FCC OET BULLETIN 65 SUPPLEMENT C 01-01
IEEE Std 1528-2003 and IEEE Std 1528a-2005

SAR EVALUATION REPORT

For

LTE Phone Bluetooth, WLAN (2.4GHz & 5GHz) and NFC

Model: LG-D500, LGD500, D500, LGMS500,
LG-MS500, MS500

FCC ID: ZNFD500

Report Number: 13U14980-7, Revision B
Issue Date: 6/21/2013

Prepared for

LG ELECTRONICS MOBILECOMM U.S.A., INC.
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	5/30/2013	Initial Issue	--
A	6/14/2013	Sections 9.6 and 9.7 – Corrected Wi-Fi target powers. Updated scaled results in sections 12 and 14 accordingly	Dave Weaver
B	6/21/2013	Sections 7.1 and 14.3 – Clarified Wi-Fi direct references	Dave Weaver

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Table of Contents

1. Attestation of Test Results 7

2. Test Methodology 8

3. Facilities and Accreditation 8

4. Calibration and Uncertainty 9

4.1. Measuring Instrument Calibration 9

4.2. Measurement Uncertainty 10

5. Measurement System Description and Setup 11

6. SAR Measurement Procedure 12

6.1. Normal SAR Measurement Procedure 12

6.2. Volume Scan Procedures 14

7. Device Under Test 15

7.1. General Information 15

7.2. Band and Air Interfaces 15

7.3. Simultaneous Transmission Condition 16

7.4. 941225 D05 SAR for LTE Devices v02 17

8. RF Exposure Conditions 18

8.1. Head Exposure Conditions 18

8.2. Body-worn Accessory Exposure Conditions 18

8.3. Hotspot Mode Exposure Conditions 18

9. RF Output Power Measurement 19

9.1. GSM850 19

9.2. GSM1900 20

9.3. W-CDMA Band II 21

9.1. W-CDMA Band IV 27

9.2. W-CDMA Band V 33

9.3. LTE Band 2 39

9.4. LTE Band 4 43

9.5. LTE Band 17 49

9.6. Wi-Fi (2.4 GHz) 53

9.7. Wi-Fi (5 GHz Bands) 54

9.8. Bluetooth 56

10. Tissue Dielectric Properties 57

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10.1. Composition of Ingredients for the Tissue Material Used in the SAR Tests 58
10.2. Tissue Dielectric Parameter Check Results 59

11. System Performance Check 62
11.1. System Performance Check Measurement Conditions 62
11.2. Reference SAR Values for System Performance Check 63
11.3. System Performance Check Results 64

12. SAR Test Results 66
12.1. GSM850 66
12.1.1. Head Exposure Conditions 66
12.1.2. Body-worn Accessory Exposure Conditions 67
12.1.3. Hotspot Mode Exposure Conditions 68
12.2. GSM1900 69
12.2.1. Head Exposure Conditions 69
12.2.2. Body-worn Accessory Exposure Conditions 70
12.2.3. Hotspot Mode Exposure Conditions 71
12.3. W-CDMA Band II 72
12.3.1. Head Exposure Conditions 72
12.3.2. Body-worn Accessory & Hotspot Exposure Conditions 72
12.4. W-CDMA Band IV 73
12.4.1. Head Exposure Conditions 73
12.4.2. Body-worn Accessory & Hotspot Mode Exposure Conditions 73
12.4.3. Hotspot Mode Exposure Conditions 73
12.5. W-CDMA Band V 74
12.5.1. Head Exposure Conditions 74
12.5.2. Body-worn Accessory & Hotspot Mode Exposure Conditions 74
12.5.3. Hotspot Mode Exposure Conditions 74
12.6. LTE Band 2 (10MHz Bandwidth) 75
12.6.1. Head Exposure Conditions 75
12.6.2. Body-worn Accessory & Hotspot ModeExposure Conditions 76
12.6.3. Hotspot Mode Exposure Conditions 76
12.7. LTE Band 4 (20MHz Bandwidth) 77
12.7.1. Head Exposure Conditions 77
12.7.2. Body-worn Accessory & Hotspot Mode Exposure Conditions 78
12.7.3. Hotspot Mode Exposure Conditions 78
12.8. LTE Band 17 (10MHz Bandwidth) 79
12.8.1. Head Exposure Conditions 79

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12.8.2. Body-worn Accessory Exposure Conditions 80
12.8.3. Hotspot Mode Exposure Conditions 80
12.9. Wi-Fi (2.4 GHz Band) 81
12.9.1. Head Exposure Conditions 81
12.9.2. Body-worn Accessory & Hotspot Mode Exposure Conditions 81
12.9.3. Hotspot Mode Exposure Conditions 81
12.10. Wi-Fi (5 GHz Bands) 82
12.10.1. Head Exposure Conditions 82
12.10.2. Body-worn Accessory Exposure Conditions 83
13. SAR Measurement Variability 84
13.1. The Highest Measured SAR Configuration in Each Frequency Band 84
13.2. Repeated Measurement Results 86
14. Simultaneous Transmission SAR Analysis 87
14.1. Estimated SAR for Bluetooth 88
14.1.1. Standalone SAR Test Exclusion 88
14.1.2. Estimated SAR 88
14.2. Head Exposure Conditions 89
14.2.1. Sum of the SAR for GSM 850, Wi-Fi 2.4 and 5 GHz Bands 89
14.2.2. Sum of the SAR for GSM 1900, Wi-Fi 2.4 and 5 GHz Bands 90
14.2.3. Sum of the SAR for W-CDMA Band II, Wi-Fi 2.4 and 5 GHz Bands 91
14.2.4. Sum of the SAR for W-CDMA Band IV Wi-Fi 2.4 and 5 GHz Bands 92
14.2.5. Sum of the SAR for W-CDMA Band V, Wi-Fi 2.4 and 5 GHz Bands 93
14.2.6. Sum of the SAR for W-CDMA LTE Band 2, Wi-Fi 2.4 and 5 GHz Bands 94
14.2.7. Sum of the SAR for W-CDMA LTE Band 4, Wi-Fi 2.4 and 5 GHz Bands 95
14.2.8. Sum of the SAR for W-CDMA LTE Band 17, Wi-Fi 2.4 and 5 GHz Bands 96
14.3. Body-worn Accessory Exposure Conditions 97
14.3.1. Sum of the SAR for GSM, Wi-Fi 2.4 GHz and 5 GHz Bands and Bluetooth 97
14.3.2. Sum of the SAR for W-CDMA, Wi-Fi 2.4 GHz and 5 GHz Bands and Bluetooth 98
14.3.3. Sum of the SAR for LTE, Wi-Fi 2.4 GHz and 5 GHz Bands and Bluetooth 99
14.4. Hotspot Mode Exposure Conditions 100
15. Appendixes 103
15.1. System Performance Check Plots 103
15.2. Highest SAR Test Plots 103
15.3. Calibration Certificate for E-Field Probe EX3DV3 - SN 3531 103
15.4. Calibration Certificate for E-Field Probe EX3DV4 - SN 3901 103
15.5. Calibration Certificate for D750V3 - SN 1019 103

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15.6. Calibration Certificate for D835V2 - SN 4d002 103
15.7. Calibration Certificate for D1750V2 - SN 1053 103
15.8. Calibration Certificate for D1900V2 - SN 5d043 103
15.9. Calibration Certificate for D2450V2 - SN 899 103
15.10. Calibration Certificate for D5GHzV2 - SN 1138 103

16. External Photos 104

17. Antenna Dimensions & Separation Distances 106

18. Setup Photos 107

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1. Attestation of Test Results

Applicant	LG ELECTRONICS MOBILECOMM U.S.A., INC.			
DUT description	LTE Phone Bluetooth, WLAN(2.4GHz & 5GHz) and NFC			
Model	LG-D500, LGD500, D500, LGMS500, LG-MS500, MS500.			
Test device is	An identical prototype			
Dvice category	Portable			
Exposure category	General Population/Uncontrolled Exposure			
Date tested	4/15/2013–5/3/2013			
The highest reported SAR values	RF exposure condition	Licensed	DTS	UNII
	Head	0.86 W/kg	0.42 W/kg	0.04 W/kg
	Body-worn Accessory	1.28 W/kg	0.25 W/kg	0.18 W/kg
	Wireless Router (Hotspot)	1.07 W/kg	0.25 W/kg	N/A
	Simultaneous Transmission	1.53 W/kg	1.53 W/kg	1.46 W/kg
Applicable Standards	OET Bulletin 65 Supplement C IEEE Std 1528-2003 and IEEE Std 1528a-2005 FCC Published RF exposure KDB procedures, and TCB workshop updates			
Test Results	Pass			

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

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

Approved & Released By:

Dave Weaver
WiSE Program Manager
UL Verification Services Inc.

Prepared By:

Elijah Garcia
WiSE Laboratory Engineer
UL Verification Services Inc.

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2. Test Methodology

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C Edition 01-01, IEEE STD 1528-2003, IEEE Std 1528a-2005, the following FCC Published RF exposure KDB procedures and TCB workshop updates:

- 447498 D01 General RF Exposure Guidance v05r01
- 648474 D04 SAR Handsets Multi Xmiter and Ant v01
- 941225 D01 SAR test for 3G devices v02
- 941225 D03 SAR Test Reduction GSM GPRS EDGE v01
- 941225 D05 SAR for LTE devices v02r02
- 941225 D06 Hot Spot SAR v01
- 248227 D01 SAR Meas for 802 11abg v01r02
- 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r01
- 865664 D02 RF Exposure REporting v01r01
- 690783 D01 SAR Listings on Grants v01r02
- 2013 TCB workshop updates

3. Facilities and Accreditation

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

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4. Calibration and Uncertainty

4.1. Measuring Instrument Calibration

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.

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due date
Network Analyzer	Agilent	8753ES	MY40001647	6/27/2013
Dielectronic Probe kit	SPEAG	DAK-3.5	1103	2/5/2014
Thermometer	Control Company	4242	122529163	9/19/2013
Synthesized Signal Generator	HP	8665B	3744A01084	3/3/2014
Power Meter	HP	438A	3513U04320	9/24/2013
Power Sensor	HP	8481A	2237A31744	9/24/2013
Power Sensor	HP	8481A	3318A95392	9/24/2013
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1620606	N/A
Directional coupler	Werlatone	C8060-102	2141	N/A
DC Power Supply	HP	6296A	2410A-05117	N/A
E-Field Probe	SPEAG	EX3DV3	3531	11/15/2012
E-Field Probe	SPEAG	EX3DV4	3901	2/13/2014
Data Acquisition Electronics	SPEAG	DAE4	1259	2/7/2014
Data Acquisition Electronics	SPEAG	DAE4	1357	2/5/2014
System Validation Dipole	SPEAG	D750V3	1019	5/5/2014
System Validation Dipole	SPEAG	D835V2	4d002	10/24/2013
System Validation Dipole	SPEAG	D1750V2	1053	8/15/2013
System Validation Dipole	SPEAG	D1900V2	5d043	11/6/2013
System Validation Dipole	SPEAG	D2450V2	899	10/5/2013
System Validation Dipole	SPEAG	D5GHzV2	1138	10/9/2013
Base Station Simulator	Agilent	8960	GB46160222	11/10/2013

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4.2. Measurement Uncertainty

Per KDB 865664, when no measured SAR values exceed 1.5 W/kg, measurement uncertainty analysis does not need to be provided in the test report.

