



SAR EVALUATION REPORT

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

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

FCC ID: PY7-54254H

**Report Number: 11626381H-S1V4
Issue Date: 4/17/2017**

Prepared for
**Sony Mobile Communications Inc.
4-12-3 Higashi-Shinagawa
Shinagawa-ku, Tokyo, 140-0002, Japan**

Prepared by
**UL VERIFICATION SERVICES INC.
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888**



NVLAP LAB CODE 200065-0

Revision History



Rev.	Date	Revisions	Revised By
V1	4/3/2017	Initial Issue	--
V2	4/10/2017	Page 1: Removed Model Name Page 2: Removed "DRAFT" Sec. 1: Removed Model Name and fixed Signature Sec. 2: Removed "Test Data Re-Use Guidance" Sec.6.1: Corrected Hardware and Software versions Sec 6.1: Corrected Overall dimension Sec 6.2: Updated to LTE Rel. 11 and added DC-HSPA+ (Rel. 9) Section 6.3.1: Updated GSM Voice/TX 1 Slot Tolerances Sec.6.3.4: Removed 64QAM (not supported) Sec. 6.36, Sec. 9.5, Sec 9.6, Sec. 10.1.1: Changed naming convention for Wi-Fi antennas Sec 7: Updated WLAN Antennas to include Extremity RF Exposure Condition Sec 9.1: Removed "EGPRS (8PSK) Rx Only" Sec 9.1-9.4: Changed to Meas. Avg Pwr Appendix A: Updated Overall Length	Lance Fleischer
V3	4/11/2017	Section 7: Added Extremity Justification Section 6.3.5: Updated 2.4 GHz Max power targets Section 9.5: Updated 2.4 GHz Max power targets	Coltyce Sanders
V4	4/17/2017	Sections: 6.2/6.3.4/6.4/9.4: Added LTE Band 38	Coltyce Sanders

Table of Contents

1.	Attestation of Test Results	5
2.	Test Specification, Methods and Procedures.....	6
3.	Facilities and Accreditation.....	6
4.	SAR Measurement System & Test Equipment	7
4.1.	<i>SAR Measurement System.....</i>	7
4.2.	<i>SAR Scan Procedures.....</i>	8
4.3.	<i>Test Equipment.....</i>	10
5.	Measurement Uncertainty.....	12
6.	Device Under Test (DUT) Information	13
6.1.	<i>DUT Description</i>	13
6.2.	<i>Wireless Technologies.....</i>	14
6.3.	<i>Maximum Output Power from Tune-up Procedure</i>	15
6.3.1.	<i>GSM Output Power from Tune-up Procedure</i>	15
6.3.2.	<i>DTM Output Power from Tune-up Procedure.....</i>	15
6.3.3.	<i>W-CDMA Output Power from Tune-up Procedure</i>	15
6.3.4.	<i>LTE Output Power from Tune-up Procedure</i>	16
6.3.5.	<i>Wi-Fi 2.4GHz</i>	16
6.3.6.	<i>Wi-Fi 5 GHz</i>	17
6.3.7.	<i>BT Output Power from Tune-up Procedure.....</i>	17
6.4.	<i>General LTE SAR Test and Reporting Considerations.....</i>	18
6.5.	<i>LTE (TDD) Considerations.....</i>	20
7.	RF Exposure Conditions (Test Configurations).....	21
8.	Dielectric Property Measurements & System Check	23
8.1.	<i>Dielectric Property Measurements</i>	23
8.2.	<i>System Check.....</i>	27
9.	Conducted Output Power Measurements.....	29
9.1.	<i>GSM</i>	29
9.2.	<i>W-CDMA</i>	32
9.4.	<i>LTE.....</i>	36
9.5.	<i>Wi-Fi 2.4GHz (DTS Band)</i>	51
9.6.	<i>Wi-Fi 5GHz (U-NII Bands).....</i>	52
9.7.	<i>Bluetooth</i>	53
10.	Measured and Reported (Scaled) SAR Results.....	54

10.1.	GSM850.....	56
10.2.	GSM1900.....	56
10.3.	W-CDMA Band V.....	57
10.4.	LTE Band 4 (20MHz Bandwidth).....	57
10.5.	LTE Band 5 (10MHz Bandwidth).....	58
10.6.	LTE Band 7 (20MHz Bandwidth).....	58
10.7.	LTE Band 12 (10MHz Bandwidth).....	59
10.8.	LTE Band 13 (10MHz Bandwidth).....	59
10.9.	LTE Band 41 (20MHz Bandwidth).....	60
10.10.	Wi-Fi (DTS Band).....	61
10.10.1.	Wi-Fi 2.4GHz Chain 0 (Main).....	61
10.10.2.	Wi-Fi 2.4GHz Chain 1 (Sub).....	61
10.11.	Wi-Fi (U-NII Bands).....	62
10.11.1.	Wi-Fi 5GHz Chain 0 (Main).....	62
10.11.2.	Wi-Fi 5GHz Chain 1 (Sub).....	62
10.12.	Standalone SAR Test Exclusion Considerations & Estimated SAR.....	63
11.	SAR Measurement Variability.....	64
12.	Simultaneous Transmission SAR Analysis.....	65
12.1.	Sum of the SAR for WWAN & Wi-Fi & BT.....	65
Appendixes	66
	11626381H-S1V2 SAR_App A Setup Photos.....	66
	11626381H-S1V1 SAR_App B System Check Plots.....	66
	11626381H-S1V1 SAR_App C Highest Test Plots.....	66
	11626381H-S1V1 SAR_App D Tissue Ingredients.....	66
	11626381H-S1V1 SAR_App E Probe Cal. Certificates.....	66
	11626381H-S1V1 SAR_App F Dipole Cal. Certificates.....	66

1. Attestation of Test Results

Applicant Name	Sony Mobile Communications Inc.			
FCC ID	PY7-54254H			
Applicable Standards	FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013			
Exposure Category	SAR Limits (W/Kg)			
	Peak spatial-average(1g of tissue)		Extremities (hands, wrists, ankles, etc.) (10g of tissue)	
General population / Uncontrolled exposure	1.6		4	
RF Exposure Conditions	Equipment Class - Highest Reported SAR (W/kg)			
	PCE	DTS	NII	DSS
Head	0.339	0.969	0.744	N/A
Body-worn*	0.353	0.065	0.092	
Hotspot/Wi-Fi Direct	0.738	0.154	N/A	
Extremity	N/A		0.345	
Simultaneous TX	1.496		1.384	
Date Tested	3/14/2017 to 3/28/2017			
Test Results	Pass			
<p>UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.</p> <p>Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.</p>				
Approved & Released By:		Prepared By:		
				
David Weaver Program Manager UL Verification Services Inc.		Lance Fleischer Laboratory Engineer UL Verification Services Inc.		

2. Test Specification, Methods and Procedures

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

- 248227 D01 802.11 Wi-Fi SAR 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

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

- [TCB workshop](#) October, 2014; Page 36, RF Exposure Procedures Update (Overlapping LTE Bands)
- [TCB workshop](#) October, 2014; Page 37, LTE Considerations (LTE Band 41 Test Channels)

3. Facilities and Accreditation

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

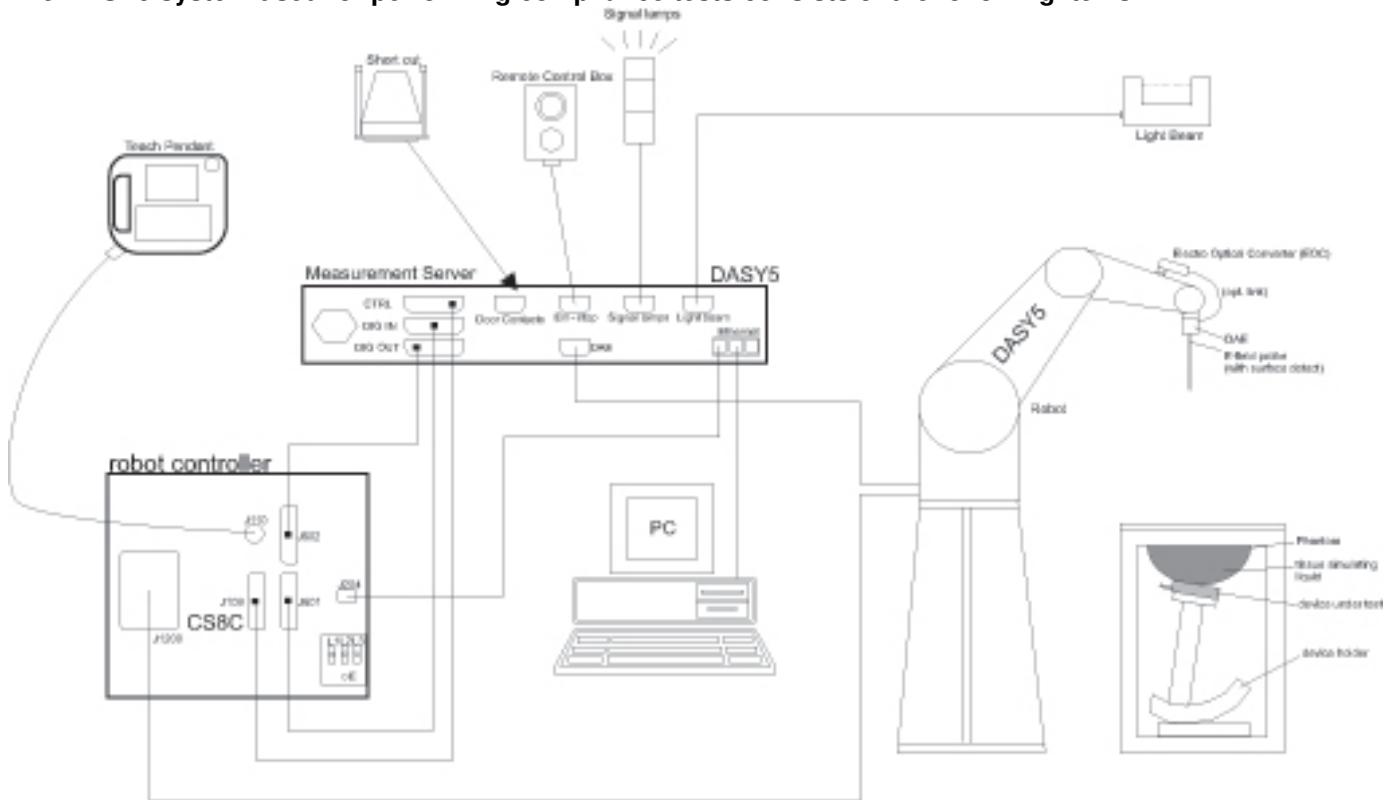
47173 Benicia Street	47266 Benicia Street
SAR Lab A	SAR Lab 1
SAR Lab B	SAR Lab 2
SAR Lab C	SAR Lab 4
SAR Lab D	
SAR Lab E	
SAR Lab F	
SAR Lab G	
SAR Lab H	

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

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



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

4.2. SAR Scan Procedures

Step 1: Power Reference Measurement

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

Step 2: Area Scan

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

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

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: 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.	

Step 3: Zoom Scan

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

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

		≤ 3 GHz	> 3 GHz	
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}, \Delta y_{Zoom}$		≤ 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 1 st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: 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 <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

Step 4: Power drift measurement

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

Step 5: Z-Scan (FCC only)

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

4.3. Test Equipment

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

Dielectric Property Measurements

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Network Analyzer	Agilent	8753ES	MY40000980	4/27/2017
Dielectric Probe kit	SPEAG	DAK-3.5	1087	11/8/2017
Shorting block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	11/8/2017
Thermometer	Traceable Calibration Control Co.	4242	140493798	8/9/2017

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Synthesized Signal Generator	Agilent	N5181A	MY50140610	5/9/2017
Power Meter	Keysight	N1912A	MY55196008	5/3/2017
Power Sensor	Agilent	E9323A	US40411556	11/11/2017
Power Sensor	Agilent	E9323A	MY53070009	6/13/2017
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1795093	N/A
Directional coupler	Werlatone	C8060-102	2149	N/A
DC Power Supply	BK PRECISION	1161	215-02292	N/A
Synthesized Signal Generator	Agilent	N5181A	MY50140630	5/9/2017
Power Meter	Keysight	N1912A	MY55196009	5/3/2017
Power Sensor	Agilent	N1912A	MY53260001	10/17/2017
Power Sensor	Agilent	E9323A	MY53070002	3/22/2017
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1795092	N/A
Directional coupler	Werlatone	C8060-102	2141	N/A
DC Power Supply	HP	6296A	2841A-05955	N/A
Synthesized Signal Generator	HP	8665B	3546A00784	9/2/2017
Power Meter	HP	437B	3125U11347	8/30/2017
Power Meter	HP	437B	3125U09516	9/27/2017
Power Sensor	HP	8481A	1926A16917	10/7/2017
Power Sensor	HP	8481A	2702A76223	9/14/2017
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1808938	N/A
Directional coupler	Werlatone	C8060-102	2710	N/A
DC Power Supply	HP	E3610A	KR24104150	N/A

Note(s):

Equipment was not used after calibration date.

