



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

SAR EVALUATION REPORT

FOR

GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac, and NFC

MODEL NUMBER: SM-A205W

FCC ID: A3LSMA205W

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Prepared for
**SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA**

Prepared by
UL Korea, Ltd.

26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

**Suwon Test Site: UL Korea, Ltd. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433**



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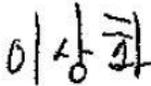
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Table of Contents

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. SAR Measurement System.....	7
4.2. SAR Scan Procedures	8
4.3. Test Equipment.....	10
5. Measurement Uncertainty.....	11
6. Device Under Test (DUT) Information	11
6.1. DUT Description	11
6.2. Wireless Technologies.....	12
6.3. Nominal and Maximum Output Power.....	13
6.4. General LTE SAR Test and Reporting Considerations.....	16
6.6. LTE (TDD) Considerations.....	18
7. RF Exposure Conditions (Test Configurations).....	19
8. Dielectric Property Measurements & System Check	20
8.1 Dielectric Property Measurements.....	20
8.2 System Check.....	24
9. Conducted Output Power Measurements.....	27
9.1 GSM	27
9.2 LTE.....	34
9.3 Wi-Fi 2.4 GHz (DTS Band).....	57
9.4 Wi-Fi 5GHz (U-NII Bands).....	58
9.5 Bluetooth	59
10. Measured and Reported (Scaled) SAR Results.....	60
10.1 GSM 850	62
10.2 GSM1900	62
10.3 W-CDMA Band II	62
10.4 W-CDMA Band IV.....	63
10.5 W-CDMA Band V.....	63
10.6 LTE Band 2 (20MHz Bandwidth).....	64
10.7 LTE Band 4 (20MHz Bandwidth).....	64
10.8 LTE Band 5 (10MHz Bandwidth).....	64

10.9	LTE Band 7 (20MHz Bandwidth)	65
10.10	LTE Band 12 (10MHz Bandwidth)	65
10.11	LTE Band 13 (10MHz Bandwidth)	66
10.12	LTE Band 17 (10MHz Bandwidth)	67
10.13	LTE Band 38 (20MHz Bandwidth)	67
10.14	LTE Band 41 (20MHz Bandwidth)	67
10.15	LTE Band 66 (20MHz Bandwidth)	68
10.16	Wi-Fi (DTS Band)	68
10.17	Wi-Fi (U-NII Bands)	69
10.18	Bluetooth	70
11.	SAR Measurement Variability	71
12.	DUT Holder Perturbations	72
13.	Simultaneous Transmission SAR Analysis	72
13.1	Sum of the SAR for WWAN & Wi-Fi & BT	74
Appendixes		75
	4788962183-S1V2 FCC Report SAR_App A_Photos & Ant. Locations	75
	4788962183-S1V2 FCC Report SAR_App B_Highest SAR Test Plots	75
	4788962183-S1V2 FCC Report SAR_App C_System Check Plots	75
	4788962183-S1V2 FCC Report SAR_App D_SAR Tissue Ingredients	75
	4788962183-S1V2 FCC Report SAR_App E_Probe Cal. Certificates	75
	4788962183-S1V2 FCC Report SAR_App F_Dipole Cal. Certificates	75

1. Attestation of Test Results

Applicant Name		SAMSUNG ELECTRONICS CO.,LTD.			
FCC ID		A3LSMA205W			
Model Number		SM-A205W			
Applicable Standards		FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013			
SAR Limits (W/Kg)					
Exposure Category		Peak spatial-average(1g of tissue)		Extremities-average(10g of tissue)	
General population / Uncontrolled exposure		1.6		4.0	
The Highest Reported SAR (W/kg)					
RF Exposure Conditions		Equipment Class			
		Licensed	DTS	U-NII	DSS(BT)
Head		1.12	0.10	0.28	<0.10
Body-worn		0.43	<0.10	0.46	N/A
Hotspot		0.78	0.26	0.32	
Product Specific 10-g		N/A		1.30	
Simultaneous TX	Head	1.39	1.22	1.39	1.16
	Body-worn	0.88	0.52	0.88	N/A
	Hotspot	1.10	1.04	1.10	
	Product Specific 10-g	N/A			
Date Tested		4/12/2019 to 5/7/2019			
Test Results		Pass			
<p>UL Korea, Ltd. 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 Korea, Ltd. 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 Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. 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 IAS, any agency of the Federal Government, or any agency of any government.</p>					
Approved & Released By:			Prepared By:		
					
Justin Park Lead Test Engineer UL Korea, Ltd. Suwon Laboratory			Sanghwa Lee Senior Laboratory Technician UL Korea, Ltd. Suwon Laboratory		

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
- 648474 D04 Handset SAR v01r03
- 690783 D01 SAR Listings on Grants v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02
- 941225 D01 3G SAR Procedures v03r01
- 941225 D05 SAR for LTE Devices v02r05
- 941225 D05A LTE Rel.10 KDB Inquiry Sheet v01r02
- 941225 D06 Hotspot Mode v02r01
- 941225 D07 UMPC Mini Tablet v01r02

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

- [TCB workshop](#) October, 2014; Page 36, RF Exposure Procedures Update (Overlapping LTE Bands)
- [TCB workshop](#) October, 2014; Page 37, RF Exposure Procedures Update (Other LTE Considerations)
- [TCB workshop](#) October, 2016; Page 7, RF Exposure Procedures (Bluetooth Duty Factor)
- [TCB workshop](#) October, 2016; Page 18, RF Exposure Procedures (DUT Holder Perturbations)

3. Facilities and Accreditation

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

Suwon
SAR 1 Room
SAR 2 Room
SAR 3 Room
SAR 4 Room

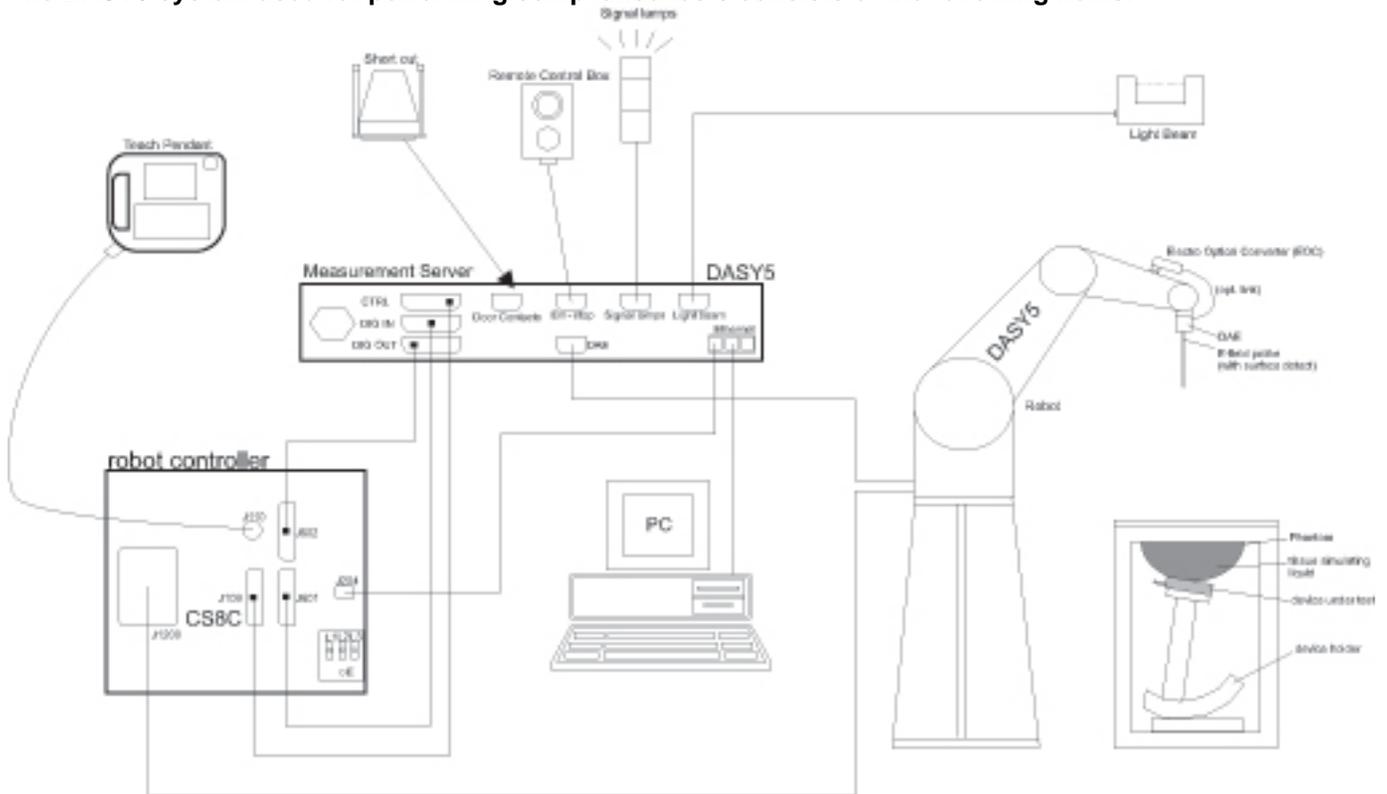
UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637.

The full scope of accreditation can be viewed at <http://www.iasonline.org/PDF/TL/TL-637.pdf>.

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	≤ 1.5 · $\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm	
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. * When zoom scan is required and the <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	E5071C	MY46522054	8-7-2019
Dielectric Assessment Kit	SPEAG	DAK-3.5	1196	6-26-2019
Shorting block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	LKM	DTM3000	3424	8-9-2019

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
MXG Analog Signal Generator	Agilent	N5181A	MY50145882	8-7-2019
Power Sensor	Agilent	U2000A	MY54260010	8-7-2019
Power Sensor	Agilent	U2000A	MY54260007	8-7-2019
Power Amplifier	EXODUS	1410025-AMP2027-10003	10003	8-8-2019
Directional Coupler	Agilent	772D	MY52180193	8-7-2019
Directional Coupler	Agilent	778D	MY52180432	8-7-2019
Low Pass Filter	MICROLAB	LA-15N	03943	8-7-2019
Low Pass Filter	FILTRON	L14012FL	1410003S	8-7-2019
Low Pass Filter	MICROLAB	LA-60N	03942	8-7-2019
Attenuator	Agilent	8491B/003	MY39269292	8-7-2019
Attenuator	Agilent	8491B/010	MY39269315	8-7-2019
Attenuator	Agilent	8491B/020	MY39269298	8-7-2019
E-Field Probe (SAR1)	SPEAG	EX3DV4	7376	9-26-2019
E-Field Probe (SAR2)	SPEAG	EX3DV4	7330	1-31-2020
E-Field Probe (SAR3)	SPEAG	EX3DV4	7314	8-30-2019
E-Field Probe (SAR4)	SPEAG	EX3DV4	3991	5-24-2019
Data Acquisition Electronics (SAR1)	SPEAG	DAE4	1447	3-21-2020
Data Acquisition Electronics (SAR2)	SPEAG	DAE4	1494	7-23-2019
Data Acquisition Electronics (SAR3)	SPEAG	DAE4	1468	8-22-2019
Data Acquisition Electronics (SAR4)	SPEAG	DAE4	1259	7-26-2019
System Validation Dipole	SPEAG	D750V3	1122	2-19-2020
System Validation Dipole	SPEAG	D835V2	4d174	1-23-2021
System Validation Dipole	SPEAG	D1750V2	1125	2-16-2020
System Validation Dipole	SPEAG	D1900V2	5d190	10-23-2020
System Validation Dipole	SPEAG	D2450V2	939	10-16-2020
System Validation Dipole	SPEAG	D2600V2	1097	1-17-2020
System Validation Dipole	SPEAG	D5GHzV2	1184	8-21-2020
Thermometer (SAR1)	Lutron	MHB-382SD	AH.91463	8-8-2019
Thermometer (SAR2)	Lutron	MHB-382SD	AH.50215	8-13-2019
Thermometer (SAR3)	Lutron	MHB-382SD	AH.50213	8-14-2019
Thermometer (SAR4)	Lutron	MHB-382SD	AH.91478	8-8-2019

Others

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Base Station Simulator	R & S	CMW500	150313	8-9-2019
Base Station Simulator	R & S	CMW500	150314	8-9-2019
Base Station Simulator	R & S	CMW500	162790	8-9-2019
Wireless Connectivity Tester	R & S	CMW270	100982	8-8-2019

Note(s):

Refer to Appendix F that mentioned about justification for Extended SAR Dipole Calibrations (D750, SN : 1122, D1750, SN : 1125, D2600, SN : 1097)

5. Measurement Uncertainty

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

6. Device Under Test (DUT) Information

6.1. DUT Description

Device Dimension	Overall (Length x Width): 158.3 mm x 74.6 mm Overall Diagonal: 169.0 mm Display Diagonal: 162.4 mm		
Back Cover	<input checked="" type="checkbox"/> The Back Cover is not removable.		
Battery Options	<input checked="" type="checkbox"/> The rechargeable battery is not user accessible		
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 : Ch 1 – Ch 11) <input checked="" type="checkbox"/> Mobile Hotspot (Wi-Fi 5 GHz : Ch 149 – Ch 165)		
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 : Ch 1 – Ch 11) <input checked="" type="checkbox"/> Wi-Fi Direct (Wi-Fi 5 GHz : Ch 149 – Ch 165)		
Test Sample Information	No.	S/N	Notes
	1	5200323b465826c5	Wi-Fi/BT conduction
	2	R38M307VMXX	Main conduction
	3	R38M404628Z	Main conduction
	4	R38M307V1TX	SAR
	5	R38M307TYFR	SAR
	6	R38M307TYEH	SAR
	7.	R38M307V1ZZ	SAR
	8.	R38M307VP0P	SAR
	9.	R38M307VNPL	SAR
	10.	R38M307V1JV	SAR
	11.	R38M4045RJX	SAR

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 type="checkbox"/> Class 12 - 4 Up, 4 Down <input checked="" 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%
W-CDMA (UMTS)	Band II Band IV Band V	UMTS Rel. 99 (Voice & Data) HSDPA (Category 24) HSUPA (Category 6) HSPA+		100%
LTE	FDD Band 2 FDD Band 4 FDD Band 5 FDD Band 7 FDD Band 12 FDD Band 13 FDD Band 17 FDD Band 66 TDD Band 38 TDD Band 41	QPSK 16QAM Rel. 10 Does not support Carrier Aggregation (CA)		100% (FDD) 63.3% (TDD) ¹
		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)		99.3% (802.11b) 95.9% (802.11g) 95.6% (802.11n 20MHz BW)
	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40) 802.11ac (VHT20) 802.11ac (VHT40) 802.11ac (VHT80)		95.6% (802.11a) 95.6% (802.11n,ac 20MHz BW) 90.9% (802.11n,ac 40MHz BW) 96.1% (802.11ac 80MHz BW)
	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		76.8% (DH5)

Notes:

1. This device supports uplink-downlink configuration 0-6. The configuration with the highest duty cycle was used (Subframe Number 0 at 63.3%).
2. The Bluetooth protocol is considered source-based averaging. Bluetooth GFSK (DH5) was verified to have the highest duty cycle of 76.8% and was considered and used for SAR Testing.
3. Duty cycle for Wi-Fi is referenced from the DTS and UNII report.

6.3. Nominal and Maximum Output Power

KDB 447498 sec.4.1. at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit

RF Air interface	Antenna	Mode	Time Slots	Max. RF Output Power (dBm)	
				Tune-up Limit	Frame Pwr
GSM850	Main 1	Voice/GPRS	1	33.5	24.5
		GPRS	2	31.5	25.5
		GPRS	3	30.5	26.2
		GPRS	4	29.5	26.5
		EGPRS	1	26.5	17.5
		EGPRS	2	24.5	18.5
		EGPRS	3	23.0	18.7
GSM1900	Main 1	Voice/GPRS	1	30.5	21.5
		GPRS	2	28.5	22.5
		GPRS	3	27.0	22.7
		GPRS	4	25.5	22.5
		EGPRS	1	26.5	17.5
		EGPRS	2	24.5	18.5
		EGPRS	3	23.0	18.7
GSM1900	Main 1	EGPRS	4	21.5	18.5

RF Air interface	Antenna	Mode	Max. RF Output Power (dBm)	Reduced. RF Output Power (dBm) Hotspot back-off	Reduced. RF Output Power (dBm) Ear-jack back-off
W-CDMA Band II	Main 1	R99	24.5	21.5	22.0
		HSDPA	23.5	21.0	22.0
		HSUPA	24.0	21.0	22.0
W-CDMA Band IV	Main 1	R99	25.0	22.0	
		HSDPA	24.5	22.0	
		HSUPA	24.0	22.0	
W-CDMA Band V	Main 1	R99	25.5		
		HSDPA	24.0		
		HSUPA	25.5		

RF Air interface	Antenna	Mode	Max. RF Output Power (dBm)	Reduced, RF Output Power (dBm) Hotspot back-off	RCV Back-off	
LTE Band 2	Main 1	QPSK	24.5	21.5		
LTE Band 4	Main 1	QPSK	24.5	22.5		
LTE Band 5	Main 1	QPSK	25.0			
LTE Band 7	Main 2	QPSK	24.5	21.5		23.5
LTE Band 12	Main 1	QPSK	24.5			
LTE Band 13	Main 1	QPSK	24.5			
LTE Band 17	Main 1	QPSK	24.5			
LTE Band 38	Main 2	QPSK	23.5			
LTE Band 41	Main 2	QPSK	23.5			
LTE Band 66	Main 1	QPSK	24.5	22.5		

Notes:

1. LTE QPSK configuration has the highest maximum average output power per 3GPP standard.
2. The device utilizes power reduction under some portable hotspot conditions for SAR compliance. There is power reduction for WWAN Bands(WCDMA Band II, IV, LTE Band 2, 4, 7, 66). The reduced powers were confirmed via conducted power measurements the RF port. Detailed description of the hotspot power reduction mechanism is included in the operational description.
3. WWAN bands (GSM 1900, WCDMA Band II, IV, LTE Band 2, 4, 7, 66) has support to proximity sensor back-off function. it is operating during extremity (hand-held) use conditions. And This function is apply to phablet 10-g SAR exposure Condition. Other Head and Body exposure conditions are performed SAR test at full power. The proximity sensor details explain in SAR report according to Section 6 in KDB 616217.
4. WWAN bands (WCDMA Band II, LTE Band 2, 4, 7, 66) has support to power reduction when ear-jack is connected to phone.
5. All Power reduction mechanisms are not work at the same time.
6. This device uses an independent fixed level power reduction mechanism for WWAN(LTE Band 7) operations during RCV operated Detailed descriptions of the power reduction mechanism are included in the operational description.
7. This device supports power reduction in the body-worn mode with the ear-jack connected and in hotspot mode for WCDMA Band II, IV and LTE Band 2, 4, 7, 66. As the power reduction is different for ear-jack (2.5dB reduction) connected versus hotspot mode (3dB reduction) for WCDMA Band II, testing for the hotspot exposure condition was performed at Hotspot reduced power and then scaled to ear-jack reduced power configuration to conservatively cover the possibility of hotspot mode being enabled with the ear-jack connected. The level of power reduction for WCDMA Band IV, LTE Band 2, 4, 7, 66 operations are the same for hotspot and ear-jack configurations therefore, testing was done at the reduced power for hotspot operations.