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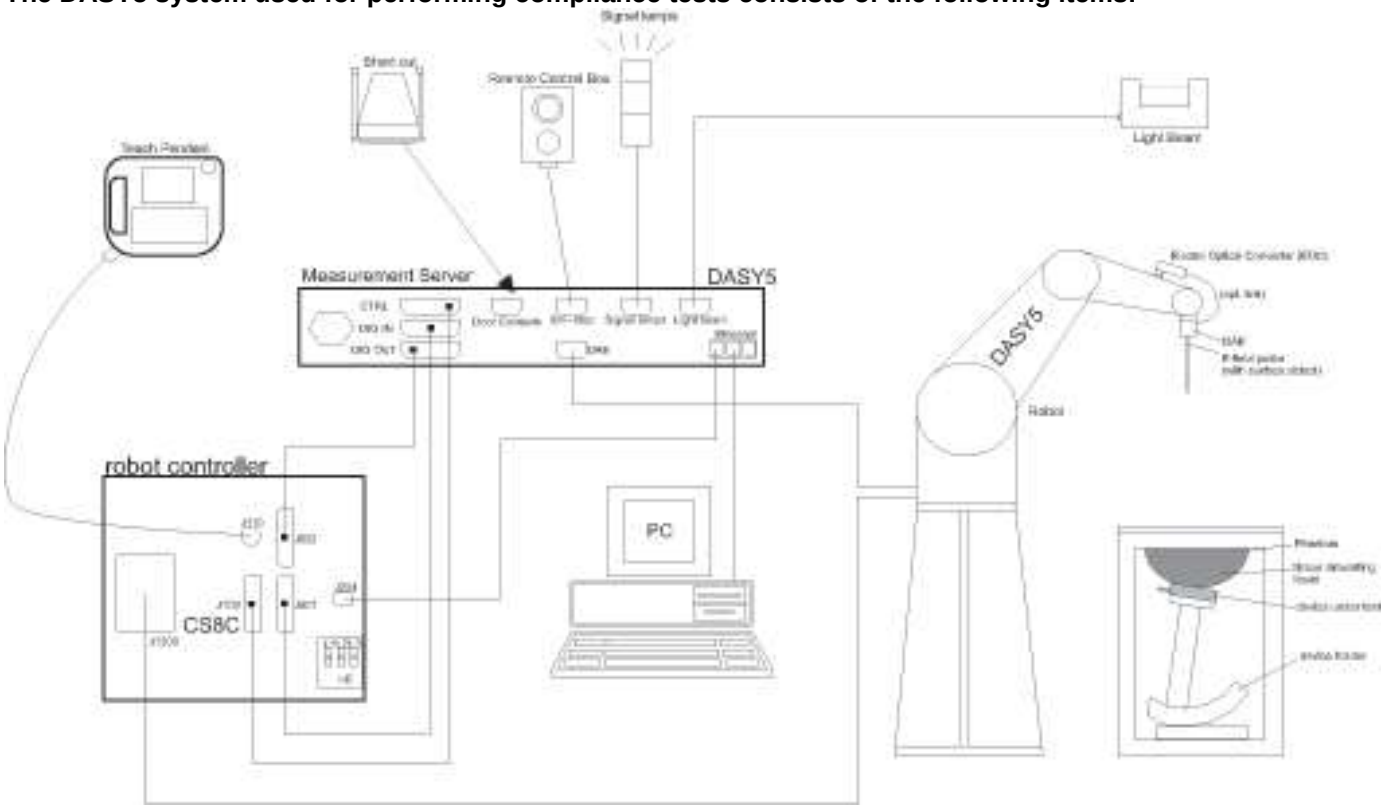
5. Measurement System Description and Setup

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



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

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6. SAR Measurement Procedure

6.1. Normal SAR Measurement Procedure

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 v01

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

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Step 3: Zoom Scan

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

Zoom Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01 (Draft)

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the area scan based *1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

Step 4: Power drift measurement

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

Step 5: Z-Scan (FCC only)

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

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6.2. Volume Scan Procedures

Step 1: Repeat Step 1-4 in Section 6.1

Step 2: Volume Scan
Volume Scans are used to assess peak SAR and averaged SAR measurements in largely extended 3-dimensional volumes within any phantom. This measurement does not need any previous area scan. The grid can be anchored to a user specific point or to the current probe location.

Step 3: 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.

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7. Device Under Test

7.1. General Information

LTE Phone Bluetooth, WLAN(2.4GHz & 5GHz) and NFC Model: LG-D500, LGD500, D500, LGMS500, LG-MS500, MS500, LG-D500H, LGD500H and D500H	
Operating Configuration(s)	Held to head, Body-worn (Voice call)
RF Exposure Condition(s)	Head, Body-worn accessory, Hotspot (wireless router) - Wi-Fi Hotspot mode permits the device to share its cellular data connection with other 2.4 GHz Wi-Fi-enabled devices (channels 1 - 11).
Device dimension (L x W)	12.79 cm x 6.57 cm
Accessory	Headset

7.2. Band and Air Interfaces

Wireless Mode and Frequency Bands	GSM 850 / 1900 W-CDMA Band: II / IV/ V LTE Band 2 / 4 / 17 Wi-Fi 802.11a/b/g/n Bluetooth 2.4 GHz
Modulation	GSM (GMSK) / GPRS (GMSK) / EGPRS (8PSK) W-CDMA - UMTS Rel. 99 - HSDPA (Rel. 5, CAT 8) - HSUPA (Rel. 6, CAT 6) - DC-HSDPA (Rel. 8 , CAT 24) - HSPA+ (Rel. 7, CAT 14) LTE: QPSK, 16QAM Wi-Fi 802.11a/b/g/n (HT20, HT40) Bluetooth Ver. 4.0
Duty Cycle	GSM Voice: 12.5%; GPRS 1 Slot: 12.5%; 2 Slots: 25%; 3 Slots: 37.5%; 4 Slots: 50% W-CDMA: 100% LTE: 100% Wi-Fi 802.11a/b/g/n: 100%
GPRS Multi-Slot Class	☐ Class 8 - One Up; ☐ Class 10 - Two Up; ☒ Class 12 - Four Up
Mobile Phone Capability	☐ Class A - Mobile phones can be connected to both GPRS and GSM services simultaneously. ☒ Class B - Mobile phones can be attached to both GPRS and GSM services, using one service at a time. ☐ Class C - Mobile phones are attached to either GPRS or GSM voice service. You need to switch manually between services
VoIP	Supported

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7.3. Simultaneous Transmission Condition

RF Exposure Condition	Capable Transmit Configurations
Head	GSM850/1900 MHz Voice + Wi-Fi 2.4 GHz GSM850/1900 MHz Voice + Wi-Fi 5 GHz bands GSM850/1900 MHz Data + Wi-Fi 2.4 GHz (VoIP) GSM850/1900 MHz Data+ Wi-Fi 5 GHz bands (VoIP) W-CDMA Band II / IV / V + Wi-Fi 2.4 GHz W-CDMA Band II / IV / V + Wi-Fi 5 GHz bands LTE Band 2 / 4 / 17 + Wi-Fi 2.4 GHz LTE Band 2 / 4 / 17 + Wi-Fi 5 GHz bands
Body-worn Accessory (Voice mode only)	GSM850/1900 MHz Voice + Wi-Fi 2.4 GHz GSM850/1900 MHz Voice + Wi-Fi 5 GHz bands GSM850/1900 MHz Data + Wi-Fi 2.4 GHz (VoIP) GSM850/1900 MHz Data+ Wi-Fi 5 GHz bands (VoIP) W-CDMA Band II / IV / V + Wi-Fi 2.4 GHz W-CDMA Band II / IV / V + Wi-Fi 5 GHz bands LTE Band 2 / 4 / 17 + Wi-Fi 2.4 GHz LTE Band 2 / 4 / 17 + Wi-Fi 5 GHz bands GSM850/1900 MHz Voice + BT GSM850/1900 MHz Data + BT (VoIP) W-CDMA Band II / IV / V + BT LTE Band 2 / 4 / 17 + BT
Hotspot (Data)	GPRS850/1900 MHz Data + Wi-Fi 2.4 GHz W-CDMA Band II / IV / V + Wi-Fi 2.4 GHz LTE Band 2 / 4 / 17 + Wi-Fi 2.4 GHz
Wi-Fi Direct	GPRS850/1900 MHz Data + Wi-Fi 2.4 GHz (GO/GC) GPRS850/1900 MHz Data + Wi-Fi 5 GHz bands (GC only) W-CDMA Band II / IV / V + Wi-Fi 2.4 GHz (GO/GC) W-CDMA Band II / IV / V + Wi-Fi 5 GHz bands (GC only) LTE Band 2 / 4 / 17 + Wi-Fi 2.4 GHz (GO/GC) LTE Band 2 / 4 / 17 + Wi-Fi 5 GHz bands (GC only)

Notes:
1. Wi-Fi 2.4GHz supports Hotspot and Wi-Fi-Direct (GO/GC).
2. Wi-Fi 5GHz does not support Hotspot but supports Wi-Fi-Direct (GC).
3. LTE, WCDMA, GPRS/EDGE supports Hotspot.
4. VoIP is supported in LTE, WCDMA, GSM (e.g. 3rd party VoIP and VoLTE)
5. Bluetooth and Wi-Fi cannot transmit simultaneously since they share the same chip.
6. GSM, WCDMA and LTE cannot transmit simultaneously since they share the same chip.

