.8	17.8		
		3	128	824.2	21.8	17.6	22.9	18.6
			190	836.6	20.9	16.7		
			251	848.8	21.9	17.7		
		4	128	824.2	21.1	18.1	21.7	18.7
			190	836.6	20.9	17.9		
			251	848.8	21.7	18.7		

Notes:
Based on the Tune-up Procedure, GPRS/EDGE (GMSK) mode with 4 time slots for Max power has maximum frame-averaged power.

GSM 850 DTM Main Ant 1 Measured Results

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Maximum Average Power (dBm)							
					Measured				Tune-up Limit			
					CS Burst Pwr	PS Burst Pwr	CS Frame Pwr	PS Frame Pwr	CS Burst Pwr	PS Burst Pwr	CS Frame Pwr	PS Frame Pwr
GSM (Voice) + GPRS/EDGE (GMSK)	CS1	1	128	824.2	32.5		23.4		33.2		24.2	
			190	836.6	32.7		23.7					
			251	848.8	32.8		23.8					
		2	128	824.2	29.1	29.1	23.1	23.1	30.2	30.2	**24.2**	**24.2**
			190	836.6	29.2	29.2	23.2	23.2				
			251	848.8	29.3	29.2	23.2	23.2				
		3	128	824.2	27.2	26.9	22.9	22.7	28.4	28.4	24.1	24.1
			190	836.6	27.2	27.1	22.9	22.9				
			251	848.8	27.2	27.0	23.0	22.7				
GSM (Voice) + EDGE (8PSK)	MCS5	1	128	824.2	32.5		23.4		33.2		24.2	
			190	836.6	32.7		23.7					
			251	848.8	32.8		23.8					
		2	128	824.2	29.1	23.4	23.1	17.4	30.2	24.7	**24.2**	18.7
			190	836.6	29.2	23.5	23.2	17.5				
			251	848.8	29.3	23.5	23.2	17.5				
		3	128	824.2	27.2	21.1	22.9	16.8	28.4	22.9	24.1	18.6
			190	836.6	27.2	21.1	22.9	16.8				
			251	848.8	27.2	21.0	23.0	16.8				

Notes:

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

- GSM(Voice) + GMSK(GPRS) mode with 1 time slot for Max power based on the Tune-up Procedure.
- 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.

GSM 1900 Main Ant 2 Measured Results

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			
					Measured		Tune-up Limit	
					Burst Pwr	Frame Pwr	Burst Pwr	Frame Pwr
GPRS/EDGE (GMSK)	CS1	1	512	1850.2	26.7	17.6	27.7	18.7
			661	1880.0	26.9	17.9		
			810	1909.8	26.8	17.8		
		2	512	1850.2	23.8	17.7	24.7	18.7
			661	1880.0	23.7	17.6		
			810	1909.8	23.8	17.7		
		3	512	1850.2	21.8	17.5	22.9	18.6
			661	1880.0	22.1	17.8		
			810	1909.8	21.9	17.6		
		4	512	1850.2	20.9	17.9	21.7	**18.7**
			661	1880.0	20.9	17.8		
			810	1909.8	21.0	17.9		
EDGE (8PSK)	MCS5	1	512	1850.2	25.9	16.9	26.7	17.7
			661	1880.0	26.3	17.2		
			810	1909.8	26.4	17.3		
		2	512	1850.2	22.7	16.7	23.7	17.7
			661	1880.0	22.8	16.7		
			810	1909.8	22.9	16.9		
		3	512	1850.2	21.0	16.7	21.9	17.6
			661	1880.0	21.5	17.3		
			810	1909.8	21.3	17.0		
		4	512	1850.2	19.4	16.4	20.7	17.7
			661	1880.0	20.2	17.2		
			810	1909.8	19.7	16.7		

Notes:

Based on the Tune-up Procedure, GPRS/EDGE (GMSK) mode with 4 time slots for Max power has maximum frame-averaged power.

GSM 1900 DTM Main Ant 2 Measured Results

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Maximum Average Power (dBm)							
					Measured				Tune-up Limit			
					CS Burst Pwr	PS Burst Pwr	CS Frame Pwr	PS Frame Pwr	CS Burst Pwr	PS Burst Pwr	CS Frame Pwr	PS Frame Pwr
GSM (Voice) + GPRS/EDGE (GMSK)	CS1	1	512	1850.2	27.1		18.1		27.7		18.7	
			661	1880.0	27.0		18.0					
			810	1909.8	27.1		18.1					
		2	512	1850.2	24.6	24.6	18.5	18.5	24.7	24.7	**18.7**	**18.7**
			661	1880.0	24.6	24.6	18.5	18.5				
			810	1909.8	24.5	24.5	18.5	18.5				
		3	512	1850.2	22.7	22.5	18.4	18.3	22.9	22.9	18.6	18.6
			661	1880.0	22.6	22.4	18.3	18.1				
			810	1909.8	22.7	22.5	18.4	18.2				
GSM (Voice) + EDGE (8PSK)	MCS5	1	512	1850.2	27.1		18.1		27.7		18.7	
			661	1880.0	27.0		18.0					
			810	1909.8	27.1		18.1					
		2	512	1850.2	24.6	22.2	18.5	16.1	24.7	23.7	**18.7**	17.7
			661	1880.0	24.6	22.2	18.5	16.2				
			810	1909.8	24.5	22.2	18.5	16.2				
		3	512	1850.2	22.7	20.3	18.4	16.1	22.9	21.9	18.6	17.6
			661	1880.0	22.6	20.3	18.3	16.0				
			810	1909.8	22.7	20.1	18.4	15.8				

Notes:

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

- GSM(Voice) + GMSK(GPRS) mode with 1 time slot for Max power based on the Tune-up Procedure.
- 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.

9.2. W-CDMA

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

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

Release 99 Setup Procedures used to establish the test signals

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1. A summary of these settings is illustrated below:

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

HSDPA Setup Procedures used to establish the test signals

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

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d *(SF)*	β_c/β_d	β_{HS} *(Note1, Note 2)*	**CM** (dB) *(Note 3)*	**MPR** (dB) *(Note 3)*
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 *(Note 4)*	15/15 *(Note 4)*	64	12/15 *(Note 4)*	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.

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

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

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

HSUPA Setup Procedures used to establish the test signals

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

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (Note1)	β_{ec}	β_{ed} (Note 4) (Note 5)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed}1$: 47/15 $\beta_{ed}2$: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c. For sub-test 5, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 5/15 with β_{hs} = 5/15 * β_c.

Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

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

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

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

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

HSPA+

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

Notes:

SAR measurement is not required for the HSDPA and HSUPA. When primary mode and the adjusted SAR is ≤ 1.2 W/kg and secondary mode is ≤ ¼ dB higher than the primary mode

W-CDMA Band II Main Ant 2 Measured Results

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)		
				Measured Pwr	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	18.5	N/A	19.7
		9400	1880.0	18.4		
		9538	1907.6	18.5		
HSDPA	Subtest 1	9262	1852.4	17.7	0	19.0
		9400	1880.0	17.4		
		9538	1907.6	17.5		
	Subtest 2	9262	1852.4	17.5	0	19.0
		9400	1880.0	17.5		
		9538	1907.6	17.5		
	Subtest 3	9262	1852.4	17.4	0.5	18.5
		9400	1880.0	17.0		
		9538	1907.6	17.0		
	Subtest 4	9262	1852.4	17.0	0.5	18.5
		9400	1880.0	16.9		
		9538	1907.6	17.0		
HSUPA	Subtest 1	9262	1852.4	17.5	0	19.0
		9400	1880.0	17.5		
		9538	1907.6	17.5		
	Subtest 2	9262	1852.4	15.8	2	17.0
		9400	1880.0	15.8		
		9538	1907.6	15.8		
	Subtest 3	9262	1852.4	16.8	1	18.0
		9400	1880.0	16.8		
		9538	1907.6	16.7		
	Subtest 4	9262	1852.4	15.8	2	17.0
		9400	1880.0	15.7		
		9538	1907.6	15.8		
	Subtest 5	9262	1852.4	17.5	0	19.0
		9400	1880.0	17.8		
		9538	1907.6	17.9		

W-CDMA Band IV Main Ant 2 Measured Results

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)		
				Measured Pwr	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	1312	1712.4	17.1	N/A	18.7
		1413	1732.6	17.2		
		1513	1752.6	17.3		
HSDPA	Subtest 1	1312	1712.4	16.1	0	18.0
		1413	1732.6	16.2		
		1513	1752.6	16.3		
	Subtest 2	1312	1712.4	16.1	0	18.0
		1413	1732.6	16.2		
		1513	1752.6	16.3		
	Subtest 3	1312	1712.4	15.6	0.5	17.5
		1413	1732.6	15.7		
		1513	1752.6	15.8		
	Subtest 4	1312	1712.4	15.8	0.5	17.5
		1413	1732.6	15.7		
		1513	1752.6	15.8		
HSUPA	Subtest 1	1312	1712.4	16.2	0	18.0
		1413	1732.6	16.3		
		1513	1752.6	16.7		
	Subtest 2	1312	1712.4	14.2	2	16.0
		1413	1732.6	14.8		
		1513	1752.6	14.4		
	Subtest 3	1312	1712.4	15.2	1	17.0
		1413	1732.6	15.4		
		1513	1752.6	15.3		
	Subtest 4	1312	1712.4	14.2	2	16.0
		1413	1732.6	14.7		
		1513	1752.6	14.8		
	Subtest 5	1312	1712.4	16.7	0	18.0
		1413	1732.6	16.8		
		1513	1752.6	16.8		

9.3. LTE

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

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

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

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

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

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

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

Maximum Output Power (Tune-up Limit) for LTE

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

a) The maximum output power, including tolerance, for the smaller band must be ≤ 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.

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	18900	19100		
				1860 MHz	1880 MHz	1900 MHz		
20 MHz	QPSK	1	0	18.9	19.0	19.1	0	20
		1	49	19.0	19.0	19.1	0	20
		1	99	18.9	19.0	19.0	0	20
		50	0	18.9	19.1	19.0	0	20
		50	24	19.0	19.1	19.0	0	20
		50	50	19.0	19.1	19.1	0	20
		100	0	19.0	19.0	19.0	0	20
	16QAM	1	0	19.2	19.3	19.2	0	20
		1	49	19.3	19.4	19.2	0	20
		1	99	19.1	19.2	19.1	0	20
		50	0	19.0	19.1	19.1	0	20
		50	24	19.0	19.1	19.1	0	20
		50	50	19.1	19.2	19.1	0	20
		100	0	19.0	19.1	19.0	0	20
	64QAM	1	0	19.3	19.3	19.3	0	20
		1	49	19.3	19.4	19.4	0	20
		1	99	19.3	19.3	19.3	0	20
		50	0	19.0	19.0	19.1	0	20
		50	24	19.1	19.1	19.1	0	20
		50	50	19.1	19.1	19.1	0	20
		100	0	19.0	19.1	19.1	0	20

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				18675	18900	19125		
				1857.5 MHz	1880 MHz	1902.5 MHz		
15 MHz	QPSK	1	0	18.9	18.9	19.0	0	20
		1	37	19.0	19.0	19.0	0	20
		1	74	19.0	19.0	18.9	0	20
		36	0	19.0	19.0	19.0	0	20
		36	20	19.0	19.0	19.1	0	20
		36	39	19.0	19.1	19.1	0	20
		75	0	19.0	19.0	19.1	0	20
	16QAM	1	0	19.2	19.2	19.2	0	20
		1	37	19.2	19.4	19.2	0	20
		1	74	19.3	19.2	19.2	0	20
		36	0	18.9	19.0	19.1	0	20
		36	20	19.0	19.0	19.1	0	20
		36	39	19.0	19.1	19.1	0	20
		75	0	19.1	19.0	19.1	0	20
	64QAM	1	0	19.2	19.2	19.2	0	20
		1	37	19.2	19.4	19.3	0	20
		1	74	19.3	19.3	19.2	0	20
		36	0	19.0	19.1	19.0	0	20
		36	20	19.1	19.0	19.1	0	20
		36	39	19.0	19.1	19.1	0	20
		75	0	19.0	19.1	19.1	0	20