RF Air interface	Mode	Max. RF Output Power (dBm)	Reduced. RF Output Power (dBm)
WiFi 2.4 GHz (Ch.1 - Ch.11)	802.11b	19.0	12.0
	802.11g	17.0	12.0
	802.11n HT20	17.0	12.0
WiFi 2.4 GHz (Ch.12)	802.11b	17.0	8.0
	802.11g	12.5	8.0
	802.11n HT20	12.0	6.0
WiFi 2.4 GHz (Ch.13)	802.11b	15.0	8.0
	802.11g	10.0	8.0
	802.11n HT20	7.0	6.0
WiFi 5 GHz (UNII-1)	802.11a	17.0	12.0
	802.11n HT20	16.0	12.0
	802.11n HT40	14.0	12.0
	802.11ac VHT20	16.0	12.0
	802.11ac VHT40	14.0	12.0
	802.11ac VHT80	12.0	12.0
WiFi 5 GHz (UNII 2-A)	802.11a	17.0	12.0
	802.11n HT20	16.0	12.0
	802.11n HT40	13.0	12.0
	802.11ac VHT20	16.0	12.0
	802.11ac VHT40	13.0	12.0
	802.11ac VHT80	12.0	12.0
WiFi 5 GHz (UNII-2C)	802.11a	17.0	12.0
	802.11n HT20	15.0	12.0
	802.11n HT40	13.0	12.0
	802.11ac VHT20	15.0	12.0
	802.11ac VHT40	13.0	12.0
	802.11ac VHT80	10.5	10.5
WiFi 5 GHz (UNII 3)	802.11a	17.0	12.0
	802.11n HT20	16.0	12.0
	802.11n HT40	15.0	12.0
	802.11ac VHT20	16.0	12.0
	802.11ac VHT40	15.0	12.0
	802.11ac VHT80	14.0	12.0
Bluetooth		10.0	
Bluetooth EDR		10.0	
Bluetooth LE		6.0	

Note(s):

This device uses an independent fixed level power reduction mechanism for WLAN operations during RCV operated. Detailed descriptions of the power reduction mechanism are included in the operational description.

6.4. General LTE SAR Test and Reporting Considerations

Item	Description						
Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 2	Frequency range: 1850 - 1910 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	18700 /1860	18675/ 1857.5	18650/ 1855	18625/ 1852.5	18615/ 1851.5	18607/ 1850.7
	Mid	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880
	High	19100/ 1900	19125/ 1902.5	19150/ 1905	19175/ 1907.5	19185/ 1908.5	19193/ 1909.3
	Band 4	Frequency range: 1710 - 1755 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	20050/ 1720	20025/ 1717.5	20000/ 1715	19975/ 1712.5	19965/ 1711.5	19957/ 1710.7
	Mid	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5
	High	20300/ 1745	20325/ 1747.5	20350/ 1750	20375/ 1752.5	20385/ 1753.5	20393/ 1754.3
	Band 5	Frequency range: 824 - 849 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low			20450/ 829	20425/ 826.5	20415/ 825.5	20407/ 824.7
	Mid			20525/ 836.5	20525/ 836.5	20525/ 836.5	20525/ 836.5
	High			20600/ 844	20625/ 846.5	20635/ 847.5	20643/ 848.3
	Band 7	Frequency range: 2500 - 2570 MHz (BW = 70 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																																																																		
	Band 66	Frequency range: 1710 - 1780 MHz																																																																		
Channel Bandwidth																																																																				
	20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz																																																														
Low	132072/ 1720	132047/ 1717.5	132022/ 1715	131997/ 1712.5	131987/ 1711.5	131979/ 1710.7																																																														
Mid	132322/ 1745	132322/ 1745	132322/ 1745	132322/ 1745	132322/ 1745	132322/ 1745																																																														
High	132572/ 1770	132597/ 1772.5	132622/ 1775	132647/ 1777.5	132657/ 1778.5	132665/ 1779.3																																																														
LTE transmitter and antenna implementation	Refer to Appendix A.																																																																			
Maximum power reduction (MPR)	<p>Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3</p> <table border="1"> <thead> <tr> <th rowspan="2">Modulation</th> <th colspan="6">Channel bandwidth / Transmission bandwidth (N_{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>64 QAM</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 3</td> </tr> <tr> <td>256 QAM</td> <td colspan="6">≥ 1</td> <td>≤ 5</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 (N _{RB})						MPR (dB)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1	64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2	64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2	64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3	256 QAM	≥ 1						≤ 5
Modulation	Channel bandwidth / Transmission bandwidth (N _{RB})							MPR (dB)																																																												
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz																																																														
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1																																																													
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1																																																													
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2																																																													
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2																																																													
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3																																																													
256 QAM	≥ 1						≤ 5																																																													
Power reduction	Yes																																																																			
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.																																																																			

Note(s):

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

6.6. LTE (TDD) Considerations

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

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

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

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

Calculated Duty Cycle

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

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

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

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

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 for SAR Testing: configuration 0 at 63.3% duty cycle and Special Subframe 7

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	Antennaa	DUT-to-User Separation	Test Position	Antenna-to-edge/surface	SAR Required	Note	
WWAN	Head	Main Ant. 1 & 2	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	Main Ant. 1 & 2	15 mm	Rear	N/A	Yes		
				Front	N/A	Yes		
	Hotspot	Main Ant.1	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		
	Hotspot	Main Ant.2	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	
	Product Specific 10-g	Main Ant.1 & Main Ant. 2	0 mm	Rear	Refer to notes 2 & 3			
				Front				
				Edge 1 (Top)				
				Edge 2 (Right)				
Edge 3 (Bottom)								
WLAN & BT	Head	WiFi & BT Ant.	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	WiFi & BT Ant.	15 mm	Rear	N/A	Yes		
				Front	N/A	Yes		
	Hotspot	WiFi & BT Ant.	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	
	Product Specific 10-g	WiFi & BT Ant.	0 mm	Rear	Refer to notes 2 & 4			
				Front				
				Edge 1 (Top)				
				Edge 2 (Right)				
				Edge 3 (Bottom)				
	Edge 4 (Left)							

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.
- For Phablet devices: When hotspot mode applies, Product specific 10-g SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.
- For Phablet devices : When hotspot mode applies and power reduction applies to hotspot mode, Product specific 10-g SAR is required for each test position that has and adjusted SAR to maximum power that is > 1.2 W/kg.
- For Phablet devices: When hotspot mode is not supported, Product specific 10-g SAR is required for all surfaces and edges with an antenna located at ≤ 25mm from that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions.

8. Dielectric Property Measurements & System Check

8.1 Dielectric Property Measurements

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

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 1 Room

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
4-20-2019	Body 2600	e'	52.3900	Relative Permittivity (ϵ_r):	52.39	52.51	-0.23	5
		e"	15.0700	Conductivity (σ):	2.18	2.16	0.83	5
	Body 2500	e'	52.6600	Relative Permittivity (ϵ_r):	52.66	52.64	0.04	5
		e"	14.9200	Conductivity (σ):	2.07	2.02	2.66	5
	Body 2700	e'	52.1200	Relative Permittivity (ϵ_r):	52.12	52.38	-0.51	5
		e"	15.3000	Conductivity (σ):	2.30	2.30	-0.19	5
4-25-2019	Body 2450	e'	52.9900	Relative Permittivity (ϵ_r):	52.99	52.70	0.55	5
		e"	14.8300	Conductivity (σ):	2.02	1.95	3.60	5
	Body 2400	e'	53.1000	Relative Permittivity (ϵ_r):	53.10	52.77	0.62	5
		e"	14.6800	Conductivity (σ):	1.96	1.90	3.21	5
	Body 2480	e'	52.9400	Relative Permittivity (ϵ_r):	52.94	52.66	0.53	5
		e"	14.9200	Conductivity (σ):	2.06	1.99	3.27	5
5-2-2019	Body 2600	e'	51.2100	Relative Permittivity (ϵ_r):	51.21	52.51	-2.48	5
		e"	15.4900	Conductivity (σ):	2.24	2.16	3.64	5
	Body 2500	e'	51.5500	Relative Permittivity (ϵ_r):	51.55	52.64	-2.06	5
		e"	15.1800	Conductivity (σ):	2.11	2.02	4.45	5
	Body 2700	e'	50.9100	Relative Permittivity (ϵ_r):	50.91	52.38	-2.82	5
		e"	15.6700	Conductivity (σ):	2.35	2.30	2.22	5
5-6-2019	Head 5250	e'	36.4100	Relative Permittivity (ϵ_r):	36.41	35.93	1.33	5
		e"	15.5100	Conductivity (σ):	4.53	4.70	-3.71	5
	Head 5260	e'	36.3900	Relative Permittivity (ϵ_r):	36.39	35.92	1.30	5
		e"	15.5200	Conductivity (σ):	4.54	4.71	-3.68	5
	Head 5600	e'	35.8100	Relative Permittivity (ϵ_r):	35.81	35.53	0.78	5
		e"	15.7300	Conductivity (σ):	4.90	5.06	-3.21	5
	Head 5750	e'	35.6100	Relative Permittivity (ϵ_r):	35.61	35.36	0.70	5
		e"	15.8300	Conductivity (σ):	5.06	5.21	-2.93	5
Head 5825	e'	35.4500	Relative Permittivity (ϵ_r):	35.45	35.30	0.42	5	
	e"	15.8800	Conductivity (σ):	5.14	5.27	-2.40	5	

SAR 2 Room

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
4-18-2019	Body 835	e'	54.0900	Relative Permittivity (ϵ_r):	54.09	55.20	-2.01	5
		e"	21.2800	Conductivity (σ):	0.99	0.97	1.86	5
	Body 820	e'	54.1500	Relative Permittivity (ϵ_r):	54.15	55.28	-2.04	5
		e"	21.3800	Conductivity (σ):	0.97	0.97	0.66	5
	Body 850	e'	54.1100	Relative Permittivity (ϵ_r):	54.11	55.16	-1.90	5
		e"	21.2200	Conductivity (σ):	1.00	0.99	1.60	5

SAR 3 Room

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
4-17-2019	Head 750	e'	42.7600	Relative Permittivity (ϵ_r):	42.76	41.96	1.90	5
		e"	21.5500	Conductivity (σ):	0.90	0.89	0.63	5
	Head 700	e'	43.4900	Relative Permittivity (ϵ_r):	43.49	42.22	3.01	5
		e"	21.8700	Conductivity (σ):	0.85	0.89	-4.27	5
	Head 790	e'	42.3400	Relative Permittivity (ϵ_r):	42.34	41.76	1.40	5
		e"	21.3300	Conductivity (σ):	0.94	0.90	4.55	5
4-18-2019	Body 750	e'	56.7800	Relative Permittivity (ϵ_r):	56.78	55.55	2.22	5
		e"	23.0700	Conductivity (σ):	0.96	0.96	-0.10	5
	Body 700	e'	57.2600	Relative Permittivity (ϵ_r):	57.26	55.74	2.73	5
		e"	23.4700	Conductivity (σ):	0.91	0.96	-4.77	5
	Body 790	e'	56.4700	Relative Permittivity (ϵ_r):	56.47	55.39	1.95	5
		e"	22.8200	Conductivity (σ):	1.00	0.97	3.75	5
4-19-2019	Head 835	e'	43.0500	Relative Permittivity (ϵ_r):	43.05	41.50	3.73	5
		e"	19.7200	Conductivity (σ):	0.92	0.90	1.73	5
	Head 820	e'	43.2600	Relative Permittivity (ϵ_r):	43.26	41.60	3.98	5
		e"	19.8100	Conductivity (σ):	0.90	0.90	0.53	5
	Head 850	e'	42.8500	Relative Permittivity (ϵ_r):	42.85	41.50	3.25	5
		e"	19.6400	Conductivity (σ):	0.93	0.92	1.45	5
5-6-2019	Body 5250	e'	47.5500	Relative Permittivity (ϵ_r):	47.55	48.95	-2.86	5
		e"	18.6400	Conductivity (σ):	5.44	5.35	1.65	5
	Body 5260	e'	47.5200	Relative Permittivity (ϵ_r):	47.52	48.94	-2.90	5
		e"	18.6500	Conductivity (σ):	5.45	5.36	1.68	5
	Body 5600	e'	46.9600	Relative Permittivity (ϵ_r):	46.96	48.48	-3.13	5
		e"	18.9500	Conductivity (σ):	5.90	5.76	2.42	5
	Body 5750	e'	46.7200	Relative Permittivity (ϵ_r):	46.72	48.27	-3.22	5
		e"	19.0800	Conductivity (σ):	6.10	5.94	2.77	5
	Body 5825	e'	46.5800	Relative Permittivity (ϵ_r):	46.58	48.20	-3.36	5
		e"	19.1500	Conductivity (σ):	6.20	6.00	3.37	5

SAR 4 Room

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
4-15-2019	Body 1900	e'	52.3700	Relative Permittivity (ϵ_r):	52.37	53.30	-1.74	5
		e"	14.8700	Conductivity (σ):	1.57	1.52	3.35	5
	Body 1850	e'	52.6000	Relative Permittivity (ϵ_r):	52.60	53.30	-1.31	5
		e"	14.9900	Conductivity (σ):	1.54	1.52	1.44	5
	Body 1910	e'	52.3200	Relative Permittivity (ϵ_r):	52.32	53.30	-1.84	5
		e"	14.9300	Conductivity (σ):	1.59	1.52	4.32	5
4-18-2019	Body 1750	e'	53.9400	Relative Permittivity (ϵ_r):	53.94	53.44	0.93	5
		e"	15.3500	Conductivity (σ):	1.49	1.49	0.50	5
	Body 1710	e'	54.0300	Relative Permittivity (ϵ_r):	54.03	53.54	0.91	5
		e"	15.5100	Conductivity (σ):	1.47	1.46	0.90	5
	Body 1755	e'	53.9200	Relative Permittivity (ϵ_r):	53.92	53.43	0.92	5
		e"	15.3300	Conductivity (σ):	1.50	1.49	0.45	5
4-18-2019	Head 1750	e'	38.5100	Relative Permittivity (ϵ_r):	38.51	40.08	-3.93	5
		e"	14.0600	Conductivity (σ):	1.37	1.37	-0.06	5
	Head 1710	e'	38.5600	Relative Permittivity (ϵ_r):	38.56	40.15	-3.95	5
		e"	14.2400	Conductivity (σ):	1.35	1.35	0.56	5
	Head 1755	e'	38.5100	Relative Permittivity (ϵ_r):	38.51	40.08	-3.91	5
		e"	14.0400	Conductivity (σ):	1.37	1.37	-0.13	5
4/18//2019	Head 1900	e'	38.3000	Relative Permittivity (ϵ_r):	38.30	40.00	-4.25	5
		e"	13.8400	Conductivity (σ):	1.46	1.40	4.44	5
	Head 1850	e'	38.4200	Relative Permittivity (ϵ_r):	38.42	40.00	-3.95	5
		e"	13.9500	Conductivity (σ):	1.43	1.40	2.50	5
	Head 1910	e'	38.2800	Relative Permittivity (ϵ_r):	38.28	40.00	-4.30	5
		e"	13.8300	Conductivity (σ):	1.47	1.40	4.91	5
4-18-2019	Body 1900	e'	53.8700	Relative Permittivity (ϵ_r):	53.87	53.30	1.07	5
		e"	14.9800	Conductivity (σ):	1.58	1.52	4.12	5
	Body 1850	e'	53.9100	Relative Permittivity (ϵ_r):	53.91	53.30	1.14	5
		e"	15.0900	Conductivity (σ):	1.55	1.52	2.12	5
	Body 1910	e'	53.8900	Relative Permittivity (ϵ_r):	53.89	53.30	1.11	5
		e"	14.9800	Conductivity (σ):	1.59	1.52	4.66	5
4-22-2019	Head 2600	e'	38.8600	Relative Permittivity (ϵ_r):	38.86	39.01	-0.39	5
		e"	13.2000	Conductivity (σ):	1.91	1.96	-2.75	5
	Head 2500	e'	39.0100	Relative Permittivity (ϵ_r):	39.01	39.14	-0.32	5
		e"	13.0900	Conductivity (σ):	1.82	1.85	-1.86	5
	Head 2700	e'	38.6500	Relative Permittivity (ϵ_r):	38.65	38.88	-0.60	5
		e"	13.2300	Conductivity (σ):	1.99	2.07	-4.06	5
4-25-2019	Head 2450	e'	37.6400	Relative Permittivity (ϵ_r):	37.64	39.20	-3.98	5
		e"	13.7500	Conductivity (σ):	1.87	1.80	4.06	5
	Head 2400	e'	37.7100	Relative Permittivity (ϵ_r):	37.71	39.30	-4.04	5
		e"	13.7100	Conductivity (σ):	1.83	1.75	4.45	5
	Head 2480	e'	37.5900	Relative Permittivity (ϵ_r):	37.59	39.16	-4.01	5
		e"	13.7700	Conductivity (σ):	1.90	1.83	3.62	5
5-2-2019	Head 2600	e'	39.1000	Relative Permittivity (ϵ_r):	39.10	39.01	0.23	5
		e"	13.3400	Conductivity (σ):	1.93	1.96	-1.71	5
	Head 2500	e'	39.3000	Relative Permittivity (ϵ_r):	39.30	39.14	0.42	5
		e"	13.2200	Conductivity (σ):	1.84	1.85	-0.88	5
	Head 2700	e'	38.9200	Relative Permittivity (ϵ_r):	38.92	38.88	0.09	5
		e"	13.3000	Conductivity (σ):	2.00	2.07	-3.55	5
5-6-2019	Head 2600	e'	39.6200	Relative Permittivity (ϵ_r):	39.62	39.01	1.56	5
		e"	13.6900	Conductivity (σ):	1.98	1.96	0.87	5
	Head 2500	e'	39.7800	Relative Permittivity (ϵ_r):	39.78	39.14	1.64	5
		e"	13.5800	Conductivity (σ):	1.89	1.85	1.82	5
	Head 2700	e'	39.4200	Relative Permittivity (ϵ_r):	39.42	38.88	1.38	5
		e"	13.7400	Conductivity (σ):	2.06	2.07	-0.36	5

8.2 System Check

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

System Performance Check Measurement Conditions:

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ±0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥ 10.0 cm for measurements > 3 GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- Distance between probe sensors and phantom surface was set to 2.5 mm.
For 5 GHz band - Distance between probe sensors and phantom surface was set to 1.4 mm
- The dipole input power (forward power) was 100 mW.
- The results are normalized to 1 W input power.

Reference Target SAR Values

The reference SAR values can be obtained from the calibration certificate of system validation dipoles.