Simultaneous Transmission Scenario - Wi-Fi direct

No.	Capable scenario	support
1	WiFi-Direct + voice call	yes
2	WiFi-Direct + data call	yes
3	WiFi-Direct + hotspot(tethering)	no

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7.4. 941225 D05 SAR for LTE Devices v02

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Frequency range, Channel Bandwidth, Numbers and Frequencies</td><td>
<table>
<tr><td rowspan="3">Band 2</td><td colspan="6">Frequency range: 1850 – 1910 MHz</td></tr>
<tr><td colspan="6">Channel Bandwidth</td></tr>
<tr><td>20 MHz</td><td>15 MHz</td><td>10 MHz</td><td>5 MHz</td><td>3 MHz</td><td>1.4 MHz</td></tr>
<tr><td>Low</td><td></td><td></td><td>18650/ 1855</td><td>18625/ 1852.5</td><td></td><td></td></tr>
<tr><td>Mid</td><td></td><td></td><td>18900/ 1880</td><td>18900/ 1880</td><td></td><td></td></tr>
<tr><td>High</td><td></td><td></td><td>19150/ 1905</td><td>19175/ 1907.5</td><td></td><td></td></tr>
<tr><td rowspan="3">Band 4</td><td colspan="6">Frequency range: 1710 – 1755 MHz</td></tr>
<tr><td colspan="6">Channel Bandwidth</td></tr>
<tr><td>20 MHz</td><td>15 MHz</td><td>10 MHz</td><td>5 MHz</td><td>3 MHz</td><td>1.4 MHz</td></tr>
<tr><td>Low</td><td>20050/ 1720</td><td>20025/ 1717.5</td><td>20000/ 1715</td><td>19975/ 1712.5</td><td></td><td></td></tr>
<tr><td>Mid</td><td>20175/ 1732.5</td><td>20175/ 1732.5</td><td>20175/ 1732.5</td><td>20175/ 1732.5</td><td></td><td></td></tr>
<tr><td>High</td><td>20300/ 1745</td><td>20325/ 1747.5</td><td>20350/ 1750</td><td>20375/ 1752.5</td><td></td><td></td></tr>
<tr><td rowspan="3">Band 17</td><td colspan="6">Frequency range: 1704 – 716 MHz</td></tr>
<tr><td colspan="6">Channel Bandwidth</td></tr>
<tr><td>20 MHz</td><td>15 MHz</td><td>10 MHz</td><td>5 MHz</td><td>3 MHz</td><td>1.4 MHz</td></tr>
<tr><td>Low</td><td></td><td></td><td>23780/ 709</td><td>23755/ 706.5</td><td></td><td></td></tr>
<tr><td>Mid</td><td></td><td></td><td>23790/ 710</td><td>23790/ 710</td><td></td><td></td></tr>
<tr><td>High</td><td></td><td></td><td>23800/ 711</td><td>23825/ 713.5</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>LTE transmitter and antenna implementation</td><td>LTE, GSM and WCDMA share the same Tx antenna</td></tr>
<tr><td>Maximum power reduction (MPR)</td><td>
Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3 MPR
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th><th rowspan="2">MPR (dB)</th></tr>
<tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr>
<tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr>
</table>
Built-in by design
A-MPR (additional MPR) was disabled during SAR testing
</td></tr>
<tr><td>Power reduction</td><td>No</td></tr>
<tr><td>Spectrum plots for RB configurations</td><td>When a properly configured base station simulator is not used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration should be included in the SAR report to demonstrate that the tested RB allocations have been correctly established at the maximum output power conditions.</td></tr>
</table>

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8. RF Exposure Conditions

Refer to Section 17 “Antenna Dimensions and Separation Distances” for the specific details of the antenna-to-antenna, antenna-to-edge(s) distances, and device orientation description.

8.1. Head Exposure Conditions

For WWAN and Wi-Fi

Test Configurations	SAR Required	Note
Left Touch	Yes	
Left Tilt (15°)	Yes	
Right Touch	Yes	
Right Tilt (15°)	Yes	

8.2. Body-worn Accessory Exposure Conditions

For WWAN

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	1 mm	Yes	
Front	9.5 mm	Yes	

For Wi-Fi/BT

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	1 mm	Yes	
Front	9.5 mm	Yes	

8.3. Hotspot Mode Exposure Conditions

For WWAN

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	1 mm	Yes	
Front	9.5 mm	Yes	
Edge 1	83 mm	No	SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR v01
Edge 2	1.5mm	Yes	
Edge 3	1.5mm	Yes	
Edge 4	1.5mm	Yes	

For Wi-Fi

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	1 mm	Yes	
Front	9.0 mm	Yes	
Edge 1	4.1mm	Yes	
Edge 2	47mm	No	SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR v01
Edge 3	97.1 mm	No	SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR v01
Edge 4	2.4mm	Yes	

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9. RF Output Power Measurement

9.1. GSM850

	Min	Max
Tune-up Tolerance (dB):	-1.5	0.5

Output Power Tolerance (dBm)	Voice	GPRS 1 slot	GPRS 2 slots	GPRS 3 slots	GPRS 4 slots
Max	33.2	33.2	31.2	30.2	29.2
Target	**32.7**	**32.7**	**30.7**	**29.7**	**28.7**
Min	31.2	31.2	29.2	28.2	27.2

GSM (GMSK) - Voice Mode

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)
850	128	824.2	33.1
	190	836.6	33.1
	251	848.8	33.1

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	Avg Power (dBm)				Avg Power (dBm)			
			1 time slot		2 time slots		3 time slots		4 time slots	
			Burst	Frame	Burst	Frame	Burst	Frame	Burst	Frame
850	128	824.2	33.1	24.1	31.1	25.1	30.0	25.7	28.7	**25.7**
	190	836.6	33.1	24.1	31.1	25.1	29.9	25.6	28.8	**25.8**
	251	848.8	33.1	24.1	31.1	25.1	30.0	25.7	28.9	**25.9**

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	Freq. (MHz)	Power (dBm)				Power (dBm)			
			1 time slot		2 time slots		3 time slots		4 time slots	
			Burst	Frame	Burst	Frame	Burst	Frame	Burst	Frame
850	128	824.2	27.0	18.0	26.9	20.9	26.2	21.9	25.0	22.0
	190	836.6	27.0	18.0	26.9	20.9	26.2	21.9	25.0	22.0
	251	848.8	27.1	18.1	27.0	21.0	26.2	21.9	25.0	22.0

Notes:

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

- Head & Body-worn Accessory: GMSK Voice Mode
- Hotspot mode: GMSK (GPRS) mode with 4 time slots, based on the output power measurements above
- SAR is not required for EGPRS (8PSK) Mode because its output power is less than that of GPRS Mode

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9.2. GSM1900

	Min	Max
Tune-up Tolerance (dB):	-1.5	0.5

Output Power Tolerance (dBm)	Voice	GPRS 1 slot	GPRS 2 slots	GPRS 3 slots	GPRS 4 slots
Max	31.2	31.2	28.7	27.7	26.7
Target	**30.7**	**30.7**	**28.2**	**27.2**	**26.2**
Min	29.2	29.2	26.7	25.7	24.7

GSM (GMSK) - Voice Mode

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)
1900	512	1850.2	30.9
	661	1880.0	31.2
	810	1909.8	30.9

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	Avg Power (dBm)				Avg Power (dBm)			
			1 time slot		2 time slots		3 time slots		4 time slots	
			Burst	Frame	Burst	Frame	Burst	Frame	Burst	Frame
1900	512	1850.2	31.0	22.0	28.7	22.7	27.7	23.4	26.7	**23.7**
	661	1880.0	31.2	22.2	28.6	22.6	27.7	23.4	26.6	**23.6**
	810	1909.8	30.9	21.9	28.7	22.7	27.7	23.4	26.5	**23.5**

	Min	Max
Tune-up Tolerance (dB):	-1.5	0.5

Output Power Tolerance (dBm)	Voice	GPRS 1 slot	GPRS 2 slots	GPRS 3 slots	GPRS 4 slots
Max	31.2	31.2	28.7	27.7	26.7
Target	**30.7**	**30.7**	**28.2**	**27.2**	**26.2**
Min	29.2	29.2	26.7	25.7	24.7

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	Freq. (MHz)	Power (dBm)				Power (dBm)			
			1 time slot		2 time slots		3 time slots		4 time slots	
			Burst	Frame	Burst	Frame	Burst	Frame	Burst	Frame
1900	512	1850.2	26.1	17.1	26.2	20.2	25.8	21.5	25.3	22.3
	661	1880.0	26.1	17.1	26.2	20.2	25.8	21.5	25.2	22.2
	810	1909.8	26.1	17.1	26.2	20.2	25.7	21.4	25.2	22.2

Notes:

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

- Head & Body-worn Accessory: GMSK Voice Mode
- Hotspot mode: GMSK (GPRS) mode with 4 time slots, based on the output power measurements above
- SAR is not required for EGPRS (8PSK) Mode because its output power is less than that of GPRS Mode

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9.3. W-CDMA Band II

	Min	Max
Tune-up Tolerance (dB):	-1.5	0.5

Output Power Tolerance	Release 99 (dBm)	HSDPA (dBm)	HSUPA (dBm)	DC-HSPA (dBm)
Max	24.2	24.2	24.2	24.2
Target	**23.7**	**23.7**	**23.7**	**23.7**
Min	22.2	22.2	22.2	22.2

Release 99

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 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	βc/βd	8/15

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)
W-CDMA Band II	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	24.1
		9400	1880.0	24.1
		9538	1907.6	24.1

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HSDPA

The following 4 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	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-Set1			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs =βhs/βc	30/15			

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)
W-CDMA Band II	Subtest 1	9262	1852.4	24.1
		9400	1880.0	24.1
		9538	1907.6	24.1
	Subtest 2	9262	1852.4	24.0
		9400	1880.0	24.0
		9538	1907.6	24.0
	Subtest 3	9262	1852.4	23.5
		9400	1880.0	23.6
		9538	1907.6	23.7
	Subtest 4	9262	1852.4	23.5
		9400	1880.0	23.6
		9538	1907.6	23.7

Maximum output power levels that are possible for all subtests reported.

Note(s):

KDB 941225 D01 – Body SAR is not required for HSDPA when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is < 75% of the SAR limit.

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HSPA (HSDPA & HSUPA)

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

	Mode	HSPA	HSPA	HSPA	HSPA	HSPA
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	15/15
	βec	209/225	12/15	30/15	2/15	24/15
	βc/βd	11/15	6/15	15/9	2/15	15/15
	βhs	22/15	12/15	30/15	4/15	30/15
	βed	1309/225	94/75	47/15 47/15	56/75	134/15
	CM (dB)	1.0	3.0	2.0	3.0	1.0
	MPR (dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = βhs/βc	30/15				
HSUPA Specific Settings	D E-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_TFCIs	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27	

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Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)
W-CDMA Band II	Subtest 1	9262	1852.4	23.2
		9400	1880.0	23.5
		9538	1907.6	23.8
	Subtest 2	9262	1852.4	21.9
		9400	1880.0	21.6
		9538	1907.6	22.0
	Subtest 3	9262	1852.4	22.7
		9400	1880.0	22.6
		9538	1907.6	22.9
	Subtest 4	9262	1852.4	22.5
		9400	1880.0	22.9
		9538	1907.6	22.6
	Subtest 5	9262	1852.4	23.9
		9400	1880.0	23.2
		9538	1907.6	23.5

Note(s):

KDB 941225 D01 – Body SAR is not required for handsets with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than ¼ dB higher than that measured without HSUPA/HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2kbps RMC is ≤ 75% of the SAR limit.