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
E-Field Probe (SAR Lab C)	SPEAG	EX3DV4	3902	5/17/2017
E-Field Probe (SAR Lab D)	SPEAG	EX3DV4	3936	7/26/2017
E-Field Probe (SAR Lab E)	SPEAG	EX3DV4	3772	2/16/2018
E-Field Probe (SAR Lab F)	SPEAG	EX3DV4	3686	8/25/2017
E-Field Probe (SAR Lab G)	SPEAG	EX3DV4	3749	1/23/2018
E-Field Probe (SAR Lab H)	SPEAG	EX3DV4	3989	2/16/2018
Data Acquisition Electronics (SAR Lab C)	SPEAG	DAE3	500	5/19/2017
Data Acquisition Electronics (SAR Lab D)	SPEAG	DAE4	1359	2/10/2018
Data Acquisition Electronics (SAR Lab E)	SPEAG	DAE4	1357	2/13/2018
Data Acquisition Electronics (SAR Lab F)	SPEAG	DAE4	1377	9/14/2017
Data Acquisition Electronics (SAR Lab G)	SPEAG	DAE4	1380	7/25/2017
Data Acquisition Electronics (SAR Lab H)	SPEAG	DAE4	1434	4/15/2017
System Validation Dipole	SPEAG	D750V3	1071	11/8/2017
System Validation Dipole	SPEAG	D900V2	1d143	9/12/2017
System Validation Dipole	SPEAG	D1750V2	1050	4/13/2017
System Validation Dipole	SPEAG	D1900V2	5d043	11/9/2017
System Validation Dipole	SPEAG	D2450V2	748	2/8/2018
System Validation Dipole	SPEAG	D2600V2	1006	9/13/2017
System Validation Dipole	SPEAG	D5GHzV2	1003	2/13/2018

Other

Name of Equipment	Manufacturer	Type/Model	T Number	Serial No.	Cal. Due Date
Power Meter	Agilent	N1911A	T1268	MY55196017	6/14/2017
Power Sensor	Keysight	N1921A	T413	MY52020011	6/20/2017
Power Sensor	Agilent	N1921A	T308	MY52260009	1/5/2018
Power Meter	Keysight	N1911A	T229	MY45100242	7/28/2017
Power Meter	Agilent	N1912A	T1273	MY55196007	7/8/2017
Base Station Simulator	R & S	CMW500	T959	137873-WG	7/8/2017
Base Station Simulator	R & S	CMW500	T 955	134854-KJ	5/13/2017
Base Station Simulator	R & S	CMW500	T 268	124593-SS	6/26/2017
Base Station Simulator	R & S	CMW500	T957	134852-CY	5/26/2017
Base Station Simulator	R & S	CMW500	T232	104245-JZ	2/3/2018
Base Station Simulator	Agilent	8960		MY53211024	9/16/2017

5. Measurement Uncertainty

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

6. Device Under Test (DUT) Information

6.1. DUT Description

Device Dimension	Overall (Length x Width): 155.8 mm x 77.44 mm Overall Diagonal: 173 mm Display Diagonal: 139 mm																																																			
Back Cover	<input checked="" type="checkbox"/> The rechargeable battery is not user accessible.																																																			
Battery Options	<input checked="" type="checkbox"/> 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. <input checked="" type="checkbox"/> Mobile Hotspot (Wi-Fi 2.4 GHz)																																																			
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other <input checked="" type="checkbox"/> Wi-Fi Direct (Wi-Fi 2.4 GHz)																																																			
Test Sample Information	<table border="1"> <thead> <tr> <th>S/N</th> <th>Technology</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>CB512DHRMF</td> <td>GSM / W-CDMA</td> <td>Conducted</td> </tr> <tr> <td>CB512DHRK7</td> <td>LTE</td> <td>Conducted</td> </tr> <tr> <td>CB512DHRLC</td> <td>LTE</td> <td>Conducted</td> </tr> <tr> <td>CB512DHRX7</td> <td>LTE</td> <td>Conducted</td> </tr> <tr> <td>CB512DHRX0</td> <td>WLAN</td> <td>Conducted</td> </tr> <tr> <td>CB512DQZUU</td> <td>GSM</td> <td>Radiated</td> </tr> <tr> <td>CB512DQZUP</td> <td>GSM</td> <td>Radiated</td> </tr> <tr> <td>CB512DQZTB</td> <td>W-CDMA</td> <td>Radiated</td> </tr> <tr> <td>CB512DQZZL</td> <td>LTE</td> <td>Radiated</td> </tr> <tr> <td>CB512DQZVD</td> <td>LTE</td> <td>Radiated</td> </tr> <tr> <td>CB512DQZYS</td> <td>LTE</td> <td>Radiated</td> </tr> <tr> <td>CB512DQZTP</td> <td>LTE</td> <td>Radiated</td> </tr> <tr> <td>CB512DQZTT</td> <td>WLAN</td> <td>Radiated</td> </tr> <tr> <td>CB512DQZYR</td> <td>WLAN</td> <td>Radiated</td> </tr> <tr> <td>CB512DQZZ5</td> <td>WLAN</td> <td>Radiated</td> </tr> <tr> <td>CB512DQZUG</td> <td>WLAN</td> <td>Radiated</td> </tr> </tbody> </table>	S/N	Technology	Notes	CB512DHRMF	GSM / W-CDMA	Conducted	CB512DHRK7	LTE	Conducted	CB512DHRLC	LTE	Conducted	CB512DHRX7	LTE	Conducted	CB512DHRX0	WLAN	Conducted	CB512DQZUU	GSM	Radiated	CB512DQZUP	GSM	Radiated	CB512DQZTB	W-CDMA	Radiated	CB512DQZZL	LTE	Radiated	CB512DQZVD	LTE	Radiated	CB512DQZYS	LTE	Radiated	CB512DQZTP	LTE	Radiated	CB512DQZTT	WLAN	Radiated	CB512DQZYR	WLAN	Radiated	CB512DQZZ5	WLAN	Radiated	CB512DQZUG	WLAN	Radiated
	S/N	Technology	Notes																																																	
	CB512DHRMF	GSM / W-CDMA	Conducted																																																	
	CB512DHRK7	LTE	Conducted																																																	
	CB512DHRLC	LTE	Conducted																																																	
	CB512DHRX7	LTE	Conducted																																																	
	CB512DHRX0	WLAN	Conducted																																																	
	CB512DQZUU	GSM	Radiated																																																	
	CB512DQZUP	GSM	Radiated																																																	
	CB512DQZTB	W-CDMA	Radiated																																																	
	CB512DQZZL	LTE	Radiated																																																	
	CB512DQZVD	LTE	Radiated																																																	
	CB512DQZYS	LTE	Radiated																																																	
	CB512DQZTP	LTE	Radiated																																																	
	CB512DQZTT	WLAN	Radiated																																																	
	CB512DQZYR	WLAN	Radiated																																																	
CB512DQZZ5	WLAN	Radiated																																																		
CB512DQZUG	WLAN	Radiated																																																		
Hardware Version	A																																																			
Software Version	9.87																																																			

6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode		Duty Cycle used for SAR testing
GSM	850 1900	Voice (GMSK) GPRS (GMSK) EGPRS (8PSK)	GPRS Multi-Slot Class: <input type="checkbox"/> Class 8 - 1 Up, 4 Down <input type="checkbox"/> Class 10 - 2 Up, 4 Down <input checked="" type="checkbox"/> Class 12 - 4 Up, 4 Down <input type="checkbox"/> 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)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
W-CDMA (UMTS)	Band V	UMTS Rel. 99 (Voice & Data) HSDPA (Rel. 5) HSUPA (Rel. 6) DC-HSPA+ (Rel. 9)		100%
LTE	FDD Band 4 FDD Band 5 FDD Band 7 FDD Band 12 FDD Band 13 FDD Band 17 TDD Band 38 TDD Band 41	QPSK 16QAM <input checked="" type="checkbox"/> Rel. 11 Does not support Carrier Aggregation (CA)		100% (FDD) 63.3% (TDD)
		Does this device support SV-LTE (1xRTT-LTE)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20)		100%
	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40) 802.11ac (VHT20) 802.11ac (VHT40) 802.11ac (VHT80)		100%
	Does this device support bands 5.60 ~ 5.65 GHz? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
Does this device support Band gap channel(s)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
Bluetooth	2.4 GHz	Version 5.0 LE		N/A

6.3. Maximum Output Power from Tune-up Procedure

Per KDB 941225 D01 3G SAR Procedures:

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

6.3.1. GSM Output Power from Tune-up Procedure

RF Air Interface	GPRS/EGPRS 8PSK Modulation (MCS1-4)							
	Voice/Tx 1 Slot		Tx 2 Slots		Tx 3 Slots		Tx 4 Slots	
	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]
GSM 850	32.5	-1.0~+0.7	29.5	-1.3~+0.7	27.5	-1.3~+0.7	26.5	-1.3~+0.7
GSM 1900	29.5	-1.0~+0.7	27.0	-1.3~+0.7	25.0	-1.3~+0.7	24.0	-1.3~+0.7
RF Air Interface	EGPRS 8PSK Modulation (MCS5-9)							
	Voice/Tx 1 Slot		Tx 2 Slots		Tx 3 Slots		Tx 4 Slots	
	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]
GSM 850	27.0	-1.5~+1.0	25.5	-2.0~+1.0	23.5	-2.0~+1.0	22.6	-2.0~+1.0
GSM 1900	26.0	-1.5~+1.0	24.4	-2.0~+1.0	22.3	-2.0~+1.0	21.5	-2.0~+1.0

6.3.2. DTM Output Power from Tune-up Procedure

RF Air Interface	CS Only		GPRS DTM GMSK							
	Tx 1 Slot		CS + TX 2 Slots				CS + TX 3 Slots			
	CS GMSK		CS GMSK		PS GMSK		CS GMSK		PS GMSK	
	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]
GSM 850	32.5	-1.0~+0.7	29.5	-1.3~+0.7	29.5	-1.3~+0.7	27.5	-1.3~+0.7	27.5	-1.3~+0.7
GSM 1900	29.5	-1.0~+0.7	27.0	-1.3~+0.7	27.0	-1.3~+0.7	25.0	-1.3~+0.7	25.0	-1.3~+0.7
RF Air Interface	CS Only		EGPRS DTM 8PSK Modulation (MCS5-9)							
	Tx 1 Slot		CS + TX 2 Slots				CS + TX 3 Slots			
	CS GMSK		CS GMSK		PS 8PSK		CS GMSK		PS 8PSK	
	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]
GSM 850	32.5	-1.0~+0.7	29.5	-1.3~+0.7	25.5	-2.0~+1.0	27.5	-1.3~+0.7	23.5	-2.0~+1.0
GSM 1900	29.5	-1.0~+0.7	27.0	-1.3~+0.7	24.4	-2.0~+1.0	25.0	-1.3~+0.7	22.3	-2.0~+1.0

6.3.3. W-CDMA Output Power from Tune-up Procedure

RF Air Interface	CS		HSDPSA				HSUPA						
	Tx 1 Slot		Subtest 1/2		Subtest 3/4		Subtest 1/5		Subtest 2/4		Subtest 3		
	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]	Target [dBm]	Tolerance +- [dB]	
FDD 5	Low	23.7	-1.5~+0.5	22.7	-2~+1.0	22.2	-2~+1.0	22.2	-2~+1.0	20.7	-2~+1.0	21.7	-2~+1.0
	Mid												
	High												

6.3.4. LTE Output Power from Tune-up Procedure

RF Air Interface	LTE			Mode			
				QPSK		16QAM	
				Target [dBm]	Tolerance +/-[dB]	Target [dBm]	Tolerance +/-[dB]
Band	BW	CH	RB Config				
LTE B4	1.4MHz	Low Mid High	1RB	21.0	-1.5~+1.0	20.0	-1.5~+1.0
			50% RB	21.0	-1.5~+1.0	20.0	-1.5~+1.0
			100% RB	20.0	-1.5~+1.0	19.0	-1.5~+1.0
	3MHz 5MHz, 10MHz 15MHz, 20MHz	Low Mid High	1RB	21.0	-1.5~+1.0	20.0	-1.5~+1.0
			50% RB	20.0	-1.5~+1.0	19.0	-1.5~+1.0
			100% RB	20.0	-1.5~+1.0	19.0	-1.5~+1.0
LTE B5	1.4MHz	Low Mid High	1RB	23.0	-1.5~+1.0	22.0	-1.5~+1.0
			50% RB	23.0	-1.5~+1.0	22.0	-1.5~+1.0
			100% RB	22.0	-1.5~+1.0	21.0	-1.5~+1.0
	3MHz 5MHz, 10MHz	Low Mid High	1RB	23.0	-1.5~+1.0	22.0	-1.5~+1.0
			50% RB	22.0	-1.5~+1.0	21.0	-1.5~+1.0
			100% RB	22.0	-1.5~+1.0	21.0	-1.5~+1.0
LTE B7	5MHz, 10MHz 15MHz, 20MHz	Low Mid High	1RB	19.0	-1.5~+1.0	18.0	-1.5~+1.0
			50% RB	18.0	-1.5~+1.0	17.0	-1.5~+1.0
			100% RB	18.0	-1.5~+1.0	17.0	-1.5~+1.0
LTE B12	1.4MHz	Low Mid High	1RB	24.0	-1.5~+1.0	23.0	-1.5~+1.0
			50% RB	24.0	-1.5~+1.0	23.0	-1.5~+1.0
			100% RB	23.0	-1.5~+1.0	22.0	-1.5~+1.0
	3MHz 5MHz, 10MHz	Low Mid High	1RB	24.0	-1.5~+1.0	23.0	-1.5~+1.0
			50% RB	23.0	-1.5~+1.0	22.0	-1.5~+1.0
			100% RB	23.0	-1.5~+1.0	22.0	-1.5~+1.0
LTE B13	5MHz, 10MHz	Low Mid High	1RB	23.0	-1.5~+1.0	22.0	-1.5~+1.0
			50% RB	22.0	-1.5~+1.0	21.0	-1.5~+1.0
			100% RB	22.0	-1.5~+1.0	21.0	-1.5~+1.0
LTE B17	5MHz, 10MHz	Low Mid High	1RB	24.0	-1.5~+1.0	23.0	-1.5~+1.0
			50% RB	23.0	-1.5~+1.0	22.0	-1.5~+1.0
			100% RB	23.0	-1.5~+1.0	22.0	-1.5~+1.0
LTE B38	5MHz, 10MHz, 15MHz, 20MHz	Low Mid High	1RB	19.0	-1.5~+1.0	18.0	-1.5~+1.0
			50% RB	18.0	-1.5~+1.0	17.0	-1.5~+1.0
			100% RB	18.0	-1.5~+1.0	17.0	-1.5~+1.0
LTE B41	5MHz, 10MHz, 15MHz, 20MHz	Low Mid High	1RB	19.0	-1.5~+1.0	18.0	-1.5~+1.0
			50% RB	18.0	-1.5~+1.0	17.0	-1.5~+1.0
			100% RB	18.0	-1.5~+1.0	17.0	-1.5~+1.0

6.3.5. Wi-Fi 2.4GHz

RF Air Interface		WLAN Chain 0 (Main)		RF Air Interface		WLAN Chain 1 (Sub)			
11b		Manufacturing Max Power {dBm}		11b		Manufacturing Max Power {dBm}			
Band	channel	1Mbps	11Mbps	Band	channel	1Mbps	11Mbps		
	2400~2485	1-11	18.58		18.58	2400~2485	1-11	19.67	19.63
	12	15.96	15.96		12	15.87	15.87		
	13	12.96	12.96		13	12.87	12.87		
11g		Manufacturing Max Power {dBm}		11g		Manufacturing Max Power {dBm}			
Band	channel	6Mbps	54Mbps	Band	channel	6Mbps	54Mbps		
	2400~2485	1-2	10.4		9.12	2400~2485	1-2	12.00	10.84
		3-10	18.4		16.12		3-10	19.89	17.84
		11	15.4		13.62		11	15.89	15.34
		12	9.88		9.88		12	10.87	10.87
	13	3.88	3.88		13	4.37	4.37		
11n HT20		Manufacturing Max Power {dBm}		11n HT20		Manufacturing Max Power {dBm}			
Band	channel	MCS-0	MCS-7	Band	channel	MCS-0	MCS-7		
	2400~2485	1-2	9.4		8.92	2400~2485	1-2	11.00	10.61
		3-10	18.4		14.42		3-10	19.83	16.11
		11	14.9		13.92		11	15.83	15.61
		12	8.63		8.63		12	9.37	9.37
	13	3.13	3.13		13	3.87	3.87		