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	Target SAR Values (W/kg)		
				1g/10g	Head	Body
D750V3	1122	2-19-2018	750	1g	8.22	8.63
				10g	5.35	5.72
D835V2	4d174	1-23-2019	835	1g	9.28	9.47
				10g	6.04	6.23
D1750V2	1125	2-16-2018	1750	1g	36.50	36.80
				10g	19.30	19.50
D1900V2	5d190	10-23-2018	1900	1g	39.10	39.00
				10g	20.40	20.50
D2450V2	939	10-16-2018	2450	1g	53.20	50.10
				10g	24.80	23.50
D2600V2	1097	1-17-2018	2600	1g	56.40	54.40
				10g	25.30	24.20
D5GHzV2	1184	8-21-2018	5250	1g	81.10	75.00
				10g	23.40	20.90
			5600	1g	85.00	78.60
				10g	24.40	22.00
			5750	1g	82.60	76.20
				10g	23.70	21.20

Note(s):

Refer to Appendix F that mentioned about justification for Extended SAR Dipole Calibrations (D750, SN : 1122, D1750, SN : 1125, D2600, SN : 1097)

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 1 Room

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta $\pm 10\%$	Plot No.	
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W				
4-20-2019	D2600V2	1097	Body	1g	5.38	53.80	54.40	-1.10	
				10g	2.33	23.30	24.20	-3.72	
4-25-2019	D2450V2	939	Body	1g	5.32	53.20	50.10	6.19	1, 2
				10g	2.51	25.10	23.50	6.81	
5-2-2019	D2600V2	1097	Body	1g	5.68	56.80	54.40	4.41	3, 4
				10g	2.55	25.50	24.20	5.37	
5-6-2019	D5GHzV2 (5250 MHz)	1184	Head	1g	7.73	77.30	81.10	-4.69	
				10g	2.19	21.90	23.40	-6.41	
5-6-2019	D5GHzV2 (5600 MHz)	1184	Head	1g	7.84	78.40	85.00	-7.76	5, 6
				10g	2.20	22.00	24.40	-9.84	
5-6-2019	D5GHzV2 (5750 MHz)	1184	Head	1g	7.89	78.90	82.60	-4.48	
				10g	2.23	22.30	23.70	-5.91	

SAR 2 Room

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta $\pm 10\%$	Plot No.	
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W				
4-18-2019	D835V2	4d174	Body	1g	0.97	9.73	9.47	2.75	7, 8
				10g	0.64	6.41	6.23	2.89	

SAR 3 Room

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta $\pm 10\%$	Plot No.	
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W				
4-17-2019	D750V3	1122	Head	1g	0.84	8.35	8.22	1.58	
				10g	0.55	5.54	5.35	3.55	
4-18-2019	D750V3	1122	Body	1g	0.84	8.36	8.63	-3.13	9, 10
				10g	0.56	5.60	5.72	-2.10	
4-19-2019	D850V2	4d174	Head	1g	1.00	9.96	9.28	7.33	11, 12
				10g	0.65	6.54	6.04	8.28	
4-26-2019	D5GHzV2 (5250 MHz)	1184	Body	1g	7.91	79.10	75.00	5.47	
				10g	2.21	22.10	20.90	5.74	
4-26-2019	D5GHzV2 (5600 MHz)	1184	Body	1g	8.13	81.30	78.60	3.44	
				10g	2.24	22.40	22.00	1.82	
4-26-2019	D5GHzV2 (5750 MHz)	1184	Body	1g	7.84	78.40	76.20	2.89	
				10g	2.18	21.80	21.20	2.83	
4-26-2019	D5GHzV2 (5250 MHz)	1184	Body	1g	7.77	77.70	75.00	3.60	
				10g	2.18	21.80	20.90	4.31	
4-26-2019	D5GHzV2 (5600 MHz)	1184	Body	1g	8.17	81.70	78.60	3.94	
				10g	2.26	22.60	22.00	2.73	
4-26-2019	D5GHzV2 (5750 MHz)	1184	Body	1g	8.03	80.30	76.20	5.38	
				10g	2.24	22.40	21.20	5.66	

SAR 4 Room

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.	
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W				
4-15-2019	D1900V2	5d190	Body	1g	4.00	40.00	39.00	2.56	
				10g	2.08	20.80	20.50	1.46	
4-18-2019	D1750V2	1125	Body	1g	3.72	37.20	36.80	1.09	
				10g	1.96	19.60	19.50	0.51	
4-18-2019	D1750V2	1125	Head	1g	3.51	35.10	36.50	-3.84	13, 14
				10g	1.85	18.50	19.30	-4.15	
4-18-2019	D1900V2	5d190	Head	1g	4.13	41.30	39.10	5.63	15, 16
				10g	2.13	21.30	20.40	4.41	
4-18-2019	D1900V2	5d190	Body	1g	4.09	40.90	39.00	4.87	
				10g	2.12	21.20	20.50	3.41	
4-22-2019	D2600V2	1097	Head	1g	5.71	57.10	56.40	1.24	
				10g	2.56	25.60	25.30	1.19	
4-25-2019	D2450V2	939	Head	1g	5.33	53.30	53.20	0.19	
				10g	2.48	24.80	24.80	0.00	
5-2-2019	D2600V2	1097	Head	1g	5.57	55.70	56.40	-1.24	
				10g	2.50	25.00	25.30	-1.19	
5-6-2019	D2600V2	1097	Head	1g	5.76	57.60	56.40	2.13	
				10g	2.58	25.80	25.30	1.98	

9. Conducted Output Power Measurements

Conducted output power was measured for WWAN in accordance with ANSI C63.26-2015.

9.1 GSM

Per KDB 941225 D01 3G SAR Procedures:

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

GSM850 Measured Results

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			
					Measured		Tune-up Limit	
					Burst Pw r	Frame Pw r	Burst Pw r	Frame Pw r
GSM (Voice)	CS1	1	128	824.2	32.8	23.8	33.5	24.5
			190	836.6	32.8	23.8		
			251	848.8	32.8	23.8		
GPRS (GMSK)	CS1	1	128	824.2	32.7	23.7	33.5	24.5
			190	836.6	32.7	23.6		
			251	848.8	32.7	23.7		
		2	128	824.2	30.7	24.7	31.5	25.5
			190	836.6	30.7	24.7		
			251	848.8	30.8	24.8		
		3	128	824.2	29.2	25.0	30.5	26.2
			190	836.6	29.0	24.7		
			251	848.8	29.3	25.1		
		4	128	824.2	28.4	25.4	29.5	26.5
			190	836.6	28.5	25.5		
			251	848.8	28.7	25.7		
EGPRS (8PSK)	MCS5	1	128	824.2	26.0	17.0	26.5	17.5
			190	836.6	26.0	16.9		
			251	848.8	26.1	17.1		
		2	128	824.2	24.0	18.0	24.5	18.5
			190	836.6	24.0	17.9		
			251	848.8	24.1	18.0		
		3	128	824.2	22.6	18.3	23.0	18.7
			190	836.6	22.3	18.1		
			251	848.8	22.7	18.4		
		4	128	824.2	20.7	17.7	21.5	18.5
			190	836.6	20.7	17.7		
			251	848.8	21.1	18.1		

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

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			
					Measured		Tune-up Limit	
					Burst Pwr	Frame Pwr	Burst Pwr	Frame Pwr
GSM (Voice)	CS1	1	512	1850.2	29.7	20.7	30.5	21.5
			661	1880.0	30.1	21.1		
			810	1909.8	30.0	20.9		
GPRS (GMSK)	CS1	1	512	1850.2	29.7	20.7	30.5	21.5
			661	1880.0	30.0	21.0		
			810	1909.8	30.0	20.9		
		2	512	1850.2	27.7	21.6	28.5	22.5
			661	1880.0	28.0	22.0		
			810	1909.8	27.9	21.9		
		3	512	1850.2	26.2	22.0	27.0	22.7
			661	1880.0	26.6	22.4		
			810	1909.8	26.6	22.3		
		4	512	1850.2	24.5	21.5	25.5	22.5
			661	1880.0	25.0	21.9		
			810	1909.8	25.0	21.9		
EGPRS (8PSK)	MCS5	1	512	1850.2	25.6	16.6	26.5	17.5
			661	1880.0	26.0	17.0		
			810	1909.8	26.0	16.9		
		2	512	1850.2	23.6	17.6	24.5	18.5
			661	1880.0	24.0	18.0		
			810	1909.8	24.0	18.0		
		3	512	1850.2	22.3	18.0	23.0	18.7
			661	1880.0	22.7	18.5		
			810	1909.8	22.8	18.5		
		4	512	1850.2	20.6	17.6	21.5	18.5
			661	1880.0	21.1	18.1		
			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 3 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.

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 table C,11.1.3 of 3GPP TS 34.121-1 v13. A summary of these settings are illustrated below:

	Mode	HSPA				
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2 kbps RMC				
	HSDPA FRC	H-Set 1				
	HSUPA Test	HSPA				
	Power Control Algorithm	Algorithm 2				Algorithm 1
	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	-
	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	0
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	12
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	67
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E-TFCIs	5	5	2	5	1
	Reference E-TFCI	11	11	11	11	67
	Reference E-TFCI PO	4	4	4	4	18
	Reference E-TFCI	67	67	92	67	67
	Reference E-TFCI PO	18	18	18	18	18
	Reference E-TFCI	71	71	71	71	71
	Reference E-TFCI PO	23	23	23	23	23
	Reference E-TFCI	75	75	75	75	75
	Reference E-TFCI PO	26	26	26	26	26
Reference E-TFCI	81	81	81	81	81	
Reference E-TFCI PO	27	27	27	27	27	
Maximum Channelization Codes	2xSF2				SF4	

HSPA+

HSPA+ is only support to down link. Therefore, the RF conducted power is not measured.

W-CDMA Band II Measured Results

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			Reduced Average Power (dBm) Hotspot back-off		
				Measured Pwr	MPR	Tune-up Limit	Measured Pwr	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	23.3	N/A	24.0	20.4	N/A	21.0
		9400	1880.0	23.6			20.7		
		9538	1907.6	23.7			20.8		
HSDPA	Subtest 1	9262	1852.4	22.8	0	23.5	20.4	0	21.0
		9400	1880.0	23.1			20.7		
		9538	1907.6	23.1			20.8		
	Subtest 2	9262	1852.4	21.4	0	23.5	20.4	0	21.0
		9400	1880.0	21.7			20.7		
		9538	1907.6	21.7			20.8		
	Subtest 3	9262	1852.4	21.9	0.5	23.0	20.4	0.0	21.0
		9400	1880.0	22.1			20.8		
		9538	1907.6	22.2			20.8		
	Subtest 4	9262	1852.4	21.0	0.5	23.0	20.5	0.0	21.0
		9400	1880.0	21.3			20.8		
		9538	1907.6	21.3			20.8		
HSUPA	Subtest 1	9262	1852.4	21.8	0	24.0	19.2	0	21.0
		9400	1880.0	22.1			19.4		
		9538	1907.6	22.1			19.5		
	Subtest 2	9262	1852.4	19.2	3	21.0	19.2	0	21.0
		9400	1880.0	19.5			19.5		
		9538	1907.6	19.6			19.6		
	Subtest 3	9262	1852.4	21.9	1	23.0	19.2	0	21.0
		9400	1880.0	22.1			19.5		
		9538	1907.6	22.2			19.5		
	Subtest 4	9262	1852.4	19.2	3	21.0	19.3	0	21.0
		9400	1880.0	19.6			19.5		
		9538	1907.6	19.6			19.6		
	Subtest 5	9262	1852.4	23.4	0	24.0	20.4	0	21.0
		9400	1880.0	23.7			20.8		
		9538	1907.6	23.7			20.8		

W-CDMA Band IV Measured Results

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			Reduced Average Power (dBm) Hotspot back-off		
				Measured Pwr	MPR	Tune-up Limit	Measured Pwr	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	1312	1712.4	23.9	N/A	25.0	20.8	N/A	22.0
		1413	1732.6	24.4			21.2		
		1513	1752.6	24.5			21.2		
HSDPA	Subtest 1	1312	1712.4	23.7	0	24.5	20.8	0	22.0
		1413	1732.6	24.4			21.2		
		1513	1752.6	24.5			21.2		
	Subtest 2	1312	1712.4	23.0	0	24.5	20.7	0	22.0
		1413	1732.6	23.5			21.3		
		1513	1752.6	23.5			21.3		
	Subtest 3	1312	1712.4	21.9	0.5	24.0	20.7	0.5	21.5
		1413	1732.6	22.4			21.3		
		1513	1752.6	22.4			21.3		
	Subtest 4	1312	1712.4	21.9	0.5	24.0	20.7	0.5	21.5
		1413	1732.6	22.4			21.3		
		1513	1752.6	22.4			21.3		
HSUPA	Subtest 1	1312	1712.4	21.3	1	23.0	19.8	0	22.0
		1413	1732.6	21.8			20.3		
		1513	1752.6	21.8			20.5		
	Subtest 2	1312	1712.4	18.8	3	21.0	18.6	2	20.0
		1413	1732.6	19.2			19.1		
		1513	1752.6	19.3			19.3		
	Subtest 3	1312	1712.4	21.3	1	23.0	19.9	1	21.0
		1413	1732.6	21.8			20.4		
		1513	1752.6	21.9			20.5		
	Subtest 4	1312	1712.4	18.7	3	21.0	18.6	2	20.0
		1413	1732.6	19.3			19.1		
		1513	1752.6	19.4			19.2		
	Subtest 5	1312	1712.4	23.3	0	24.0	20.7	0	22.0
		1413	1732.6	23.7			21.2		
		1513	1752.6	23.8			21.3		

W-CDMA Band V Measured Results

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)		
				Measured Pwr	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	4132	826.4	24.8	NA	25.5
		4183	836.6	24.8		
		4233	846.6	25.0		
HSDPA	Subtest 1	4132	826.4	23.3	0	24.0
		4183	836.6	23.3		
		4233	846.6	23.4		
	Subtest 2	4132	826.4	22.4	0	24.0
		4183	836.6	22.4		
		4233	846.6	22.5		
	Subtest 3	4132	826.4	22.5	0.5	23.5
		4183	836.6	22.5		
		4233	846.6	22.6		
	Subtest 4	4132	826.4	21.5	0.5	23.5
		4183	836.6	21.5		
		4233	846.6	21.7		
HSUPA	Subtest 1	4132	826.4	22.4	1	24.5
		4183	836.6	22.4		
		4233	846.6	22.6		
	Subtest 2	4132	826.4	20.3	3	22.5
		4183	836.6	20.3		
		4233	846.6	20.5		
	Subtest 3	4132	826.4	22.4	1	24.5
		4183	836.6	22.5		
		4233	846.6	22.6		
	Subtest 4	4132	826.4	20.3	3	22.5
		4183	836.6	20.3		
		4233	846.6	20.5		
	Subtest 5	4132	826.4	24.8	0	25.5
		4183	836.6	24.9		
		4233	846.6	25.0		

9.2 LTE

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

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

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

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

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

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

Network Signalling value	Requirements (subclause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N _{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	N/A
NS_03	6.6.2.2.1	2, 4, 10, 23, 25, 35, 36, 66, 70	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
NS_04	6.6.2.2.2, 6.6.3.3.19	41	5, 10, 15, 20	Table 6.2.4-4, Table 6.2.4-4a	
				10, 15, 20	≥ 50 (NOTE 1)
NS_05	6.6.3.3.1	1	15, 20	Table 6.2.4-18 (NOTE 2)	
			10, 15, 20	≥ 50	≤ 1 (NOTE 1)
			15, 20	Table 6.2.4-18 (NOTE 2)	
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	N/A
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	
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	6.6.2.2.1 6.6.3.3.13	23	1.4, 3, 5, 10, 15, 20	Table 6.2.4-5	
NS_11	6.6.2.2.1 6.6.3.3.13	23	1.4, 3, 5, 10, 15, 20	Table 6.2.4-5	
NS_12	6.6.3.3.5	26	1.4, 3, 5, 10, 15	Table 6.2.4-6	
NS_13	6.6.3.3.6	26	5	Table 6.2.4-7	
NS_14	6.6.3.3.7	26	10, 15	Table 6.2.4-8	
NS_15	6.6.3.3.8	26	1.4, 3, 5, 10, 15	Table 6.2.4-9 Table 6.2.4-10	
NS_16	6.6.3.3.9	27	3, 5, 10	Table 6.2.4-11, Table 6.2.4-12, Table 6.2.4-13	
NS_17	6.6.3.3.10	28	5, 10	Table 5.6-1	N/A
NS_18	6.6.3.3.11	28	5	≥ 2	≤ 1
				10, 15, 20	≥ 1
NS_19	6.6.3.3.12	44	10, 15, 20	Table 6.2.4-14	
NS_20	6.2.2 6.6.2.2.1 6.6.3.3.14	23	5, 10, 15, 20	Table 6.2.4-15	
				6.2.2A 6.6.3.3.15	Table 6.2.4-16
NS_21	6.6.2.2.1 6.6.3.3.14	30	5, 10	Table 6.2.4-16	
NS_22	6.6.3.3.16	42, 43	5, 10, 15, 20	Table 6.2.4-17	
NS_23	6.6.3.3.17	42, 43	5, 10, 15, 20	N/A	
NS_24	6.6.3.3.20	65 (NOTE 4)	5, 10, 15, 20	Table 6.2.4-19	
NS_25	6.6.3.3.21	65 (NOTE 4)	5, 10, 15, 20	Table 6.2.4-20	
NS_26	6.6.3.3.22	68	10, 15	Table 6.2.4-21	
NS_27	6.6.2.2.5, 6.6.3.3.23	48	5, 10, 15, 20	Table 6.2.4-22	
NS_28	6.2.2A, 6.6.3.3.24	46 (NOTE 5)	20	Table 6.2.4-23	
NS_29	6.2.2A, 6.6.2.3.1a, 6.6.3.3.25	46 (NOTE 5)	20	Table 6.2.4-24	
				6.2.2A, 6.6.3.3.26	Table 6.2.4-25
NS_30	6.2.2A, 6.6.3.3.26	46 (NOTE 5)	20	Table 6.2.4-25	
NS_31	6.2.2A, 6.6.3.3.27	46 (NOTE 5)	20	Table 6.2.4-26	
NS_32	-	-	-	-	-

NOTE 1: Applicable when the lower edge of the assigned E-UTRA UL channel bandwidth frequency is larger than or equal to the upper edge of PHS band (1915.7 MHz) + 4 MHz + the channel BW assigned, where channel BW is as defined in subclause 5.6. A-MPR for

Max power Results

LTE Band 2 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				18700	18900	19100		
				1860 MHz	1880 MHz	1900 MHz		
20 MHz	QPSK	1	0	23.5	23.8	23.2	0.0	24.5
		1	49	23.6	23.8	23.3	0.0	24.5
		1	99	23.6	23.8	22.8	0.0	24.5
		50	0	22.5	22.8	22.2	1.0	23.5
		50	24	22.5	22.8	22.2	1.0	23.5
		50	50	22.5	22.8	22.3	1.0	23.5
		100	0	22.5	22.8	22.2	1.0	23.5
	16QAM	1	0	22.5	22.8	22.0	1.0	23.5
		1	49	22.5	22.7	22.1	1.0	23.5
		1	99	22.5	22.7	22.3	1.0	23.5
		50	0	21.5	21.7	21.2	2.0	22.5
		50	24	21.5	21.7	21.2	2.0	22.5
		50	50	21.5	21.7	21.3	2.0	22.5
		100	0	21.5	21.8	21.3	2.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				18675	18900	19125		
				1857.5 MHz	1880 MHz	1902.5 MHz		
				15 MHz	QPSK	1	0	23.5
1	37	23.5	23.8			23.2	0.0	24.5
1	74	23.5	23.8			23.2	0.0	24.5
36	0	22.5	22.8			22.1	1.0	23.5
36	20	22.5	22.8			22.1	1.0	23.5
36	39	22.5	22.8			22.2	1.0	23.5
75	0	22.5	22.8			22.2	1.0	23.5
16QAM	1	0	22.4		22.8	22.1	1.0	23.5
	1	37	22.4		22.8	22.2	1.0	23.5
	1	74	22.3		22.8	22.3	1.0	23.5
	36	0	21.4		21.7	21.1	2.0	22.5
	36	20	21.4		21.7	21.1	2.0	22.5
	36	39	21.4		21.7	21.2	2.0	22.5
	75	0	21.4		21.7	21.1	2.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				18650	18900	19150		
				1855 MHz	1880 MHz	1905 MHz		
				10 MHz	QPSK	1	0	23.5
1	25	23.4	23.8			23.2	0.0	24.5
1	49	23.4	23.8			23.3	0.0	24.5
25	0	22.4	22.8			22.0	1.0	23.5
25	12	22.4	22.8			22.1	1.0	23.5
25	25	22.4	22.8			22.1	1.0	23.5
50	0	22.4	22.8			22.0	1.0	23.5
16QAM	1	0	22.2		22.8	21.8	1.0	23.5
	1	25	22.2		22.8	21.9	1.0	23.5
	1	49	22.3		22.9	22.0	1.0	23.5
	25	0	21.4		21.7	21.1	2.0	22.5
	25	12	21.4		21.7	21.1	2.0	22.5
	25	25	21.4		21.7	21.2	2.0	22.5
	50	0	21.4		21.7	21.1	2.0	22.5