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	19.1	19.1	19.1	0	20
		1	25	19.1	19.2	19.1	0	20
		1	49	19.1	19.1	19.1	0	20
		25	0	19.2	19.2	19.2	0	20
		25	12	19.1	19.2	19.2	0	20
		25	25	19.1	19.2	19.1	0	20
		50	0	19.2	19.1	19.1	0	20
	16QAM	1	0	19.4	19.5	19.5	0	20
		1	25	19.4	19.5	19.5	0	20
		1	49	19.3	19.5	19.5	0	20
		25	0	19.1	19.2	19.1	0	20
		25	12	19.2	19.2	19.1	0	20
		25	25	19.2	19.3	19.2	0	20
		50	0	19.1	19.1	19.1	0	20
	64QAM	1	0	19.3	19.4	19.4	0	20
		1	25	19.3	19.4	19.4	0	20
		1	49	19.3	19.5	19.4	0	20
		25	0	19.1	19.1	19.1	0	20
		25	12	19.2	19.2	19.2	0	20
		25	25	19.2	19.3	19.2	0	20
		50	0	19.1	19.1	19.1	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
				18625	18900	19175		
				1852.5 MHz	1880 MHz	1907.5 MHz		
5 MHz	QPSK	1	0	19.1	19.1	19.1	0	20
		1	12	19.3	19.3	19.2	0	20
		1	24	19.1	19.1	19.1	0	20
		12	0	19.1	19.1	19.1	0	20
		12	7	19.2	19.1	19.2	0	20
		12	13	19.1	19.2	19.2	0	20
		25	0	19.1	19.1	19.1	0	20
	16QAM	1	0	19.4	19.4	19.4	0	20
		1	12	19.5	19.4	19.6	0	20
		1	24	19.4	19.4	19.4	0	20
		12	0	19.2	19.1	19.2	0	20
		12	7	19.3	19.2	19.2	0	20
		12	13	19.2	19.2	19.2	0	20
		25	0	19.1	19.1	19.2	0	20
	64QAM	1	0	19.3	19.4	19.3	0	20
		1	12	19.4	19.5	19.5	0	20
		1	24	19.3	19.5	19.4	0	20
		12	0	19.1	19.1	19.3	0	20
		12	7	19.1	19.2	19.3	0	20
		12	13	19.1	19.2	19.3	0	20
		25	0	19.1	19.1	19.2	0	20

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				18615	18900	19185		
				1851.5 MHz	1880 MHz	1908.5 MHz		
3 MHz	QPSK	1	0	18.9	18.9	18.9	0	20
		1	8	19.0	19.0	19.0	0	20
		1	14	18.8	19.0	18.9	0	20
		8	0	18.9	19.0	19.0	0	20
		8	4	19.0	19.0	19.1	0	20
		8	7	19.0	19.1	19.0	0	20
		15	0	19.0	18.9	19.0	0	20
	16QAM	1	0	19.3	19.3	19.3	0	20
		1	8	19.4	19.5	19.4	0	20
		1	14	19.3	19.3	19.3	0	20
		8	0	19.1	19.1	18.9	0	20
		8	4	19.1	19.1	19.0	0	20
		8	7	19.1	19.2	19.0	0	20
		15	0	19.0	19.0	18.9	0	20
	64QAM	1	0	19.2	19.1	19.2	0	20
		1	8	19.3	19.3	19.3	0	20
		1	14	19.1	19.2	19.3	0	20
		8	0	19.0	19.0	19.1	0	20
		8	4	19.0	19.0	19.2	0	20
		8	7	19.1	19.0	19.2	0	20
		15	0	19.0	18.9	19.1	0	20

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				18607	18900	19193		
				1850.7 MHz	1880 MHz	1909.3 MHz		
1.4 MHz	QPSK	1	0	19.0	19.0	19.0	0	20
		1	3	19.0	19.0	19.0	0	20
		1	5	19.0	19.0	18.9	0	20
		3	0	19.0	19.0	19.0	0	20
		3	1	19.0	19.0	19.0	0	20
		3	3	19.0	19.0	19.0	0	20
		6	0	19.0	19.0	19.0	0	20
	16QAM	1	0	19.1	19.2	19.3	0	20
		1	3	19.2	19.3	19.3	0	20
		1	5	19.2	19.2	19.3	0	20
		3	0	19.1	19.2	19.2	0	20
		3	1	19.1	19.2	19.2	0	20
		3	3	19.1	19.2	19.2	0	20
		6	0	19.1	19.1	19.1	0	20
	64QAM	1	0	19.3	19.5	19.2	0	20
		1	3	19.4	19.5	19.3	0	20
		1	5	19.3	19.4	19.3	0	20
		3	0	19.1	19.2	19.1	0	20
		3	1	19.2	19.2	19.0	0	20
		3	3	19.1	19.1	19.1	0	20
		6	0	19.1	19.1	19.0	0	20

LTE Band 4 Main Ant 2 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				20050	20175	20300		
				1720 MHz	1732.5 MHz	1745 MHz		
20 MHz	QPSK	1	0	17.8	18.1	18.0	0	19
		1	49	17.8	18.1	18.1	0	19
		1	99	17.9	18.2	18.2	0	19
		50	0	17.8	18.0	17.9	0	19
		50	24	17.9	18.0	18.0	0	19
		50	50	17.9	18.0	18.0	0	19
		100	0	17.9	17.9	17.9	0	19
	16QAM	1	0	18.2	18.1	18.2	0	19
		1	49	18.2	18.3	18.3	0	19
		1	99	18.3	18.2	18.2	0	19
		50	0	17.8	17.9	18.0	0	19
		50	24	17.9	17.9	18.0	0	19
		50	50	17.9	18.0	18.0	0	19
		100	0	17.9	17.9	17.9	0	19
	64QAM	1	0	18.2	18.1	18.3	0	19
		1	49	18.2	18.2	18.3	0	19
		1	99	18.3	18.2	18.3	0	19
		50	0	17.9	17.9	17.9	0	19
		50	24	17.9	17.9	18.1	0	19
		50	50	17.9	18.0	18.0	0	19
		100	0	17.9	17.9	17.9	0	19

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				20025	20175	20325		
				1717.5 MHz	1732.5 MHz	1747.5 MHz		
15 MHz	QPSK	1	0	17.9	17.9	17.9	0	19
		1	37	18.0	17.9	17.9	0	19
		1	74	18.0	17.9	18.0	0	19
		36	0	17.9	17.9	17.9	0	19
		36	20	18.0	17.9	17.9	0	19
		36	39	18.0	18.0	18.0	0	19
		75	0	18.0	17.9	17.9	0	19
	16QAM	1	0	18.2	18.2	18.2	0	19
		1	37	18.2	18.3	18.2	0	19
		1	74	18.4	18.2	18.2	0	19
		36	0	18.0	18.0	18.0	0	19
		36	20	18.0	18.0	17.9	0	19
		36	39	18.0	18.0	18.0	0	19
		75	0	18.0	17.9	17.9	0	19
	64QAM	1	0	18.2	18.1	18.2	0	19
		1	37	18.2	18.2	18.2	0	19
		1	74	18.1	18.2	18.2	0	19
		36	0	17.8	17.9	17.9	0	19
		36	20	17.9	18.0	18.0	0	19
		36	39	17.9	18.0	18.0	0	19
		75	0	17.9	17.9	17.9	0	19