6.3.6. Wi-Fi 5 GHz

RF Air Interface		WLAN Chain 0 (Main)		RF Air Interface		WLAN Chain 1 (Sub)	
11a		Manufacturing Max Power {dBm}		11a		Manufacturing Max Power {dBm}	
Band	channel	6Mbps	54Mbps	Band	channel	6Mbps	54Mbps
5150~5250MHz	All	13.0	13.0	5150~5250MHz	All	10.84	10.84
5250~5350MHz	All	13.0	13.0	5250~5350MHz	All	11.04	11.04
5470~5725MHz	All	13.0	13.0	5470~5725MHz	All	11.26	11.26
5725~5850MHz	All	13.0	13.0	5725~5850MHz	All	11.26	11.26
11n HT-20		Manufacturing Max Power {dBm}		11n HT-20		Manufacturing Max Power {dBm}	
Band	channel	MCS-0	MCS-7	Band	channel	MCS-0	MCS-7
5150~5250MHz	All	13.0	13.0	5150~5250MHz	All	10.84	10.84
5250~5350MHz	All	13.0	13.0	5250~5350MHz	All	11.04	11.04
5470~5725MHz	All	13.0	13.0	5470~5725MHz	All	11.26	11.26
5725~5850MHz	All	13.0	13.0	5725~5850MHz	All	11.26	11.26
11n HT-40		Manufacturing Max Power {dBm}		11n HT-40		Manufacturing Max Power {dBm}	
Band	channel	MCS-0	MCS-7	Band	channel	MCS-0	MCS-7
5150~5250MHz	All	13.0	13.0	5150~5250MHz	All	10.84	10.84
5250~5350MHz	All	13.0	13.0	5250~5350MHz	All	11.04	11.04
5470~5725MHz	All	13.0	13.0	5470~5725MHz	All	11.26	11.26
5725~5850MHz	All	13.0	13.0	5725~5850MHz	All	11.26	11.26
11ac VHT-20		Manufacturing Max Power {dBm}		11ac VHT-20		Manufacturing Max Power {dBm}	
Band	channel	MCS-0	MCS-8	Band	channel	MCS-0	MCS-8
5150~5250MHz	All	13.0	13.0	5150~5250MHz	All	10.84	10.84
5250~5350MHz	All	13.0	13.0	5250~5350MHz	All	11.04	11.04
5470~5725MHz	All	13.0	13.0	5470~5725MHz	All	11.26	11.26
5725~5850MHz	All	13.0	13.0	5725~5850MHz	All	11.26	11.26
11ac VHT-40		Manufacturing Max Power {dBm}		11ac VHT-40		Manufacturing Max Power {dBm}	
Band	channel	MCS-0	MCS-8, 9	Band	channel	MCS-0	MCS-8, 9
5150~5250MHz	All	13.0	13.0	5150~5250MHz	All	10.84	10.84
5250~5350MHz	All	13.0	13.0	5250~5350MHz	All	11.04	11.04
5470~5725MHz	All	13.0	13.0	5470~5725MHz	All	11.26	11.26
5725~5850MHz	All	13.0	13.0	5725~5850MHz	All	11.26	11.26
11ac VHT-80		Manufacturing Max Power {dBm}		11ac VHT-80		Manufacturing Max Power {dBm}	
Band	channel	MCS-0	MCS-8, 9	Band	channel	MCS-0	MCS-8, 9
5150~5250MHz	All	13.0	13.0	5150~5250MHz	All	10.84	10.84
5250~5350MHz	All	13.0	13.0	5250~5350MHz	All	11.04	11.04
5470~5725MHz	All	13.0	13.0	5470~5725MHz	All	11.26	11.26
5725~5850MHz	All	13.0	13.0	5725~5850MHz	All	11.26	11.26

6.3.7. BT Output Power from Tune-up Procedure

RF Air Interface		Manufacturing Max Power [dBm]				
BT		BR	EDR	BLE (1 Mbps)	BLE (2 Mbps)	
2400~2485MHz	Low	Time Averaged	11.00	8.10	4.50	4.50
		Calculated to 100% Duty Cycle	12.12	9.25	5.18	5.18
	Mid	Time Averaged	11.70	8.70	5.50	5.50
		Calculated to 100% Duty Cycle	12.85	9.85	6.18	6.18
	High	Time Averaged	11.80	9.40	6.80	6.80
		Calculated to 100% Duty Cycle	12.94	10.55	7.48	7.48

6.4. General LTE SAR Test and Reporting Considerations

Item	Description						
Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 4	Frequency range: 1710 - 1755 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	20050/ 1720	18675/ 1857.5	18650/ 1855	18625/ 1852.5	18615/ 1851.5	18607/ 1850.7
	Mid	20175/ 1732.5	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880
	High	20300/ 1745	19125/ 1902.5	19150/ 1905	19175/ 1907.5	19185/ 1908.5	19193/ 1909.3
	Band 5	Frequency range: 824 - 849 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low			20450/ 829	20425/ 826.5	20415/ 825.5	20407/ 824.7
	Mid			20525/ 836.5	20525/ 836.5	20525/ 836.5	20525/ 836.5
	High			20600/ 844	20625/ 846.5	20635/ 847.5	20643/ 848.3
	Band 7	Frequency range: 2500 - 2570 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	20850 2510	20825 2507.5	20800 2505	20775 2502.5		
	Mid	21100 2535	21100 2535	21100 2535	21100 2535		
	High	21350 2560	21375 2562.5	21400 2565	21425 2567.5		
	Band 12	Frequency range: 699 – 716 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low			23060/ 704	23035/ 701.5	23025/ 700.5	23017/ 699.7
	Mid			23095/ 707.5	23095/ 707.5	23095/ 707.5	23095/ 707.5
	High			23130/ 711	23155/ 713.5	23165/ 714.5	23173/ 715.3
	Band 13	Frequency range: 777 - 787 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low				23205/ 779.5		
Mid			23230/ 782	23230/ 782			
High				23255/ 784.5			

General LTE SAR Test and Reporting Considerations (Continued)

Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 17	Frequency range: 704 - 716 MHz																																										
		Channel Bandwidth																																										
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz																																					
	Low			23780/ 709	23755/ 706.5																																							
	Mid			23790/ 710	23790/ 710																																							
	High			23800/ 711	23825/ 713.5																																							
	Band 38	Frequency Range: 2570 – 2620 MHz																																										
		Channel Bandwidth																																										
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz																																					
	Low	37850/ 2580	37825/ 2577.5	37800/ 2575	37775/ 2572.5																																							
	Mid	38000/ 2595	38000/ 2595	38000/ 2595	38000/ 2595																																							
	High	38150/ 2610	38175/ 2612.5	38200/ 2615	38225/ 2617.5																																							
	Band 41	Frequency range: 2496 - 2690 MHz																																										
		Channel Bandwidth																																										
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz																																					
Low	39750 / 2506.0																																											
Low-Mid	40185 / 2549.5																																											
Mid	40620 / 2593.0																																											
Mid-High	41055 / 2636.5																																											
High	41490 / 2680.0																																											
LTE transmitter and antenna implementation	Refer to Appendix A.																																											
Maximum power reduction (MPR)	<p align="center">Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3</p> <table border="1"> <thead> <tr> <th rowspan="2">Modulation</th> <th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th> <th rowspan="2">MPR (dB)</th> </tr> <tr> <th>1.4 MHz</th> <th>3.0 MHz</th> <th>5 MHz</th> <th>10 MHz</th> <th>15 MHz</th> <th>20 MHz</th> </tr> </thead> <tbody> <tr> <td>QPSK</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 2</td> </tr> </tbody> </table> <p>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</p>						Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1	16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
Modulation	Channel bandwidth / Transmission bandwidth (RB)							MPR (dB)																																				
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz																																						
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1																																					
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1																																					
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2																																					
Power reduction	No																																											
Spectrum plots for RB configurations	A properly configured base station simulator was used for the SAR and power measurements; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.																																											

6.5. LTE (TDD) Considerations

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

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

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

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS).

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

Calculated Duty Cycle

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

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

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

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

where

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

Note(s):

This device supports uplink-downlink configurations 0-6. The configuration with highest duty cycle was used-configuration 0 at 63.3% duty cycle.

7. RF Exposure Conditions (Test Configurations)

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

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

Notes:

- SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR.
- When hotspot mode does not apply, 10-g Extremity SAR is required for all surfaces and edges with an antenna located at \leq 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.

RF Exposure Conditions (Test Configurations) continued:

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

Notes:

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

8. Dielectric Property Measurements & System Check

8.1. Dielectric Property Measurements

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

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

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

The dielectric constant (ϵ_r) and conductivity (σ) of typical tissue-equivalent media recipes are expected to be within $\pm 5\%$ 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 ϵ_r and σ may be relaxed to $\pm 10\%$. This is limited to frequencies ≤ 3 GHz.

Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

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

IEEE Std 1528-2013

Refer to Table 3 within the IEEE Std 1528-2013

Dielectric Property Measurements Results:

SAR Lab	Date	Tissue Type	Band (MHz)	Frequency (MHz)	Relative Permittivity (ϵ_r)			Conductivity (σ)		
					Measured	Target	Delta (%)	Measured	Target	Delta (%)
E	3/14/2017	Head	1750	1750	40.87	40.08	1.96	1.32	1.37	-3.29
				1710	41.02	40.15	2.18	1.28	1.35	-4.86
				1755	40.85	40.08	1.93	1.33	1.37	-3.27
E	3/14/2017	Head	1900	1900	40.08	40.00	0.20	1.43	1.40	1.93
				1850	40.23	40.00	0.57	1.39	1.40	-0.64
				1920	40.21	40.00	0.53	1.45	1.40	3.21
E	3/14/2017	Body	1900	1900	51.22	53.30	-3.90	1.57	1.52	3.03
				1850	51.26	53.30	-3.83	1.53	1.52	0.66
				1920	51.15	53.30	-4.03	1.58	1.52	4.01
E	3/14/2017	Body	1750	1750	51.57	53.44	-3.50	1.45	1.49	-2.63
				1710	51.66	53.54	-3.52	1.41	1.46	-3.25
				1755	51.56	53.43	-3.50	1.45	1.49	-2.57
F	3/14/2017	Head	750	750	40.58	41.96	-3.29	0.90	0.89	0.43
				695	41.35	42.24	-2.12	0.85	0.89	-4.92
				790	40.02	41.76	-4.16	0.94	0.90	4.38
F	3/14/2017	Body	750	750	54.09	55.55	-2.62	0.97	0.96	0.71
				695	54.61	55.76	-2.06	0.92	0.96	-4.54
				790	53.66	55.39	-3.13	1.01	0.97	4.02
G	3/14/2017	Head	2600	2600	38.36	39.01	-1.67	1.99	1.96	1.32
				2495	38.76	39.14	-0.98	1.87	1.85	0.94
				2690	38.02	38.90	-2.26	2.10	2.06	1.77
G	3/14/2017	Body	2600	2600	52.00	52.51	-0.97	2.24	2.16	3.66
				2495	52.37	52.64	-0.52	2.09	2.01	3.81
				2690	51.66	52.40	-1.41	2.37	2.29	3.57
H	3/14/2017	Head	900	900	41.14	41.50	-0.87	0.98	0.97	0.66
				835	41.92	41.50	1.01	0.92	0.90	2.10
				805	42.27	41.68	1.42	0.89	0.90	-1.24
H	3/14/2017	Body	900	900	52.79	55.00	-4.02	1.07	1.05	1.43
				835	53.47	55.20	-3.13	1.00	0.97	3.40
				805	53.91	55.33	-2.57	0.97	0.97	0.10
D	3/20/2017	Head	2450	2450	40.11	39.20	2.32	1.87	1.80	3.89
				2400	40.26	39.30	2.45	1.81	1.75	3.33
				2480	40.03	39.16	2.22	1.89	1.83	3.36
D	3/20/2017	Body	2450	2450	50.93	52.70	-3.36	2.04	1.95	4.62
				2400	51.01	52.77	-3.34	1.98	1.90	4.11
				2480	50.86	52.66	-3.42	2.06	1.99	3.46

SAR Lab	Date	Tissue Type	Band (MHz)	Frequency (MHz)	Relative Permittivity (ϵ_r)			Conductivity (σ)		
					Measured	Target	Delta (%)	Measured	Target	Delta (%)
C	3/20/2017	Head	5200	5200	37.24	35.99	3.47	4.51	4.65	-2.99
				5150	37.30	36.05	3.48	4.46	4.60	-3.10
				5350	37.03	35.82	3.38	4.65	4.80	-3.19
C	3/20/2017	Head	5800	5800	36.33	35.30	2.92	5.14	5.27	-2.39
				5700	36.46	35.42	2.94	5.02	5.16	-2.72
				5850	36.24	35.30	2.66	5.18	5.27	-1.71
C	3/20/2017	Body	5200	5200	47.13	49.02	-3.85	5.10	5.29	-3.62
				5150	47.16	49.09	-3.93	5.05	5.24	-3.52
				5350	46.90	48.82	-3.93	5.25	5.47	-3.98
C	3/20/2017	Body	5600	5600	46.65	48.48	-3.77	5.57	5.76	-3.40
				5500	46.58	48.61	-4.18	5.45	5.64	-3.53
				5725	46.19	48.31	-4.39	5.74	5.91	-2.82
C	3/20/2017	Body	5800	5800	46.10	48.20	-4.36	5.88	6.00	-1.98
				5700	46.25	48.34	-4.33	5.72	5.88	-2.73
				5850	45.97	48.20	-4.63	5.93	6.00	-1.10
C	3/24/2017	5200	Head	5200	36.97	35.99	2.72	4.55	4.65	-2.24
				5150	37.07	36.05	2.84	4.48	4.60	-2.69
				5350	36.79	35.82	2.71	4.72	4.80	-1.76
C	3/24/2017	5600	Head	5600	36.46	35.53	2.61	4.98	5.06	-1.61
				5500	36.60	35.65	2.67	4.87	4.96	-1.73
				5725	36.32	35.39	2.62	5.11	5.19	-1.54
C	3/24/2017	5200	Body	5200	49.34	49.02	0.65	5.35	5.29	0.99
				5150	49.41	49.09	0.66	5.27	5.24	0.58
				5350	49.23	48.82	0.85	5.46	5.47	-0.16
C	3/24/2017	5600	Body	5600	48.83	48.48	0.73	5.71	5.76	-0.95
				5500	48.94	48.61	0.67	5.68	5.64	0.56
				5725	48.71	48.31	0.83	5.90	5.91	-0.13
C	3/24/2017	5800	Body	5800	48.58	48.20	0.79	6.04	6.00	0.58
				5700	48.72	48.34	0.78	5.89	5.88	0.13
				5850	48.47	48.20	0.56	6.10	6.00	1.67
C	3/27/2017	5200	Head	5200	34.82	35.99	-3.25	4.60	4.65	-1.03
				5150	34.90	36.05	-3.18	4.54	4.60	-1.24
				5350	34.56	35.82	-3.52	4.75	4.80	-1.18
C	3/27/2017	5600	Head	5600	34.15	35.53	-3.89	5.01	5.06	-0.91
				5500	34.32	35.65	-3.73	4.90	4.96	-1.11
				5725	33.93	35.39	-4.13	5.14	5.19	-0.93
C	3/27/2017	5800	Head	5800	33.83	35.30	-4.16	5.23	5.27	-0.68
				5700	34.00	35.42	-4.01	5.12	5.16	-0.88
				5850	33.70	35.30	-4.53	5.27	5.27	0.04

SAR Lab	Date	Tissue Type	Band (MHz)	Frequency (MHz)	Relative Permittivity (ϵ_r)			Conductivity (σ)		
					Measured	Target	Delta (%)	Measured	Target	Delta (%)
C	3/27/2017	5200	Body	5200	47.45	49.02	-3.20	5.15	5.29	-2.73
				5150	47.50	49.09	-3.23	5.07	5.24	-3.12
				5350	47.17	48.82	-3.37	5.32	5.47	-2.72
C	3/27/2017	5600	Body	5600	46.71	48.48	-3.65	5.67	5.76	-1.61
				5500	46.86	48.61	-3.61	5.53	5.64	-2.03
				5725	46.48	48.31	-3.78	5.83	5.91	-1.23
C	3/27/2017	5800	Body	5800	46.40	48.20	-3.73	5.96	6.00	-0.63
				5700	46.57	48.34	-3.67	5.81	5.88	-1.24
				5850	46.27	48.20	-4.00	6.02	6.00	0.40
D	3/27/2017	2450	Head	2450	38.34	39.20	-2.19	1.84	1.80	1.94
				2400	38.54	39.30	-1.93	1.78	1.75	1.85
				2480	38.22	39.16	-2.41	1.87	1.83	1.83

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 \pm 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 \geq 15.0 cm for SAR measurements \leq 3 GHz and \geq 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.