LTE Band 2 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				18625	18900	19175		
				1852.5 MHz	1880 MHz	1907.5 MHz		
5 MHz	QPSK	1	0	23.0	23.7	22.8	0.0	24.5
		1	12	23.1	23.7	22.8	0.0	24.5
		1	24	23.1	23.8	22.9	0.0	24.5
		12	0	21.9	22.8	21.8	1.0	23.5
		12	7	21.9	22.8	21.8	1.0	23.5
		12	13	21.9	22.8	21.8	1.0	23.5
	16QAM	25	0	21.9	22.8	21.8	1.0	23.5
		1	0	21.6	22.5	21.6	1.0	23.5
		1	12	21.6	22.5	21.6	1.0	23.5
		1	24	21.7	22.5	21.7	1.0	23.5
		12	0	20.9	21.7	20.8	2.0	22.5
		12	7	20.9	21.7	20.8	2.0	22.5
3 MHz	QPSK	12	13	20.9	21.7	20.8	2.0	22.5
		25	0	20.9	21.7	20.8	2.0	22.5
		1	0	22.8	23.8	22.7	0.0	24.5
		1	8	22.9	23.8	22.7	0.0	24.5
		1	14	22.9	23.8	22.8	0.0	24.5
		8	0	21.7	22.8	21.6	1.0	23.5
	16QAM	8	4	21.7	22.8	21.6	1.0	23.5
		8	7	21.7	22.8	21.6	1.0	23.5
		15	0	21.7	22.8	21.7	1.0	23.5
		1	0	21.5	22.8	21.6	1.0	23.5
		1	8	21.5	22.8	21.6	1.0	23.5
		1	14	21.5	22.8	21.6	1.0	23.5
1.4 MHz	QPSK	8	0	20.7	21.7	20.6	2.0	22.5
		8	4	20.7	21.7	20.6	2.0	22.5
		8	7	20.7	21.7	20.6	2.0	22.5
		15	0	20.7	21.7	20.6	2.0	22.5
		1	0	22.6	23.8	22.8	0.0	24.5
		1	3	22.6	23.8	23.8	0.0	24.5
	16QAM	1	5	22.6	23.8	23.8	0.0	24.5
		3	0	22.6	23.8	23.8	0.0	24.5
		3	1	22.6	23.8	23.8	0.0	24.5
		3	3	22.6	23.8	23.8	0.0	24.5
		6	0	22.6	22.8	21.5	1.0	23.5
		1	0	21.4	22.7	22.7	1.0	23.5
16QAM	1	3	21.4	22.7	22.7	1.0	23.5	
	1	5	21.4	22.7	22.7	1.0	23.5	
	3	0	21.4	22.7	22.7	1.0	23.5	
	3	1	21.5	22.7	22.7	1.0	23.5	
	3	3	21.4	22.7	22.7	1.0	23.5	
	6	0	21.4	21.7	20.6	2.0	22.5	

LTE Band 4 Measured Results

SAR for LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 5 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				20525	836.5 MHz			
10 MHz	QPSK	1	0	24.6			0.0	25
		1	25	24.6			0.0	25
		1	49	24.5			0.0	25
		25	0	23.5			1.0	24
		25	12	23.5			1.0	24
		25	25	23.4			1.0	24
		50	0	23.5			1.0	24
	16QAM	1	0	23.4			1.0	24
		1	25	23.3			1.0	24
		1	49	23.3			1.0	24
		25	0	22.6			2.0	23
		25	12	22.5			2.0	23
		25	25	22.6			2.0	23
		50	0	22.5			2.0	23
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				20425	20525	20625		
				826.5 MHz	836.5 MHz	846.5 MHz		
5 MHz	QPSK	1	0	24.2	24.5	23.7	0.0	25
		1	12	24.2	24.5	23.7	0.0	25
		1	24	24.2	24.5	23.7	0.0	25
		12	0	23.2	23.5	22.7	1.0	24
		12	7	23.2	23.5	22.7	1.0	24
		12	13	23.2	23.5	22.8	1.0	24
		25	0	23.2	23.5	22.7	1.0	24
	16QAM	1	0	23.1	23.4	22.6	1.0	24
		1	12	23.1	23.3	22.6	1.0	24
		1	24	23.0	23.3	22.6	1.0	24
		12	0	22.3	22.6	21.8	2.0	23
		12	7	22.2	22.5	21.8	2.0	23
		12	13	22.2	22.5	21.8	2.0	23
		25	0	22.3	22.6	21.8	2.0	23
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				20415	20525	20635		
				825.5 MHz	836.5 MHz	847.5 MHz		
3 MHz	QPSK	1	0	24.1	24.5	23.4	0.0	25
		1	8	24.0	24.6	23.4	0.0	25
		1	14	24.0	24.6	23.4	0.0	25
		8	0	23.1	23.5	22.4	1.0	24
		8	4	23.1	23.5	22.4	1.0	24
		8	7	23.1	23.5	22.5	1.0	24
		15	0	23.1	23.5	22.4	1.0	24
	16QAM	1	0	23.2	23.3	22.3	1.0	24
		1	8	23.2	23.4	22.3	1.0	24
		1	14	23.3	23.3	22.1	1.0	24
		8	0	22.2	22.6	21.5	2.0	23
		8	4	22.2	22.6	21.5	2.0	23
		8	7	22.2	22.6	21.5	2.0	23
		15	0	22.1	22.5	21.4	2.0	23

LTE Band 5 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				20407	20525	20643		
				824.7 MHz	836.5 MHz	848.3 MHz		
1.4 MHz	QPSK	1	0	24.0	24.5	23.2	0.0	25
		1	3	24.0	24.4	23.2	0.0	25
		1	5	24.0	24.4	23.2	0.0	25
		3	0	24.0	24.4	23.1	0.0	25
		3	1	24.0	24.4	23.1	0.0	25
		3	3	24.0	24.4	23.2	0.0	25
		6	0	23.0	23.5	22.2	1.0	24
	16QAM	1	0	23.0	23.3	21.9	1.0	24
		1	3	23.1	23.4	22.0	1.0	24
		1	5	23.2	23.3	22.1	1.0	24
		3	0	23.0	23.5	22.2	1.0	24
		3	1	23.0	23.5	22.2	1.0	24
		3	3	23.0	23.5	22.2	1.0	24
		6	0	21.9	22.6	21.4	2.0	23

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

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				20850 2510 MHz	21100 2535 MHz	21350 2560 MHz		
20 MHz	QPSK	1	0	24.15	24.12	23.22	0.0	24.5
		1	49	23.99	24.12	23.15	0.0	24.5
		1	99	24.14	24.07	22.79	0.0	24.5
		50	0	23.10	22.99	22.21	1.0	23.5
		50	24	23.03	22.98	22.16	1.0	23.5
		50	50	22.93	22.93	22.13	1.0	23.5
	16QAM	100	0	22.99	22.98	22.17	1.0	23.5
		1	0	23.01	22.93	22.08	1.0	23.5
		1	49	22.96	22.84	21.97	1.0	23.5
		1	99	22.89	22.81	21.32	1.0	23.5
		50	0	21.81	21.79	20.70	2.0	22.5
		50	24	21.77	21.78	20.64	2.0	22.5
		50	50	21.72	21.76	20.58	2.0	22.5
		100	0	21.76	21.80	20.71	2.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				20825 2507.5 MHz	21100 2535 MHz	21375 2562.5 MHz		
				15 MHz	QPSK	1	0	24.13
1	37	24.08	24.10			23.01	0.0	24.5
1	74	24.01	24.08			22.36	0.0	24.5
36	0	23.06	22.98			22.07	1.0	23.5
36	20	23.04	22.95			22.04	1.0	23.5
36	39	22.97	22.92			22.00	1.0	23.5
16QAM	75	0	23.02		22.98	22.10	1.0	23.5
	1	0	23.00		22.77	22.06	1.0	23.5
	1	37	22.93		22.72	21.97	1.0	23.5
	1	74	22.84		22.74	21.82	1.0	23.5
	36	0	21.82		21.83	20.57	2.0	22.5
	36	20	21.79		21.81	20.54	2.0	22.5
		36	39	21.74	21.79	20.47	2.0	22.5
		75	0	21.75	21.83	20.57	2.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				20800 2505 MHz	21100 2535 MHz	21400 2565 MHz		
				10 MHz	QPSK	1	0	24.14
1	25	24.07	24.12			22.92	0.0	24.5
1	49	24.06	24.09			22.60	0.0	24.5
25	0	23.03	22.94			21.91	1.0	23.5
25	12	22.97	22.94			21.87	1.0	23.5
25	25	22.97	22.91			21.83	1.0	23.5
16QAM	50	0	22.97		22.91	21.86	1.0	23.5
	1	0	22.91		22.92	21.88	1.0	23.5
	1	25	22.81		22.90	21.81	1.0	23.5
	1	49	22.80		22.93	21.75	1.0	23.5
	25	0	21.77		21.84	20.54	2.0	22.5
	25	12	21.72		21.83	20.49	2.0	22.5
		25	25	21.69	21.82	20.45	2.0	22.5
		50	0	21.67	21.79	20.43	2.0	22.5

LTE Band 7 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				20775	21100	21425		
				2502.5 MHz	2535 MHz	2567.5 MHz		
5 MHz	QPSK	1	0	23.76	23.98	22.33	0.0	24.5
		1	12	23.77	24.03	22.34	0.0	24.5
		1	24	23.74	23.96	22.33	0.0	24.5
		12	0	22.83	22.85	21.29	1.0	23.5
		12	7	22.81	22.84	21.25	1.0	23.5
		12	13	22.82	22.84	21.28	1.0	23.5
	16QAM	25	0	22.76	22.85	21.32	1.0	23.5
		1	0	22.61	22.55	21.23	1.0	23.5
		1	12	22.55	22.59	21.15	1.0	23.5
		1	24	22.53	22.54	21.14	1.0	23.5
		12	0	21.48	21.88	20.01	2.0	22.5
		12	7	21.46	21.87	20.10	2.0	22.5
		12	13	21.47	21.86	20.07	2.0	22.5
		25	0	21.51	21.82	20.02	2.0	22.5

LTE Band 12 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				23095	707.5 MHz			
10 MHz	QPSK	1	0	23.9			0.0	24.5
		1	25	23.9			0.0	24.5
		1	49	23.8			0.0	24.5
		25	0	22.7			1.0	23.5
		25	12	22.7			1.0	23.5
		25	25	22.7			1.0	23.5
	16QAM	50	0	22.7			1.0	23.5
		1	0	22.5			1.0	23.5
		1	25	22.4			1.0	23.5
		1	49	22.4			1.0	23.5
		25	0	21.8			2.0	22.5
		25	12	21.8			2.0	22.5
		25	25	21.8			2.0	22.5
		50	0	21.8			2.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				23035	23095	23155		
				701.5 MHz	707.5 MHz	713.5 MHz		
5 MHz	QPSK	1	0	23.8	23.8	23.9	0.0	24.5
		1	12	23.8	23.8	23.8	0.0	24.5
		1	24	23.8	23.7	23.8	0.0	24.5
		12	0	22.8	22.7	22.8	1.0	23.5
		12	7	22.7	22.7	22.8	1.0	23.5
		12	13	22.7	22.7	22.7	1.0	23.5
	16QAM	25	0	22.7	22.7	22.7	1.0	23.5
		1	0	22.7	22.5	22.5	1.0	23.5
		1	12	22.7	22.5	22.5	1.0	23.5
		1	24	22.7	22.4	22.5	1.0	23.5
		12	0	21.8	21.7	21.8	2.0	22.5
		12	7	21.8	21.7	21.7	2.0	22.5
		12	13	21.8	21.8	21.7	2.0	22.5
		25	0	21.8	21.8	21.8	2.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				23025	23095	23165		
				700.5 MHz	707.5 MHz	714.5 MHz		
3 MHz	QPSK	1	0	24.1	23.8	23.9	0.0	24.5
		1	8	24.1	23.8	23.9	0.0	24.5
		1	14	24.1	23.8	23.9	0.0	24.5
		8	0	23.0	22.8	22.7	1.0	23.5
		8	4	23.0	22.8	22.7	1.0	23.5
		8	7	23.0	22.8	22.7	1.0	23.5
	16QAM	15	0	22.9	22.7	22.7	1.0	23.5
		1	0	23.0	22.7	22.7	1.0	23.5
		1	8	22.9	22.5	22.5	1.0	23.5
		1	14	23.0	22.7	22.5	1.0	23.5
		8	0	22.1	21.9	21.8	2.0	22.5
		8	4	22.1	21.9	21.7	2.0	22.5
		8	7	22.1	21.9	21.7	2.0	22.5
		15	0	22.0	21.8	21.7	2.0	22.5

LTE Band 12 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				23017	23095	23173		
				699.7 MHz	707.5 MHz	715.3 MHz		
1.4 MHz	QPSK	1	0	24.0	23.7	23.8	0.0	24.5
		1	3	24.0	23.7	23.8	0.0	24.5
		1	5	24.0	23.8	23.8	0.0	24.5
		3	0	24.0	23.7	23.7	0.0	24.5
		3	1	24.0	23.7	23.7	0.0	24.5
		3	3	24.0	23.7	23.7	0.0	24.5
		6	0	22.9	22.7	22.7	1.0	23.5
	16QAM	1	0	22.9	22.6	22.7	1.0	23.5
		1	3	22.9	22.5	22.6	1.0	23.5
		1	5	22.8	22.6	22.7	1.0	23.5
		3	0	23.0	22.7	22.7	1.0	23.5
		3	1	23.0	22.7	22.7	1.0	23.5
		3	3	23.0	22.7	22.7	1.0	23.5
		6	0	21.9	21.8	21.8	2.0	22.5

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

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			
				Measured Pwr (dBm)		MPR	Tune-up Limit
				23230	782 MHz		
10 MHz	QPSK	1	0	24.0		0.0	24.5
		1	25	23.9		0.0	24.5
		1	49	23.8		0.0	24.5
		25	0	22.8		1.0	23.5
		25	12	22.8		1.0	23.5
		25	25	22.8		1.0	23.5
		50	0	22.8		1.0	23.5
	16QAM	1	0	22.8		1.0	23.5
		1	25	22.7		1.0	23.5
		1	49	22.6		1.0	23.5
		25	0	21.9		2.0	22.5
		25	12	21.9		2.0	22.5
		25	25	21.8		2.0	22.5
		50	0	21.8		2.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			
				Measured Pwr (dBm)		MPR	Tune-up Limit
				23230	782 MHz		
5 MHz	QPSK	1	0	23.8		0.0	24.5
		1	12	23.8		0.0	24.5
		1	24	23.8		0.0	24.5
		12	0	22.8		1.0	23.5
		12	7	22.8		1.0	23.5
		12	13	22.8		1.0	23.5
		25	0	22.8		1.0	23.5
	16QAM	1	0	22.7		1.0	23.5
		1	12	22.6		1.0	23.5
		1	24	22.6		1.0	23.5
		12	0	21.8		2.0	22.5
		12	7	21.8		2.0	22.5
		12	13	21.8		2.0	22.5
		25	0	21.8		2.0	22.5

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 66 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				132072 1720 MHz	132322 1745 MHz	132572 1770 MHz		
20 MHz	QPSK	1	0	23.8	24.0	24.3	0.0	24.5
		1	49	23.8	24.0	24.2	0.0	24.5
		1	99	23.7	23.9	24.2	0.0	24.5
		50	0	22.6	22.9	23.2	1.0	23.5
		50	24	22.6	22.9	23.2	1.0	23.5
		50	50	22.6	22.8	23.1	1.0	23.5
	16QAM	1	0	22.6	22.8	23.1	1.0	23.5
		1	49	22.6	22.8	23.1	1.0	23.5
		1	99	22.6	22.8	23.0	1.0	23.5
		50	0	21.6	21.9	22.1	2.0	22.5
		50	24	21.6	21.8	22.1	2.0	22.5
		50	50	21.6	21.8	22.1	2.0	22.5
		100	0	21.6	21.9	22.2	2.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				132047 1717.5 MHz	132322 1745 MHz	132597 1772.5 MHz		
				15 MHz	QPSK	1	0	23.7
1	37	23.6	24.1			24.3	0.0	24.5
1	74	23.6	24.0			24.2	0.0	24.5
36	0	22.5	22.9			23.2	1.0	23.5
36	20	22.5	22.9			23.2	1.0	23.5
36	39	22.5	22.9			23.2	1.0	23.5
16QAM	75	0	22.6		22.9	23.2	1.0	23.5
	1	0	22.4		22.8	23.2	1.0	23.5
	1	37	22.5		22.8	23.2	1.0	23.5
	1	74	22.4		22.8	23.1	1.0	23.5
	36	0	21.6		21.9	22.2	2.0	22.5
	36	20	21.6		21.9	22.1	2.0	22.5
		36	39	21.6	21.8	22.1	2.0	22.5
		75	0	21.5	21.9	22.2	2.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				132022 1715 MHz	132322 1745 MHz	132622 1775 MHz		
				10 MHz	QPSK	1	0	23.6
1	25	23.6	24.0			24.3	0.0	24.5
1	49	23.5	24.0			24.3	0.0	24.5
25	0	22.5	22.9			23.2	1.0	23.5
25	12	22.5	22.9			23.2	1.0	23.5
25	25	22.5	22.9			23.2	1.0	23.5
16QAM	50	0	22.5		22.9	23.2	1.0	23.5
	1	0	22.6		22.8	23.3	1.0	23.5
	1	25	22.5		22.8	23.3	1.0	23.5
	1	49	22.5		22.8	23.2	1.0	23.5
	25	0	21.5		21.9	22.2	2.0	22.5
	25	12	21.5		21.9	22.2	2.0	22.5
		25	25	21.5	21.9	22.2	2.0	22.5
		50	0	21.5	21.8	22.1	2.0	22.5

LTE Band 66 Measured Results (continued)

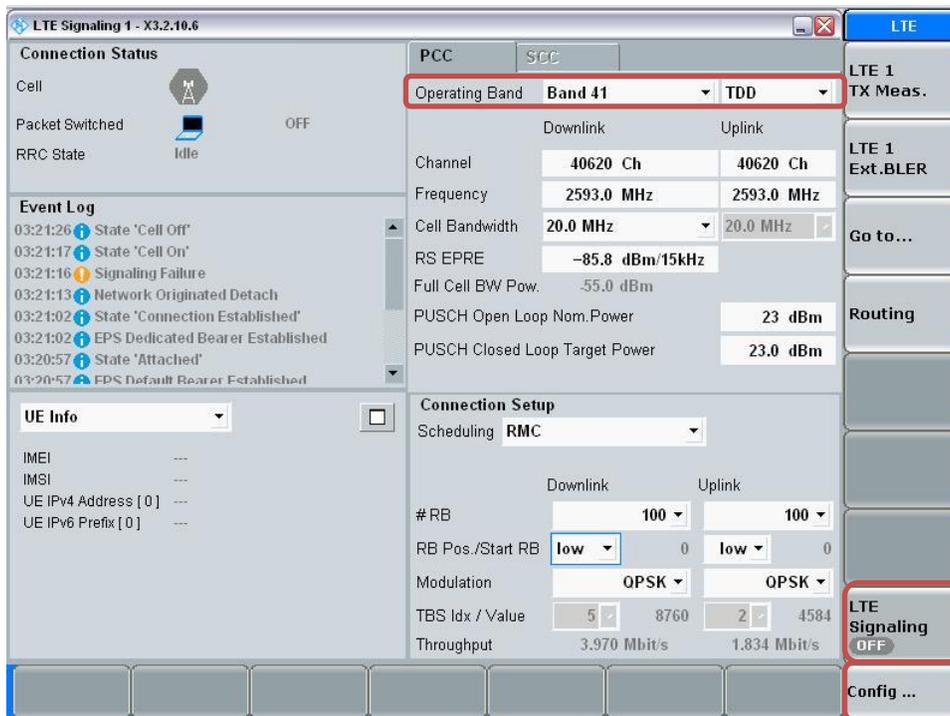
BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				131997	132322	132647		
				1712.5 MHz	1745 MHz	1777.5 MHz		
5 MHz	QPSK	1	0	23.4	24.0	24.3	0.0	24.5
		1	12	23.4	24.0	24.3	0.0	24.5
		1	24	23.4	24.0	24.3	0.0	24.5
		12	0	22.4	22.9	23.2	1.0	23.5
		12	7	22.4	22.9	23.2	1.0	23.5
		12	13	22.4	22.9	23.2	1.0	23.5
	16QAM	25	0	22.3	22.9	23.2	1.0	23.5
		1	0	22.3	22.7	22.9	1.0	23.5
		1	12	22.3	22.8	22.9	1.0	23.5
		1	24	22.3	22.7	22.9	1.0	23.5
		12	0	21.4	21.9	22.2	2.0	22.5
		12	7	21.4	21.9	22.1	2.0	22.5
		12	13	21.4	21.9	22.1	2.0	22.5
		25	0	21.4	21.9	22.2	2.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				131987	132322	132657		
				1711.5 MHz	1745 MHz	1778.5 MHz		
				3 MHz	QPSK	1		
1	8	23.4	24.0			24.3	0.0	24.5
1	14	23.4	24.0			24.3	0.0	24.5
8	0	22.4	22.9			23.2	1.0	23.5
8	4	22.4	22.9			23.2	1.0	23.5
8	7	22.4	22.9			23.2	1.0	23.5
16QAM	15	0	22.3		22.8	23.1	1.0	23.5
	1	0	22.2		22.9	23.1	1.0	23.5
	1	8	22.2		22.9	23.1	1.0	23.5
	1	14	22.2		22.9	22.9	1.0	23.5
	8	0	21.4		21.9	22.1	2.0	22.5
	8	4	21.4		21.9	22.1	2.0	22.5
	8	7	21.4		22.0	22.1	2.0	22.5
	15	0	21.3		21.8	22.0	2.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				131979	132322	132665		
				1710.7 MHz	1745 MHz	1779.3 MHz		
				1.4 MHz	QPSK	1		
1	3	23.3	23.9			24.2	0.0	24.5
1	5	23.4	23.9			24.2	0.0	24.5
3	0	23.4	23.9			24.1	0.0	24.5
3	1	23.4	23.9			24.1	0.0	24.5
3	3	23.4	23.9			24.1	0.0	24.5
16QAM	6	0	22.4		22.9	23.2	1.0	23.5
	1	0	22.4		22.9	23.0	1.0	23.5
	1	3	22.4		22.8	23.2	1.0	23.5
	1	5	22.3		22.9	23.1	1.0	23.5
	3	0	22.4		22.8	23.0	1.0	23.5
	3	1	22.4		22.8	23.0	1.0	23.5
	3	3	22.4		22.8	23.0	1.0	23.5
	6	0	21.3		21.9	22.2	2.0	22.5