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				20000	20175	20350		
				1715 MHz	1732.5 MHz	1750 MHz		
10 MHz	QPSK	1	0	18.1	18.1	18.1	0	19
		1	25	18.0	18.2	18.2	0	19
		1	49	18.0	18.2	18.1	0	19
		25	0	18.1	18.0	18.1	0	19
		25	12	18.1	18.2	18.1	0	19
		25	25	17.9	18.3	18.2	0	19
		50	0	18.1	18.0	18.0	0	19
	16QAM	1	0	18.3	18.3	18.5	0	19
		1	25	18.3	18.4	18.4	0	19
		1	49	18.4	18.5	18.4	0	19
		25	0	18.1	18.2	18.1	0	19
		25	12	18.1	18.2	18.1	0	19
		25	25	18.1	18.2	18.3	0	19
		50	0	18.0	18.1	18.2	0	19
	64QAM	1	0	18.2	18.4	18.5	0	19
		1	25	18.3	18.4	18.4	0	19
		1	49	18.4	18.4	18.3	0	19
		25	0	18.1	18.2	18.2	0	19
		25	12	18.2	18.2	18.2	0	19
		25	25	18.0	18.2	18.3	0	19
		50	0	18.1	18.1	18.2	0	19

LTE Band 4 Main Ant 2 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				19975	20175	20375		
				1712.5 MHz	1732.5 MHz	1752.5 MHz		
5 MHz	QPSK	1	0	18.0	18.1	18.1	0	19
		1	12	18.2	18.3	18.2	0	19
		1	24	18.0	18.2	18.1	0	19
		12	0	18.1	18.1	18.2	0	19
		12	7	18.1	18.2	18.2	0	19
		12	13	18.1	18.2	18.2	0	19
		25	0	18.1	18.1	18.2	0	19
	16QAM	1	0	18.3	18.4	18.5	0	19
		1	12	18.3	18.6	18.6	0	19
		1	24	18.4	18.5	18.4	0	19
		12	0	18.2	18.2	18.3	0	19
		12	7	18.2	18.2	18.4	0	19
		12	13	18.1	18.3	18.3	0	19
		25	0	18.1	18.2	18.2	0	19
	64QAM	1	0	18.3	18.5	18.4	0	19
		1	12	18.3	18.6	18.4	0	19
		1	24	18.4	18.3	18.4	0	19
		12	0	18.1	18.2	18.2	0	19
		12	7	18.2	18.2	18.1	0	19
		12	13	18.2	18.3	18.2	0	19
		25	0	18.2	18.2	18.2	0	19

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				19965	20175	20385		
				1711.5 MHz	1732.5 MHz	1753.5 MHz		
3 MHz	QPSK	1	0	18.1	18.2	18.2	0	19
		1	8	18.1	18.2	18.3	0	19
		1	14	18.1	18.2	18.1	0	19
		8	0	18.1	18.2	18.3	0	19
		8	4	18.2	18.2	18.3	0	19
		8	7	18.2	18.3	18.3	0	19
		15	0	18.1	18.2	18.2	0	19
	16QAM	1	0	18.2	18.2	18.5	0	19
		1	8	18.3	18.2	18.3	0	19
		1	14	18.4	18.5	18.2	0	19
		8	0	18.3	18.3	18.4	0	19
		8	4	18.2	18.2	18.4	0	19
		8	7	18.3	18.4	18.4	0	19
		15	0	18.2	18.1	18.3	0	19
	64QAM	1	0	18.3	18.4	18.5	0	19
		1	8	18.3	18.4	18.3	0	19
		1	14	18.4	18.5	18.4	0	19
		8	0	18.2	18.3	18.4	0	19
		8	4	18.2	18.4	18.4	0	19
		8	7	18.1	18.4	18.4	0	19
		15	0	18.2	18.2	18.3	0	19

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				19957	20175	20393		
				1710.7 MHz	1732.5 MHz	1754.3 MHz		
1.4 MHz	QPSK	1	0	18.0	18.2	18.1	0	19
		1	3	18.1	18.2	18.2	0	19
		1	5	18.1	18.2	18.1	0	19
		3	0	18.1	18.2	18.1	0	19
		3	1	18.1	18.2	18.2	0	19
		3	3	18.1	18.2	18.1	0	19
		6	0	18.1	18.1	18.2	0	19
	16QAM	1	0	18.3	18.2	18.5	0	19
		1	3	18.3	18.1	18.2	0	19
		1	5	18.2	18.2	18.4	0	19
		3	0	18.3	18.4	18.4	0	19
		3	1	18.3	18.3	18.4	0	19
		3	3	18.3	18.4	18.4	0	19
		6	0	18.2	18.2	18.3	0	19
	64QAM	1	0	18.3	18.4	18.4	0	19
		1	3	18.2	18.2	18.3	0	19
		1	5	18.4	18.5	18.3	0	19
		3	0	18.3	18.3	18.4	0	19
		3	1	18.3	18.3	18.4	0	19
		3	3	18.3	18.3	18.4	0	19
		6	0	18.1	18.2	18.2	0	19

LTE Band 12 Main Ant 1 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				23060	23095	23130		
				704 MHz	707.5 MHz	711 MHz		
10 MHz	QPSK	1	0	21.2	21.1	21.2	0	22
		1	25	21.2	21.1	21.2	0	22
		1	49	21.2	21.1	21.1	0	22
		25	0	21.1	21.1	21.3	0	22
		25	12	21.2	21.1	21.2	0	22
		25	25	21.3	21.2	21.2	0	22
		50	0	21.2	21.2	21.2	0	22
	16QAM	1	0	21.6	21.6	21.6	0	22
		1	25	21.5	21.5	21.6	0	22
		1	49	21.6	21.4	21.6	0	22
		25	0	21.2	21.2	21.2	0	22
		25	12	21.3	21.1	21.2	0	22
		25	25	21.3	21.2	21.3	0	22
		50	0	21.2	21.0	21.2	0	22
	64QAM	1	0	21.3	21.5	21.5	0	22
		1	25	21.5	21.4	21.5	0	22
		1	49	21.4	21.5	21.5	0	22
		25	0	21.2	21.2	21.3	0	22
		25	12	21.2	21.2	21.3	0	22
		25	25	21.2	21.3	21.3	0	22
		50	0	21.2	21.1	21.2	0	22