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 %	
E	3/14/2017	Head	D1750V2 SN:1050	4/13/2017	3.510	35.10	35.90	-2.23	1.860	18.60	19.00	-2.11	
E	3/14/2017	Head	D1900V2 SN:5d043	11/9/2017	4.010	40.10	40.00	0.25	2.060	20.60	20.90	-1.44	
E	3/14/2017	Body	D1900V2 SN:5d043	11/9/2017	4.040	40.40	39.10	3.32	2.070	20.70	20.70	0.00	1,2
E	3/14/2017	Body	D1750V2 SN:1050	4/13/2017	3.710	37.10	36.20	2.49	1.960	19.60	19.30	1.55	3,4
H	3/14/2017	Head	D900V2 SN:1d143	9/12/2017	1.080	10.80	10.60	1.89	0.701	7.01	6.82	2.79	
H	3/14/2017	Body	D900V2 SN:1d143	9/12/2017	1.070	10.70	11.00	-2.73	0.688	6.88	7.13	-3.51	5,6
F	3/14/2017	Head	D750V3 SN:1071	11/8/2017	0.847	8.47	8.28	2.29	0.557	5.57	5.43	2.58	
F	3/14/2017	Body	D750V3 SN:1071	11/8/2017	0.915	9.15	8.62	6.15	0.610	6.10	5.73	6.46	7,8
G	3/14/2017	Head	D2600V2 SN:1006	9/13/2017	5.700	57.00	55.50	2.70	2.480	24.80	25.00	-0.80	
G	3/14/2017	Body	D2600V2 SN:1006	9/13/2017	5.680	56.80	54.20	4.80	2.460	24.60	24.30	1.23	9,10
C	3/20/2017	Head	D5GHzV2 SN:1003 (5.2 GHz)	2/13/2018	7.350	73.50	76.50	-3.92	2.090	20.90	21.80	-4.13	
C	3/20/2017	Head	D5GHzV2 SN:1003 (5.8 GHz)	2/13/2018	7.540	75.40	78.10	-3.46	2.130	21.30	22.10	-3.62	
C	3/20/2017	Body	D5GHzV2 SN:1003 (5.2 GHz)	2/13/2018	7.130	71.30	70.50	1.13	2.010	20.10	19.80	1.52	
C	3/20/2017	Body	D5GHzV2 SN:1003 (5.6 GHz)	2/13/2018	8.420	84.20	78.30	7.54	2.330	23.30	22.00	5.91	11,12
C	3/20/2017	Body	D5GHzV2 SN:1003 (5.8 GHz)	2/13/2018	7.530	75.30	73.50	2.45	2.110	21.10	20.50	2.93	
D	3/20/2017	Head	D2450V2 SN:748	2/8/2018	5.330	53.30	52.10	2.30	2.400	24.00	24.20	-0.83	
D	3/20/2017	Body	D2450V2 SN:748	2/8/2018	5.510	55.10	51.30	7.41	2.500	25.00	23.90	4.60	13,14
C	3/24/2017	Body	D5GHzV2 SN:1003 (5.2 GHz)	2/13/2018	7.490	74.90	70.50	6.24	2.110	21.10	19.80	6.57	
C	3/24/2017	Body	D5GHzV2 SN:1003 (5.6 GHz)	2/13/2018	7.610	76.10	78.30	-2.81	2.120	21.20	22.00	-3.64	
C	3/24/2017	Body	D5GHzV2 SN:1003 (5.8 GHz)	2/13/2018	6.900	69.00	73.50	-6.12	1.930	19.30	20.50	-5.85	
C	3/24/2017	Head	D5GHzV2 SN:1003 (5.2 GHz)	2/13/2018	7.870	78.70	76.50	2.88	2.250	22.50	21.80	3.21	
C	3/24/2017	Head	D5GHzV2 SN:1003 (5.6 GHz)	2/13/2018	8.830	88.30	83.30	6.00	2.520	25.20	23.80	5.88	
D	3/27/2017	Head	D2450V2 SN:748	2/8/2018	5.190	51.90	52.10	-0.38	2.330	23.30	24.20	-3.72	
C	3/27/2017	Body	D5GHzV2 SN:1003 (5.2 GHz)	2/13/2018	7.410	74.10	70.50	5.11	2.080	20.80	19.80	5.05	
C	3/27/2017	Body	D5GHzV2 SN:1003 (5.6 GHz)	2/13/2018	8.050	80.50	78.30	2.81	2.240	22.40	22.00	1.82	
C	3/27/2017	Body	D5GHzV2 SN:1003 (5.8 GHz)	2/13/2018	7.330	73.30	73.50	-0.27	2.060	20.60	20.50	0.49	
C	3/27/2017	Head	D5GHzV2 SN:1003 (5.2 GHz)	2/13/2018	7.860	78.60	76.50	2.75	2.260	22.60	21.80	3.67	
C	3/27/2017	Head	D5GHzV2 SN:1003 (5.6 GHz)	2/13/2018	8.360	83.60	83.30	0.36	2.380	23.80	23.80	0.00	
C	3/27/2017	Head	D5GHzV2 SN:1003 (5.8 GHz)	2/13/2018	7.640	76.40	78.10	-2.18	2.170	21.70	22.10	-1.81	

9. Conducted Output Power Measurements

9.1. GSM

GSM850 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Meas. Avg. Pwr	
						Burst (dBm)	Frame (dBm)
850	GPRS (GMSK)	CS4	1	128	824.2	32.5	23.5
				190	836.6	32.7	23.6
				251	848.8	32.5	23.5
			2	128	824.2	29.6	23.6
				190	836.6	29.6	23.6
				251	848.8	29.5	23.5
			3	128	824.2	27.6	23.3
				190	836.6	27.7	23.5
				251	848.8	27.6	23.4
			4	128	824.2	26.6	23.6
				190	836.6	26.7	23.7
				251	848.8	26.6	23.6
	EGPRS (8PSK)	MCS9	1	128	824.2	27.0	18.0
				190	836.6	27.1	18.0
				251	848.8	27.1	18.0
			2	128	824.2	25.5	19.5
				190	836.6	25.5	19.5
				251	848.8	25.5	19.4
			3	128	824.2	23.7	19.5
				190	836.6	23.8	19.5
				251	848.8	23.6	19.3
			4	128	824.2	22.9	19.9
				190	836.6	23.0	20.0
				251	848.8	22.9	19.9

Notes:

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

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

GSM1900 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Meas. Avg. Pwr	
						Burst (dBm)	Frame (dBm)
1900	GPRS (GMSK)	CS4	1	512	1850.2	29.7	20.6
				661	1880.0	29.6	20.6
				810	1909.8	29.8	20.7
			2	512	1850.2	27.1	21.1
				661	1880.0	27.1	21.1
				810	1909.8	27.2	21.2
			3	512	1850.2	25.0	20.7
				661	1880.0	25.1	20.8
				810	1909.8	25.3	21.0
			4	512	1850.2	24.1	21.1
				661	1880.0	24.1	21.1
				810	1909.8	24.3	21.3
	EGPRS (8PSK)	MCS9	1	512	1850.2	25.2	16.2
				661	1880.0	25.2	16.2
				810	1909.8	25.4	16.4
			2	512	1850.2	24.5	18.5
				661	1880.0	24.4	18.4
				810	1909.8	24.6	18.6
			3	512	1850.2	22.1	17.8
				661	1880.0	22.0	17.7
				810	1909.8	22.3	18.0
			4	512	1850.2	21.0	18.0
				661	1880.0	20.9	17.9
				810	1909.8	21.2	18.2

Notes:

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

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

GSM850 DTM Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Meas. Avg. Pwr			
						CS		PS	
						Burst (dBm)	Frame (dBm)	Burst (dBm)	Frame (dBm)
850	GSM(Voice) + GPRS(GMSK)	CS4	1	128	824.2	32.5	23.5		
				190	836.6	32.7	23.6		
				251	848.8	32.6	23.5		
			2	128	824.2	29.6	23.6	29.6	23.6
				190	836.6	29.7	23.7	29.7	23.7
				251	848.8	29.7	23.7	29.7	23.7
			3	128	824.2	27.7	23.4	27.7	23.4
				190	836.6	27.8	23.5	27.8	23.5
				251	848.8	27.6	23.3	27.6	23.3
	GSM(Voice) + EGPRS(8PSK)	MCS9	1	128	824.2	32.5	23.5		
				190	836.6	32.7	23.6		
				251	848.8	32.6	23.5		
			2	128	824.2	29.6	23.6	25.7	19.7
				190	836.6	29.7	23.7	25.6	19.6
				251	848.8	29.6	23.6	25.7	19.7
			3	128	824.2	27.6	23.3	23.8	19.5
				190	836.6	27.7	23.4	23.9	19.6
				251	848.8	27.6	23.3	23.8	19.5

Notes:

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

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

GSM1900 DTM Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Meas. Avg. Pwr			
						CS		PS	
						Burst (dBm)	Frame (dBm)	Burst (dBm)	Frame (dBm)
1900	GSM(Voice) + GPRS(GMSK)	CS4	1	512	1850.2	29.6	20.6		
				661	1880.0	29.6	20.6		
				810	1909.8	29.8	20.7		
			2	512	1850.2	26.8	20.8	27.0	21.0
				661	1880.0	26.8	20.8	27.0	21.0
				810	1909.8	27.0	20.9	27.1	21.1
			3	512	1850.2	24.8	20.5	25.0	20.7
				661	1880.0	24.8	20.5	25.0	20.7
				810	1909.8	25.1	20.8	25.3	21.0
	GSM(Voice) + EGPRS(8PSK)	MCS9	1	512	1850.2	29.6	20.6		
				661	1880.0	29.6	20.6		
				810	1909.8	29.8	20.7		
			2	512	1850.2	26.9	20.9	24.5	18.5
				661	1880.0	26.9	20.9	24.5	18.5
				810	1909.8	27.0	21.0	24.7	18.7
			3	512	1850.2	24.9	20.6	22.2	17.9
				661	1880.0	24.9	20.6	22.1	17.8
				810	1909.8	25.1	20.8	22.4	18.1

Notes:

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

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

9.2. W-CDMA

Release 99 Setup Procedures used to establish the test signals

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

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

HSDPA Setup Procedures used to establish the test signals

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

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

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

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

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

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

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

HSPA+

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

W-CDMA Band V Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Meas. Avg. Pwr (dBm)	
W-CDMA Band V	Rel 99	RMC, 12.2 kbps	4132	826.4	N/A	24.2	
			4183	836.6	N/A	24.1	
			4233	846.6	N/A	24.2	
	HSDPA	Subtest 1	4132	826.4	0	23.0	
			4183	836.6	0	23.1	
			4233	846.6	0	23.1	
		Subtest 2	4132	826.4	0	23.0	
			4183	836.6	0	23.1	
			4233	846.6	0	23.1	
		Subtest 3	4132	826.4	0.5	22.5	
			4183	836.6	0.5	22.6	
			4233	846.6	0.5	22.5	
		Subtest 4	4132	826.4	0.5	22.5	
			4183	836.6	0.5	22.6	
			4233	846.6	0.5	22.5	
		HSUPA	Subtest 1	4132	826.4	0	23.0
				4183	836.6	0	23.0
				4233	846.6	0	23.1
	Subtest 2		4132	826.4	2	21.0	
			4183	836.6	2	21.1	
			4233	846.6	2	21.1	
	Subtest 3		4132	826.4	1	22.0	
			4183	836.6	1	22.1	
			4233	846.6	1	22.1	
	Subtest 4		4132	826.4	2	21.0	
			4183	836.6	2	21.1	
			4233	846.6	2	21.1	
	Subtest 5		4132	826.4	0	23.0	
			4183	836.6	0	23.0	
			4233	846.6	0	23.1	

9.4. LTE

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

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

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

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

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

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

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

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

LTE Band 4 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						1720 MHz	1732.5 MHz	1745 MHz
LTE Band 4	20	QPSK	1	0	0		21.8	
			1	50	0		21.6	
			1	99	0		21.5	
			50	0	1		20.7	
			50	25	1		20.6	
			50	50	1		20.6	
		16QAM	100	0	1		20.6	
			1	0	1		21.0	
			1	50	1		21.0	
			1	99	1		21.0	
			50	0	2		19.8	
			50	25	2		19.7	
			50	50	2		19.6	
			100	0	2		19.7	
Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						1717.5 MHz	1732.5 MHz	1747.5 MHz
LTE Band 4	15	QPSK	1	0	0	21.7	21.9	21.8
			1	36	0	21.5	21.5	21.6
			1	74	0	21.5	21.5	21.5
			36	0	1	20.7	20.7	20.7
			36	18	1	20.6	20.7	20.7
			36	37	1	20.5	20.6	20.6
		16QAM	75	0	1	20.6	20.6	20.7
			1	0	1	21.0	20.7	21.0
			1	36	1	20.9	20.5	21.0
			1	74	1	20.8	20.4	20.9
			36	0	2	19.6	19.7	19.8
			36	18	2	19.6	19.6	19.8
			36	37	2	19.5	19.6	19.7
			75	0	2	19.6	19.6	19.7
Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						1715 MHz	1732.5 MHz	1750 MHz
LTE Band 4	10	QPSK	1	0	0	21.9	21.8	21.8
			1	25	0	21.7	21.6	21.6
			1	49	0	21.7	21.5	21.6
			25	0	1	20.8	20.6	20.7
			25	12	1	20.8	20.6	20.7
			25	25	1	20.8	20.6	20.7
		16QAM	50	0	1	20.8	20.6	20.7
			1	0	1	21.0	20.7	20.7
			1	25	1	21.0	20.6	20.6
			1	49	1	21.0	20.5	20.6
			25	0	2	19.9	19.7	19.8
			25	12	2	19.9	19.7	19.8
			25	25	2	19.8	19.7	19.7
			50	0	2	19.8	19.6	19.7