LTE Band TDD Measured Results

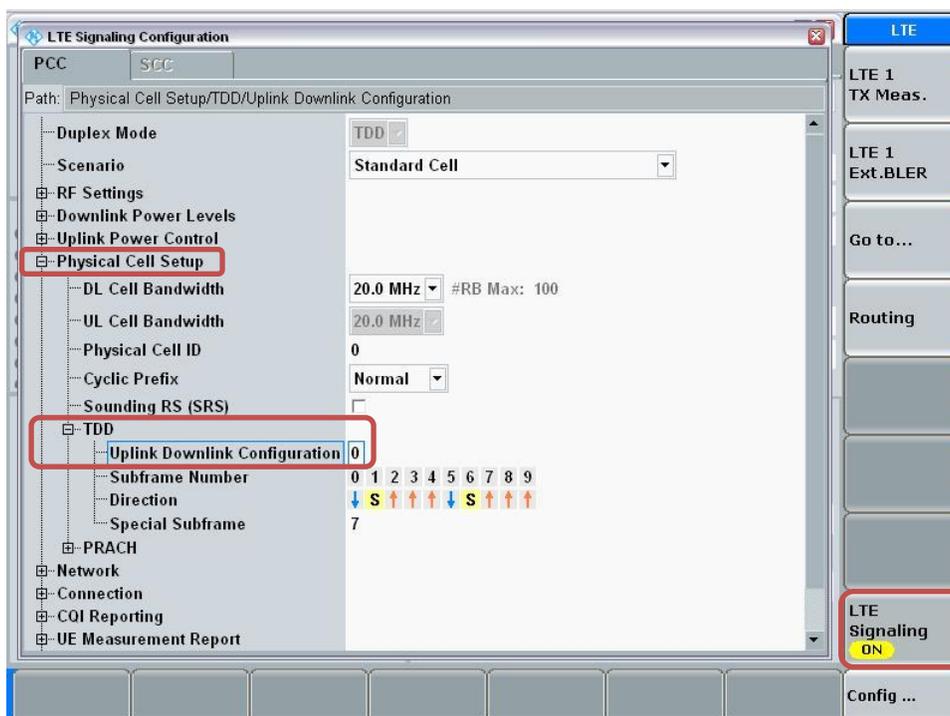
Procedure used to establish SAR test signal for LTE TDD Band

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...”

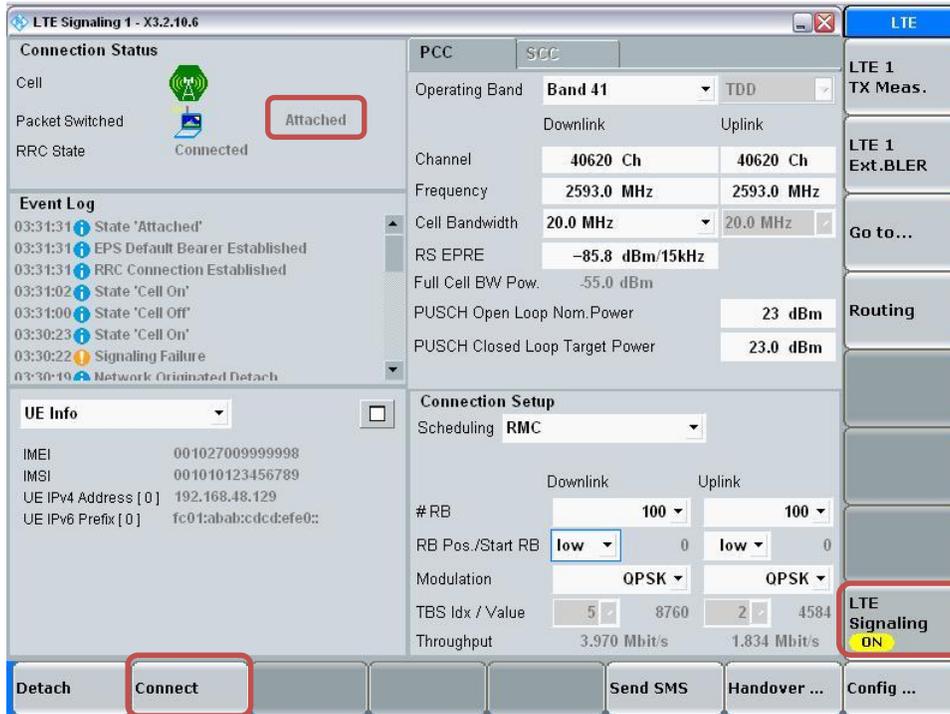


- Go to “Physical Cell Setup”
- Select “TDD” and Set “Uplink Downlink Configuration” to “0”
- Turn the cell on using “ON | OFF” key



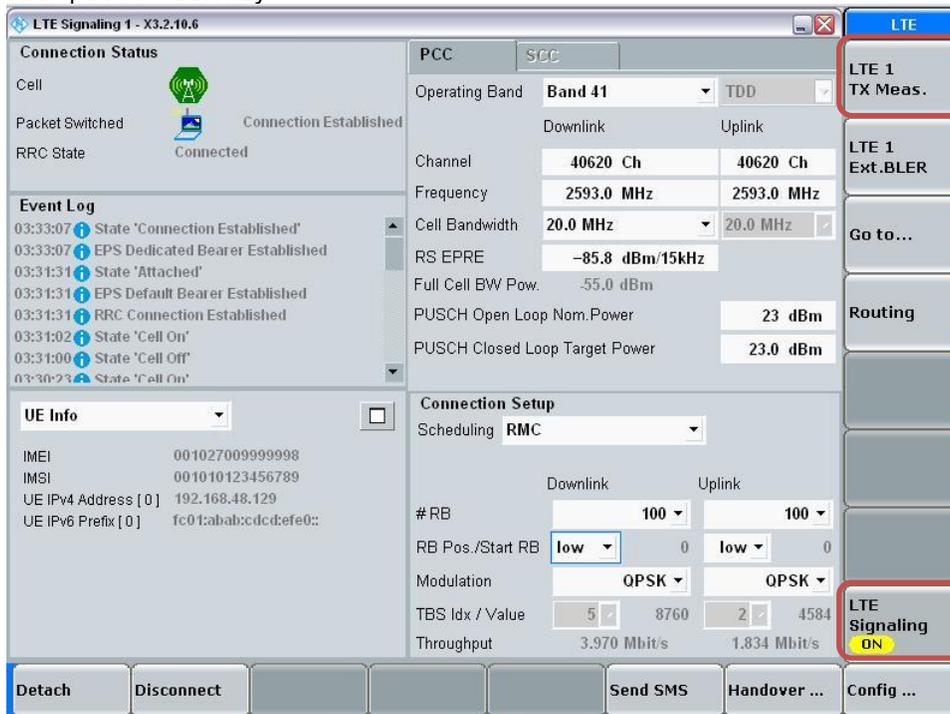
Connect to EUT

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

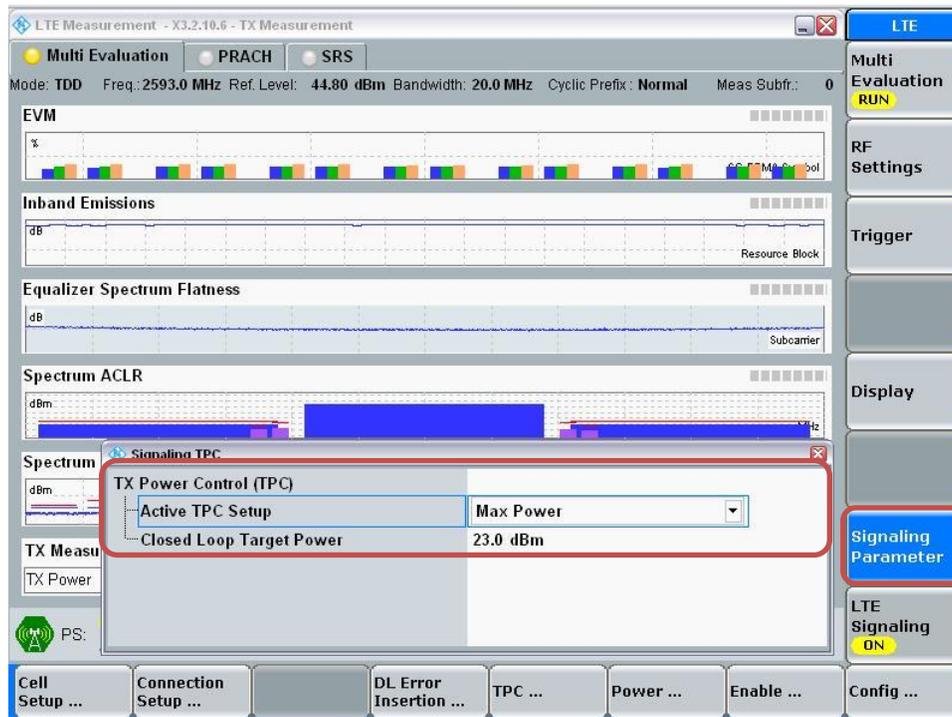


Max Power Setting

- 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 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

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)						
				Measured Pwr (dBm)					MPR	Tune-up Limit
				39750 2506 MHz	40185 2549.5 MHz	40620 2593 MHz	41055 2636.5 MHz	41490 2680 MHz		
20 MHz	QPSK	1	0	23.0	23.0	22.4	22.0	22.0	0.0	23.5
		1	49	23.0	22.7	22.4	21.9	21.8	0.0	23.5
		1	99	22.9	22.5	22.3	21.7	21.6	0.0	23.5
		50	0	22.0	22.1	21.4	21.0	20.9	1.0	22.5
		50	24	22.1	21.8	21.4	20.9	20.8	1.0	22.5
		50	50	22.0	21.7	21.4	20.9	20.7	1.0	22.5
	16QAM	100	0	22.1	21.7	21.4	20.9	20.8	1.0	22.5
		1	0	22.1	21.6	21.4	20.9	20.7	1.0	22.5
		1	49	21.8	21.5	21.3	20.9	20.7	1.0	22.5
		1	99	21.8	21.4	21.2	20.7	20.4	1.0	22.5
		50	0	21.0	20.7	20.5	19.9	19.9	2.0	21.5
		50	24	21.0	20.7	20.4	19.9	19.8	2.0	21.5
		50	50	21.0	20.6	20.4	19.8	19.7	2.0	21.5
		100	0	21.0	20.6	20.4	19.9	19.8	2.0	21.5
15 MHz	QPSK	1	0	23.0	22.8	22.5	21.9	22.0	0.0	23.5
		1	37	22.9	22.7	22.4	21.8	21.8	0.0	23.5
		1	74	22.9	22.6	22.4	21.7	21.7	0.0	23.5
		36	0	22.1	21.8	21.5	21.0	20.9	1.0	22.5
		36	20	22.1	21.8	21.5	21.0	20.9	1.0	22.5
		36	39	22.1	21.7	21.4	20.9	20.8	1.0	22.5
	16QAM	75	0	22.1	21.8	21.5	21.0	20.9	1.0	22.5
		1	0	21.9	21.4	21.1	20.9	20.7	1.0	22.5
		1	37	21.8	21.5	21.1	21.0	20.4	1.0	22.5
		1	74	21.7	21.3	21.3	20.6	20.5	1.0	22.5
		36	0	21.1	20.8	20.5	20.0	20.0	2.0	21.5
		36	20	21.1	20.7	20.5	20.0	19.9	2.0	21.5
		36	39	21.1	20.7	20.4	19.9	19.8	2.0	21.5
		75	0	21.0	20.7	20.5	19.9	19.9	2.0	21.5
10 MHz	QPSK	1	0	23.0	22.7	22.4	21.9	22.0	0.0	23.5
		1	25	23.0	22.6	22.4	21.8	21.9	0.0	23.5
		1	49	23.0	22.6	22.4	21.8	21.8	0.0	23.5
		25	0	22.1	21.8	21.4	21.0	20.9	1.0	22.5
		25	12	22.1	21.8	21.4	20.9	20.8	1.0	22.5
		25	25	22.1	21.7	21.4	20.9	20.8	1.0	22.5
	16QAM	50	0	22.1	21.8	21.4	20.9	20.8	1.0	22.5
		1	0	22.1	21.5	21.3	21.0	20.7	1.0	22.5
		1	25	22.1	21.4	21.2	21.0	20.6	1.0	22.5
		1	49	22.1	21.3	21.2	20.9	20.6	1.0	22.5
		25	0	21.1	20.7	20.4	20.0	19.9	2.0	21.5
		25	12	21.1	20.7	20.4	19.9	19.9	2.0	21.5
		25	25	21.0	20.7	20.4	19.9	19.8	2.0	21.5
		50	0	21.1	20.7	20.4	19.9	19.9	2.0	21.5
5 MHz	QPSK	1	0	23.0	22.7	22.4	21.8	21.8	0.0	23.5
		1	12	23.0	22.6	22.3	21.8	21.8	0.0	23.5
		1	24	22.9	22.6	22.3	21.8	21.7	0.0	23.5
		12	0	22.0	21.8	21.4	20.9	20.8	1.0	22.5
		12	7	22.0	21.8	21.4	20.9	20.8	1.0	22.5
		12	13	22.0	21.7	21.3	20.9	20.8	1.0	22.5
	16QAM	25	0	22.0	21.7	21.4	20.9	20.8	1.0	22.5
		1	0	22.0	21.6	20.9	20.7	20.7	1.0	22.5
		1	12	22.0	21.6	20.9	20.7	20.6	1.0	22.5
		1	24	21.9	21.6	20.8	20.6	20.6	1.0	22.5
		12	0	20.9	20.8	20.3	19.8	19.9	2.0	21.5
		12	7	20.9	20.7	20.3	19.7	19.9	2.0	21.5
		12	13	20.9	20.7	20.3	19.7	19.9	2.0	21.5
		25	0	21.0	20.7	20.4	19.9	19.9	2.0	21.5

Reduced power Results

LTE Band 2 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Reduced Average Power (dBm) Hotspot back-off				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				18700	18900	19100		
				1860 MHz	1880 MHz	1900 MHz		
20 MHz	QPSK	1	0	20.5	20.8	20.1	0.0	21.5
		1	49	20.5	20.7	20.2	0.0	21.5
		1	99	20.5	20.7	20.4	0.0	21.5
		50	0	20.5	20.7	20.1	0.0	21.5
		50	24	20.5	20.7	20.2	0.0	21.5
		50	50	20.4	20.7	20.2	0.0	21.5
	100	0	20.4	20.7	20.2	0.0	21.5	
	16QAM	1	0	20.4	20.7	20.1	0.0	21.5
		1	49	20.4	20.6	20.1	0.0	21.5
		1	99	20.4	20.6	20.3	0.0	21.5
		50	0	20.5	20.7	20.1	0.0	21.5
		50	24	20.5	20.7	20.2	0.0	21.5
		50	50	20.5	20.7	20.2	0.0	21.5
	100	0	20.5	20.8	20.2	0.0	21.5	
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				18675	18900	19125		
				1857.5 MHz	1880 MHz	1902.5 MHz		
15 MHz	QPSK	1	0	20.4	20.8	20.1	0.0	21.5
		1	37	20.4	20.8	20.2	0.0	21.5
		1	74	20.4	20.8	20.3	0.0	21.5
		36	0	20.4	20.7	20.1	0.0	21.5
		36	20	20.4	20.7	20.1	0.0	21.5
		36	39	20.4	20.7	20.2	0.0	21.5
	75	0	20.4	20.7	20.2	0.0	21.5	
	16QAM	1	0	20.3	20.6	20.1	0.0	21.5
		1	37	20.3	20.7	20.2	0.0	21.5
		1	74	20.3	20.6	20.3	0.0	21.5
		36	0	20.5	20.7	20.1	0.0	21.5
		36	20	20.4	20.7	20.1	0.0	21.5
		36	39	20.4	20.7	20.2	0.0	21.5
	75	0	20.4	20.8	20.2	0.0	21.5	
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				18650	18900	19150		
				1855 MHz	1880 MHz	1905 MHz		
10 MHz	QPSK	1	0	20.4	20.8	20.1	0.0	21.5
		1	25	20.4	20.8	20.2	0.0	21.5
		1	49	20.4	20.8	20.3	0.0	21.5
		25	0	20.4	20.7	20.0	0.0	21.5
		25	12	20.4	20.7	20.1	0.0	21.5
		25	25	20.4	20.7	20.1	0.0	21.5
	50	0	20.4	20.7	20.1	0.0	21.5	
	16QAM	1	0	20.4	20.7	19.8	0.0	21.5
		1	25	20.4	20.6	19.9	0.0	21.5
		1	49	20.4	20.6	20.0	0.0	21.5
		25	0	20.4	20.8	20.1	0.0	21.5
		25	12	20.4	20.8	20.1	0.0	21.5
		25	25	20.4	20.8	20.2	0.0	21.5
	50	0	20.4	20.7	20.1	0.0	21.5	