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DC-HSDPA

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS34.108 v9.5.0. A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

Table E.5.0: Levels for HSDPA connection setup

Parameter During Connection setup	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH _Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table. Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

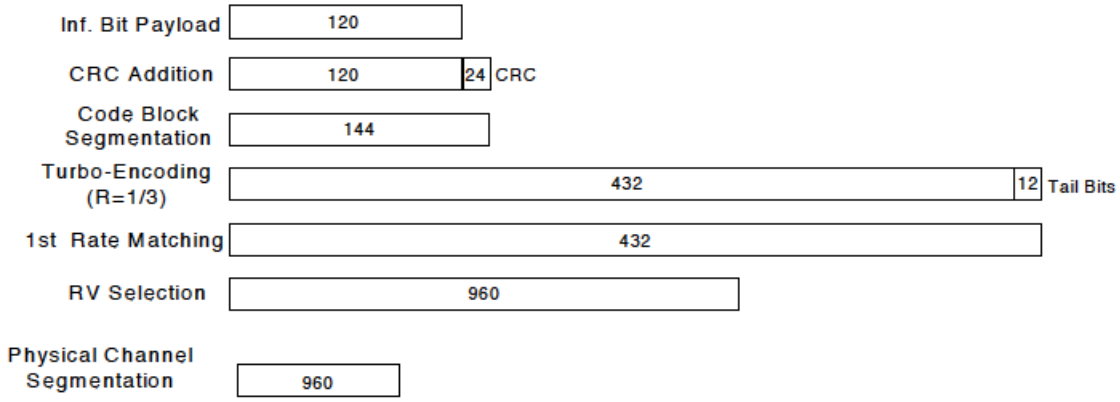

Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

The following 4 Sub-tests for HSDPA were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of subtest settings are illustrated below:

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	Mode	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack Repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs = βhs/ βc	30/15			

Up commands are set continuously to set the UE to Max power.

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)
W-CDMA Band II	Subtest 1	9262	1852.4	23.9
		9400	1880.0	24.0
		9538	1907.6	24.0
	Subtest 2	9262	1852.4	23.6
		9400	1880.0	23.6
		9538	1907.6	23.5
	Subtest 3	9262	1852.4	23.4
		9400	1880.0	23.5
		9538	1907.6	23.4
	Subtest 4	9262	1852.4	23.5
		9400	1880.0	23.6
		9538	1907.6	23.4

HSPA+

Since 16QAM is not used for uplink, the uplink Category and release is same as HSUPA, i.e., CAT 6 Rel 6. Therefore, the RF conducted power is not measured.

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9.1. W-CDMA Band IV

	Min	Max
Tune-up Tolerance (dB):	-1.5	0.5

Output Power Tolerance	Release 99 (dBm)	HSDPA (dBm)	HSUPA (dBm)	DC-HSPA (dBm)
Max	23.9	23.9	23.9	23.9
Target	**23.4**	**23.4**	**23.4**	**23.4**
Min	21.9	21.9	21.9	21.9

Release 99

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 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	βc/βd	8/15

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)
W-CDMA Band IV	Rel 99 (RMC, 12.2 kbps)	1312	1712.4	23.8
		1413	1732.6	23.8
		1513	1752.6	23.8

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HSDPA

The following 4 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	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-Set1			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs =βhs/βc	30/15			

Measured Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)
W-CDMA Band IV	Subtest 1	1312	1712.4	23.7
		1413	1732.6	23.7
		1513	1752.6	23.7
	Subtest 2	1312	1712.4	23.8
		1413	1732.6	23.8
		1513	1752.6	23.7
	Subtest 3	1312	1712.4	23.1
		1413	1732.6	23.2
		1513	1752.6	23.2
	Subtest 4	1312	1712.4	23.1
		1413	1732.6	23.2
		1513	1752.6	23.1

Maximum output power levels that are possible for all subtests reported.

Note(s):

KDB 941225 D01 – Body SAR is not required for HSDPA when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is < 75% of the SAR limit.

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HSPA (HSDPA & HSUPA)

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

	Mode	HSPA	HSPA	HSPA	HSPA	HSPA
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	15/15
	βec	209/225	12/15	30/15	2/15	24/15
	βc/βd	11/15	6/15	15/9	2/15	15/15
	βhs	22/15	12/15	30/15	4/15	30/15
	βed	1309/225	94/75	47/15 47/15	56/75	134/15
	CM (dB)	1.0	3.0	2.0	3.0	1.0
	MPR (dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = βhs/βc	30/15				
HSUPA Specific Settings	D E-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_TFCIs	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27	

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Measured Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)
W-CDMA Band IV	Subtest 1	1312	1712.4	23.5
		1413	1732.6	23.2
		1513	1752.6	23.2
	Subtest 2	1312	1712.4	22.5
		1413	1732.6	21.6
		1513	1752.6	22.0
	Subtest 3	1312	1712.4	22.1
		1413	1732.6	22.3
		1513	1752.6	22.5
	Subtest 4	1312	1712.4	22.1
		1413	1732.6	22.4
		1513	1752.6	22.4
	Subtest 5	1312	1712.4	23.2
		1413	1732.6	23.2
		1513	1752.6	23.2

Note(s):

KDB 941225 D01 – Body SAR is not required for handsets with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than ¼ dB higher than that measured without HSUPA/HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2kbps RMC is ≤ 75% of the SAR limit.

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DC-HSDPA (Rel 8, CAT 24)

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS34.108 v9.5.0. A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

Table E.5.0: Levels for HSDPA connection setup

Parameter During Connection setup	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH _Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table. Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

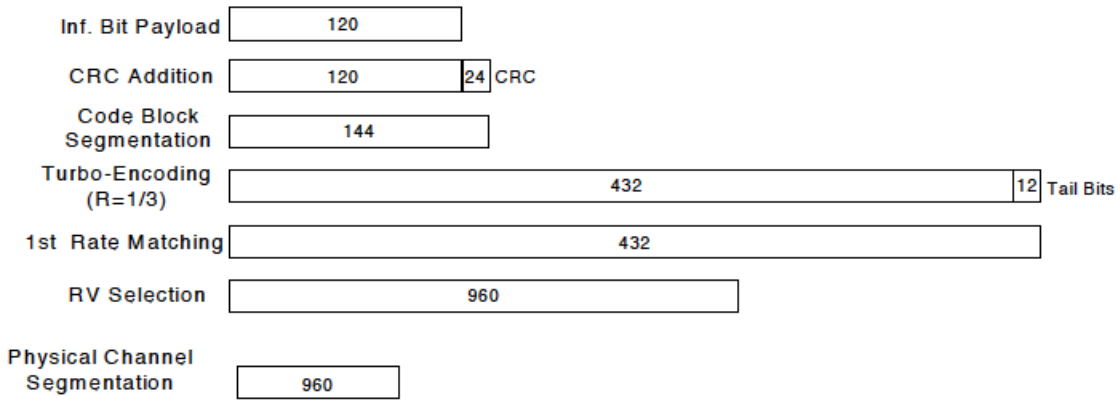

Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

The following 4 Sub-tests for HSDPA were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of subtest settings are illustrated below:

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	Mode	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack Repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs = βhs/ βc	30/15			

Up commands are set continuously to set the UE to Max power.

Measured Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)
W-CDMA Band IV	Subtest 1	1312	1712.4	23.8
		1413	1732.6	23.7
		1513	1752.6	23.7
	Subtest 2	1312	1712.4	23.3
		1413	1732.6	23.3
		1513	1752.6	23.3
	Subtest 3	1312	1712.4	23.3
		1413	1732.6	23.2
		1513	1752.6	23.2
	Subtest 4	1312	1712.4	23.3
		1413	1732.6	23.2
		1513	1752.6	23.1

HSPA+

Since 16QAM is not used for uplink, the uplink Category and release is same as HSUPA, i.e., CAT 6 Rel 6. Therefore, the RF conducted power is not measured.

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9.2. W-CDMA Band V

	Min	Max
Tune-up Tolerance (dB):	-1.5	0.5

Output Power Tolerance	Release 99 (dBm)	HSDPA (dBm)	HSUPA (dBm)	DC-HSPA (dBm)
Max	24.2	24.2	24.2	24.2
Target	**23.7**	**23.7**	**23.7**	**23.7**
Min	22.2	22.2	22.2	22.2

Release 99

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 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	βc/βd	8/15

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)
W-CDMA Band V	Rel 99 (RMC, 12.2 kbps)	4132	826.4	24.1
		4183	836.6	24.0
		4233	846.6	24.0

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HSDPA

The following 4 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	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-Set1			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs =βhs/βc	30/15			

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)
W-CDMA Band V	Subtest 1	4132	826.4	24.1
		4183	836.6	24.0
		4233	846.6	24.0
	Subtest 2	4132	826.4	24.1
		4183	836.6	24.2
		4233	846.6	24.0
	Subtest 3	4132	826.4	23.5
		4183	836.6	23.6
		4233	846.6	23.5
	Subtest 4	4132	826.4	23.6
		4183	836.6	23.6
		4233	846.6	23.5

Maximum output power levels that are possible for all subtests reported.

Note(s):

KDB 941225 D01 – Body SAR is not required for HSDPA when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is < 75% of the SAR limit.

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HSPA (HSDPA & HSUPA)

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

	Mode	HSPA	HSPA	HSPA	HSPA	HSPA
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	15/15
	βec	209/225	12/15	30/15	2/15	24/15
	βc/βd	11/15	6/15	15/9	2/15	15/15
	βhs	22/15	12/15	30/15	4/15	30/15
	βed	1309/225	94/75	47/15 47/15	56/75	134/15
	CM (dB)	1.0	3.0	2.0	3.0	1.0
	MPR (dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = βhs/βc	30/15				
HSUPA Specific Settings	D E-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_TFCIs	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27	

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Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)
W-CDMA Band V	Subtest 1	4132	826.4	23.5
		4183	836.6	23.5
		4233	846.6	22.6
	Subtest 2	4132	826.4	22.6
		4183	836.6	21.8
		4233	846.6	22.9
	Subtest 3	4132	826.4	22.7
		4183	836.6	22.7
		4233	846.6	22.4
	Subtest 4	4132	826.4	22.6
		4183	836.6	22.9
		4233	846.6	23.4
	Subtest 5	4132	826.4	23.3
		4183	836.6	23.2
		4233	846.6	23.2

Note(s):

KDB 941225 D01 – Body SAR is not required for handsets with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than ¼ dB higher than that measured without HSUPA/HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2kbps RMC is ≤ 75% of the SAR limit.

HSPA+

Since 16QAM is not used for uplink, the uplink Category and release is same as HSUPA, i.e., CAT 6 Rel 6. Therefore, the RF conducted power is not measured.