LTE Band 4 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						1712.5 MHz	1732.5 MHz	1752.5 MHz
LTE Band 4	5	QPSK	1	0	0	21.9	21.7	21.8
			1	12	0	21.9	21.6	21.7
			1	24	0	21.9	21.5	21.8
			12	0	1	20.9	20.6	20.8
			12	6	1	20.9	20.6	20.8
			12	11	1	20.9	20.6	20.8
		16QAM	25	0	1	20.9	20.6	20.8
			1	0	1	21.0	20.8	21.0
			1	12	1	21.0	20.7	21.0
			1	24	1	21.0	20.8	21.0
			12	0	2	20.0	19.7	20.0
			12	6	2	20.0	19.7	20.0
			12	11	2	19.9	19.7	20.0
			25	0	2	19.9	19.6	19.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						1711.5 MHz	1732.5 MHz	1753.5 MHz
LTE Band 4	3	QPSK	1	0	0	21.5	21.3	21.5
			1	7	0	21.6	21.4	21.5
			1	14	0	21.5	21.3	21.4
			8	0	1	20.7	20.3	20.4
			8	4	1	20.7	20.3	20.4
			8	7	1	20.7	20.4	20.5
		16QAM	15	0	1	20.6	20.3	20.5
			1	0	1	20.6	20.7	20.5
			1	7	1	20.7	20.8	20.6
			1	14	1	20.5	20.7	20.4
			8	0	2	19.8	19.2	19.6
			8	4	2	19.8	19.3	19.7
			8	7	2	19.8	19.3	19.6
			15	0	2	19.7	19.4	19.4
Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						1710.7 MHz	1732.5 MHz	1754.3 MHz
LTE Band 4	1.4	QPSK	1	0	0	21.6	21.2	21.3
			1	2	0	21.6	21.3	21.4
			1	5	0	21.6	21.2	21.3
			3	0	0	21.6	21.3	21.4
			3	1	0	21.7	21.3	21.4
			3	2	0	21.6	21.3	21.5
			6	0	1	20.5	20.2	20.4
		16QAM	1	0	1	20.7	20.6	20.5
			1	2	1	20.8	20.7	20.6
			1	5	1	20.7	20.6	20.5
			3	0	1	20.7	20.5	20.7
			3	1	1	20.7	20.5	20.7
			3	2	1	20.7	20.5	20.7
			6	0	2	19.7	19.2	19.6

Note(s):

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

LTE Band 5 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						829 MHz	836.5 MHz	844 MHz
LTE Band 5	10	QPSK	1	0	0		23.8	
			1	25	0		23.7	
			1	49	0		23.6	
			25	0	1		22.8	
			25	12	1		22.8	
			25	25	1		22.7	
		16QAM	50	0	1		22.8	
			1	0	1		22.8	
			1	25	1		22.7	
			1	49	1		22.6	
			25	0	2		21.8	
			25	12	2		21.8	
			25	25	2		21.8	
			50	0	2		21.8	

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						826.5 MHz	836.5 MHz	846.5 MHz
LTE Band 5	5	QPSK	1	0	0	23.9	23.9	23.8
			1	12	0	23.8	23.8	23.7
			1	24	0	23.8	23.8	23.6
			12	0	1	22.8	22.8	22.7
			12	6	1	22.8	22.7	22.7
			12	11	1	22.7	22.7	22.7
		16QAM	25	0	1	22.8	22.7	22.7
			1	0	1	23.0	23.0	22.9
			1	12	1	23.0	23.0	22.8
			1	24	1	22.9	23.0	22.8
			12	0	2	21.9	21.9	21.8
			12	6	2	21.9	21.9	21.8
			12	11	2	21.8	21.9	21.8
			25	0	2	21.8	21.8	21.7

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						825.5 MHz	836.5 MHz	847.5 MHz
LTE Band 5	3	QPSK	1	0	0	23.7	23.8	23.7
			1	7	0	23.7	23.9	23.7
			1	14	0	23.6	23.8	23.6
			8	0	1	22.7	22.8	22.7
			8	4	1	22.7	22.8	22.7
			8	7	1	22.7	22.7	22.7
		16QAM	15	0	1	22.7	22.8	22.7
			1	0	1	22.6	23.0	22.8
			1	7	1	22.7	23.0	22.8
			1	14	1	22.5	23.0	22.7
			8	0	2	21.8	21.7	21.9
			8	4	2	21.8	21.7	21.9
			8	7	2	21.8	21.7	21.9
			15	0	2	21.7	21.8	21.6

LTE Band 5 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						824.7 MHz	836.5 MHz	848.3 MHz
LTE Band 5	1.4	QPSK	1	0	0	23.6	23.7	23.6
			1	2	0	23.7	23.8	23.6
			1	5	0	23.6	23.7	23.6
			3	0	0	23.7	23.7	23.6
			3	1	0	23.7	23.8	23.7
			3	2	0	23.7	23.8	23.7
		16QAM	6	0	1	22.6	22.7	22.6
			1	0	1	22.8	23.0	22.6
			1	2	1	22.8	23.0	22.7
			1	5	1	22.8	23.0	22.6
			3	0	1	22.7	22.9	22.8
			3	1	1	22.7	23.0	22.8
			3	2	1	22.7	23.0	22.8
			6	0	2	21.8	21.6	21.8

Note(s):

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

LTE Band 7 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						2510 MHz	2535 MHz	2560 MHz
LTE Band 7	20	QPSK	1	0	0	20.0	19.9	19.4
			1	49	0	19.8	19.6	19.3
			1	99	0	19.5	19.3	19.5
			50	0	1	18.9	18.8	18.5
			50	24	1	18.9	18.6	18.5
			50	50	1	18.7	18.5	18.6
		16QAM	100	0	1	18.8	18.6	18.6
			1	0	1	19.0	19.0	18.9
			1	49	1	18.9	19.0	18.8
			1	99	1	19.0	18.7	19.0
			50	0	2	17.9	17.8	17.5
			50	24	2	17.9	17.6	17.5
			50	50	2	17.7	17.5	17.6
			100	0	2	17.9	17.6	17.5

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						2507.5 MHz	2535 MHz	2562.5 MHz
LTE Band 7	15	QPSK	1	0	0	20.0	19.8	19.9
			1	37	0	19.9	19.5	19.9
			1	74	0	19.8	19.3	20.0
			36	0	1	19.0	18.7	19.0
			36	20	1	19.0	18.6	19.0
			36	39	1	19.0	18.5	19.0
		16QAM	75	0	1	19.0	18.6	19.0
			1	0	1	19.0	19.0	19.0
			1	37	1	18.8	18.9	18.9
			1	74	1	18.7	18.7	19.0
			36	0	2	18.0	17.8	17.9
			36	20	2	18.0	17.7	18.0
			36	39	2	18.0	17.5	18.0
			75	0	2	18.0	17.6	18.0

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						2505 MHz	2535 MHz	2565 MHz
LTE Band 7	10	QPSK	1	0	0	19.9	19.7	19.7
			1	25	0	20.0	19.5	19.7
			1	49	0	20.0	19.4	19.7
			25	0	1	19.0	18.7	18.7
			25	12	1	19.0	18.6	18.8
			25	25	1	19.0	18.5	18.8
		16QAM	50	0	1	19.0	18.6	18.8
			1	0	1	19.0	19.0	18.7
			1	25	1	19.0	18.8	18.7
			1	49	1	18.9	18.7	18.8
			25	0	2	18.0	17.7	17.8
			25	12	2	18.0	17.6	17.9
			25	25	2	18.0	17.6	17.9
			50	0	2	18.0	17.6	17.8

LTE Band 7 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						2502.5 MHz	2535 MHz	2567.5 MHz
LTE Band 7	5	QPSK	1	0	0	19.4	19.6	19.7
			1	12	0	19.4	19.5	19.8
			1	24	0	19.4	19.5	19.8
			12	0	1	18.5	18.6	18.8
			12	7	1	18.5	18.6	18.9
			12	13	1	18.5	18.6	18.9
			25	0	1	18.4	18.6	18.8
		16QAM	1	0	1	18.6	19.0	18.9
			1	12	1	18.6	19.0	18.9
			1	24	1	18.6	19.0	18.9
			12	0	2	17.5	17.8	17.9
			12	7	2	17.6	17.8	17.9
			12	13	2	17.5	17.7	17.9
			25	0	2	17.5	17.6	17.8

LTE Band 12 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						704 MHz	707.5 MHz	711 MHz
LTE Band 12	10	QPSK	1	0	0		24.8	
			1	25	0		24.7	
			1	49	0		24.6	
			25	0	1		23.8	
			25	12	1		23.8	
			25	25	1		23.7	
		16QAM	50	0	1		23.8	
			1	0	1		24.0	
			1	25	1		24.0	
			1	49	1		24.0	
			25	0	2		22.8	
			25	12	2		22.8	
			25	25	2		22.8	
			50	0	2		22.8	
Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						701.5 MHz	707.5 MHz	713.5 MHz
LTE Band 12	5	QPSK	1	0	0	24.8	24.8	24.8
			1	12	0	24.7	24.7	24.7
			1	24	0	24.6	24.7	24.3
			12	0	1	23.8	23.8	23.8
			12	7	1	23.8	23.8	23.8
			12	13	1	23.7	23.8	23.8
		16QAM	25	0	1	23.7	23.7	23.8
			1	0	1	24.0	24.0	23.9
			1	12	1	23.9	24.0	23.9
			1	24	1	23.9	24.0	23.6
			12	0	2	22.8	22.9	22.9
			12	7	2	22.8	22.9	22.8
			12	13	2	22.8	22.9	22.8
			25	0	2	22.8	22.8	22.7
			Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR
						700.5 MHz	707.5 MHz	714.5 MHz
LTE Band 12	3	QPSK	1	0	0	24.8	24.7	24.8
			1	8	0	24.8	24.8	24.9
			1	14	0	24.7	24.7	24.3
			8	0	1	23.8	23.8	23.9
			8	4	1	23.8	23.8	23.9
			8	7	1	23.8	23.8	23.9
			15	0	1	23.7	23.8	23.9
		16QAM	1	0	1	23.8	23.6	24.0
			1	8	1	23.9	23.7	24.0
			1	14	1	23.7	23.6	23.8
			8	0	2	23.0	22.9	22.8
			8	4	2	23.0	22.9	22.8
			8	7	2	23.0	22.9	22.8
			15	0	2	22.7	22.8	22.9

LTE Band 12 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)		
						699.7 MHz	707.5 MHz	715.3 MHz
LTE Band 12	1.4	QPSK	1	0	0	24.8	24.6	24.7
			1	3	0	24.7	24.7	24.6
			1	5	0	24.6	24.6	24.3
			3	0	0	24.7	24.7	24.6
			3	1	0	24.8	24.7	24.6
			3	3	0	24.8	24.7	24.4
			6	0	1	23.7	23.7	23.7
		16QAM	1	0	1	23.7	23.8	24.0
			1	3	1	23.8	23.8	24.0
			1	5	1	23.7	23.7	23.7
			3	0	1	23.9	23.8	23.8
			3	1	1	23.9	23.8	23.8
			3	3	1	23.9	23.8	23.8
			6	0	2	22.9	22.8	22.6

Note(s):

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

LTE Band 13 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)
						782 MHz
LTE Band 13	10	QPSK	1	0	0	23.7
			1	25	0	23.6
			1	49	0	23.5
			25	0	1	22.8
			25	12	1	22.7
			25	25	1	22.6
			50	0	1	21.4
		16QAM	1	0	1	23.0
			1	25	1	23.0
			1	49	1	22.9
			25	0	2	21.8
			25	12	2	21.7
			25	25	2	21.7
			50	0	2	21.7

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)
						782 MHz
LTE Band 13	5	QPSK	1	0	0	23.7
			1	12	0	23.6
			1	24	0	23.6
			12	0	1	22.7
			12	6	1	22.7
			12	11	1	22.6
			25	0	1	22.7
		16QAM	1	0	1	23.0
			1	12	1	23.0
			1	24	1	23.0
			12	0	2	21.9
			12	6	2	21.8
			12	11	2	21.8
			25	0	2	21.7

Note(s):

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

LTE Band 17 Measured Results

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

LTE Band 38 Measured Results

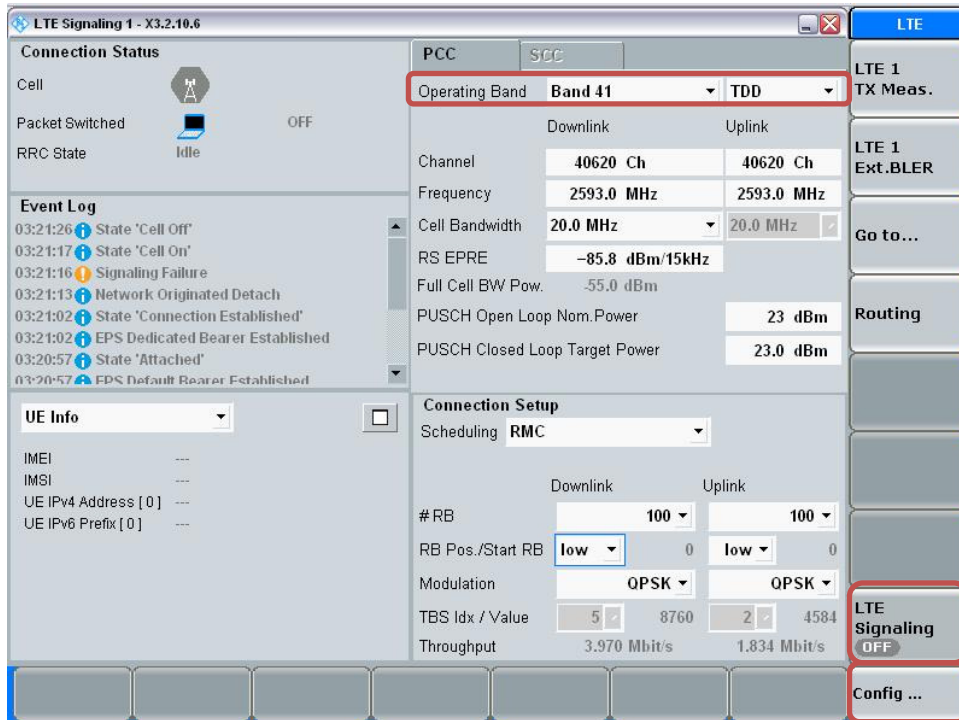
SAR for LTE Band 38 (Frequency range: 2570-2620 MHz) is covered by LTE Band 41 (Frequency range: 2496-2690 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 41 Measured Results

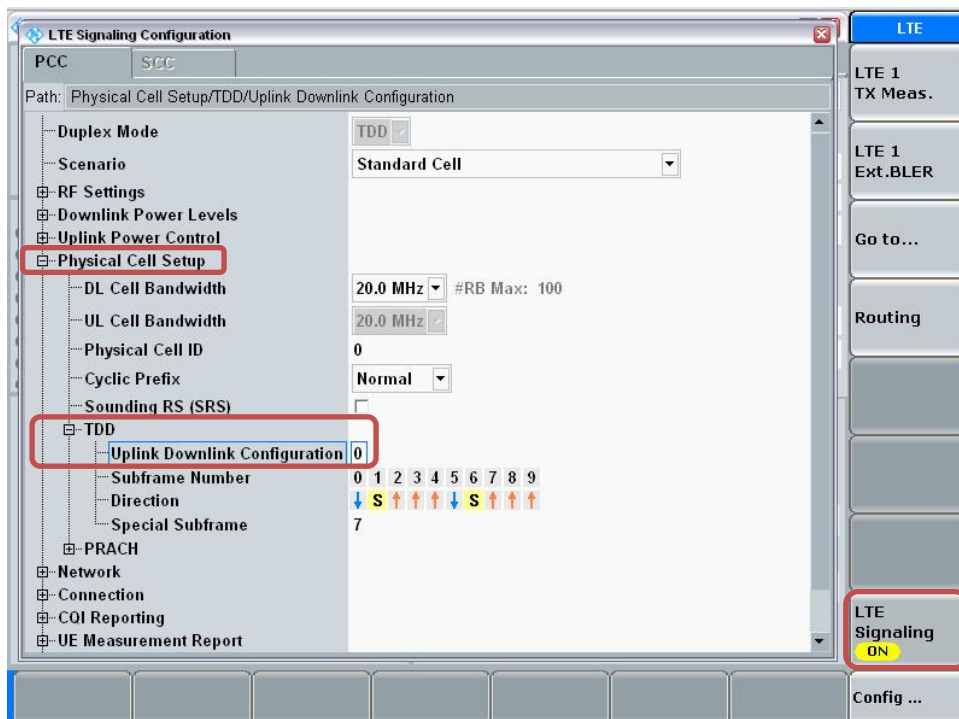
Procedure used to establish SAR test signal for LTE TDD Band 41

Set to CMW-500 with following parameters:

- Turn the LTE Signaling off using “ON | OFF” key
- Operating Band: Select Band 41 and TDD
- Go to “Config...”