LTE Band 2 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB offset	Reduced Average Power (dBm) Hotspot back-off				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				18625	18900	19175		
				1852.5 MHz	1880 MHz	1907.5 MHz		
5 MHz	QPSK	1	0	19.9	20.7	19.8	0.0	21.5
		1	12	19.9	20.7	19.8	0.0	21.5
		1	24	19.9	20.7	19.9	0.0	21.5
		12	0	19.9	20.7	19.8	0.0	21.5
		12	7	19.9	20.7	19.8	0.0	21.5
		12	13	19.9	20.7	19.8	0.0	21.5
	16QAM	25	0	19.9	20.7	19.8	0.0	21.5
		1	0	19.6	20.6	19.7	0.0	21.5
		1	12	19.6	20.6	19.8	0.0	21.5
		1	24	19.6	20.6	19.8	0.0	21.5
		12	0	19.9	20.7	19.8	0.0	21.5
		12	7	19.9	20.7	19.9	0.0	21.5
		12	13	19.9	20.7	19.9	0.0	21.5
		25	0	19.9	20.8	19.9	0.0	21.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				18615	18900	19185		
				1851.5 MHz	1880 MHz	1908.5 MHz		
3 MHz	QPSK	1	0	19.6	20.7	19.7	0.0	21.5
		1	8	19.6	20.7	19.7	0.0	21.5
		1	14	19.7	20.7	19.7	0.0	21.5
		8	0	19.7	20.7	19.6	0.0	21.5
		8	4	19.7	20.7	19.7	0.0	21.5
		8	7	19.7	20.7	19.6	0.0	21.5
	16QAM	15	0	19.7	20.7	19.6	0.0	21.5
		1	0	19.6	20.7	19.5	0.0	21.5
		1	8	19.6	20.6	19.6	0.0	21.5
		1	14	19.6	20.5	19.6	0.0	21.5
		8	0	19.7	20.8	19.6	0.0	21.5
		8	4	19.8	20.8	19.7	0.0	21.5
		8	7	19.7	20.8	19.7	0.0	21.5
		15	0	19.7	20.7	19.5	0.0	21.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				18607	18900	19193		
				1850.7 MHz	1880 MHz	1909.3 MHz		
1.4 MHz	QPSK	1	0	19.6	20.7	19.6	0.0	21.5
		1	3	19.5	20.7	19.6	0.0	21.5
		1	5	19.6	20.7	19.6	0.0	21.5
		3	0	19.5	20.7	19.6	0.0	21.5
		3	1	19.5	20.7	19.6	0.0	21.5
		3	3	19.5	20.7	19.6	0.0	21.5
	16QAM	6	0	19.5	20.7	19.6	0.0	21.5
		1	0	19.4	20.7	19.4	0.0	21.5
		1	3	19.3	20.7	19.5	0.0	21.5
		1	5	19.4	20.7	19.4	0.0	21.5
		3	0	19.5	20.7	19.6	0.0	21.5
		3	1	19.6	20.7	19.6	0.0	21.5
		3	3	19.5	20.6	19.6	0.0	21.5
		6	0	19.6	20.7	19.6	0.0	21.5

LTE Band 4 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Reduced Average Power (dBm) Hotspot back-off				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				20175	1732.5 MHz			
20 MHz	QPSK	1	0	21.8			0.0	22.5
		1	49	21.9			0.0	22.5
		1	99	21.8			0.0	22.5
		50	0	21.8			0.0	22.5
		50	24	21.8			0.0	22.5
		50	50	21.7			0.0	22.5
		100	0	21.8			0.0	22.5
	16QAM	1	0	21.6			0.0	22.5
		1	49	21.6			0.0	22.5
		1	99	21.6			0.0	22.5
		50	0	21.8			0.0	22.5
		50	24	21.8			0.0	22.5
		50	50	21.8			0.0	22.5
		100	0	21.8			0.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				20025	20175	20325		
				1717.5 MHz	1732.5 MHz	1747.5 MHz		
15 MHz	QPSK	1	0	21.6	21.9	21.8	0.0	22.5
		1	37	21.5	21.9	21.8	0.0	22.5
		1	74	21.5	21.8	21.8	0.0	22.5
		36	0	21.5	21.8	21.8	0.0	22.5
		36	20	21.5	21.8	21.8	0.0	22.5
		36	39	21.5	21.8	21.8	0.0	22.5
		75	0	21.5	21.8	21.8	0.0	22.5
	16QAM	1	0	21.5	21.7	21.9	0.0	22.5
		1	37	21.6	21.6	21.9	0.0	22.5
		1	74	21.5	21.6	21.9	0.0	22.5
		36	0	21.6	21.8	21.8	0.0	22.5
		36	20	21.6	21.8	21.8	0.0	22.5
		36	39	21.5	21.8	21.8	0.0	22.5
		75	0	21.5	21.8	21.9	0.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				20000	20175	20350		
				1715 MHz	1732.5 MHz	1750 MHz		
10 MHz	QPSK	1	0	21.5	21.9	22.1	0.0	22.5
		1	25	21.5	21.9	22.0	0.0	22.5
		1	49	21.5	21.9	22.0	0.0	22.5
		25	0	21.4	21.8	21.9	0.0	22.5
		25	12	21.4	21.8	21.9	0.0	22.5
		25	25	21.5	21.8	21.9	0.0	22.5
		50	0	21.4	21.8	21.9	0.0	22.5
	16QAM	1	0	21.5	21.6	21.8	0.0	22.5
		1	25	21.5	21.7	21.8	0.0	22.5
		1	49	21.5	21.7	21.7	0.0	22.5
		25	0	21.5	21.8	22.0	0.0	22.5
		25	12	21.5	21.8	22.0	0.0	22.5
		25	25	21.5	21.8	22.0	0.0	22.5
		50	0	21.4	21.8	21.9	0.0	22.5

LTE Band 4 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB offset	Reduced Average Power (dBm) Hotspot back-off				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				19975	20175	20375		
				1712.5 MHz	1732.5 MHz	1752.5 MHz		
5 MHz	QPSK	1	0	21.3	21.7	21.9	0.0	22.5
		1	12	21.3	21.7	21.9	0.0	22.5
		1	24	21.3	21.7	21.9	0.0	22.5
		12	0	21.4	21.8	21.9	0.0	22.5
		12	7	21.4	21.8	21.9	0.0	22.5
		12	13	21.3	21.8	21.9	0.0	22.5
	16QAM	25	0	21.3	21.8	21.9	0.0	22.5
		1	0	21.2	21.6	21.9	0.0	22.5
		1	12	21.2	21.7	21.8	0.0	22.5
		1	24	21.3	21.7	21.9	0.0	22.5
		12	0	21.4	21.8	21.9	0.0	22.5
		12	7	21.4	21.8	21.9	0.0	22.5
		12	13	21.4	21.8	21.9	0.0	22.5
		25	0	21.4	21.8	21.9	0.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				19965	20175	20385		
				1711.5 MHz	1732.5 MHz	1753.5 MHz		
3 MHz	QPSK	1	0	21.4	21.9	21.8	0.0	22.5
		1	8	21.4	21.9	21.9	0.0	22.5
		1	14	21.4	21.9	21.9	0.0	22.5
		8	0	21.4	21.8	21.9	0.0	22.5
		8	4	21.4	21.8	21.9	0.0	22.5
		8	7	21.4	21.8	21.9	0.0	22.5
	16QAM	15	0	21.3	21.8	21.9	0.0	22.5
		1	0	21.3	21.8	21.8	0.0	22.5
		1	8	21.4	21.8	21.8	0.0	22.5
		1	14	21.3	21.8	21.7	0.0	22.5
		8	0	21.4	21.8	22.0	0.0	22.5
		8	4	21.4	21.8	22.0	0.0	22.5
		8	7	21.4	21.8	22.0	0.0	22.5
		15	0	21.3	21.7	21.9	0.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				19957	20175	20393		
				1710.7 MHz	1732.5 MHz	1754.3 MHz		
1.4 MHz	QPSK	1	0	21.3	21.8	22.0	0.0	22.5
		1	3	21.3	21.8	21.9	0.0	22.5
		1	5	21.3	21.8	21.9	0.0	22.5
		3	0	21.3	21.8	21.9	0.0	22.5
		3	1	21.3	21.8	21.9	0.0	22.5
		3	3	21.3	21.8	21.9	0.0	22.5
	16QAM	6	0	21.3	21.8	21.9	0.0	22.5
		1	0	21.3	21.6	21.7	0.0	22.5
		1	3	21.2	21.6	21.7	0.0	22.5
		1	5	21.3	21.7	21.6	0.0	22.5
		3	0	21.3	21.7	22.0	0.0	22.5
		3	1	21.3	21.7	22.0	0.0	22.5
		3	3	21.3	21.7	22.0	0.0	22.5
		6	0	21.4	21.7	21.9	0.0	22.5

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 7 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Reduced Average Power (dBm)					Reduced Average Power (dBm)				
				Hotspot back-off			MPR	Tune-up Limit	RCVR back-off			MPR	Tune-up Limit
				Measured Pwr (dBm)					Measured Pwr (dBm)				
				20850	21100	21350			20850	21100	21350		
2510 MHz	2535 MHz	2560 MHz	2510 MHz	2535 MHz	2560 MHz								
20 MHz	QPSK	1	0	21.22	21.15	20.03	0.0	21.5	23.08	22.95	22.06	0.0	23.5
		1	49	21.15	21.10	19.88	0.0	21.5	22.92	22.91	21.92	0.0	23.5
		1	99	21.08	21.05	19.77	0.0	21.5	22.96	22.88	21.11	0.0	23.5
		50	0	21.09	21.08	19.97	0.0	21.5	23.06	22.99	22.15	0.0	23.5
		50	24	21.02	21.05	19.92	0.0	21.5	23.03	22.97	22.07	0.0	23.5
	100	0	21.03	21.06	19.92	0.0	21.5	23.02	22.98	22.10	0.0	23.5	
	16QAM	1	0	21.08	21.01	20.03	0.0	21.5	23.03	22.80	22.12	0.0	23.5
		1	49	20.93	20.94	19.92	0.0	21.5	22.89	22.67	22.04	0.0	23.5
		1	99	20.84	20.89	19.76	0.0	21.5	22.78	22.68	21.39	0.0	23.5
		50	0	21.11	21.15	19.97	0.0	21.5	21.78	21.81	20.66	1.0	22.5
50		24	21.05	21.13	19.92	0.0	21.5	21.74	21.78	20.61	1.0	22.5	
100	0	21.01	21.10	19.88	0.0	21.5	21.68	21.77	20.56	1.0	22.5		
100	0	21.06	21.13	19.97	0.0	21.5	21.75	21.82	20.68	1.0	22.5		
BW (MHz)	Mode	RB Allocation	RB offset	Reduced Average Power (dBm)					Reduced Average Power (dBm)				
				Hotspot back-off			MPR	Tune-up Limit	RCVR back-off			MPR	Tune-up Limit
				Measured Pwr (dBm)					Measured Pwr (dBm)				
				20825	21100	21375			20825	21100	21375		
2507.5 MHz	2535 MHz	2562.5 MHz	2507.5 MHz	2535 MHz	2562.5 MHz								
15 MHz	QPSK	1	0	21.04	21.21	19.85	0.0	21.5	23.04	22.94	21.98	0.0	23.5
		1	37	20.96	21.19	19.74	0.0	21.5	22.95	22.91	21.92	0.0	23.5
		1	74	20.89	21.15	19.67	0.0	21.5	22.88	22.87	21.72	0.0	23.5
		36	0	21.07	21.13	19.84	0.0	21.5	23.06	22.99	22.07	0.0	23.5
		36	20	20.99	21.10	19.80	0.0	21.5	22.99	22.95	22.01	0.0	23.5
	36	39	20.99	21.08	19.75	0.0	21.5	22.94	22.98	21.98	0.0	23.5	
	75	0	21.00	21.10	19.78	0.0	21.5	22.99	22.99	22.02	0.0	23.5	
	16QAM	1	0	21.09	21.02	19.87	0.0	21.5	23.02	22.82	21.91	0.0	23.5
		1	37	21.05	20.97	19.78	0.0	21.5	22.89	22.78	21.83	0.0	23.5
		1	74	20.98	20.96	19.65	0.0	21.5	22.82	22.78	21.77	0.0	23.5
36		0	21.11	21.17	19.80	0.0	21.5	21.81	21.83	20.55	1.0	22.5	
36		20	21.06	21.17	19.78	0.0	21.5	21.79	21.82	20.51	1.0	22.5	
36	39	21.04	21.14	19.72	0.0	21.5	21.74	21.83	20.45	1.0	22.5		
75	0	21.06	21.13	19.82	0.0	21.5	21.77	21.84	20.53	1.0	22.5		
BW (MHz)	Mode	RB Allocation	RB offset	Reduced Average Power (dBm)					Reduced Average Power (dBm)				
				Hotspot back-off			MPR	Tune-up Limit	RCVR back-off			MPR	Tune-up Limit
				Measured Pwr (dBm)					Measured Pwr (dBm)				
				20800	21100	21400			20800	21100	21400		
2505 MHz	2535 MHz	2565 MHz	2505 MHz	2535 MHz	2565 MHz								
10 MHz	QPSK	1	0	20.98	21.18	19.89	0.0	21.5	23.06	23.05	21.87	0.0	23.5
		1	25	20.99	21.15	19.81	0.0	21.5	23.02	23.00	21.82	0.0	23.5
		1	49	20.93	21.14	19.76	0.0	21.5	22.93	23.02	21.83	0.0	23.5
		25	0	20.97	21.07	19.73	0.0	21.5	23.01	22.93	21.93	0.0	23.5
		25	12	20.94	21.05	19.69	0.0	21.5	22.93	22.97	21.91	0.0	23.5
	25	25	20.92	21.05	19.64	0.0	21.5	22.93	22.96	21.86	0.0	23.5	
	50	0	20.91	21.05	19.69	0.0	21.5	22.92	22.94	21.87	0.0	23.5	
	16QAM	1	0	20.99	21.02	19.72	0.0	21.5	22.80	22.91	21.97	0.0	23.5
		1	25	20.94	21.01	19.66	0.0	21.5	22.69	22.93	21.88	0.0	23.5
		1	49	20.91	20.98	19.53	0.0	21.5	22.70	22.87	21.85	0.0	23.5
25		0	21.08	21.13	19.78	0.0	21.5	21.75	21.85	20.51	1.0	22.5	
25		12	21.03	21.10	19.74	0.0	21.5	21.71	21.83	20.48	1.0	22.5	
25	25	21.01	21.11	19.70	0.0	21.5	21.69	21.83	20.43	1.0	22.5		
50	0	20.95	21.08	19.70	0.0	21.5	21.66	21.80	20.41	1.0	22.5		
BW (MHz)	Mode	RB Allocation	RB offset	Reduced Average Power (dBm)					Maximum Average Power (dBm)				
				Hotspot back-off			MPR	Tune-up Limit	RCVR back-off			MPR	Tune-up Limit
				Measured Pwr (dBm)					Measured Pwr (dBm)				
				20775	21100	21425			20775	21100	21425		
2502.5 MHz	2535 MHz	2567.5 MHz	2502.5 MHz	2535 MHz	2567.5 MHz								
5 MHz	QPSK	1	0	20.77	21.10	19.19	0.0	21.5	22.73	22.82	21.20	0.0	23.5
		1	12	20.75	21.09	19.18	0.0	21.5	22.72	22.80	21.21	0.0	23.5
		1	24	20.76	21.07	19.13	0.0	21.5	22.70	22.81	21.21	0.0	23.5
		12	0	20.80	21.08	19.24	0.0	21.5	22.84	22.87	21.36	0.0	23.5
		12	7	20.78	21.09	19.21	0.0	21.5	22.82	22.85	21.37	0.0	23.5
	12	13	20.76	21.10	19.20	0.0	21.5	22.80	22.87	21.32	0.0	23.5	
	25	0	20.77	21.08	19.22	0.0	21.5	22.82	22.85	21.32	0.0	23.5	
	16QAM	1	0	20.60	20.94	19.09	0.0	21.5	22.56	22.86	21.23	0.0	23.5
		1	12	20.60	20.94	19.06	0.0	21.5	22.54	22.85	21.19	0.0	23.5
		1	24	20.55	20.94	19.02	0.0	21.5	22.50	22.82	21.19	0.0	23.5
12		0	20.82	21.17	19.26	0.0	21.5	21.49	21.86	20.09	1.0	22.5	
12		7	20.80	21.15	19.24	0.0	21.5	21.47	21.85	20.05	1.0	22.5	
12	13	20.80	21.15	19.23	0.0	21.5	21.47	21.85	20.05	1.0	22.5		
25	0	20.80	21.14	19.26	0.0	21.5	21.49	21.80	20.06	1.0	22.5		

LTE Band 66 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Reduced Average Power (dBm) Hotspot back-off				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				132072	132322	132572		
				1720 MHz	1745 MHz	1770 MHz		
20 MHz	QPSK	1	0	21.6	21.8	22.1	0.0	22.5
		1	49	21.6	21.8	22.1	0.0	22.5
		1	99	21.5	21.8	22.0	0.0	22.5
		50	0	21.6	21.9	22.1	0.0	22.5
		50	24	21.6	21.8	22.1	0.0	22.5
		50	50	21.6	21.8	22.0	0.0	22.5
	16QAM	100	0	21.6	21.8	22.1	0.0	22.5
		1	0	21.4	21.6	22.1	0.0	22.5
		1	49	21.4	21.5	22.1	0.0	22.5
		1	99	21.4	21.5	22.0	0.0	22.5
		50	0	21.6	21.9	22.1	0.0	22.5
		50	24	21.6	21.8	22.1	0.0	22.5
		50	50	21.6	21.8	22.0	0.0	22.5
		100	0	21.6	21.9	22.1	0.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				132047	132322	132597		
				1717.5 MHz	1745 MHz	1772.5 MHz		
				15 MHz	QPSK	1	0	21.5
1	37	21.5	21.9			22.1	0.0	22.5
1	74	21.5	21.8			22.0	0.0	22.5
36	0	21.5	21.9			22.2	0.0	22.5
36	20	21.6	21.9			22.2	0.0	22.5
36	39	21.5	21.9			22.1	0.0	22.5
16QAM	75	0	21.5		21.9	22.2	0.0	22.5
	1	0	21.6		21.7	22.2	0.0	22.5
	1	37	21.5		21.7	22.1	0.0	22.5
	1	74	21.5		21.7	22.1	0.0	22.5
	36	0	21.6		21.9	22.1	0.0	22.5
	36	20	21.6		21.9	22.1	0.0	22.5
	36	39	21.6		21.9	22.1	0.0	22.5
	75	0	21.5		21.9	22.2	0.0	22.5
BW (MHz)	Mode	RB Allocation	RB offset	Measured Pwr (dBm)			MPR	Tune-up Limit
				132022	132322	132622		
				1715 MHz	1745 MHz	1775 MHz		
				10 MHz	QPSK	1	0	21.5
1	25	21.5	21.8			22.1	0.0	22.5
1	49	21.5	21.8			22.1	0.0	22.5
25	0	21.5	21.8			22.1	0.0	22.5
25	12	21.5	21.8			22.1	0.0	22.5
25	25	21.5	21.8			22.1	0.0	22.5
16QAM	50	0	21.5		21.8	22.1	0.0	22.5
	1	0	21.3		21.7	21.9	0.0	22.5
	1	25	21.3		21.7	21.9	0.0	22.5
	1	49	21.3		21.7	21.8	0.0	22.5
	25	0	21.6		21.9	22.2	0.0	22.5
	25	12	21.6		21.9	22.2	0.0	22.5
	25	25	21.5		21.9	22.2	0.0	22.5
	50	0	21.5		21.9	22.2	0.0	22.5

LTE Band 66 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB offset	Reduced Average Power (dBm) Hotspot back-off				
				Measured Pwr (dBm)			MPR	Tune-up Limit
				131997	132322	132647		
				1712.5 MHz	1745 MHz	1777.5 MHz		
5 MHz	QPSK	1	0	21.4	21.8	22.1	0.0	22.5
		1	12	21.4	21.8	22.1	0.0	22.5
		1	24	21.4	21.8	22.0	0.0	22.5
		12	0	21.4	21.8	22.1	0.0	22.5
		12	7	21.3	21.8	22.1	0.0	22.5
		12	13	21.3	21.8	22.1	0.0	22.5
	16QAM	25	0	21.4	21.8	22.1	0.0	22.5
		1	0	21.3	21.7	22.0	0.0	22.5
		1	12	21.2	21.6	22.0	0.0	22.5
		1	24	21.2	21.7	22.0	0.0	22.5
		12	0	21.5	21.8	22.1	0.0	22.5
		12	7	21.5	21.8	22.1	0.0	22.5
3 MHz	QPSK	12	13	21.4	21.8	22.1	0.0	22.5
		25	0	21.4	21.9	22.1	0.0	22.5
		1	0	21.4	21.9	22.2	0.0	22.5
		1	8	21.4	21.8	22.1	0.0	22.5
		1	14	21.4	21.8	22.1	0.0	22.5
		8	0	21.3	21.8	22.1	0.0	22.5
	16QAM	8	4	21.3	21.8	22.1	0.0	22.5
		8	7	21.3	21.8	22.1	0.0	22.5
		15	0	21.3	21.8	22.1	0.0	22.5
		1	0	21.2	21.7	22.0	0.0	22.5
		1	8	21.2	21.7	21.9	0.0	22.5
		1	14	21.0	21.7	21.8	0.0	22.5
1.4 MHz	QPSK	8	0	21.3	21.8	22.1	0.0	22.5
		8	4	21.3	21.8	22.1	0.0	22.5
		8	7	21.3	21.8	22.1	0.0	22.5
		15	0	21.3	21.9	22.1	0.0	22.5
		1	0	21.4	21.8	22.1	0.0	22.5
		1	3	21.4	21.8	22.0	0.0	22.5
	16QAM	1	5	21.4	21.8	22.1	0.0	22.5
		3	0	21.3	21.8	22.1	0.0	22.5
		3	1	21.3	21.8	22.1	0.0	22.5
		3	3	21.3	21.8	22.0	0.0	22.5
		6	0	21.3	21.8	22.1	0.0	22.5
		1	0	21.2	21.7	21.9	0.0	22.5
1.4 MHz	16QAM	1	3	20.9	21.8	22.0	0.0	22.5
		1	5	21.3	21.6	21.9	0.0	22.5
		3	0	21.2	21.8	22.0	0.0	22.5
		3	1	21.2	21.8	22.1	0.0	22.5
		3	3	21.2	21.8	22.1	0.0	22.5
		6	0	21.4	21.7	22.2	0.0	22.5

9.3 Wi-Fi 2.4 GHz (DTS Band)

Measured Results (Max power)

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Maximum Average Power (dBm)			
					Meas Pwr	Tune-up Limit	SAR Test (Yes/No)	
2.4	802.11b	1 Mbps	1	2412.0	17.8	19.0	Yes	
			6	2437.0	18.2			
			11	2462.0	17.7			
			12	2467.0	16.2	17.0		
			13	2472.0	14.8	15.0		
	802.11g	6 Mbps	1	2412.0	Not Required	17.0	No	
			6	2437.0				
			11	2462.0				
			12	2467.0				
	802.11n (HT20)	6.5 Mbps	1	2412.0	Not Required	17.0	No	
			6	2437.0				
			11	2462.0				
			12	2467.0				
				13	2472.0		7.0	

Measured Results (reduced power)

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Reduced Average Power (dBm)			
					Meas Pwr	Tune-up Limit	SAR Test (Yes/No)	
2.4	802.11b	1 Mbps	1	2412.0	11.5	12.0	Yes	
			6	2437.0	11.2			
			11	2462.0	11.3			
			12	2467.0	7.7	8.0		
			13	2472.0	7.8	8.0		
	802.11g	6 Mbps	1	2412.0	11.8	12.0	No	
			6	2437.0	12.0			
			11	2462.0	12.0			
			12	2467.0	7.9			
	802.11n (HT20)	6.5 Mbps	1	2412.0	11.6	12.0	No	
			6	2437.0	11.7			
			11	2462.0	11.7			
			12	2467.0	5.8			
				13	2472.0	5.8	6.0	

Note(s):

- SAR is not required for 802.11g/n modes when the adjusted SAR for 802.11b is < 1.2 W/kg.
- For "Not required", 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 measurements were not deemed necessary.
- 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. Refer to §6.3.