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DC-HSDPA (Rel 8, CAT 24)

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS34.108 v9.5.0. A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

Table E.5.0: Levels for HSDPA connection setup

Parameter During Connection setup	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH _Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table. Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

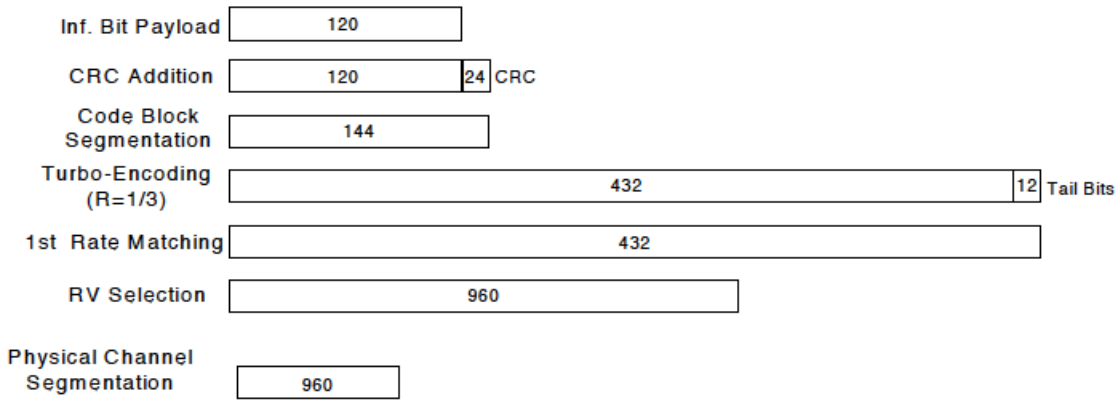

Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

The following 4 Sub-tests for HSDPA were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of subtest settings are illustrated below:

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	Mode	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack Repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs = βhs/ βc	30/15			

Up commands are set continuously to set the UE to Max power.

Measured Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)
W-CDMA Band V	Subtest 1	4132	826.4	24.1
		4180	836.0	24.1
		4230	846.0	24.2
	Subtest 2	4132	826.4	23.8
		4180	836.0	23.8
		4230	846.0	23.9
	Subtest 3	4132	826.4	23.7
		4180	836.0	23.7
		4230	846.0	23.7
	Subtest 4	4132	826.4	23.7
		4180	836.0	23.6
		4230	846.0	23.7

HSPA+

Since 16QAM is not used for uplink, the uplink Category and release is same as HSUPA, i.e., CAT 6 Rel 6. Therefore, the RF conducted power is not measured.

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9.3. LTE Band 2

	Min	Max
Tune-up Tolerance (dB):	-1.5	0.5

Output Power Tolerance	QPSK (dBm)	16QAM (dBm)
Max	23.7	23.7
Target	**23.2**	**23.2**
Min	21.7	21.7

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

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

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

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

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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 Signalling Value of “NS_01”.3

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

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23[1]	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-
Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.					

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Results

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)
10	18650	1855.0	QPSK	1	0	0	23.7
				1	24	0	23.7
				1	49	0	23.6
				25	0	1	22.5
				25	12	1	22.5
				25	24	1	22.6
				50	0	1	22.4
			16QAM	1	0	1	22.0
				1	24	1	22.1
				1	49	1	22.0
				25	0	2	21.6
				25	12	2	21.6
				25	24	2	21.5
				50	0	2	21.6
	18900	1880.0	QPSK	1	0	0	23.6
				1	24	0	23.5
				1	49	0	23.5
				25	0	1	22.6
				25	12	1	22.6
				25	24	1	22.5
				50	0	1	22.5
			16QAM	1	0	1	21.6
				1	24	1	21.7
				1	49	1	21.6
				25	0	2	21.6
				25	12	2	23.6
				25	24	2	23.5
				50	0	2	23.5
	19150	1905.0	QPSK	1	0	0	22.7
				1	24	0	22.7
				1	49	0	22.5
				25	0	1	22.7
				25	12	1	22.7
				25	24	1	22.5
				50	0	1	22.7
			16QAM	1	0	1	22.1
				1	24	1	22.2
				1	49	1	22.0
				25	0	2	22.5
				25	12	2	22.6
				25	24	2	21.6
				50	0	2	21.7

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LTE Band 2 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)
5	18625	1855.0	QPSK	1	0	0	23.6
				1	12	0	23.6
				1	24	0	23.6
				12	0	1	22.5
				12	6	1	22.4
				12	11	1	22.4
				25	0	1	22.4
			16QAM	1	0	1	22.6
				1	12	1	22.4
				1	24	1	22.7
				12	0	2	21.5
				12	6	2	21.5
				12	11	2	21.5
				25	0	2	21.6
	18900	1880.0	QPSK	1	0	0	23.6
				1	12	0	23.5
				1	24	0	23.6
				12	0	1	22.6
				12	6	1	22.6
				12	11	1	22.6
				25	0	1	22.5
			16QAM	1	0	1	22.6
				1	12	1	22.7
				1	24	1	22.3
				12	0	2	21.5
				12	6	2	21.6
				12	11	2	21.5
				25	0	2	21.6
	19175	1907.5	QPSK	1	0	0	23.4
				1	12	0	23.5
				1	24	0	23.4
				12	0	1	22.6
				12	6	1	22.7
				12	11	1	22.6
				25	0	1	22.6
			16QAM	1	0	1	22.3
				1	12	1	22.4
				1	24	1	21.7
				12	0	2	21.7
				12	6	2	21.7
				12	11	2	21.5
				25	0	2	21.6

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9.4. LTE Band 4

	Min	Max
Tune-up Tolerance (dB):	-1.5	0.5

Output Power Tolerance	QPSK (dBm)	16QAM (dBm)
Max	23.7	23.7
Target	**23.2**	**23.2**
Min	21.7	21.7

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

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

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

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

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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 Signalling Value of “NS_01”.3

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

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23[1]	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-
Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.					

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Results

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)
20	20050	1720.0	QPSK	1	0	0	23.7
				1	49	0	23.6
				1	99	0	23.6
				50	0	1	22.6
				50	24	1	22.4
				50	49	1	22.4
				100	0	1	22.4
			16QAM	1	0	1	22.3
				1	49	1	22.3
				1	99	1	22.3
				50	0	2	21.6
				50	24	2	21.4
				50	49	2	21.4
				100	0	2	21.5
	20175	1732.5	QPSK	1	0	0	23.5
				1	49	0	23.5
				1	99	0	23.5
				50	0	1	22.6
				50	24	1	22.6
				50	49	1	22.5
				100	0	1	22.5
			16QAM	1	0	1	22.4
				1	49	1	22.3
				1	99	1	22.3
				50	0	2	21.6
				50	24	2	21.6
				50	49	2	21.6
				100	0	2	21.5
	20300	1745.0	QPSK	1	0	0	23.6
				1	49	0	23.6
				1	99	0	23.5
				50	0	1	22.7
				50	24	1	22.6
				50	49	1	22.5
				100	0	1	22.5
			16QAM	1	0	1	22.5
				1	49	1	22.5
				1	99	1	22.5
				50	0	2	21.6
				50	24	2	21.6
				50	49	2	21.6
				100	0	2	21.5

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LTE Band 4 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)
15	20025	1717.5	QPSK	1	0	0	23.6
				1	37	0	23.5
				1	74	0	23.5
				36	0	1	22.5
				36	16	1	22.5
				36	35	1	22.4
				75	0	1	22.4
			16QAM	1	0	1	22.3
				1	37	1	22.1
				1	74	1	22.0
				36	0	2	21.6
				36	16	2	21.5
				36	35	2	21.5
				75	0	2	21.5
	20175	1732.5	QPSK	1	0	0	23.6
				1	37	0	23.6
				1	74	0	23.5
				36	0	1	22.6
				36	16	1	22.5
				36	35	1	22.6
				75	0	1	22.5
			16QAM	1	0	1	22.5
				1	37	1	22.4
				1	74	1	22.3
				36	0	2	21.6
				36	16	2	21.6
				36	35	2	21.5
				75	0	2	21.5
	20325	1747.5	QPSK	1	0	0	23.6
				1	37	0	23.5
				1	74	0	23.5
				36	0	1	22.7
				36	16	1	22.6
				36	35	1	22.5
				75	0	1	22.5
			16QAM	1	0	1	22.6
				1	37	1	22.6
				1	74	1	22.6
				36	0	2	21.7
				36	16	2	21.7
				36	35	2	21.6
				75	0	2	21.7

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LTE Band 4 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)
10	20000	1715.0	QPSK	1	0	0	23.5
				1	24	0	23.5
				1	49	0	23.6
				25	0	1	23.4
				25	12	1	22.4
				25	24	1	22.5
				50	0	1	22.5
			16QAM	1	0	1	22.6
				1	24	1	22.6
				1	49	1	22.6
				25	0	2	21.5
				25	12	2	21.6
				25	24	2	21.5
				50	0	2	21.6
	20175	1732.5	QPSK	1	0	0	23.7
				1	24	0	23.6
				1	49	0	23.5
				25	0	1	22.6
				25	12	1	22.4
				25	24	1	22.5
				50	0	1	22.5
			16QAM	1	0	1	22.5
				1	24	1	22.4
				1	49	1	22.3
				25	0	2	21.6
				25	12	2	21.4
				25	24	2	21.5
				50	0	2	21.5
	20350	1750.0	QPSK	1	0	0	23.6
				1	24	0	23.5
				1	49	0	23.5
				25	0	1	22.5
				25	12	1	22.5
				25	24	1	22.4
				50	0	1	22.5
			16QAM	1	0	1	22.3
				1	24	1	22.2
				1	49	1	22.2
				25	0	2	21.6
				25	12	2	21.6
				25	24	2	21.5
				50	0	2	21.6

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LTE Band 4 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)
5	19975	1712.5	QPSK	1	0	0	23.5
				1	12	0	23.5
				1	24	0	23.5
				12	0	1	22.5
				12	6	1	22.5
				12	11	1	22.5
				25	0	1	22.4
			16QAM	1	0	1	22.5
				1	12	1	22.5
				1	24	1	22.4
				12	0	2	21.6
				12	6	2	21.5
				12	11	2	21.6
				25	0	2	21.6
	20175	1732.5	QPSK	1	0	0	23.6
				1	12	0	23.6
				1	24	0	23.6
				12	0	1	22.5
				12	6	1	22.5
				12	11	1	22.5
				25	0	1	22.5
			16QAM	1	0	1	22.7
				1	12	1	22.6
				1	24	1	22.6
				12	0	2	21.5
				12	6	2	21.5
				12	11	2	21.4
				25	0	2	21.6
	20375	1752.5	QPSK	1	0	0	23.5
				1	12	0	23.4
				1	24	0	23.4
				12	0	1	22.6
				12	6	1	22.6
				12	11	1	22.6
				25	0	1	22.5
			16QAM	1	0	1	22.3
				1	12	1	22.1
				1	24	1	22.2
				12	0	2	21.6
				12	6	2	21.5
				12	11	2	21.6
				25	0	2	21.5

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9.5. LTE Band 17

	Min	Max
Tune-up Tolerance (dB):	-1.5	0.5

Output Power Tolerance	QPSK (dBm)	16QAM (dBm)
Max	23.7	23.7
Target	**23.2**	**23.2**
Min	21.7	21.7

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

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

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

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

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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 Signalling Value of “NS_01”.3

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

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23[1]	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-
Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.					