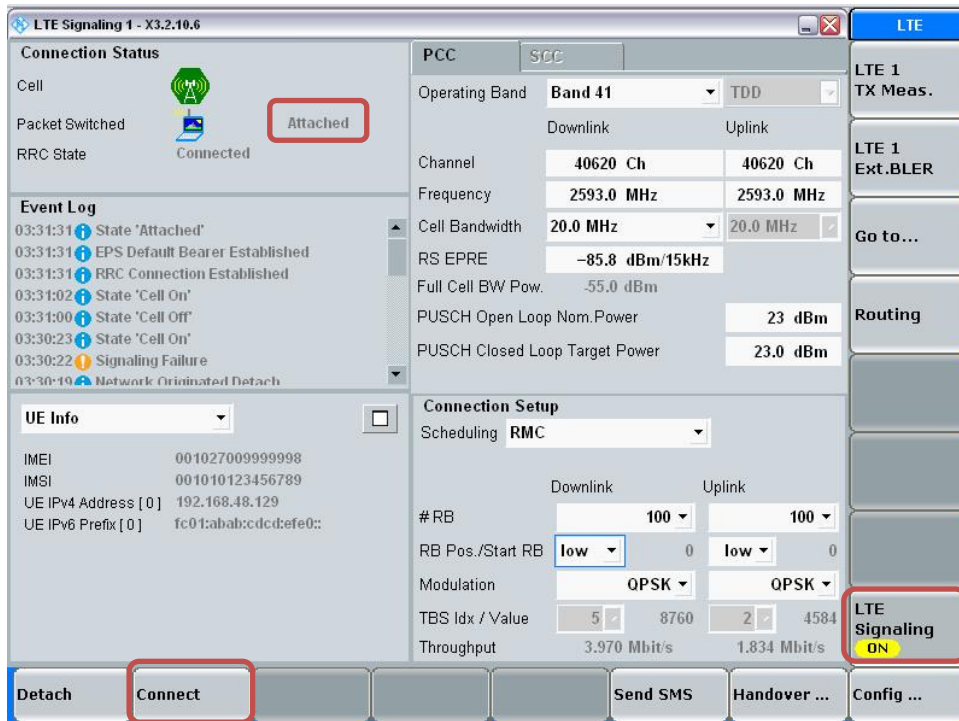


- Go to “Physical Cell Setup”
- Select “TDD” and Set “Uplink Downlink Configuration” to “0”
- Turn the cell on using “ON | OFF” key



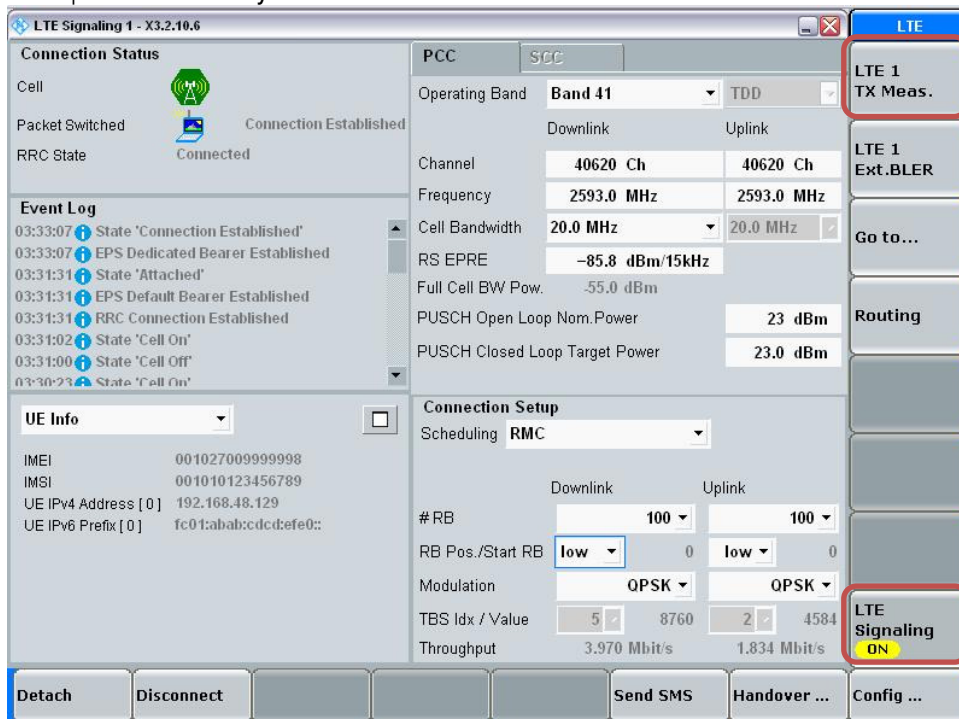
Connect to EUT

- Turn the cell on using “ON | OFF” key
- After EUT is Attached
- Select “Connect”

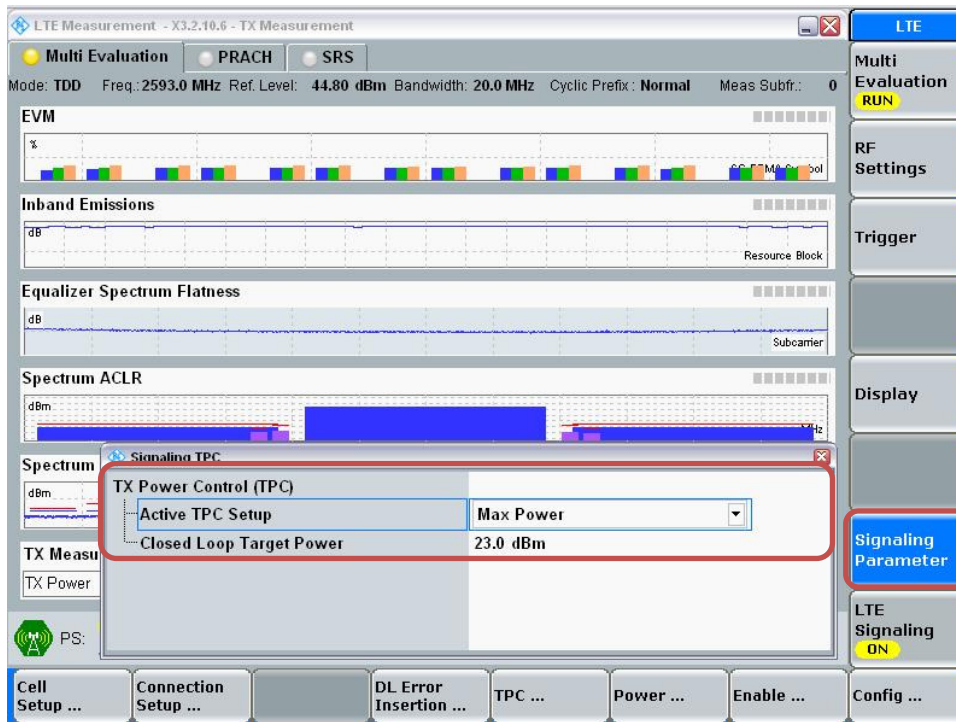


Max Power Setting

- Select “LTE 1 TX Meas.”
- Press “RESTART | STOP” Soft key

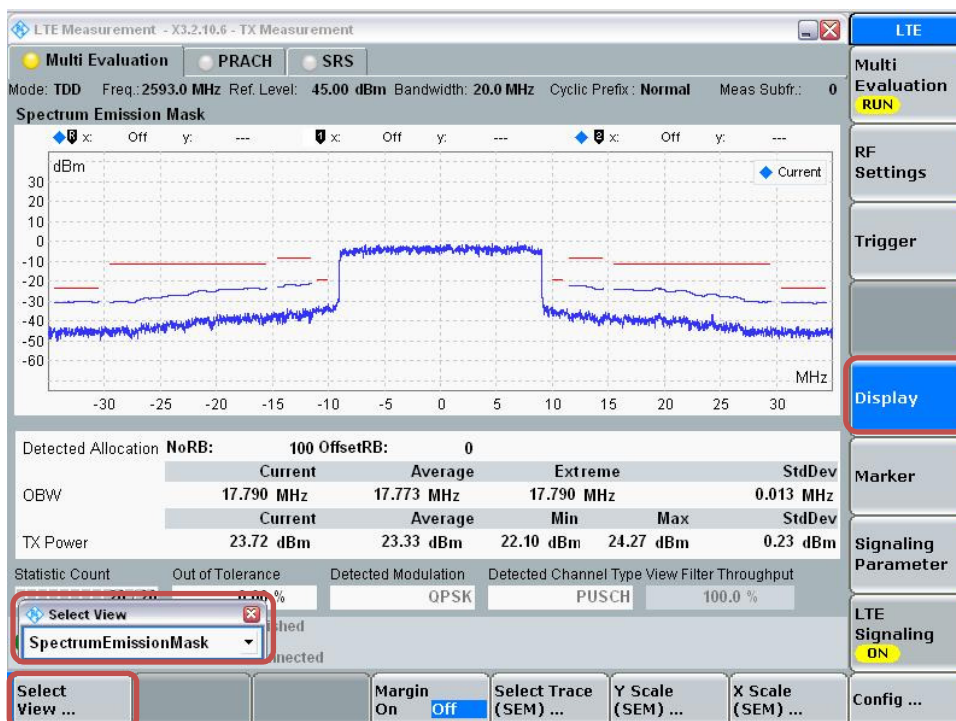


- Select “Signaling Parameter”
- Select “TX Power Control (TPC)” > Select “Active TPC Setup” to “Max Power” > Set “Closed Loop Target Power” to “23 dBm”



View TX Power

- Go to “Display”
- Select “Select View...”
- Select “Spectrum Emission Mask”



LTE Band 41 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)				
						2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz
LTE Band 41	20	QPSK	1	0	0	19.7	19.6	19.6	19.8	19.6
			1	50	0	19.5	19.4	19.3	19.5	19.3
			1	99	0	19.4	19.3	19.2	19.6	19.2
			50	0	1	18.6	18.6	18.5	18.7	18.5
			50	25	1	18.5	18.5	18.4	18.6	18.4
			50	50	1	18.4	18.4	18.3	18.6	18.3
			100	0	1	18.6	18.5	18.4	18.6	18.3
		16QAM	1	0	1	18.6	18.6	18.4	18.7	18.6
			1	50	1	18.4	18.3	18.1	18.5	18.4
			1	99	1	18.3	18.2	18.0	18.4	18.3
			50	0	2	17.6	17.5	17.5	17.7	17.5
			50	25	2	17.5	17.4	17.4	17.6	17.4
			50	50	2	17.4	17.4	17.3	17.6	17.3
			100	0	2	17.5	17.4	17.4	17.7	17.4
LTE Band 41	15	QPSK	1	0	0	19.7	19.6	19.6	19.8	19.4
			1	36	0	19.5	19.4	19.3	19.6	19.1
			1	74	0	19.4	19.4	19.3	19.6	19.1
			36	0	1	18.6	18.6	18.4	18.7	18.4
			36	18	1	18.6	18.5	18.4	18.7	18.4
			36	37	1	18.5	18.5	18.3	18.6	18.3
			75	0	1	18.5	18.5	18.3	18.6	18.4
		16QAM	1	0	1	18.6	18.5	18.4	18.7	18.5
			1	36	1	18.4	18.4	18.2	18.6	18.3
			1	74	1	18.3	18.3	18.1	18.6	18.2
			36	0	2	17.6	17.6	17.4	17.7	17.4
			36	18	2	17.6	17.5	17.4	17.6	17.4
			36	37	2	17.5	17.4	17.3	17.6	17.3
			75	0	2	17.6	17.5	17.3	17.7	17.4
LTE Band 41	10	QPSK	1	0	0	19.6	19.5	19.4	19.7	19.5
			1	25	0	19.5	19.4	19.3	19.6	19.5
			1	49	0	19.5	19.3	19.2	19.6	19.4
			25	0	1	18.7	18.5	18.4	18.7	18.5
			25	12	1	18.6	18.5	18.4	18.7	18.5
			25	25	1	18.6	18.4	18.4	18.6	18.5
			50	0	1	18.6	18.4	18.4	18.6	18.5
		16QAM	1	0	1	18.8	18.4	18.3	18.8	18.5
			1	25	1	18.7	18.3	18.2	18.7	18.4
			1	49	1	18.6	18.3	18.2	18.7	18.3
			25	0	2	17.6	17.5	17.4	17.7	17.5
			25	12	2	17.6	17.4	17.4	17.7	17.5
			25	25	2	17.6	17.4	17.3	17.6	17.4
			50	0	2	17.6	17.4	17.4	17.7	17.5

LTE Band 41 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	MPR	Meas. Avg Pwr (dBm)				
						2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz
LTE Band 41	5	QPSK	1	0	0	19.6	19.5	19.4	19.7	19.4
			1	12	0	19.6	19.4	19.3	19.7	19.4
			1	24	0	19.5	19.4	19.3	19.6	19.4
			12	0	1	18.6	18.4	18.4	18.6	18.5
			12	7	1	18.6	18.4	18.4	18.7	18.5
			12	13	1	18.6	18.4	18.4	18.7	18.5
			25	0	1	18.5	18.4	18.4	18.6	18.4
		16QAM	1	0	1	18.5	18.3	18.4	18.6	18.5
			1	12	1	18.4	18.2	18.3	18.6	18.5
			1	24	1	18.4	18.2	18.3	18.6	18.5
			12	0	2	17.6	17.4	17.4	17.6	17.5
			12	7	2	17.6	17.4	17.4	17.7	17.5
			12	13	2	17.5	17.4	17.3	17.6	17.5
			25	0	2	17.6	17.4	17.4	17.7	17.5

9.5. Wi-Fi 2.4GHz (DTS Band)

Measured Results

Antenna	Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Meas. Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)
SISO WLAN Chain 0 (Main)	2.4	802.11b	1 Mbps	1	2412	17.10	18.58	Yes
				6	2437	18.10		
				11	2462	17.60		
				12	2467	15.60		
				13	2472	12.20		
		802.11g	6 Mbps	1	2412	Not Required	10.40	No
				6	2437		18.40	
				11	2462		15.40	
				12	2467		9.88	
				13	2472		3.88	
		802.11n (HT20)	6.5 Mbps	1	2412	Not Required	9.40	No
				6	2437		18.40	
				11	2462		14.90	
				12	2467		8.63	
				13	2472		3.13	
SISO WLAN Chain 1 (Sub)	2.4	802.11b	1 Mbps	1	2412	18.70	19.67	Yes
				6	2437	19.30		
				11	2462	18.90		
				12	2467	15.40		
				13	2472	12.20		
		802.11g	6 Mbps	1	2412	Not Required	12.00	No
				6	2437		19.89	
				11	2462		15.89	
				12	2467		10.87	
				13	2472		4.37	
		802.11n (HT20)	6.5 Mbps	1	2412	Not Required	11.00	No
				6	2437		19.83	
				11	2462		15.83	
				12	2467		9.37	
				13	2472		3.87	

Note(s):

- 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 802.11 a/g/n/ac 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.
- Additionally, SAR is not required for Channels 12 and 13 because the tune-up limit and the measured output power for these two channels are no greater than those for the default test channels.