9.4 Wi-Fi 5GHz (U-NII Bands)

Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Maximum Average Power (dBm)			Reduced Average Power (dBm)		
					Meas Pwr	Tune-up Limit	SAR Test (Yes/No)	Meas Pwr	Tune-up Limit	SAR Test (Yes/No)
5.3 (U-NII 2A)	802.11a	6 Mbps	52	5260.0	15.9	17.0	Yes	Not Required	12.0	No
			56	5280.0	15.8					
			60	5300.0	15.7					
			64	5320.0	15.7					
	802.11n (HT20)	6.5 Mbps	52	5260.0	Not Required	16.0	No	Not Required	12.0	No
			56	5280.0						
			60	5300.0						
	802.11n (HT40)	13.5 Mbps	54	5270.0	Not Required	13.0	No	Not Required	12.0	No
			62	5310.0						
	802.11ac (VHT20)	6.5 Mbps	52	5260.0	Not Required	16.0	No	Not Required	12.0	No
			56	5280.0						
			60	5300.0						
	802.11ac (VHT40)	13.5 Mbps	54	5270.0	Not Required	13.0	No	Not Required	12.0	No
62			5310.0							
802.11ac (VHT80)	29.3 Mbps	58	5290.0	Not Required	12.0	No	11.0	12.0	Yes	
5.5 (U-NII 2C)	802.11a	6 Mbps	100	5500.0	15.7	17.0	Yes	Not Required	12.0	No
			120	5600.0	15.4					
			124	5620.0	15.6					
			144	5720.0	15.9					
	802.11n (HT20)	6.5 Mbps	100	5500.0	Not Required	15.0	No	Not Required	12.0	No
			120	5600.0						
			124	5620.0						
			144	5720.0						
	802.11n (HT40)	13.5 Mbps	102	5510.0	Not Required	13.0	No	11.1	12.0	Yes
			118	5590.0				11.3		
			126	5630.0				11.5		
			142	5710.0				11.3		
	802.11ac (VHT20)	6.5 Mbps	100	5500.0	Not Required	15.0	No	Not Required	12.0	No
			120	5600.0						
			124	5620.0						
			144	5720.0						
	802.11ac (VHT40)	13.5 Mbps	102	5510.0	Not Required	13.0	No	11.0	12.0	No
			118	5590.0				11.2		
			126	5630.0				11.3		
			142	5710.0				11.2		
	802.11ac (VHT80)	29.3 Mbps	106	5530.0	Not Required	10.5	No	Not Required	10.5	No
122			5610.0							
138			5690.0							
5.8 (U-NII 3)	802.11a	6 Mbps	149	5745.0	16.1	17.0	Yes	Not Required	12.0	No
			157	5785.0	16.0					
			165	5825.0	16.0					
	802.11n (HT20)	6.5 Mbps	149	5745.0	Not Required	16.0	No	Not Required	12.0	No
			157	5785.0						
			165	5825.0						
	802.11n (HT40)	13.5 Mbps	151	5755.0	Not Required	15.0	No	Not Required	12.0	No
			159	5795.0						
	802.11ac (VHT20)	6.5 Mbps	149	5745.0	Not Required	16.0	No	Not Required	12.0	No
			157	5785.0						
			165	5825.0						
	802.11ac (VHT40)	13.5 Mbps	151	5755.0	Not Required	15.0	No	Not Required	12.0	No
			159	5795.0						
802.11ac (VHT80)	29.3 Mbps	155	5775.0	Not Required	12.0	No	12.0	12.0	Yes	

Note(s):

- For "Not required", 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.
- When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac/ax modes, the channel in the lower order/sequence 802.11 mode (i.e. a, g, n ac) is selected.
- When UNII band 2A's specified maximum output power is higher or same than UNII band 1, begin SAR measurement in UNII band 2A; and if the highest reported SAR for UNII band 2A is
 - ≤ 1.2 W/kg, SAR is not required for UNII band 1
 - > 1.2 W/kg, both bands should be tested independently for SAR.

9.5 Bluetooth

Average Power Measured Results

Band (GHz)	Mode	Ch #	Freq. (MHz)	Maximum Average Power (dBm)	
				Meas Pwr	Tune-up Limit
2.4	GFSK	0	2402	8.4	10.0
		39	2441	8.6	
		78	2480	7.6	
	EDR, 8-DPSK	0	2402	7.1	10.0
		39	2441	7.4	
		78	2480	6.4	
	LE, GFSK-1M	0	2402	4.4	6.0
		19	2440	4.9	
		39	2480	4.2	
	LE, GFSK-2M	0	2402	4.2	
		19	2440	4.7	
		39	2480	4.0	

Note(s):

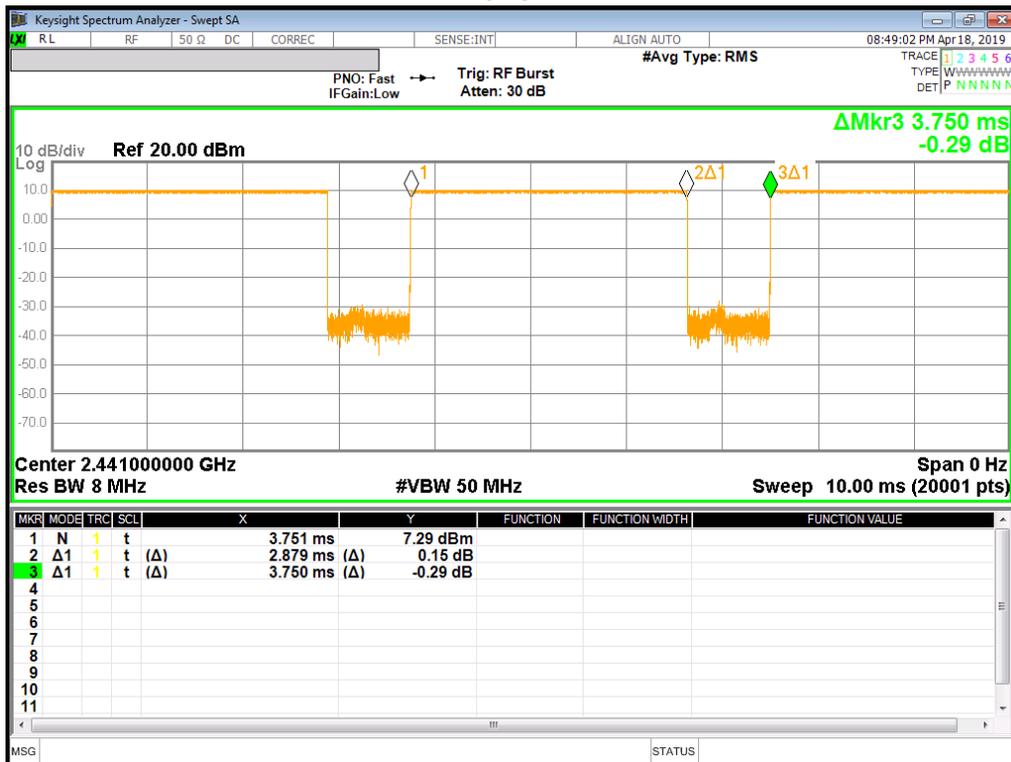
SAR test is evaluated at GFSK mode in Bluetooth

Duty Factor Measured Results

Mode	Type	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
GFSK	DH5	2.879	3.750	76.8%	1.30

Duty Cycle plots

GFSK



10. Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

Reported SAR(W/kg) for WWAN= Measured SAR *Tune-up Scaling Factor

Reported SAR(W/kg) for Wi-Fi and Bluetooth= Measured SAR * Tune-up scaling factor * Duty Cycle scaling factor

KDB 447498 D01 General RF Exposure Guidance:

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

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

KDB 648474 D04 Handset SAR:

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

KDB 648474 D04 Handset SAR (Phablet Only):

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

Additional 1-g SAR testing at 5 mm is not required when hotspot mode 10-g extremity SAR is not required for the surfaces and edges; since all 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 $\leq 1/4$ 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 GSM 850

Antenna	RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Main 1	Head	Voice	N/A	0	Left Touch	190	836.6	33.5	32.8	0.124	0.146	1
					Left Tilt	190	836.6	33.5	32.8	0.071	0.084	
					Right Touch	190	836.6	33.5	32.8	0.147	0.173	
					Right Tilt	190	836.6	33.5	32.8	0.077	0.090	
	Body-worn	GPRS 4 Slot	N/A	15	Rear	190	836.6	29.5	28.5	0.316	0.393	2
					Front	190	836.6	29.5	28.5	0.220	0.274	
	Hotspot	GPRS 4 Slot	N/A	10	Rear	190	836.6	29.5	28.5	0.478	0.595	3
					Front	190	836.6	29.5	28.5	0.202	0.252	
					Edge 2	190	836.6	29.5	28.5	0.331	0.412	
					Edge 3	190	836.6	29.5	28.5	0.218	0.271	
				Edge 4	190	836.6	29.5	28.5	0.149	0.186		

10.2 GSM1900

Antenna	RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Main 1	Head	Voice	Off	0	Left Touch	661	1880.0	30.5	30.1	0.117	0.129	4
					Left Tilt	661	1880.0	30.5	30.1	0.058	0.064	
					Right Touch	661	1880.0	30.5	30.1	0.062	0.068	
					Right Tilt	661	1880.0	30.5	30.1	0.054	0.059	
	Body-worn	GPRS 3 Slot	Off	15	Rear	661	1880.0	27.0	26.6	0.159	0.173	5
					Front	661	1880.0	27.0	26.6	0.104	0.113	
	Hotspot	GPRS 3 Slot	Off	10	Rear	661	1880.0	27.0	26.6	0.417	0.455	6
					Front	661	1880.0	27.0	26.6	0.209	0.228	
					Edge 2	661	1880.0	27.0	26.6	0.076	0.083	
					Edge 3	661	1880.0	27.0	26.6	0.357	0.389	
				Edge 4	661	1880.0	27.0	26.6	0.247	0.269		

10.3 W-CDMA Band II

Antenna	RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Main 1	Head	Rel.99 RMC	Off	0	Left Touch	9400	1880.0	24.5	23.6	0.193	0.238	7
					Left Tilt	9400	1880.0	24.5	23.6	0.115	0.142	
					Right Touch	9400	1880.0	24.5	23.6	0.135	0.166	
					Right Tilt	9400	1880.0	24.5	23.6	0.088	0.109	
	Body-worn	Rel.99 RMC	Off	15	Rear	9400	1880.0	24.5	23.6	0.192	0.236	8
					Front	9400	1880.0	24.5	23.6	0.132	0.162	
	Hotspot	Rel.99 RMC	On	10	Rear	9400	1880.0	22.0	20.7	0.245	0.329	9
					Front	9400	1880.0	22.0	20.7	0.133	0.179	
					Edge 2	9400	1880.0	22.0	20.7	0.032	0.043	
					Edge 3	9400	1880.0	22.0	20.7	0.151	0.203	
				Edge 4	9400	1880.0	22.0	20.7	0.145	0.195		

Note(s):

hotspot mode was tested with hotspot reduced power configuration and then scaled up to Ear-jack reduced power configuration in order to cover higher priority reduced power configuration mentioned in the operational description.

10.4 W-CDMA Band IV

Antenna	RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Main 1	Head	Rel.99 RMC	Off	0	Left Touch	1413	1732.6	25.0	24.4	0.210	0.240	10
					Left Tilt	1413	1732.6	25.0	24.4	0.178	0.203	
					Right Touch	1413	1732.6	25.0	24.4	0.193	0.220	
					Right Tilt	1413	1732.6	25.0	24.4	0.202	0.231	
	Body-worn	Rel.99 RMC	Off	15	Rear	1413	1732.6	25.0	24.4	0.323	0.369	11
					Front	1413	1732.6	25.0	24.4	0.308	0.351	
	Hotspot	Rel.99 RMC	On	10	Rear	1413	1732.6	22.0	21.2	0.407	0.488	12
					Front	1413	1732.6	22.0	21.2	0.238	0.285	
					Edge 2	1413	1732.6	22.0	21.2	0.073	0.087	
					Edge 3	1413	1732.6	22.0	21.2	0.263	0.315	
Edge 4					1413	1732.6	22.0	21.2	0.115	0.138		

10.5 W-CDMA Band V

Antenna	RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Main 1	Head	Rel.99 RMC	N/A	0	Left Touch	4183	836.6	25.5	24.8	0.192	0.226	
					Left Tilt	4183	836.6	25.5	24.8	0.109	0.128	
					Right Touch	4183	836.6	25.5	24.8	0.222	0.261	13
					Right Tilt	4183	836.6	25.5	24.8	0.118	0.139	
	Body-worn	Rel.99 RMC	N/A	15	Rear	4183	836.6	25.5	24.8	0.337	0.396	14
					Front	4183	836.6	25.5	24.8	0.242	0.285	
	Hotspot	Rel.99 RMC	N/A	10	Rear	4183	836.6	25.5	24.8	0.557	0.655	15
					Front	4183	836.6	25.5	24.8	0.219	0.258	
					Edge 2	4183	836.6	25.5	24.8	0.333	0.392	
					Edge 3	4183	836.6	25.5	24.8	0.207	0.243	
Edge 4					4183	836.6	25.5	24.8	0.166	0.195		

10.6 LTE Band 2 (20MHz Bandwidth)

Antenna	RF Exposure Conditions	Mode	PWR Back-off	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					
Main 1	Head	QPSK	Off	0	Left Touch	18900	1880.0	1	0	24.5	23.8	0.202	0.236	16				
								50	0	23.5	22.8	0.160	0.187					
					Left Tilt	18900	1880.0	1	0	24.5	23.8	0.109	0.127					
								50	0	23.5	22.8	0.082	0.096					
					Right Touch	18900	1880.0	1	0	24.5	23.8	0.124	0.145					
								50	0	23.5	22.8	0.099	0.115					
					Right Tilt	18900	1880.0	1	0	24.5	23.8	0.092	0.108					
								50	0	23.5	22.8	0.072	0.084					
					Body-worn	QPSK	Off	15	Rear	18900	1880.0	1	0	24.5	23.8	0.192	0.224	17
												50	0	23.5	22.8	0.156	0.182	
									Front	18900	1880.0	1	0	24.5	23.8	0.157	0.184	
												50	0	23.5	22.8	0.116	0.136	
	Hotspot	QPSK	On	10					Rear	18900	1880.0	1	0	21.5	20.8	0.283	0.336	18
												50	0	21.5	20.7	0.279	0.333	
					Front	18900	1880.0	1	0	21.5	20.8	0.116	0.138					
								50	0	21.5	20.7	0.118	0.141					
					Edge 2	18900	1880.0	1	0	21.5	20.8	0.038	0.046					
								50	0	21.5	20.7	0.038	0.046					
					Edge 3	18900	1880.0	1	0	21.5	20.8	0.107	0.127					
								50	0	21.5	20.7	0.155	0.185					
	Edge 4	18900	1880.0	1	0	21.5	20.8	0.123	0.146									
				50	0	21.5	20.7	0.137	0.163									

10.7 LTE Band 4 (20MHz Bandwidth)

SAR for LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

10.8 LTE Band 5 (10MHz Bandwidth)

Antenna	RF Exposure Conditions	Mode	PWR Back-off	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					
Main 1	Head	QPSK	N/A	0	Left Touch	20525	836.5	1	0	25.0	24.6	0.185	0.202					
								25	0	24.0	23.5	0.147	0.165					
					Left Tilt	20525	836.5	1	0	25.0	24.6	0.118	0.129					
								25	0	24.0	23.5	0.088	0.098					
					Right Touch	20525	836.5	1	0	25.0	24.6	0.222	0.242	19				
								25	0	24.0	23.5	0.182	0.204					
					Right Tilt	20525	836.5	1	0	25.0	24.6	0.115	0.126					
								25	0	24.0	23.5	0.091	0.101					
					Body-worn	QPSK	N/A	15	Rear	20525	836.5	1	0	25.0	24.6	0.309	0.337	20
												25	0	24.0	23.5	0.247	0.277	
									Front	20525	836.5	1	0	25.0	24.6	0.227	0.248	
												25	0	24.0	23.5	0.179	0.201	
	Hotspot	QPSK	N/A	10					Rear	20525	836.5	1	0	25.0	24.6	0.453	0.495	21
												25	0	24.0	23.5	0.404	0.453	
					Front	20525	836.5	1	0	25.0	24.6	0.211	0.230					
								25	0	24.0	23.5	0.166	0.186					
					Edge 2	20525	836.5	1	0	25.0	24.6	0.312	0.341					
								25	0	24.0	23.5	0.252	0.282					
					Edge 3	20525	836.5	1	0	25.0	24.6	0.201	0.220					
								25	0	24.0	23.5	0.167	0.187					
	Edge 4	20525	836.5	1	0	25.0	24.6	0.155	0.169									
				25	0	24.0	23.5	0.118	0.132									