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Results

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)
10	23780	709.0	QPSK	1	0	0	23.6
				1	24	0	23.7
				1	49	0	23.7
				25	0	1	22.4
				25	12	1	22.4
				25	24	1	22.4
				50	0	1	22.4
			16QAM	1	0	1	22.2
				1	24	1	22.3
				1	49	1	22.2
				25	0	2	21.6
				25	12	2	21.6
				25	24	2	21.7
				50	0	2	21.5
	23790	710.0	QPSK	1	0	0	23.6
				1	24	0	23.6
				1	49	0	23.7
				25	0	1	22.5
				25	12	1	22.6
				25	24	1	22.5
				50	0	1	22.5
			16QAM	1	0	1	22.3
				1	24	1	22.4
				1	49	1	22.4
				25	0	2	21.7
				25	12	2	21.7
				25	24	2	21.7
				50	0	2	21.7
	23800	711.0	QPSK	1	0	0	23.6
				1	24	0	23.6
				1	49	0	23.6
				25	0	1	22.5
				25	12	1	22.5
				25	24	1	22.4
				50	0	1	22.4
			16QAM	1	0	1	22.0
				1	24	1	22.0
				1	49	1	22.1
				25	0	2	21.6
				25	12	2	21.6
				25	24	2	21.6
				50	0	2	21.6

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LTE Band 17 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)
5	23755	706.5	QPSK	1	0	0	23.5
				1	12	0	23.5
				1	24	0	23.6
				12	0	1	22.5
				12	6	1	22.4
				12	11	1	22.5
				25	0	1	22.4
			16QAM	1	0	1	22.3
				1	12	1	22.3
				1	24	1	22.3
				12	0	2	21.6
				12	6	2	21.6
				12	11	2	21.6
				25	0	2	21.5
	23790	710.0	QPSK	1	0	0	23.5
				1	12	0	23.6
				1	24	0	23.6
				12	0	1	22.5
				12	6	1	22.6
				12	11	1	22.5
				25	0	1	22.5
			16QAM	1	0	1	22.3
				1	12	1	22.4
				1	24	1	22.4
				12	0	2	21.6
				12	6	2	21.7
				12	11	2	21.7
				25	0	2	21.6
	23825	713.5	QPSK	1	0	0	23.6
				1	12	0	23.5
				1	24	0	23.4
				12	0	1	22.6
				12	6	1	22.5
				12	11	1	22.5
				25	0	1	22.5
			16QAM	1	0	1	22.4
				1	12	1	22.4
				1	24	1	22.3
				12	0	2	21.7
				12	6	2	21.7
				12	11	2	21.7
				25	0	2	21.6

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9.6. Wi-Fi (2.4 GHz)

Output Power Tolerance Table

Output Power Tolerance	IEEE 802.11 (dBm)		
	b	g	n (HT20)
Max	17.0	15.0	13.0
Target	16.0	14.0	12.0

Required Test Channels per KDB 248227 D01

Mode	Band	**GHz**	Channel	"Default Test Channels"	
				802.11b	802.11g
802.11b/g	2.4 GHz	**2.412**	1#	√	∇
		2.437	6	√	∇
		2.462	11#	√	∇

Notes:
√ = "default test channels"
∇ = possible 802.11g channels with maximum average output ¼ dB ≥ the "default test channels"
= when output power is reduced for channel 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested.

Band (MHz)	Mode	Ch #	Freq. (MHz)	Avg Pwr (dBm)	Note
2.4	802.11b	1	2412	16.5	
		6	2437	16.2	
		11	2462	16.0	
	802.11g	1	2412	14.1	
		6	2437	14.2	
		11	2462	13.9	
	802.11n (HT20)	1	2412	12.0	
		6	2437	11.8	
		11	2462	11.7	

Note(s):
Per KDB 248227 D01, SAR is not required for 802.11g/HT20 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

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9.7. Wi-Fi (5 GHz Bands)

Output Power Tolerance table

	IEEE 802.11 (dBm)		
	a	n (HT20)	n (HT40)
Max	12.0	11.0	11.0
Target	11.0	10.0	10.0

Required Test Channels per KDB 248227 D01

Mode		Band	GHz	Channel	"Default Test Channels"	
					802.11a	
802.11a	UNII (15.407)	5.2 GHz	5.180	36	√	
			5.200	40		*
			2.220	44		*
			5.240	48	√	
		5.3 GHz	5.260	52	√	
			5.280	56		*
			5.300	60		*
			5.320	64	√	
		5.5 GHz	5.500	100		
			5.520	104	√	
			5.540	108		*
			5.560	112		*
			5.580	116	√	
			5.600	120		*
			5.620	124	√	
			5.640	128		*
			5.660	132		*
			5.680	136	√	
			5.700	140		*
	DTS (15.247)	5.8 GHz	5.745	149	√	
			5.765	153		*
			5.785	157	√	
			5.805	161		*
			5.825	165	√	

√ = "default test channels"

* = possible 802.11a channels with maximum average output > the "default test channels"

= when output power is reduced for channel 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested.

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Band (MHz)	Mode	Ch #	Freq. (MHz)	Avg Pwr (dBm)
5.2	802.11a	36	5180	11.1
		40	5200	11.1
		44	5220	11.1
		48	5240	11.1
	802.11n (HT20)	36	5180	9.0
		40	5200	9.1
		48	5240	9.2
	802.11n (HT40)	38	5190	9.8
		46	5230	10.0
5.3	802.11a	52	5260	11.3
		56	5280	11.3
		60	5300	11.3
		64	5320	11.3
	802.11n (HT20)	52	5260	9.0
		60	5300	9.0
		64	5320	8.8
	802.11n (HT40)	54	5270	9.4
		62	5310	9.5
5.5	802.11a	100	5500	11.2
		104	5520	11.3
		108	5540	11.2
		112	5560	11.2
		116	5580	11.3
		120	5600	not supported
		124	5620	not supported
		128	5640	not supported
		132	5660	11.0
		136	5680	11.3
		140	5700	11.0
	802.11n (HT20)	100	5500	9.4
		116	5580	9.5
		140	5700	9.1
	802.11n (HT40)	102	5510	10.1
		118	5590	not supported
		134	5670	10.1
5.8	802.11a	149	5745	11.3
		153	5765	11.1
		157	5785	11.3
		161	5805	11.3
		165	5825	11.3
	802.11n (HT20)	149	5745	9.3
		157	5785	9.5
		161	5805	9.6
	802.11n (HT40)	151	5755	10.2
		159	5795	10.1

Note(s):

1. SAR is not required for 802.11n HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a/b channels. As per KDB 248227

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9.8. Bluetooth

Maximum tune-up tolerance limit is 11.5 dBm from the rated nominal maximum output power. This power level qualifies for exclusion of SAR testing. Refer to Section 14.1. Standalone SAR Test Exclusion Considerations

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10. Tissue Dielectric Properties

IEEE Std 1528-2003 Table 2

Target Frequency (MHz)	Head	
	ε_r	σ (S/m)
300	45.3	0.87
450	43.5	0.87
835	41.5	0.90
900	41.5	0.97
1450	40.5	1.20
1800 – 2000	40.0	1.40
2450	39.2	1.80
2600	39.0	1.96
3000	38.5	2.40

FCC OET Bulletin 65 Supplement C 01-01

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

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10.1. Composition of Ingredients for the Tissue Material Used in the SAR Tests

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
Water: De-ionized, 16 MΩ+ resistivity HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

Simulating Liquids for 5 GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	78
Mineral oil	11
Emulsifiers	9
Additives and Salt	2

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10.2. Tissue Dielectric Parameter Check Results

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 2°C of the temperature when the tissue parameters are characterized.

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

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

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
4/16/2013	Head 2450	e'	38.5400	Relative Permittivity (ε_r):	38.54	39.20	-1.68	5
		e"	13.5600	Conductivity (σ):	1.85	1.80	2.62	5
	Head 2410	e'	38.7200	Relative Permittivity (ε_r):	38.72	39.28	-1.42	5
		e"	13.4300	Conductivity (σ):	1.80	1.76	2.23	5
	Head 2475	e'	38.4500	Relative Permittivity (ε_r):	38.45	39.17	-1.83	5
		e"	13.6300	Conductivity (σ):	1.88	1.83	2.67	5
4/16/2013	Body 2450	e'	50.5300	Relative Permittivity (ε_r):	50.53	52.70	-4.12	5
		e"	14.8200	Conductivity (σ):	2.02	1.95	3.53	5
	Body 2410	e'	50.7200	Relative Permittivity (ε_r):	50.72	52.76	-3.87	5
		e"	14.6400	Conductivity (σ):	1.96	1.91	2.85	5
	Body 2475	e'	50.4700	Relative Permittivity (ε_r):	50.47	52.67	-4.17	5
		e"	14.9100	Conductivity (σ):	2.05	1.99	3.36	5
4/18/2013	Body 1750	e'	54.4400	Relative Permittivity (ε_r):	54.44	53.44	1.87	5
		e"	14.8000	Conductivity (σ):	1.44	1.49	-3.10	5
	Body 1710	e'	54.5600	Relative Permittivity (ε_r):	54.56	53.54	1.90	5
		e"	14.7200	Conductivity (σ):	1.40	1.46	-4.24	5
	Body 1755	e'	54.4600	Relative Permittivity (ε_r):	54.46	53.43	1.93	5
		e"	14.8000	Conductivity (σ):	1.44	1.49	-3.02	5
4/19/2013	Body 835	e'	53.4400	Relative Permittivity (ε_r):	53.44	55.20	-3.19	5
		e"	21.7700	Conductivity (σ):	1.01	0.97	4.20	5
	Body 820	e'	53.5700	Relative Permittivity (ε_r):	53.57	55.28	-3.09	5
		e"	21.8300	Conductivity (σ):	1.00	0.97	2.77	5
	Body 850	e'	53.2800	Relative Permittivity (ε_r):	53.28	55.16	-3.40	5
		e"	21.7300	Conductivity (σ):	1.03	0.99	4.04	5
4/19/2013	Body 1900	e'	51.7200	Relative Permittivity (ε_r):	51.72	53.30	-2.96	5
		e"	14.9700	Conductivity (σ):	1.58	1.52	4.05	5
	Body 1850	e'	51.9500	Relative Permittivity (ε_r):	51.95	53.30	-2.53	5
		e"	14.8500	Conductivity (σ):	1.53	1.52	0.50	5
	Body 1910	e'	51.7000	Relative Permittivity (ε_r):	51.70	53.30	-3.00	5
		e"	15.0000	Conductivity (σ):	1.59	1.52	4.80	5
4/22/2013	Body 1750	e'	52.4800	Relative Permittivity (ε_r):	52.48	53.44	-1.80	5
		e"	15.5000	Conductivity (σ):	1.51	1.49	1.49	5
	Body 1710	e'	52.6200	Relative Permittivity (ε_r):	52.62	53.54	-1.72	5
		e"	15.4000	Conductivity (σ):	1.46	1.46	0.19	5
	Body 1755	e'	52.4600	Relative Permittivity (ε_r):	52.46	53.43	-1.81	5
		e"	15.5300	Conductivity (σ):	1.52	1.49	1.76	5
4/24/2013	Head 1750	e'	38.5100	Relative Permittivity (ε_r):	38.51	40.08	-3.93	5
		e"	13.9900	Conductivity (σ):	1.36	1.37	-0.56	5
	Head 1710	e'	38.6900	Relative Permittivity (ε_r):	38.69	40.15	-3.63	5
		e"	13.9100	Conductivity (σ):	1.32	1.35	-1.77	5
	Head 1755	e'	38.5100	Relative Permittivity (ε_r):	38.51	40.08	-3.91	5
		e"	14.0000	Conductivity (σ):	1.37	1.37	-0.41	5