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				23035	23095	23155		
				701.5 MHz	707.5 MHz	713.5 MHz		
5 MHz	QPSK	1	0	21.2	21.2	21.3	0	22
		1	12	21.3	21.2	21.3	0	22
		1	24	21.1	21.2	21.1	0	22
		12	0	21.2	21.2	21.2	0	22
		12	7	21.2	21.1	21.2	0	22
		12	13	21.2	21.3	21.2	0	22
		25	0	21.1	21.2	21.2	0	22
	16QAM	1	0	21.5	21.6	21.6	0	22
		1	12	21.5	21.6	21.7	0	22
		1	24	21.4	21.5	21.6	0	22
		12	0	21.2	21.2	21.3	0	22
		12	7	21.2	21.2	21.3	0	22
		12	13	21.3	21.2	21.3	0	22
		25	0	21.2	21.2	21.2	0	22
	64QAM	1	0	21.3	21.4	21.6	0	22
		1	12	21.5	21.6	21.6	0	22
		1	24	21.3	21.5	21.5	0	22
		12	0	21.2	21.2	21.1	0	22
		12	7	21.1	21.1	21.2	0	22
		12	13	21.2	21.3	21.2	0	22
		25	0	21.2	21.2	21.1	0	22

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				23025	23095	23165		
				700.5 MHz	707.5 MHz	714.5 MHz		
3 MHz	QPSK	1	0	21.1	21.2	21.2	0	22
		1	8	21.2	21.3	21.3	0	22
		1	14	21.1	21.2	21.2	0	22
		8	0	21.2	21.1	21.2	0	22
		8	4	21.2	21.2	21.2	0	22
		8	7	21.2	21.2	21.3	0	22
		15	0	21.2	21.2	21.1	0	22
	16QAM	1	0	21.5	21.5	21.4	0	22
		1	8	21.6	21.6	21.6	0	22
		1	14	21.4	21.5	21.4	0	22
		8	0	21.2	21.3	21.2	0	22
		8	4	21.2	21.2	21.4	0	22
		8	7	21.3	21.4	21.3	0	22
		15	0	21.2	21.2	21.2	0	22
	64QAM	1	0	21.5	21.5	21.5	0	22
		1	8	21.5	21.4	21.5	0	22
		1	14	21.3	21.4	21.4	0	22
		8	0	21.2	21.3	21.2	0	22
		8	4	21.2	21.3	21.4	0	22
		8	7	21.2	21.4	21.4	0	22
		15	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
				23017	23095	23173		
				699.7 MHz	707.5 MHz	715.3 MHz		
1.4 MHz	QPSK	1	0	21.2	21.2	21.2	0	22
		1	3	21.1	21.3	21.1	0	22
		1	5	21.2	21.3	21.2	0	22
		3	0	21.2	21.2	21.2	0	22
		3	1	21.1	21.2	21.2	0	22
		3	3	21.2	21.2	21.2	0	22
		6	0	21.1	21.1	21.2	0	22
	16QAM	1	0	21.4	21.5	21.5	0	22
		1	3	21.6	21.6	21.6	0	22
		1	5	21.5	21.6	21.5	0	22
		3	0	21.3	21.4	21.4	0	22
		3	1	21.3	21.4	21.3	0	22
		3	3	21.3	21.4	21.4	0	22
		6	0	21.2	21.2	21.2	0	22
	64QAM	1	0	21.3	21.5	21.5	0	22
		1	3	21.3	21.6	21.5	0	22
		1	5	21.3	21.5	21.5	0	22
		3	0	21.3	21.3	21.3	0	22
		3	1	21.3	21.3	21.2	0	22
		3	3	21.2	21.2	21.4	0	22
		6	0	21.2	21.1	21.2	0	22

9.4. Wi-Fi 2.4GHz (DTS Band)

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

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

SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11g/n/ac/ax mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band. Additional output power measurements were not deemed necessary.

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

The Tune-Up Limits are the same between both MIMO and SISO transmission.

Wi-Fi 2.4GHz Normal State Measured Results

Band	Mode	Ch #	Freq. (MHz)	Chain 0 Average Power (dBm)			Chain 1 Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
DSSS 2.4 GHz	802.11b	1	2412	13.9	14.5	Yes	12.1	12.7	Yes
		6	2437	14.3	14.5		12.2	12.7	
		11	2462	14.1	14.5		12.2	12.7	