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

Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	WLAN Chain 0 (Main)			WLAN Chain 1 (Sub)			
					Meas. Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)	Meas. Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)	
5.2 (U-NII 1)	802.11a	6 Mbps	36	5180	Not Required	13	No	Not Required	10.84	No	
			40	5200							
			44	5220							
			48	5240							
	802.11n (HT20)	6.5 Mbps	6.5 Mbps	36	5180	Not Required	13	No	Not Required	10.84	No
				40	5200						
				44	5220						
				48	5240						
	802.11n (HT40)	13.5 Mbps	13.5 Mbps	38	5190	Not Required	13	No	Not Required	10.84	No
				46	5230						
	802.11ac (VHT20)	6.5 Mbps	6.5 Mbps	36	5180	Not Required	13	No	Not Required	10.84	No
				40	5200						
				44	5220						
				48	5240						
802.11nac (HT40)	13.5 Mbps	13.5 Mbps	38	5190	Not Required	13	No	Not Required	10.84	No	
			46	5230							
802.11ac (VHT80)	29.3 Mbps	29.3 Mbps	42	5210	12.10	13	No	10.00	10.84	No	
5.3 (U-NII 2A)	802.11a	6 Mbps	52	5260	Not Required	13	No	Not Required	11.04	No	
			56	5280							
			60	5300							
			64	5320							
	802.11n (HT20)	6.5 Mbps	6.5 Mbps	52	5260	Not Required	13	No	Not Required	11.04	No
				56	5280						
				60	5300						
				64	5320						
	802.11n (HT40)	13.5 Mbps	13.5 Mbps	54	5270	Not Required	13	No	Not Required	11.04	No
				62	5310						
	802.11ac (VHT20)	6.5 Mbps	6.5 Mbps	52	5260	Not Required	13	No	Not Required	11.04	No
				56	5280						
				60	5300						
				64	5320						
802.11ac (VHT40)	13.5 Mbps	13.5 Mbps	54	5270	Not Required	13	No	Not Required	11.04	No	
			62	5310							
802.11ac (VHT80)	29.3 Mbps	29.3 Mbps	58	5290	12.30	13	Yes	10.20	11.04	Yes	
5.5 (U-NII 2C)	802.11a	6 Mbps	100	5500	Not Required	13	No	Not Required	11.26	No	
			116	5580							
			124	5620							
			144	5720							
	802.11n (HT20)	6.5 Mbps	6.5 Mbps	100	5500	Not Required	13	No	Not Required	11.26	No
				116	5580						
				124	5620						
				144	5720						
	802.11n (HT40)	13.5 Mbps	13.5 Mbps	102	5510	Not Required	13	No	Not Required	11.26	No
				118	5590						
	802.11ac (VHT20)	6.5 Mbps	6.5 Mbps	100	5500	Not Required	13	No	Not Required	11.26	No
				116	5580						
				124	5620						
				144	5720						
802.11ac (VHT40)	13.5 Mbps	13.5 Mbps	102	5510	Not Required	13	No	Not Required	11.26	No	
			118	5590							
802.11ac (VHT80)	29.3 Mbps	29.3 Mbps	106	5530	12.78	13	Yes	11.08	11.26	Yes	
			122	5610	12.71			11.16			
			138	5690	12.81			11.21			

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	WLAN Chain 0 (Main)			WLAN Chain 1 (Sub)		
					Meas. Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)	Meas. Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)
5.8 (U-NII 3)	802.11a	6 Mbps	149	5745	Not Required	13	No	Not Required	11.26	No
			157	5785						
			165	5825						
	802.11n (HT20)	6.5 Mbps	149	5745	Not Required	13	No	Not Required	11.26	No
			157	5785						
			165	5825						
	802.11n (HT40)	13.5 Mbps	151	5755	Not Required	13	No	Not Required	11.26	No
			159	5795						
	802.11ac (VHT20)	6.5 Mbps	149	5745	Not required	13	No	Not required	11.26	No
			157	5785						
			165	5825						
	802.11ac (VHT40)	13.5 Mbps	151	5755	Not Required	13	No	Not Required	11.26	No
159			5795							
802.11ac (VHT80)	29.3 Mbps	155	5775	12.67	13	Yes	11.18	11.26	Yes	

Note(s):

- 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/g/n/ac 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
- When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac modes, the channel in the lower order/sequence 802.11 mode (i.e. a, g, n then ac) is selected.
- When the specified maximum output power is the same for both UNII band I and UNII band 2A, begin SAR measurement in UNII band 2A; and if the highest reported SAR for UNII band 2A is $0 \leq 1.2 \text{ W/kg}$, SAR is not required for UNII band I

9.7. Bluetooth

Maximum tune-up tolerance limit is 12.94 dBm. This power level qualifies for exclusion of SAR testing.

10. Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

KDB 447498 D01 General RF Exposure Guidance:

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

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

KDB 648474 D04 Handset SAR:

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

KDB 648474 D04 Handset SAR (Phablet):

When hotspot mode does not apply, 10-g Extremity SAR is required for all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions.

When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.

KDB 941225 D01 SAR test for 3G devices:

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

KDB 941225 D05 SAR for LTE Devices:

SAR test reduction is applied using the following criteria:

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

KDB 248227 D01 SAR meas for 802.11:

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

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

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

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

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

10.1. GSM850

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up Limit	Meas.	Meas.	Scaled	
Head	GPRS 4 Slots	0	Left Touch	190	836.6	27.2	26.7	0.292	0.328	1
			Left Tilt	190	836.6	27.2	26.7	0.137	0.154	
			Right Touch	190	836.6	27.2	26.7	0.302	0.339	
			Right Tilt	190	836.6	27.2	26.7	0.128	0.144	
Body-worn	GPRS 4 Slots	15	Rear	190	836.6	27.2	26.7	0.285	0.320	2
			Front	190	836.6	27.2	26.7	0.310	0.348	
Hotspot	GPRS 4 Slots	10	Rear	190	836.6	27.2	26.7	0.559	0.627	3
			Front	190	836.6	27.2	26.7	0.589	0.661	
			Edge 2	190	836.6	27.2	26.7	0.099	0.111	
			Edge 3	190	836.6	27.2	26.7	0.055	0.061	
			Edge 4	190	836.6	27.2	26.7	0.107	0.120	
DTM	CS + PS 2 Slots	10	Front	190	836.6	30.2	29.7	0.585	0.656	

10.2. GSM1900

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up Limit	Meas.	Meas.	Scaled	
Head	GPRS 4 Slots	0	Left Touch	661	1880.0	24.7	24.1	0.171	0.196	4
			Left Tilt	661	1880.0	24.7	24.1	0.067	0.077	
			Right Touch	661	1880.0	24.7	24.1	0.115	0.132	
			Right Tilt	661	1880.0	24.7	24.1	0.059	0.068	
Body-worn	GPRS 4 Slots	15	Rear	661	1880.0	24.7	24.1	0.148	0.170	5
			Front	661	1880.0	24.7	24.1	0.131	0.150	
Hotspot	GPRS 4 Slots	10	Rear	661	1880.0	24.7	24.1	0.265	0.304	6
			Front	661	1880.0	24.7	24.1	0.234	0.269	
			Edge 2	661	1880.0	24.7	24.1	0.039	0.045	
			Edge 3	661	1880.0	24.7	24.1	0.236	0.271	
			Edge 4	661	1880.0	24.7	24.1	0.275	0.316	
DTM	CS + PS 2 Slots	10	Edge 4	661	1880.0	27.7	27.0	0.260	0.305	

10.3. W-CDMA Band V

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC	0	Left Touch	4183	836.6	24.2	24.1	0.316	0.321	7
			Left Tilt	4183	836.6	24.2	24.1	0.133	0.135	
			Right Touch	4183	836.6	24.2	24.1	0.316	0.321	
			Right Tilt	4183	836.6	24.2	24.1	0.125	0.127	
Body-worn	Rel 99 RMC	15	Rear	4183	836.6	24.2	24.1	0.314	0.319	8
			Front	4183	836.6	24.2	24.1	0.327	0.332	
Hotspot	Rel 99 RMC	10	Rear	4183	836.6	24.2	24.1	0.619	0.629	9
			Front	4183	836.6	24.2	24.1	0.726	0.738	
			Edge 2	4183	836.6	24.2	24.1	0.126	0.128	
			Edge 3	4183	836.6	24.2	24.1	0.068	0.069	
			Edge 4	4183	836.6	24.2	24.1	0.124	0.126	

10.4. LTE Band 4 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	20175	1732.5	1	0	22.0	21.8	0.181	0.190	10
						50	0	21.0	20.7	0.147	0.156	
			Left Tilt	20175	1732.5	1	0	22.0	21.8	0.066	0.069	
						50	0	21.0	20.7	0.052	0.055	
			Right Touch	20175	1732.5	1	0	22.0	21.8	0.102	0.107	
						50	0	21.0	20.7	0.082	0.087	
			Right Tilt	20175	1732.5	1	0	22.0	21.8	0.059	0.062	
						50	0	21.0	20.7	0.046	0.049	
Body-worn	QPSK	15	Rear	20175	1732.5	1	0	22.0	21.8	0.134	0.140	
						50	0	21.0	20.7	0.103	0.110	
			Front	20175	1732.5	1	0	22.0	21.8	0.150	0.157	11
						50	0	21.0	20.7	0.117	0.125	
Hotspot	QPSK	10	Rear	20175	1732.5	1	0	22.0	21.8	0.274	0.287	
						50	0	21.0	20.7	0.210	0.223	
			Front	20175	1732.5	1	0	22.0	21.8	0.287	0.301	
						50	0	21.0	20.7	0.222	0.236	
			Edge 2	20175	1732.5	1	0	22.0	21.8	0.049	0.051	
						50	0	21.0	20.7	0.037	0.039	
			Edge 3	20175	1732.5	1	0	22.0	21.8	0.349	0.365	12
						50	0	21.0	20.7	0.269	0.286	
			Edge 4	20175	1732.5	1	0	22.0	21.8	0.235	0.246	
						50	0	21.0	20.7	0.186	0.198	

10.5. LTE Band 5 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	20525	836.5	1	0	24.0	23.8	0.314	0.327	13
						25	0	23.0	22.8	0.251	0.263	
			Left Tilt	20525	836.5	1	0	24.0	23.8	0.094	0.098	
						25	0	23.0	22.8	0.072	0.075	
			Right Touch	20525	836.5	1	0	24.0	23.8	0.293	0.305	
						25	0	23.0	22.8	0.229	0.240	
			Right Tilt	20525	836.5	1	0	24.0	23.8	0.081	0.084	
						25	0	23.0	22.8	0.067	0.070	
Body-worn	QPSK	15	Rear	20525	836.5	1	0	24.0	23.8	0.339	0.353	14
						25	0	23.0	22.8	0.273	0.287	
			Front	20525	836.5	1	0	24.0	23.8	0.338	0.352	
						25	0	23.0	22.8	0.272	0.285	
Hotspot	QPSK	10	Rear	20525	836.5	1	0	24.0	23.8	0.639	0.666	15
						25	0	23.0	22.8	0.516	0.542	
			Front	20525	836.5	1	0	24.0	23.8	0.579	0.604	
						25	0	23.0	22.8	0.464	0.487	
			Edge 2	20525	836.5	1	0	24.0	23.8	0.102	0.106	
						25	0	23.0	22.8	0.084	0.088	
			Edge 3	20525	836.5	1	0	24.0	23.8	0.059	0.061	
						25	0	23.0	22.8	0.053	0.056	
Edge 4	20525	836.5	1	0	24.0	23.8	0.104	0.108				
			25	0	23.0	22.8	0.082	0.086				

10.6. LTE Band 7 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	21100	2535.0	1	0	20.0	19.9	0.069	0.070	
						50	0	19.0	18.8	0.050	0.052	
			Left Tilt	21100	2535.0	1	0	20.0	19.9	0.092	0.093	
						50	0	19.0	18.8	0.070	0.073	
			Right Touch	21100	2535.0	1	0	20.0	19.9	0.183	0.186	16
						50	0	19.0	18.8	0.140	0.147	
Right Tilt	21100	2535.0	1	0	20.0	19.9	0.066	0.067				
			50	0	19.0	18.8	0.050	0.052				
Body-worn	QPSK	15	Rear	21100	2535.0	1	0	20.0	19.9	0.261	0.265	17
						50	0	19.0	18.8	0.203	0.213	
			Front	21100	2535.0	1	0	20.0	19.9	0.171	0.174	
						50	0	19.0	18.8	0.132	0.139	
Hotspot	QPSK	10	Rear	21100	2535.0	1	0	20.0	19.9	0.513	0.521	18
						50	0	19.0	18.8	0.394	0.414	
			Front	21100	2535.0	1	0	20.0	19.9	0.283	0.288	
						50	0	19.0	18.8	0.234	0.246	
			Edge 2	21100	2535.0	1	0	20.0	19.9	0.425	0.432	
						50	0	19.0	18.8	0.325	0.341	
			Edge 3	21100	2535.0	1	0	20.0	19.9	0.178	0.181	
						50	0	19.0	18.8	0.135	0.142	
Edge 4	21100	2535.0	1	0	20.0	19.9	0.009	0.009				
			50	0	19.0	18.8	0.007	0.007				

10.7. LTE Band 12 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	23095	707.5	1	0	25.0	24.8	0.135	0.141	19
						25	0	24.0	23.8	0.109	0.114	
			Left Tilt	23095	707.5	1	0	25.0	24.8	0.079	0.082	
						25	0	24.0	23.8	0.063	0.066	
			Right Touch	23095	707.5	1	0	25.0	24.8	0.134	0.140	
						25	0	24.0	23.8	0.108	0.113	
			Right Tilt	23095	707.5	1	0	25.0	24.8	0.084	0.087	
						25	0	24.0	23.8	0.066	0.069	
Body-worn	QPSK	15	Rear	23095	707.5	1	0	25.0	24.8	0.212	0.221	20
						25	0	24.0	23.8	0.170	0.178	
			Front	23095	707.5	1	0	25.0	24.8	0.210	0.219	
						25	0	24.0	23.8	0.167	0.174	
Hotspot	QPSK	10	Rear	23095	707.5	1	0	25.0	24.8	0.242	0.253	21
						25	0	24.0	23.8	0.193	0.202	
			Front	23095	707.5	1	0	25.0	24.8	0.225	0.235	
						25	0	24.0	23.8	0.182	0.190	
			Edge 2	23095	707.5	1	0	25.0	24.8	0.162	0.169	
						25	0	24.0	23.8	0.127	0.133	
			Edge 3	23095	707.5	1	0	25.0	24.8	0.031	0.032	
						25	0	24.0	23.8	0.025	0.026	
			Edge 4	23095	707.5	1	0	25.0	24.8	0.191	0.200	
						25	0	24.0	23.8	0.145	0.151	