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Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
4/24/2013	Body 5180	e'	47.6400	Relative Permittivity (ε_r):	47.64	49.05	-2.87	10
		e"	18.5500	Conductivity (σ):	5.34	5.27	1.36	5
	Body 5200	e'	47.6300	Relative Permittivity (ε_r):	47.63	49.02	-2.83	10
		e"	18.6300	Conductivity (σ):	5.39	5.29	1.74	5
	Body 5600	e'	47.1800	Relative Permittivity (ε_r):	47.18	48.48	-2.68	10
		e"	18.9200	Conductivity (σ):	5.89	5.76	2.26	5
	Body 5800	e'	46.7700	Relative Permittivity (ε_r):	46.77	48.20	-2.97	10
		e"	19.0800	Conductivity (σ):	6.15	6.00	2.55	5
	Body 5825	e'	46.6700	Relative Permittivity (ε_r):	46.67	48.20	-3.17	10
		e"	19.2200	Conductivity (σ):	6.23	6.00	3.75	5
4/25/2013	Head 835	e'	40.7900	Relative Permittivity (ε_r):	40.79	41.50	-1.71	5
		e"	19.6900	Conductivity (σ):	0.91	0.90	1.58	5
	Head 820	e'	41.0100	Relative Permittivity (ε_r):	41.01	41.60	-1.42	5
		e"	19.7200	Conductivity (σ):	0.90	0.90	0.07	5
	Head 850	e'	40.6100	Relative Permittivity (ε_r):	40.61	41.50	-2.14	5
		e"	19.6300	Conductivity (σ):	0.93	0.92	1.40	5
4/26/2013	Body 750	e'	55.3500	Relative Permittivity (ε_r):	55.35	55.55	-0.35	5
		e"	23.3700	Conductivity (σ):	0.97	0.96	1.19	5
	Body 710	e'	55.7600	Relative Permittivity (ε_r):	55.76	55.70	0.11	5
		e"	23.7200	Conductivity (σ):	0.94	0.96	-2.46	5
	Body 790	e'	54.9800	Relative Permittivity (ε_r):	54.98	55.39	-0.74	5
		e"	23.0600	Conductivity (σ):	1.01	0.97	4.84	5
4/26/2013	Head 5180	e'	34.1500	Relative Permittivity (ε_r):	34.15	36.01	-5.17	10
		e"	15.4100	Conductivity (σ):	4.44	4.63	-4.15	5
	Head 5200	e'	34.1100	Relative Permittivity (ε_r):	34.11	35.99	-5.22	10
		e"	15.3800	Conductivity (σ):	4.45	4.65	-4.39	5
	Head 5600	e'	33.5600	Relative Permittivity (ε_r):	33.56	35.53	-5.55	10
		e"	15.4500	Conductivity (σ):	4.81	5.06	-4.93	5
	Head 5800	e'	33.2900	Relative Permittivity (ε_r):	33.29	35.30	-5.69	10
		e"	15.5700	Conductivity (σ):	5.02	5.27	-4.72	5
	Head 5825	e'	33.2700	Relative Permittivity (ε_r):	33.27	35.30	-5.75	10
		e"	15.5800	Conductivity (σ):	5.05	5.27	-4.25	5
4/30/2013	Head 5180	e'	35.4700	Relative Permittivity (ε_r):	35.47	36.01	-1.51	10
		e"	15.4300	Conductivity (σ):	4.44	4.63	-4.02	5
	Head 5200	e'	35.4100	Relative Permittivity (ε_r):	35.41	35.99	-1.61	10
		e"	15.4200	Conductivity (σ):	4.46	4.65	-4.14	5
	Head 5600	e'	35.0400	Relative Permittivity (ε_r):	35.04	35.53	-1.39	10
		e"	15.5400	Conductivity (σ):	4.84	5.06	-4.38	5
	Head 5800	e'	34.9900	Relative Permittivity (ε_r):	34.99	35.30	-0.88	10
		e"	15.6900	Conductivity (σ):	5.06	5.27	-3.98	5
	Head 5825	e'	34.8500	Relative Permittivity (ε_r):	34.85	35.30	-1.27	10
		e"	15.5000	Conductivity (σ):	5.02	5.27	-4.74	5
5/3/2013	Head 5180	e'	36.4000	Relative Permittivity (ε_r):	36.40	36.01	1.07	10
		e"	15.5700	Conductivity (σ):	4.48	4.63	-3.15	5
	Head 5200	e'	36.2900	Relative Permittivity (ε_r):	36.29	35.99	0.83	10
		e"	15.5500	Conductivity (σ):	4.50	4.65	-3.33	5
	Head 5600	e'	36.0800	Relative Permittivity (ε_r):	36.08	35.53	1.54	10
		e"	15.6900	Conductivity (σ):	4.89	5.06	-3.45	5
	Head 5800	e'	35.9400	Relative Permittivity (ε_r):	35.94	35.30	1.81	10
		e"	15.8300	Conductivity (σ):	5.11	5.27	-3.13	5
	Head 5825	e'	35.8600	Relative Permittivity (ε_r):	35.86	35.30	1.59	10
		e"	15.7200	Conductivity (σ):	5.09	5.27	-3.39	5

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Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
5/6/2013	Body 1900	e'	51.5300	Relative Permittivity (ε_r):	51.53	53.30	-3.32	5
		e''	14.7300	Conductivity (σ):	1.56	1.52	2.38	5
	Body 1850	e'	51.7200	Relative Permittivity (ε_r):	51.72	53.30	-2.96	5
		e''	14.5900	Conductivity (σ):	1.50	1.52	-1.26	5
	Body 1910	e'	51.4900	Relative Permittivity (ε_r):	51.49	53.30	-3.40	5
		e''	14.7400	Conductivity (σ):	1.57	1.52	2.99	5
5/6/2013	Head 1900	e'	39.4000	Relative Permittivity (ε_r):	39.40	40.00	-1.50	5
		e''	13.6500	Conductivity (σ):	1.44	1.40	3.00	5
	Head 1850	e'	39.6200	Relative Permittivity (ε_r):	39.62	40.00	-0.95	5
		e''	13.5300	Conductivity (σ):	1.39	1.40	-0.59	5
	Head 1910	e'	39.3600	Relative Permittivity (ε_r):	39.36	40.00	-1.60	5
		e''	13.6500	Conductivity (σ):	1.45	1.40	3.55	5
5/6/2013	Head 835	e'	43.2600	Relative Permittivity (ε_r):	43.26	41.50	4.24	5
		e''	20.2600	Conductivity (σ):	0.94	0.90	4.52	5
	Head 820	e'	43.4400	Relative Permittivity (ε_r):	43.44	41.60	4.42	5
		e''	20.3000	Conductivity (σ):	0.93	0.90	3.02	5
	Head 850	e'	43.0600	Relative Permittivity (ε_r):	43.06	41.50	3.76	5
		e''	20.1800	Conductivity (σ):	0.95	0.92	4.24	5
5/10/2013	Head 1750	e'	39.4900	Relative Permittivity (ε_r):	39.49	40.08	-1.48	5
		e''	14.1500	Conductivity (σ):	1.38	1.37	0.58	5
	Head 1710	e'	39.6500	Relative Permittivity (ε_r):	39.65	40.15	-1.24	5
		e''	14.0300	Conductivity (σ):	1.33	1.35	-0.92	5
	Head 1755	e'	39.4500	Relative Permittivity (ε_r):	39.45	40.08	-1.56	5
		e''	14.1600	Conductivity (σ):	1.38	1.37	0.73	5
5/14/2013	Body 750	e'	55.5100	Relative Permittivity (ε_r):	55.51	55.55	-0.07	5
		e''	23.3800	Conductivity (σ):	0.98	0.96	1.24	5
	Body 700	e'	56.0300	Relative Permittivity (ε_r):	56.03	55.74	0.52	5
		e''	23.8400	Conductivity (σ):	0.93	0.96	-3.27	5
	Body 790	e'	55.1300	Relative Permittivity (ε_r):	55.13	55.39	-0.47	5
		e''	23.0900	Conductivity (σ):	1.01	0.97	4.98	5
5/14/2013	Head 750	e'	41.2200	Relative Permittivity (ε_r):	41.22	41.96	-1.77	5
		e''	21.6600	Conductivity (σ):	0.90	0.89	1.14	5
	Head 700	e'	41.8500	Relative Permittivity (ε_r):	41.85	42.22	-0.87	5
		e''	22.0100	Conductivity (σ):	0.86	0.89	-3.66	5
	Head 790	e'	40.7000	Relative Permittivity (ε_r):	40.70	41.76	-2.53	5
		e''	21.3500	Conductivity (σ):	0.94	0.90	4.65	5
5/15/2013	Head 900	e'	41.0100	Relative Permittivity (ε_r):	41.01	41.50	-1.18	5
		e''	19.2900	Conductivity (σ):	0.97	0.97	-0.48	5
	Head 880	e'	41.1900	Relative Permittivity (ε_r):	41.19	41.50	-0.75	5
		e''	19.4000	Conductivity (σ):	0.95	0.95	0.45	5
	Head 915	e'	40.8400	Relative Permittivity (ε_r):	40.84	41.50	-1.59	5
		e''	19.2900	Conductivity (σ):	0.98	0.98	0.14	5

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11. System Performance 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 remeasured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

11.1. 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 ± 0.5 cm for SAR measurements ≤ 3 GHz and ≥ 10.0 cm ± 0.5 cm for measurements > 3 GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- Distance between probe sensors and phantom surface was set to 3 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was 100 mW.
- The results are normalized to 1 W input power.

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11.2. Reference SAR Values for System Performance Check

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 (mW/g)		
				1g/10g	Head	Body
D750V3	1019	03/05/2013	750	1g	8.50	8.68
				10g	5.59	5.75
D835V2	4d002	10/24/12	835	1g	9.58	9.48
				10g	6.28	6.26
D1900V2	5d043	11/6/12	1900	1g	39.9	40.9
				10g	20.9	21.6
D1750V2	1053	08/15/12	1750	1g	35.9	37.5
				10g	19.1	20.2
D2450V2	899	10/5/12	2450	1g	53.6	51.7
				10g	25.0	24.3
D5GHzV2	1138	10/9/2012	5200	1g	79.5	73.2
				10g	22.8	20.4
			5500	1g	83.6	77.9
				10g	23.8	21.7
			5800	1g	78.7	72.8
				10g	22.4	20.1

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11.3. System Performance 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.