Duty Factor Measured Results

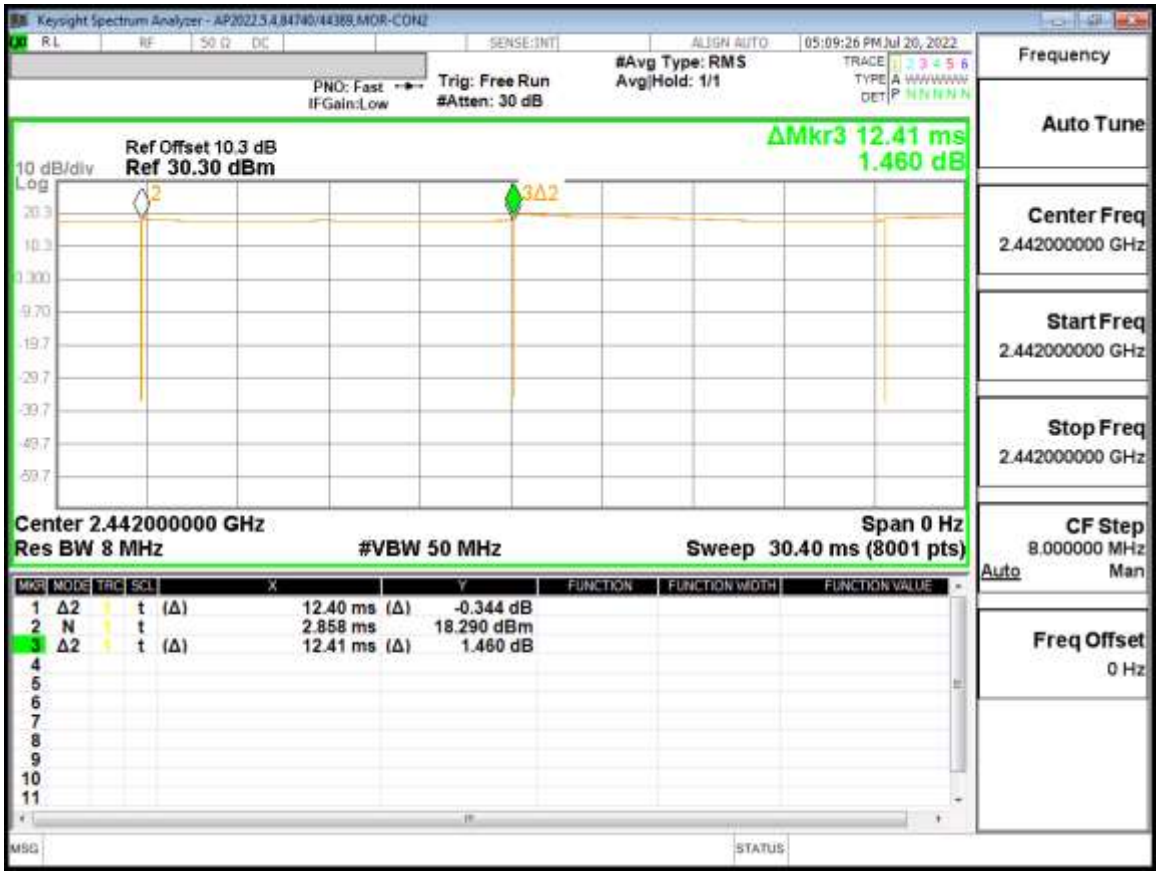
Mode	Type	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
802.11b	1 Mb	12.4	12.410	99.92%	1.00

Note(s):

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

WLAN 2.4GHz Duty Cycle

802.11b



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

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

When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/n/ac/ax modes, the channel in the lower order/sequence 802.11 transmission mode is selected.

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

SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/n/ac/ax mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band. Additional output power measurements were not deemed necessary.

When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is ≤ 1.2 W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR. Hotspot mode is supported in U-NII Band 1. Therefore, Hotspot mode was tested separately for SAR for U-NII Band 1.

The Tune-Up Limits are the same between both MIMO and SISO transmission.

Wi-Fi 5 GHz Normal State Measured Results

Band	Mode	Ch #	Freq. (MHz)	Chain 0 Average Power (dBm)			Chain 1 Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-1 & 2A	802.11ac (VHT160)	50	5250	11.5	11.5	Yes	11.2	11.5	Yes
Band	Mode	Ch #	Freq. (MHz)	Chain 0 Average Power (dBm)			Chain 1 Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-2C 5.5 GHz	802.11ac (VHT160)	114	5570	11.1	11.5	Yes	10.9	11.5	Yes
Band	Mode	Ch #	Freq. (MHz)	Chain 0 Average Power (dBm)			Chain 1 Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-3 5.8 GHz	802.11ac (VHT80)	155	5775	10.9	11.5	Yes	11.0	11.5	Yes

Duty Factor Measured Results

Mode	Type	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
802.11ac VHT80	MCS0	5.425	5.445	99.63%	1.00
802.11ac VHT160	MCS0	5.427	5.446	99.65%	1.00

Note(s):

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

WLAN 5GHz Duty Cycle

802.11ac VHT80

802.11ac VHT160

9.6. Bluetooth

Maximum Output Power (Tune-up Limit) for Bluetooth

From October 2016 TCB workshop, Power and SAR measurements were performed with test software using DH5 modulation. The duty cycle value from the device is taken from the Duty Cycle plot below.

Bluetooth Measured Results

Band	Mode	Ch #	Freq. (MHz)	Chain 0 Average Power (dBm)			Chain 1 Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
2.4	BR GFSK	0	2402	13.6	14.0	Yes	13.3	14.0	Yes
		39	2441	13.0	14.0		13.6	14.0	
		78	2480	13.8	14.0		12.3	14.0	

Note(s):

SAR measurement is not required for the EDR and LE. When the secondary mode is ≤ ¼ dB higher than the primary mode.

Duty Factor Measured Results

Mode	Type	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
GFSK	DH1	2.88	3.750	76.80%	1.30

Note(s):

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

Bluetooth Duty Cycle

GFSK

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

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

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

10.1. GSM 850

RF Exposure Conditions	Mode	Antenna	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	Main Ant 1	0	Left Touch	251	848.8	27.2	26.5	0.160	**0.188**	1
				Left Tilt	251	848.8	27.2	26.5	0.050	0.059	
				Right Touch	251	848.8	27.2	26.5	0.121	0.142	
				Right Tilt	251	848.8	27.2	26.5	0.047	0.055	
Body-Worn & Hotspot	GPRS 4 Slots	Main Ant 1	10	Back	251	848.8	27.2	26.5	0.147	**0.173**	2
				Front	251	848.8	27.2	26.5	0.129	0.152	
Hotspot	GPRS 4 Slots	Main Ant 1	10	Edge Bottom	251	848.8	27.2	26.5	0.034	0.040	
				Edge Left	251	848.8	27.2	26.5	0.190	**0.224**	3
Hotspot	DTM (CS + 1 PS slot)	Main Ant 1	10	Edge Left	251	848.8	30.2	29.3	0.185	**0.230**	4

Notes:

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

10.2. GSM 1900

RF Exposure Conditions	Mode	Antenna	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	Main Ant 2	0	Left Touch	661	1880.0	21.7	20.9	0.025	**0.030**	5
				Left Tilt	661	1880.0	21.7	20.9	0.011	0.013	
				Right Touch	661	1880.0	21.7	20.9	0.022	0.027	
				Right Tilt	661	1880.0	21.7	20.9	0.012	0.015	
Body-Worn & Hotspot	GPRS 4 Slots	Main Ant 2	10	Back	661	1880.0	21.7	20.9	0.221	**0.268**	6
				Front	661	1880.0	21.7	20.9	0.149	0.181	
Hotspot	GPRS 4 Slots	Main Ant 2	10	Edge Right	661	1880.0	21.7	20.9	0.099	0.120	
				Edge Bottom	661	1880.0	21.7	20.9	0.237	**0.288**	7
Hotspot	DTM (CS + 1 PS slot)	Main Ant 2	10	Edge Bottom	661	1880.0	24.7	24.6	0.333	**0.343**	8