10.9 LTE Band 7 (20MHz Bandwidth)

Antenna	RF Exposure Conditions	Mode	PWR Back-off	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	
Main 2	Head	QPSK	On	0	Left Touch	20850	2510.0	1	0	23.5	23.1	0.209	0.230	
								50	0	23.5	23.1	0.206	0.228	
					Left Tilt	20850	2510.0	1	0	23.5	23.1	0.227	0.250	
								50	0	23.5	23.1	0.225	0.249	
					Right Touch	20850	2510.0	1	0	23.5	23.1	0.729	0.804	
								50	0	23.5	23.1	0.702	0.776	
								100	0	23.5	23.0	0.694	0.776	
								1	0	23.5	23.0	0.895	1.016	
								50	0	23.5	23.0	0.874	0.982	
								21350	2560.0	1	0	23.5	22.1	0.802
					Right Tilt	20850	2510.0	1	0	23.5	23.1	0.321	0.354	
								50	0	23.5	23.1	0.247	0.273	
	Body-worn	QPSK	Off	15	Rear	20850	2510.0	1	0	24.5	24.2	0.393	0.426	23
								50	0	23.5	23.1	0.303	0.332	
					Front	20850	2510.0	1	0	24.5	24.2	0.100	0.108	
	50	0	23.5	23.1				0.071	0.077					
	Hotspot	QPSK	On	10	Rear	20850	2510.0	1	0	21.5	21.2	0.444	0.473	24
								50	0	21.5	21.1	0.430	0.473	
					Front	20850	2510.0	1	0	21.5	21.2	0.090	0.095	
								50	0	21.5	21.1	0.087	0.096	
					Edge 1	20850	2510.0	1	0	21.5	21.2	0.050	0.053	
								50	0	21.5	21.1	0.050	0.055	
					Edge 4	20850	2510.0	1	0	21.5	21.2	0.190	0.202	
								50	0	21.5	21.1	0.188	0.207	

10.10 LTE Band 12 (10MHz Bandwidth)

Antenna	RF Exposure Conditions	Mode	PWR Back-off	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					
Main 1	Head	QPSK	N/A	0	Left Touch	23095	707.5	1	0	24.5	23.9	0.144	0.166					
								25	0	23.5	22.7	0.114	0.136					
					Left Tilt	23095	707.5	1	0	24.5	23.9	0.083	0.095					
								25	0	23.5	22.7	0.070	0.083					
					Right Touch	23095	707.5	1	0	24.5	23.9	0.149	0.171	25				
								25	0	23.5	22.7	0.121	0.144					
					Right Tilt	23095	707.5	1	0	24.5	23.9	0.088	0.101					
								25	0	23.5	22.7	0.068	0.081					
					Body-worn	QPSK	N/A	15	Rear	23095	707.5	1	0	24.5	23.9	0.302	0.347	26
												25	0	23.5	22.7	0.241	0.287	
									Front	23095	707.5	1	0	24.5	23.9	0.193	0.222	
					25	0	23.5	22.7				0.156	0.186					
	Hotspot	QPSK	N/A	10	Rear	23095	707.5	1	0	24.5	23.9	0.371	0.427	27				
								25	0	23.5	22.7	0.295	0.351					
					Front	23095	707.5	1	0	24.5	23.9	0.193	0.222					
								25	0	23.5	22.7	0.153	0.182					
					Edge 2	23095	707.5	1	0	24.5	23.9	0.246	0.283					
								25	0	23.5	22.7	0.198	0.236					
					Edge 3	23095	707.5	1	0	24.5	23.9	0.070	0.080					
								25	0	23.5	22.7	0.056	0.067					
					Edge 4	23095	707.5	1	0	24.5	23.9	0.175	0.201					
								25	0	23.5	22.7	0.137	0.163					

10.11 LTE Band 13 (10MHz Bandwidth)

Antenna	RF Exposure Conditions	Mode	PWR Back-off	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	
Main 1	Head	QPSK	N/A	0	Left Touch	23230	782.0	1	0	24.5	24.0	0.143	0.161	
								25	0	23.5	22.8	0.116	0.135	
					Left Tilt	23230	782.0	1	0	24.5	24.0	0.090	0.102	
								25	0	23.5	22.8	0.074	0.086	
					Right Touch	23230	782.0	1	0	24.5	24.0	0.176	0.198	28
								25	0	23.5	22.8	0.141	0.164	
	Right Tilt	23230	782.0	1	0	24.5	24.0	0.099	0.111					
				25	0	23.5	22.8	0.080	0.094					
	Body-worn	QPSK	N/A	15	Rear	23230	782.0	1	0	24.5	24.0	0.342	0.385	29
								25	0	23.5	22.8	0.271	0.316	
					Front	23230	782.0	1	0	24.5	24.0	0.213	0.240	
								25	0	23.5	22.8	0.171	0.199	
	Hotspot	QPSK	N/A	10	Rear	23230	782.0	1	0	24.5	24.0	0.383	0.432	30
								25	0	23.5	22.8	0.304	0.354	
					Front	23230	782.0	1	0	24.5	24.0	0.204	0.230	
								25	0	23.5	22.8	0.163	0.190	
					Edge 2	23230	782.0	1	0	24.5	24.0	0.288	0.325	
								25	0	23.5	22.8	0.236	0.275	
					Edge 3	23230	782.0	1	0	24.5	24.0	0.097	0.109	
								25	0	23.5	22.8	0.082	0.095	
					Edge 4	23230	782.0	1	0	24.5	24.0	0.203	0.229	
								25	0	23.5	22.8	0.162	0.189	

10.12 LTE Band 17 (10MHz Bandwidth)

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

10.13 LTE Band 38 (20MHz Bandwidth)

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

10.14 LTE Band 41 (20MHz Bandwidth)

Antenna	RF Exposure Conditions	Mode	PWR Back-off	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			
Main 2	Head	QPSK	N/A	0	Left Touch	40185	2549.5	1	0	23.5	23.0	0.162	0.181			
								50	0	22.5	22.1	0.138	0.152			
					Left Tilt	40185	2549.5	1	0	23.5	23.0	0.190	0.213			
								50	0	22.5	22.1	0.150	0.165			
					Right Touch	40185	2549.5	1	0	23.5	23.0	0.500	0.560	31		
								50	0	22.5	22.1	0.417	0.459			
					Right Tilt	40185	2549.5	1	0	23.5	23.0	0.225	0.252			
								50	0	22.5	22.1	0.187	0.206			
	Body-worn	QPSK	N/A	15	Rear	40185	2549.5	1	0	23.5	23.0	0.238	0.266	32		
								50	0	22.5	22.1	0.186	0.205			
					Front	40185	2549.5	1	0	23.5	23.0	0.067	0.075			
								50	0	22.5	22.1	0.051	0.056			
	Hotspot	QPSK	N/A	10	Rear	40185	2549.5	39750	2506.0	1	0	23.5	23.0	0.558	0.633	
								40185	2549.5	1	0	23.5	23.0	0.595	0.666	
								40620	2593.0	50	0	22.5	22.1	0.459	0.506	
								41055	2636.5	1	0	23.5	22.0	0.549	0.780	33
								41490	2680.0	1	0	23.5	22.0	0.476	0.675	
					Front	40185	2549.5	1	0	23.5	23.0	0.132	0.148			
								50	0	22.5	22.1	0.102	0.112			
					Edge 1	40185	2549.5	1	0	23.5	23.0	0.078	0.087			
50								0	22.5	22.1	0.060	0.066				
Edge 4					40185	2549.5	1	0	23.5	23.0	0.268	0.300				
							50	0	22.5	22.1	0.206	0.227				

10.15 LTE Band 66 (20MHz Bandwidth)

Antenna	RF Exposure Conditions	Mode	PWR Back-off	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	
Main 1	Head	QPSK	Off	0	Left Touch	132572	1770.0	1	0	24.5	24.3	0.109	0.114	
								50	0	23.5	23.2	0.095	0.101	
					Left Tilt	132572	1770.0	1	0	24.5	24.3	0.113	0.118	34
								50	0	23.5	23.2	0.106	0.113	
					Right Touch	132572	1770.0	1	0	24.5	24.3	0.062	0.065	
								50	0	23.5	23.2	0.057	0.060	
					Right Tilt	132572	1770.0	1	0	24.5	24.3	0.048	0.050	
								50	0	23.5	23.2	0.039	0.042	
	Body-worn	QPSK	Off	15	Rear	132572	1770.0	1	0	24.5	24.3	0.220	0.230	35
								50	0	23.5	23.2	0.187	0.200	
					Front	132572	1770.0	1	0	24.5	24.3	0.090	0.094	
								50	0	23.5	23.2	0.085	0.091	
	Hotspot	QPSK	On	10	Rear	132572	1770.0	1	0	22.5	22.1	0.453	0.496	36
								50	0	22.5	22.1	0.455	0.495	
					Front	132572	1770.0	1	0	22.5	22.1	0.107	0.117	
								50	0	22.5	22.1	0.120	0.131	
					Edge 2	132572	1770.0	1	0	22.5	22.1	0.017	0.019	
								50	0	22.5	22.1	0.020	0.022	
					Edge 3	132572	1770.0	1	0	22.5	22.1	0.114	0.125	
								50	0	22.5	22.1	0.116	0.126	
Edge 4					132572	1770.0	1	0	22.5	22.1	0.107	0.117		
							50	0	22.5	22.1	0.120	0.131		

10.16 Wi-Fi (DTS Band)

Frequency Band	Mode	RF Exposure Conditions	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle (%)	Power (dBm)		1-g SAR (W/kg)		Note	Plot No.		
										Tune-up limit	Meas.	Meas.	Scaled				
2.4GHz	802.11b 1 Mbps	Head	On	0	Left Touch	1	2412.0	0.116	99.3%	12.0	11.5						
					Left Tilt	1	2412.0	0.121	99.3%	12.0	11.5	0.090	0.103			1	37
					Right Touch	1	2412.0	0.059	99.3%	12.0	11.5						
					Right Tilt	1	2412.0	0.060	99.3%	12.0	11.5						
		Body-worn	Off	15	Rear	6	2437.0	0.101	99.3%	19.0	18.2	0.079	0.097	1	38		
					Front	6	2437.0	0.028	99.3%	19.0	18.2						
		Hotspot	Off	10	Rear	6	2437.0	0.298	99.3%	19.0	18.2	0.213	0.260	1	39		
					Front	6	2437.0	0.071	99.3%	19.0	18.2						
					Edge 1	6	2437.0	0.135	99.3%	19.0	18.2						
					Edge 2	6	2437.0	0.041	99.3%	19.0	18.2						

Note(s):

- When the Highest reported SAR is ≤ 0.4 or 1.0 W/kg (1-g or 10-g respectively). Therefore, further SAR measurements within this exposure condition are not required.
- Highest reported SAR is > 0.4 or 1.0 W/kg (1-g or 10-g respectively). Due to the highest reported SAR for this test position, other test positions in this exposure condition were evaluated until a SAR ≤ 0.8 or 2.0 W/kg (1-g or 10-g respectively) was reported.
- Testing for a second channel was required because the reported SAR for this test position was > 0.8 or 2.0 W/kg (1-g or 10-g respectively).
- Additional testing required in order satisfying FCC simultaneous transmission limit criteria.
- SAR testing is not required for OFDM mode(s) when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

10.18 Bluetooth

Frequency Band	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle (%)	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
2.4GHz	GFSK	Head	0	Left Touch	39	2441.0	76.8	10.0	8.6	0.025	0.044	49
				Left Tilt	39	2441.0	76.8	10.0	8.6	0.024	0.044	
				Right Touch	39	2441.0	76.8	10.0	8.6	0.015	0.028	
				Rightt Tilt	39	2441.0	76.8	10.0	8.6	0.015	0.027	

Standalone SAR Test Exclusion Considerations & Estimated SAR

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	10.0	10	15	1.0	0.140
	Hotspot	2.480	10.0	10	10	1.6	0.210

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 (~ 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 .

Peak spatial-average (1g of tissue)

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	Repeated Measured SAR (W/kg)	Largest to Smallest SAR Ratio
750	LTE Band 12	Hotspot	Rear	No	0.371	N/A	N/A
	LTE Band 13	Hotspot	Rear	No	0.383	N/A	N/A
835	GSM 850	Hotspot	Rear	No	0.478	N/A	N/A
	WCDMA Band V	Hotspot	Rear	No	0.557	N/A	N/A
	LTE Band 5	Hotspot	Rear	No	0.453	N/A	N/A
1750	WCDMA Band IV	Hotspot	Rear	No	0.407	N/A	N/A
	LTE Band 66	Hotspot	Rear	No	0.455	N/A	N/A
1900	GSM 1900	Hotspot	Rear	No	0.417	N/A	N/A
	WCDMA Band II	Hotspot	Rear	No	0.245	N/A	N/A
	LTE Band 2	Hotspot	Rear	No	0.283	N/A	N/A
2400	Wi-Fi 802.11b/g/n	Hotspot	Rear	No	0.213	N/A	N/A
	Bluetooth	Head	Left Touch	No	0.025	N/A	N/A
2600	LTE Band 7	Head	Right Touch	Yes	0.895	0.906	1.01
	LTE Band 41	Hotspot	Rear	No	0.595	N/A	N/A
5300	Wi-Fi 802.11a/ac	Head	Left Tilt	No	0.212	N/A	N/A
5500	Wi-Fi 802.11a/n	Body	Rear	No	0.336	N/A	N/A
5800	Wi-Fi 802.11a/ac	Hotspot	Rear	No	0.246	N/A	N/A

Peak spatial-average (10g of tissue)

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	Repeated Measured SAR (W/kg)	Largest to Smallest SAR Ratio
5300	Wi-Fi 802.11a	Product Specific 10g	Rear	No	0.965	N/A	N/A
5500	Wi-Fi 802.11a	Product Specific 10g	Rear	No	0.685	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. DUT Holder Perturbations

In accordance with published DUT Holder Perturbations in Oct.2016 TCB workshop,

When Highest reported SAR is over 1.2 or 3.0 W/kg (1-g or 10-g respectively), Holder perturbation verification is required for each antenna, using the highest configuration among all applicable frequency bands. Both Head test and Body test (Edge 1-4 sides) are evaluated with DUT holder. Both Front and Rear sides are evaluated without DUT holder. (Details of test setup are refer to Appendix A.)

So we are only consider about Head test and Body test (Edge 1-4 sides).

All highest SAR level is not over 1.2 or 3.0 W/kg (1-g or 10-g respectively) in All bands.

Please refer to Section 10. **So DUT Holder perturbations verification are not required.**

13. Simultaneous Transmission SAR Analysis

Simultaneous Transmission Condition

RF Exposure Condition	Item	Capable Transmit Configurations		
Head	1	GSM(Voice)	+	DTS
	2	GSM(Voice)	+	UNII
	3	GSM(Voice)	+	BT
	4	W-CDMA	+	DTS
	5	W-CDMA	+	UNII
	6	W-CDMA	+	BT
	7	LTE	+	DTS
	8	LTE	+	UNII
	9	LTE	+	BT
Body worn	10	GSM(Voice/GPRS)	+	DTS
	11	GSM(Voice/GPRS)	+	UNII
	12	GSM(Voice/GPRS)	+	BT
	13	W-CDMA	+	DTS
	14	W-CDMA	+	UNII
	15	W-CDMA	+	BT
	16	LTE	+	DTS
	18	LTE	+	UNII
	19	LTE	+	BT
Hotspot & Product Specific 10-g	20	GSM(GPRS)	+	DTS
	21	GSM(GPRS)	+	UNII
	22	GSM(GPRS)	+	BT
	23	W-CDMA	+	DTS
	24	W-CDMA	+	UNII
	25	W-CDMA	+	BT
	26	LTE	+	DTS
	27	LTE	+	UNII
28	LTE	+	BT	

Notes:

1. DTS supports Wi-Fi Direct, Hotspot and VoIP.
2. U-NII supports Wi-Fi Direct, Hotspot and VoIP.
3. W-CDMA, LTE supports Hotspot and VoIP.
4. U-NII Radio cannot transmit simultaneously w ith Bluetooth Radio.
5. DTS Radio cannot transmit simultaneously w ith Bluetooth Radio.
6. DTS Radio cannot transmit simultaneously w ith UNII Radio.
7. BT tethering is consider about each RF exposure conditions

Simultaneous transmission SAR test exclusion considerations

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

Sum of SAR

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

SAR to Peak Location Ratio (SPLSR)

KDB 447498 D01 General RF Exposure Guidance explains how to calculate the SAR to Peak Location Ratio (SPLSR) between pairs of simultaneously transmitting antennas:

$$SPLSR = (SAR_1 + SAR_2)^{1.5} / Ri$$

Where:

SAR₁ is the highest reported or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

SAR₂ is the highest reported or estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

R_i is the separation distance between the pair of simultaneous transmitting antennas. When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of

$$[(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2]$$

In order for a pair of simultaneous transmitting antennas with the sum of 1-g SAR > 1.6 W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:

$$(SAR_1 + SAR_2)^{1.5} / Ri \leq 0.04$$

When an individual antenna transmits at on two bands simultaneously, the sum of the highest *reported* SAR for the frequency bands should be used to determine **SAR₁**, or **SAR₂**. When SPLSR is necessary, the smallest distance between the peak SAR locations for the antenna pair with respect to the peaks from each antenna should be used.

The antennas in all antenna pairs that do not qualify for simultaneous transmission SAR test exclusion must be tested for SAR compliance, according to the enlarged zoom scan and volume scan post-processing procedures in KDB Publication 865664 D01

The antennas for the unlicensed transmitters are closely situated. As a result, the associated SAR hotspots are also closely situated. Some of the sum of SAR calculations yielded results over 1.6 W/kg. The SPLSR calculations for these situations were performed by treating the unlicensed SAR values as a single transmitter. The most conservative distance between all the unlicensed hotspots to the licensed hotspot was used for the value of *d* in the SPLSR calculation.

Simultaneous transmission SAR measurement

When simultaneous transmission SAR measurements are required in different frequency bands not covered by a single probe calibration point then separate tests for each frequency band are performed. The tests are performed using enlarged zoom scans which are processed, by means of superposition, using the DASY5 volume scan postprocessing procedures to determine the 1-g SAR for the aggregate SAR distribution.

The spatial resolution used for all enlarged zoom scans is the same as used for the most stringent zoom scans. I.E. the scan parameters required for the highest frequency assessed are used for all enlarged zoom scans. The scans cover the complete area of the device to ensure all transmitting antennas and radiating structures are assessed.

DASY5 provides the ability to perform Multiband Evaluations according to the latest standards using the Volume Scan job as well as appropriate routines for the Post-processing.

In order to extract and process measurements within different frequency bands, the SEMCAD X Post-processor performs the combination and subsequent superposition of these measurement data via DASY5= Combined MultiBand Averaged SAR.

Combined Multi Band Averaged SAR allows - in addition to the data extraction - an evaluation of the 1 g, 10 g and/or arbitrary averaged mass SAR.

Power Scaling Factor is used to allow the volume scans to be scaled by a value other than "1", this is important when the results need to be scaled to different maximum power levels. The Power Scaling Factor is applied to each individual point of the scan. When power scaling is used in multi-band combinations the scaling factor is applied to each individual point of the first scan, the second factor is then applied to each individual point of the second scan and so on. The scans are then combined.

13.1 Sum of the SAR for WWAN & Wi-Fi & BT

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	① + ② WWAN + DTS		① + ③ WWAN + U-NII		① + ④ WWAN + BT	
						∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
						Head	All Position	1.118	0.103	0.276	0.044
Body-worn	All Position	0.426	0.097	0.455	0.140	0.523	No	0.881	No	0.566	No
Hotspot	All Position	0.780	0.260	0.316	0.210	1.040	No	1.096	No	0.990	No

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the either sum of the 1-g SAR is < 1.6 W/kg or the SPLSR is ≤ 0.04 for all circumstances that require SPLSR calculation.

Appendixes

Refer to separated files for the following appendixes.

4788962183-S1V2 FCC Report SAR_App A_Photos & Ant. Locations

4788962183-S1V2 FCC Report SAR_App B_Highest SAR Test Plots

4788962183-S1V2 FCC Report SAR_App C_System Check Plots

4788962183-S1V2 FCC Report SAR_App D_SAR Tissue Ingredients

4788962183-S1V2 FCC Report SAR_App E_Probe Cal. Certificates

4788962183-S1V2 FCC Report SAR_App F_Dipole Cal. Certificates

END OF REPORT