10.8. LTE Band 13 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	23230	782.0	1	0	24.0	23.7	0.192	0.203	22
						25	0	23.0	22.8	0.146	0.155	
			Left Tilt	23230	782.0	1	0	24.0	23.7	0.115	0.122	
						25	0	23.0	22.8	0.092	0.097	
			Right Touch	23230	782.0	1	0	24.0	23.7	0.166	0.176	
						25	0	23.0	22.8	0.131	0.139	
			Right Tilt	23230	782.0	1	0	24.0	23.7	0.107	0.113	
						25	0	23.0	22.8	0.086	0.091	
Body-worn	QPSK	15	Rear	23230	782.0	1	0	24.0	23.7	0.206	0.218	
						25	0	23.0	22.8	0.161	0.171	
			Front	23230	782.0	1	0	24.0	23.7	0.209	0.221	23
						25	0	23.0	22.8	0.162	0.172	
Hotspot	QPSK	10	Rear	23230	782.0	1	0	24.0	23.7	0.277	0.293	
						25	0	23.0	22.8	0.174	0.184	
			Front	23230	782.0	1	0	24.0	23.7	0.304	0.322	24
						25	0	23.0	22.8	0.243	0.257	
			Edge 2	23230	782.0	1	0	24.0	23.7	0.088	0.093	
						25	0	23.0	22.8	0.074	0.078	
			Edge 3	23230	782.0	1	0	24.0	23.7	0.043	0.046	
						25	0	23.0	22.8	0.034	0.036	
			Edge 4	23230	782.0	1	0	24.0	23.7	0.097	0.103	
						25	0	23.0	22.8	0.075	0.080	

10.9. LTE Band 41 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.		
								Tune-up limit	Meas.	Meas.	Scaled			
Head	QPSK	0	Left Touch	40620	2593.0	1	0	20.0	19.6	0.048	0.053			
						50	0	19.0	18.5	0.036	0.041			
			Left Tilt	40620	2593.0	1	0	20.0	19.6	0.057	0.063			
						50	0	19.0	18.5	0.043	0.049			
			Right Touch	40620	2593.0	1	0	20.0	19.6	0.118	0.130	0.090	0.102	25
						50	0	19.0	18.5	0.032	0.035			
Right Tilt	40620	2593.0	1	0	20.0	19.6	0.024	0.027						
			50	0	19.0	18.5	0.024	0.027						
Body-worn & Hotspot	QPSK	10	Rear	40620	2593.0	1	0	20.0	19.6	0.129	0.142	26		
						50	0	19.0	18.5	0.100	0.113			
			Front	40620	2593.0	1	0	20.0	19.6	0.110	0.121			
						50	0	19.0	18.5	0.055	0.062			
Hotspot	QPSK	10	Rear	40620	2593.0	1	0	20.0	19.6	0.263	0.290	27		
						50	0	19.0	18.5	0.203	0.230			
			Front	40620	2593.0	1	0	20.0	19.6	0.188	0.208			
						50	0	19.0	18.5	0.144	0.163			
			Edge 2	40620	2593.0	1	0	20.0	19.6	0.237	0.262			
						50	0	19.0	18.5	0.181	0.205			
			Edge 3	40620	2593.0	1	0	20.0	19.6	0.096	0.106			
						50	0	19.0	18.5	0.076	0.086			
Edge 4	40620	2593.0	1	0	20.0	19.6	0.005	0.006						
			50	0	19.0	18.5	0.003	0.004						

10.10. Wi-Fi (DTS Band)

10.10.1. Wi-Fi 2.4GHz Chain 0 (Main)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
Head	802.11b 1 Mbps	0	Left Touch	6	2437	0.228	18.58	18.10	0.178	0.199	
			Left Tilt	6	2437	0.141	18.58	18.10	0.121	0.135	
			Right Touch	6	2437	0.619	18.58	18.10	0.446	0.498	
			Right Tilt	6	2437	0.266	18.58	18.10	0.212	0.237	
Body-worn	802.11b 1 Mbps	15	Rear	6	2437	0.037	18.58	18.10	0.013	0.015	
			Front	6	2437	0.032	18.58	18.10			
Hotspot	802.11b 1 Mbps	10	Rear	6	2437	0.081	18.58	18.10	0.035	0.040	
			Front	6	2437	0.047	18.58	18.10			
			Edge 1	6	2437	0.018	18.58	18.10			
			Edge 4	6	2437	0.049	18.58	18.10			

10.10.2. Wi-Fi 2.4GHz Chain 1 (Sub)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
Head	802.11b 1 Mbps	0	Left Touch	6	2437	1.390	19.67	19.30	0.890	0.969	28
				11	2462	0.928	19.67	18.90	0.685	0.818	
			Left Tilt	6	2437	0.573	19.67	19.30	0.413	0.450	
			Right Touch	6	2437	0.287	19.67	19.30	0.240	0.261	
			Right Tilt	6	2437	0.214	19.67	19.30	0.174	0.189	
Body-worn	802.11b 1 Mbps	15	Rear	6	2437	0.094	19.67	19.30	0.060	0.065	29
			Front	6	2437	0.066	19.67	19.30			
Hotspot	802.11b 1 Mbps	10	Rear	6	2437	0.181	19.67	19.30	0.141	0.154	30
			Front	6	2437	0.157	19.67	19.30			
			Edge 1	6	2437	0.063	19.67	19.30			
			Edge 2	6	2437	0.071	19.67	19.30			

10.11. Wi-Fi (U-NII Bands)

10.11.1. Wi-Fi 5GHz Chain 0 (Main)

Frequency Band	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.		
								Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled			
5.3 GHz U-NII 2A	802.11ac VHT80	Head	0	Left Touch	58	5290.0	0.136	13.00	12.30	0.052	0.061	0.015	0.018			
				Left Tilt	58	5290.0	0.088	13.00	12.30							
				Right Touch	58	5290.0	1.280	13.00	12.30	0.633	0.744	0.139	0.163	31		
				Right Tilt	58	5290.0	0.266	13.00	12.30	0.134	0.157	0.038	0.045			
		Body-worn	15	Rear	58	5290.0	0.139	13.00	12.30	0.078	0.092	0.026	0.031	32		
				Front	58	5290.0	0.136	13.00	12.30							
		Extremity	0	Rear	58	5290.0	2.070	13.00	12.30	0.881	1.035	0.178	0.209			
				Front	58	5290.0	0.674	13.00	12.30							
				Edge 1	58	5290.0	0.152	13.00	12.30							
				Edge 4	58	5290.0	0.009	13.00	12.30							
		5.5 GHz U-NII 2C	802.11ac VHT80	Head	0	Left Touch	138	5690.0	0.327	13.00	12.81	0.127	0.133	0.032	0.033	
						Left Tilt	138	5690.0	0.270	13.00	12.81					
Right Touch	138					5690.0	1.420	13.00	12.81	0.579	0.605	0.135	0.141	33		
Right Tilt	138					5690.0	0.477	13.00	12.81	0.129	0.135	0.040	0.042			
Body-worn	15			Rear	138	5690.0	0.338	13.00	12.81	0.085	0.089	0.030	0.031	34		
				Front	138	5690.0	0.078	13.00	12.81	0.031	0.032	0.013	0.013			
Extremity	0			Rear	138	5690.0	9.090	13.00	12.81	1.330	1.389	0.213	0.223	35		
				Front	138	5690.0	1.570	13.00	12.81							
				Edge 1	138	5690.0	0.091	13.00	12.81							
				Edge 4	138	5690.0	2.740	13.00	12.81							
5.8 GHz U-NII 3	802.11ac VHT80			Head	0	Left Touch	155	5775.0	0.139	13.00	12.67					
						Left Tilt	155	5775.0	0.079	13.00	12.67					
		Right Touch	155			5775.0	1.030	13.00	12.67	0.475	0.512	0.108	0.117	36		
		Right Tilt	155			5775.0	0.167	13.00	12.67	0.077	0.084	0.023	0.025			
		Body-worn	15	Rear	155	5775.0	0.146	13.00	12.67	0.076	0.082	0.027	0.029	37		
				Front	155	5775.0	0.082	13.00	12.67							
		Extremity	0	Rear	155	5775.0	1.700	13.00	12.67							
				Front	155	5775.0	2.670	13.00	12.67	1.040	1.122	0.215	0.232	38		
				Edge 1	155	5775.0	0.081	13.00	12.67							
				Edge 4	155	5775.0	1.960	13.00	12.67							

10.11.2. Wi-Fi 5GHz Chain 1 (Sub)

Frequency Band	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.		
								Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled			
5.3 GHz U-NII 2A	802.11ac VHT80	Head	0	Left Touch	58	5290.0	0.241	11.04	10.20	0.162	0.197	0.045	0.055			
				Left Tilt	58	5290.0	0.132	11.04	10.20							
				Right Touch	58	5290.0	0.060	11.04	10.20							
				Right Tilt	58	5290.0	0.043	11.04	10.20							
		Body-worn	15	Rear	58	5290.0	0.098	11.04	10.20	0.055	0.067	0.020	0.024			
				Front	58	5290.0	0.033	11.04	10.20							
		Extremity	0	Rear	58	5290.0	1.660	11.04	10.20							
				Front	58	5290.0	0.903	11.04	10.20							
				Edge 1	58	5290.0	0.149	11.04	10.20							
				Edge 2	58	5290.0	3.350	11.04	10.20	1.610	1.954	0.284	0.345	39		
		5.5 GHz U-NII 2C	802.11ac VHT80	Head	0	Left Touch	138	5690.0	0.572	11.26	11.21	0.298	0.301	0.087	0.088	
						Left Tilt	138	5690.0	0.315	11.26	11.21					
Right Touch	138					5690.0	0.157	11.26	11.21							
Right Tilt	138					5690.0	0.122	11.26	11.21							
Body-worn	15			Rear	138	5690.0	0.067	11.26	11.21	0.034	0.034	0.013	0.013			
				Front	138	5690.0	0.038	11.26	11.21							
Extremity	0			Rear	138	5690.0	1.300	11.26	11.21							
				Front	138	5690.0	0.803	11.26	11.21							
				Edge 1	138	5690.0	0.257	11.26	11.21							
				Edge 4	138	5690.0	1.790	11.26	11.21	1.180	1.194	0.218	0.221			
5.8 GHz U-NII 3	802.11ac VHT80			Head	0	Left Touch	155	5775.0	0.223	11.26	11.18	0.145	0.148	0.043	0.044	
						Left Tilt	155	5775.0	0.149	11.26	11.18					
		Right Touch	155			5775.0	0.074	11.26	11.18							
		Right Tilt	155			5775.0	0.058	11.26	11.18							
		Body-worn	15	Rear	155	5775.0	0.046	11.26	11.18	0.029	0.030	0.010	0.010			
				Front	155	5775.0	0.032	11.26	11.18							
		Extremity	0	Rear	155	5775.0	1.400	11.26	11.18							
				Front	155	5775.0	0.602	11.26	11.18							
				Edge 1	155	5775.0	0.188	11.26	11.18							
				Edge 4	155	5775.0	7.170	11.26	11.18	1.030	1.049	0.177	0.180			

10.12. Standalone SAR Test Exclusion Considerations & Estimated SAR

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

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$, for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

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

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

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

- $(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm}) \cdot [\sqrt{f_{(\text{GHz})}}/x] \text{ W/kg}$ for test separation distances ≤ 50 mm; where $x = 7.5$ for 1-g SAR, and $x = 18.75$ for 10-g SAR.
- 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm.

RF Air interface	RF Exposure Conditions	Frequency (GHz)	Max. tune-up tolerance Power		Min. test separation distance (mm)	SAR test exclusion Result*	Estimated 1-g SAR (W/kg)
			(dBm)	(mW)			
Bluetooth	Body-w orn	2.480	12.9	20	15	2.1	0.280

Conclusion:

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

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 ($\sim 10\%$ from the 1-g or 10-g respective SAR limit).
- 4) Perform a third repeated measurement only if the original, first, or second repeated measurement is ≥ 1.5 or 3.75 W/kg (1-g or 10-g respectively) and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	First Repeated	
						Measured SAR (W/kg)	Largest to Smallest SAR Ratio
700	LTE Band 12	Hotspot	Rear	No	0.242	N/A	N/A
	LTE Band 13	Hotspot	Front	No	0.304	N/A	N/A
850	GSM 850	Hotspot	Front	No	0.589	N/A	N/A
	WCDMA Band V	Hotspot	Front	No	0.726	N/A	N/A
	LTE Band 5	Hotspot	Rear	No	0.639	N/A	N/A
1900	GSM 1900	Hotspot	Edge 4	No	0.275	N/A	N/A
1700	LTE Band 4	Hotspot	Edge 3	No	0.349	N/A	N/A
2400	Wi-Fi 802.11b/g/n	Head	Left Touch	Yes	0.890	0.832	1.07
2600	LTE Band 7	Hotspot	Rear	No	0.513	N/A	N/A
	LTE Band 41	Hotspot	Rear	No	0.263	N/A	N/A
5300	Wi-Fi 802.11a/n/ac	Head	Right Touch	No	0.633	N/A	N/A
5500	Wi-Fi 802.11a/n/ac	Head	Right Touch	No	0.579	N/A	N/A
5800	Wi-Fi 802.11a/n/ac	Head	Right Touch	No	0.475	N/A	N/A

Note(s):

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

12. Simultaneous Transmission SAR Analysis

Simultaneous Transmission Condition

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

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

RF Exposure conditions	Test Position	Standalone SAR (W/kg)						Σ 1-g SAR (W/kg)							
		WWAN		DTS		U-NII		BT	WWAN + BT	WWAN + DTS	WWAN + DTS	WWAN + U-NII	WWAN+DTS+U-NII	WWAN+U-NII+BT	U-NII+BT
		①	Chain 0 ②	Chain 1 ③	Chain 0 ④	Chain 1 ⑤	⑥	①+⑥	①+②	①+②+③	①+④+⑤	①+②+⑤	①+④+⑤+⑥	④+⑤+⑥	
Head	Left Touch	0.328	0.199	0.969	0.133	0.301			0.527	1.496	0.762	0.828		0.434	
	Left Tilt	0.154	0.135	0.450	0.744	0.301			0.289	0.739	1.199	0.590		1.045	
	Right Touch	0.339	0.498	0.261	0.744	0.301			0.837	1.098	1.384	1.138		1.045	
	Right Tilt	0.144	0.237	0.189	0.157	0.301			0.381	0.570	0.602	0.682		0.458	
Body-worn	Rear	0.353	0.015	0.065	0.089	0.067	0.280	0.633	0.368	0.433	0.509	0.435	0.789	0.436	
	Front	0.352	0.015	0.065	0.089	0.067	0.280	0.632	0.367	0.432	0.508	0.434	0.788	0.436	
Hotspot	Rear	0.666	0.040	0.154					0.706	0.860	0.666	0.706			
	Front	0.738	0.040	0.154					0.778	0.932	0.738	0.778			
	Edge 1		0.040	0.154						0.194		0.040			
	Edge 2	0.432	0.040	0.154					0.472	0.626	0.432	0.472			
	Edge 4	0.316	0.040	0.154					0.356	0.510	0.316	0.356			

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.

11626381H-S1V2 SAR_App A Setup Photos

11626381H-S1V1 SAR_App B System Check Plots

11626381H-S1V1 SAR_App C Highest Test Plots

11626381H-S1V1 SAR_App D Tissue Ingredients

11626381H-S1V1 SAR_App E Probe Cal. Certificates

11626381H-S1V1 SAR_App F Dipole Cal. Certificates

END OF REPORT