Notes:

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

10.3. W-CDMA Band II

RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up Limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC 12.2 kbps	Main Ant 2	0	Left Touch	9400	1880.0	19.7	18.4	0.030	0.040	
				Left Tilt	9400	1880.0	19.7	18.4	0.023	0.031	
				Right Touch	9400	1880.0	19.7	18.4	0.040	**0.054**	9
				Right Tilt	9400	1880.0	19.7	18.4	0.014	0.019	
Body-Worn & Hotspot	Rel 99 RMC 12.2 kbps	Main Ant 2	10	Back	9400	1880	19.7	18.4	0.429	**0.575**	10
				Front	9400	1880	19.7	18.4	0.301	0.403	
Hotspot	Rel 99 RMC 12.2 kbps	Main Ant 2	10	Edge Right	9400	1880	19.7	18.4	0.188	0.252	
				Edge Bottom	9400	1880	19.7	18.4	0.471	**0.631**	11

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

10.4. W-CDMA Band IV

RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up Limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC 12.2 kbps	Main Ant 2	0	Left Touch	1413	1732.6	18.7	17.2	0.026	0.036	
				Left Tilt	1413	1732.6	18.7	17.2	0.016	0.022	
				Right Touch	1413	1732.6	18.7	17.2	0.030	**0.042**	12
				Right Tilt	1413	1732.6	18.7	17.2	0.015	0.021	
Body-Worn & Hotspot	Rel 99 RMC 12.2 kbps	Main Ant 2	10	Back	1413	1732.6	18.7	17.2	0.235	**0.329**	13
				Front	1413	1732.6	18.7	17.2	0.212	0.297	
Hotspot	Rel 99 RMC 12.2 kbps	Main Ant 2	10	Edge Right	1413	1732.6	18.7	17.2	0.135	0.189	
				Edge Bottom	1413	1732.6	18.7	17.2	0.281	**0.393**	14

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

10.5. 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	50	50	20.0	19.1	0.027	0.033	
					19100	1900	1	0	20.0	19.1	0.027	0.034	
				Left Tilt	18900	1880	50	50	20.0	19.1	0.020	0.024	
					19100	1900	1	0	20.0	19.1	0.020	0.025	
				Right Touch	18900	1880	50	50	20.0	19.1	0.037	0.045	
					19100	1900	1	0	20.0	19.1	0.039	**0.048**	15
				Right Tilt	18900	1880	50	50	20.0	19.1	0.018	0.022	
					19100	1900	1	0	20.0	19.1	0.017	0.021	
Body-Worn & Hotspot	QPSK	Main Ant 2	10	Back	18900	1880	50	50	20.0	19.1	0.227	0.277	
					19100	1900	1	0	20.0	19.1	0.228	**0.283**	16
				Front	18900	1880	50	50	20.0	19.1	0.198	0.241	
					19100	1900	1	0	20.0	19.1	0.210	0.261	
Hotspot	QPSK	Main Ant 2	10	Edge Right	18900	1880	50	50	20.0	19.1	0.120	0.146	
					19100	1900	1	0	20.0	19.1	0.127	0.158	
				Edge Bottom	18900	1880	50	50	20.0	19.1	0.473	0.577	
					19100	1900	1	0	20.0	19.1	0.491	**0.610**	17

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

10.6. LTE Band 4 (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	20175	1732.5	1	99	19.0	18.2	0.032	0.038	
							50	50	19.0	18.0	0.032	0.040	
				Left Tilt	20175	1732.5	1	99	19.0	18.2	0.017	0.020	
							50	50	19.0	18.0	0.017	0.021	
				Right Touch	20175	1732.5	1	99	19.0	18.2	0.036	0.043	
							50	50	19.0	18.0	0.038	**0.048**	18
				Right Tilt	20175	1732.5	1	99	19.0	18.2	0.017	0.020	
							50	50	19.0	18.0	0.018	0.023	
Body-Worn & Hotspot	QPSK	Main Ant 2	10	Back	20175	1732.5	1	99	19.0	18.2	0.225	0.271	
							50	50	19.0	18.0	0.226	**0.285**	19
				Front	20175	1732.5	1	99	19.0	18.2	0.172	0.207	
							50	50	19.0	18.0	0.173	0.218	
Hotspot	QPSK	Main Ant 2	10	Edge Right	20175	1732.5	1	99	19.0	18.2	0.134	0.161	
							50	50	19.0	18.0	0.135	0.170	
				Edge Bottom	20175	1732.5	1	99	19.0	18.2	0.301	0.362	
							50	50	19.0	18.0	0.298	**0.375**	20

Notes:

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

10.7. 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	25	22.0	21.1	0.064	0.078	
							25	25	22.0	21.2	0.068	**0.082**	21
				Left Tilt	23095	707.5	1	25	22.0	21.1	0.031	0.038	
							25	25	22.0	21.2	0.033	0.040	
				Right Touch	23095	707.5	1	25	22.0	21.1	0.060	0.073	
							25	25	22.0	21.2	0.062	0.075	
				Right Tilt	23095	707.5	1	25	22.0	21.1	0.039	0.048	
							25	25	22.0	21.2	0.037	0.045	
Body-Worn & Hotspot	QPSK	Main Ant 1	10	Back	23095	707.5	1	25	22.0	21.1	0.122	0.149	
							25	25	22.0	21.2	0.127	**0.154**	22
				Front	23095	707.5	1	25	22.0	21.1	0.105	0.128	
							25	25	22.0	21.2	0.108	0.131	
Hotspot	QPSK	Main Ant 1	10	Edge Bottom	23095	707.5	1	25	22.0	21.1	0.038	0.046	
							25	25	22.0	21.2	0.041	0.050	
				Edge Left	23095	707.5	1	25	22.0	21.1	0.114	0.139	
							25	25	22.0	21.2	0.117	0.142	

Notes:

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

10.8. WLAN & Bluetooth Spot Check Verification

WLAN Spot Check Verification (1g)

Technology	RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle	Power (dBm)		FCC ID: PY7-93060R		FCC ID: PY7-17565F		% Delta	Plot No.
											1-g SAR (W/kg)		1-g SAR (W/kg)			
									Tune-up Limit	Meas.	Meas.	Scaled	Meas.	Scaled		
WLAN 2.4 GHz	Head	802.11b	Chain 0	0	Right Touch	6	2437	99.92%	14.5	14.3	0.505	0.580	0.473	0.498	15.22%	23
WLAN 5.3 GHz	Head	802.11ac VHT160	Chain 0	0	Right Touch	50	5250	99.65%	11.5	11.5	0.277	0.284	0.235	0.238	17.62%	

WLAN Spot Check Verification (10g)

Technology	RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle	Power (dBm)		FCC ID: PY7-93060R		FCC ID: PY7-17565F		% Delta	Plot No.
											10-g SAR (W/kg)		10-g SAR (W/kg)			
									Tune-up Limit	Meas.	Meas.	Scaled	Meas.	Scaled		
WLAN 5.5 GHz	Extremity	802.11ac (VHT160)	Chain 1	0	Back	114	5570	99.65%	11.5	10.9	0.400	0.44	0.331	0.378	9.37%	24

Bluetooth Spot Check Verification (1g)

Technology	RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		FCC ID: PY7-93060R		FCC ID: PY7-17565F		% Delta	Plot No.
										1-g SAR (W/kg)		1-g SAR (W/kg)			
								Tune-up Limit	Meas.	Meas.	Scaled	Meas.	Scaled		
Bluetooth	Head	GFSK	Chain 0	0	Right Touch	39	2441	14.0	13.0	0.191	0.195	0.166	0.210	7.61%	

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	WLAN/BT Chain 0			WLAN/BT Chain 1		
		ain Ant 1/ Ant	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	0.188	0.147	0.001	0.284	0.001	0.040	0.001	0.336	0.473	0.513	0.474
	Left Tilt	0.059	0.147	0.001	0.284	0.001	0.007	0.001	0.207	0.344	0.351	0.345
	Right Touch	0.142	0.580	0.001	0.284	0.001	0.210	0.001	0.723	0.427	**0.637**	0.428
	Right Tilt	0.055	0.147	0.001	0.284	0.001	0.039	0.001	0.203	0.340	0.379	0.341
Body-worn & Hotspot	Back	0.173	0.122	0.121	0.050	0.099	0.045	0.036	0.416	0.322	0.367	0.358
	Front	0.152	0.122	0.121	0.050	0.099	0.027	0.001	0.395	0.301	0.328	0.302
Hotspot	Edge Top		0.232		0.050		0.002		0.232	0.050	0.052	0.050
	Edge Bottom	0.050		0.121		0.099		0.001	0.171	0.149	0.149	0.150
	Edge Left	0.230	0.232	0.121	0.116	0.099	0.070	0.004	0.583	0.445	0.515	0.449

Note(s):

- WLAN and Bluetooth SAR results from UL report # 14311585-S1 are listed above. Refer to note in §1.

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because 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	Standalone SAR (W/kg)					∑ 1-g SAR (W/kg)
		WWAN	DTS		U-NII		WWAN + DTS + UNII
		Main Ant 1 ①	Chain 0 ②	Chain 1 ③	Chain 0 ④	Chain 1 ⑤	①+②+③+④+⑤
Head	Left Touch	0.188	0.073	0.001	0.176	0.001	0.439
	Left Tilt	0.059	0.073	0.001	0.176	0.001	0.310
	Right Touch	0.142	0.415	0.001	0.176	0.001	**0.735**
	Right Tilt	0.055	0.073	0.001	0.176	0.001	0.306
Body-worn & Hotspot	Back	0.173	0.048	0.112	0.029	0.055	0.417
	Front	0.152	0.048	0.112	0.029	0.055	0.396
Hotspot	Edge Top		0.048		0.049		0.097
	Edge Bottom	0.050		0.112		0.055	0.217
	Edge Left	0.230	0.119	0.112	0.049	0.055	0.565

Note(s):

- WLAN and Bluetooth SAR results from UL report # 14311585-S1 are listed above. Refer to note in §1.

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because 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	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 2 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	0.040	0.147	0.001	0.284	0.001	0.040	0.001	0.188	0.325	0.365	0.326
	Left Tilt	0.031	0.147	0.001	0.284	0.001	0.007	0.001	0.179	0.316	0.323	0.317
	Right Touch	0.054	0.580	0.001	0.284	0.001	0.210	0.001	0.635	0.339	0.549	0.340
	Right Tilt	0.023	0.147	0.001	0.284	0.001	0.039	0.001	0.171	0.308	0.347	0.309
Body-worn & Hotspot	Back	0.575	0.122	0.121	0.050	0.099	0.045	0.036	0.818	0.724	**0.769**	0.760
	Front	0.403	0.122	0.121	0.050	0.099	0.027	0.001	0.646	0.552	0.579	0.553
Hotspot	Edge Top		0.232		0.050		0.002		0.232	0.050	0.052	0.050
	Edge Bottom	0.631		0.121		0.099		0.001	0.752	0.730	0.730	0.731
	Edge Left		0.232	0.121	0.116	0.099	0.070	0.004	0.353	0.215	0.285	0.219

Note(s):

- WLAN and Bluetooth SAR results from UL report # 14311585-S1 are listed above. Refer to note in §1.

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because 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	Standalone SAR (W/kg)					∑ 1-g SAR (W/kg)
		WWAN	DTS		U-NII		WWAN + DTS + UNII
		Main Ant 2 ①	Chain 0 ②	Chain 1 ③	Chain 0 ④	Chain 1 ⑤	①+②+③+④+⑤
Head	Left Touch	0.040	0.073	0.001	0.176	0.001	0.291
	Left Tilt	0.031	0.073	0.001	0.176	0.001	0.282
	Right Touch	0.054	0.415	0.001	0.176	0.001	0.647
	Right Tilt	0.023	0.073	0.001	0.176	0.001	0.274
Body-worn & Hotspot	Back	0.575	0.048	0.112	0.029	0.055	**0.819**
	Front	0.403	0.048	0.112	0.029	0.055	0.647
Hotspot	Edge Top		0.048		0.049		0.097
	Edge Bottom	0.631		0.112		0.055	0.798
	Edge Left		0.119	0.112	0.049	0.055	0.335

Note(s):

- WLAN and Bluetooth SAR results from UL report # 14311585-S1 are listed above. Refer to note in §1.

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because 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