Date Tested	System Dipole		T.S. Liquid		Measured Results			Target (Ref. Value)	Delta ±10 %	Est./Zoom Ratio ±3 %	Plot No.
	Type	Serial #			Area Scan	Zoom Scan	Normalize to 1 W				
4/17/2013	D2450V2	899	Head	1g	5.71	5.490	54.90	53.60	2.43	3.85	1
				10g	2.50	2.500	25.00	25.00	0.00		
4/17/2013	D2450V2	899	Body	1g	5.31	5.33	53.30	51.70	3.09	-0.38	2
				10g	2.280	2.49	24.90	24.30	2.47		
4/18/2013	D1750V2	1053	Body	1g	3.81	3.700	37.00	37.50	-1.33	2.89	3
				10g	1.960	1.960	19.60	20.20	-2.97		
4/18/2013	D5GHzV3 (5200GHz)	1138	Body	1g	6.70	7.02	70.20	73.2	-4.10	-4.78	4
				10g	1.86	2.00	20.00	20.4	-1.96		
4/18/2013	D5GHzV3 (5600GHz)	1138	Body	1g	7.53	7.85	78.50	77.9	0.77	-4.25	5
				10g	2.08	2.21	22.10	21.7	1.84		
4/18/2013	D5GHzV3 (5800GHz)	1138	Body	1g	6.88	7.360	73.60	72.80	1.10	-6.98	6
				10g	1.880	2.060	20.60	20.10	2.49		
4/19/2013	D835V2	4d002	Body	1g	1.00	0.98	9.75	9.48	2.85	2.50	7
				10g	0.671	0.64	6.41	6.26	2.40		
4/19/2013	D1900V2	5d043	Body	1g	3.86	3.88	38.80	40.9	-5.13	-0.52	8
				10g	1.98	2.04	20.40	21.6	-5.56		
4/22/2013	D1900V2	5d043	Body	1g	3.78	3.98	39.80	40.9	-2.69	-5.29	9
				10g	1.92	2.09	20.90	21.6	-3.24		
4/22/2013	D1900V2	5d043	Head	1g	4.27	4.11	41.10	39.9	3.01	3.75	10
				10g	2.17	2.13	21.30	20.9	1.91		
4/22/2013	D1750V2	1053	Body	1g	3.74	3.670	36.70	37.50	-2.13	1.87	11
				10g	1.930	1.950	19.50	20.20	-3.47		
4/24/2013	D5GHzV3 (5200GHz)	1138	Body	1g	6.77	7.12	71.20	73.2	-2.73	-5.17	12
				10g	1.900	2.03	20.30	20.4	-0.49		
4/24/2013	D5GHzV3 (5600GHz)	1138	Body	1g	7.51	7.82	78.20	77.9	0.39	-4.13	13
				10g	2.07	2.20	22.00	21.7	1.38		
4/24/2013	D5GHzV3 (5800GHz)	1138	Body	1g	6.29	6.65	66.50	72.80	-8.65	-5.72	14
				10g	1.73	1.87	18.70	20.10	-6.97		
4/24/2013	D1750V2	1053	Head	1g	3.82	3.69	36.90	35.90	2.79	3.40	15
				10g	2.01	1.94	19.40	19.10	1.57		
4/25/2013	D835V2	4d002	Head	1g	0.958	0.934	9.34	9.58	-2.51	2.51	16
				10g	0.644	0.609	6.09	6.28	-3.03		

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Date Tested	System Dipole		T.S. Liquid		Measured Results			Target (Ref. Value)	Delta ±10 %	Est./Zoom Ratio ±3 %	Plot No.
	Type	Serial #			Area Scan	Zoom Scan	Normalize to 1 W				
4/26/2013	D5GHzV3 (5200GHz)	1138	Head	1g	7.08	7.56	75.6	79.5	-4.91	-6.78	17
				10g	1.99	2.20	22.0	22.8	-3.51		
4/26/2013	D5GHzV3 (5600GHz)	1138	Head	1g	7.96	8.53	85.30	83.60	2.03	-7.16	18
				10g	2.21	2.45	24.50	23.80	2.94		
4/26/2013	D5GHzV3 (5800GHz)	1138	Head	1g	7.18	7.92	79.20	78.70	0.64	-10.31	19
				10g	1.97	2.26	22.60	22.40	0.89		
4/29/2013	D1900V2	5d043	Body	1g	3.85	3.85	38.5	40.9	-5.87	0.00	20
				10g	1.95	2.02	20.2	21.6	-6.48		
4/29/2013	D1750V2	1053	Body	1g	3.65	3.590	35.90	37.50	-4.27	1.64	21
				10g	1.900	1.900	19.00	20.20	-5.94		
4/30/2013	D5GHzV3 (5200GHz)	1138	Head	1g	7.22	7.66	76.6	79.5	-3.65	-6.09	22
				10g	2.05	2.24	22.4	22.8	-1.75		
4/30/2013	D5GHzV3 (5600GHz)	1138	Head	1g	7.66	8.25	82.50	83.60	-1.32	-7.70	23
				10g	2.14	2.37	23.70	23.80	-0.42		
4/30/2013	D5GHzV3 (5800GHz)	1138	Head	1g	7.02	7.62	76.20	78.70	-3.18	-8.55	24
				10g	1.95	2.19	21.90	22.40	-2.23		
5/3/2013	D5GHzV3 (5600GHz)	1138	Head	1g	7.92	8.46	84.60	83.60	1.20	-6.82	25
				10g	2.19	2.44	24.40	23.80	2.52		
5/3/2013	D5GHzV3 (5800GHz)	1138	Head	1g	7.28	7.93	79.30	78.70	0.76	-8.93	26
				10g	2.00	2.27	22.70	22.40	1.34		
5/6/2013	D1900V2	5d043	Body	1g	3.84	3.84	38.4	40.9	-6.11	0.00	27
				10g	1.95	2.02	20.2	21.6	-6.48		
5/6/2013	D1900V2	5d043	Head	1g	4.18	4.06	40.6	39.9	1.75	2.87	28
				10g	2.15	2.09	20.9	20.9	0.00		
5/6/2013	D835V2	4d002	Head	1g	0.910	0.89	8.9	9.58	-6.99	2.09	29
				10g	0.611	0.58	5.8	6.28	-7.32		
5/10/2013	D1750V2	1053	Body	1g	3.71	3.670	36.70	37.50	-2.13	1.08	30
				10g	1.990	1.940	19.40	20.20	-3.96		
5/14/2013	D750V3	1019	Body	1g	0.912	0.892	8.92	8.68	2.76	2.19	31
				10g	0.616	0.592	5.92	5.75	2.96		
5/14/2013	D750V3	1019	Head	1g	0.85	0.840	8.40	8.50	-1.18	1.18	32
				10g	0.577	0.550	5.50	5.59	-1.61		
5/15/2013	D1750V2	1053	Body	1g	3.85	3.700	37.00	37.50	-1.33	3.90	33
				10g	2.060	1.940	19.40	20.20	-3.96		

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12. SAR Test Results

12.1. GSM850

12.1.1. Head Exposure Conditions

Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
				Tune-up limit	Meas.	Meas.	Scaled		
Left Touch	Voice	128	824.2	33.2	33.1				1
		190	836.6	33.2	33.1	0.171	0.175		
		251	848.8	33.2	33.1				1
Left Tilt (15°)	Voice	128	824.2	33.2	33.1				1
		190	836.6	33.2	33.1	0.116	0.119		
		251	848.8	33.2	33.1				1
Right Touch	Voice	128	824.2	33.2	33.1				1
		190	836.6	33.2	33.1	0.153	0.157		
		251	848.8	33.2	33.1				1
Right Tilt (15°)	Voice	128	824.2	33.2	33.1				1
		190	836.6	33.2	33.1	0.107	0.109		
		251	848.8	33.2	33.1				1

Head Exposure Conditions (VoIP mode)

Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
				Tune-up limit	Meas.	Meas.	Scaled		
Left Touch	GPRS 4 slots	128	824.2	29.2	28.7				1
		190	836.6	29.2	28.8	0.230	**0.252**	1	
		251	848.8	29.2	28.9				1
Left Tilt (15°)	GPRS 4 slots	128	824.2	29.2	28.7				1
		190	836.6	29.2	28.8	0.166	0.182		
		251	848.8	29.2	28.9				1
Right Touch	GPRS 4 slots	128	824.2	29.2	28.7				1
		190	836.6	29.2	28.8	0.225	0.247		
		251	848.8	29.2	28.9				1
Right Tilt (15°)	GPRS 4 slots	128	824.2	29.2	28.7				1
		190	836.6	29.2	28.8	0.174	0.191		
		251	848.8	29.2	28.9				1

Note(s):

1. According to KDB 447498, 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.

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12.1.2. Body-worn Accessory Exposure Conditions

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Rear	Voice	10	128	824.2	33.2	33.1				1
			190	836.6	33.2	33.1	0.500	**0.512**	2	
			251	848.8	33.2	33.1				1
Front	Voice	10	128	824.2	33.2	33.1				1
			190	836.6	33.2	33.1	0.221	0.226		
			251	848.8	33.2	33.1				1

Body-worn Accessory Exposure Conditions (VoIP mode)

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Rear	GPRS 4 slots	10	128	824.2	29.2	28.7				1
			190	836.6	29.2	28.8	0.653	0.716		
			251	848.8	29.2	28.9				1
Front	GPRS 4 slots	10	128	824.2	29.2	28.7				1
			190	836.6	29.2	28.8	0.308	0.338		
			251	848.8	29.2	28.9				1

Note(s):

1. According to KDB 447498, 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.

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12.1.3. Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Rear	GPRS 4 slots	10	128	824.2	29.2	28.7				1
			190	836.6	29.2	28.8	0.653	**0.716**	3	
			251	848.8	29.2	28.9				1
Front	GPRS 4 slots	10	128	824.2	29.2	28.7				1
			190	836.6	29.2	28.8	0.308	0.338		
			251	848.8	29.2	28.9				1
Edge 2	GPRS 4 slots	10	128	824.2	29.2	28.7				1
			190	836.6	29.2	28.8	0.219	0.240		
			251	848.8	29.2	28.9				1
Edge 3	GPRS 4 slots	10	128	824.2	29.2	28.7				1
			190	836.6	29.2	28.8	0.059	0.065		
			251	848.8	29.2	28.9				1
Edge 4	GPRS 4 slots	10	128	824.2	29.2	28.7				1
			190	836.6	29.2	28.8	0.361	0.396		
			251	848.8	29.2	28.9				1

Note(s):

1. According to KDB 447498, 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.

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12.2. GSM1900

12.2.1. Head Exposure Conditions

Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
				Tune-up limit	Meas.	Meas.	Scaled		
Left Touch	Voice	512	1850.2	31.2	30.9				1
		661	1880.0	31.2	31.2	0.306	0.306		
		810	1909.8	31.2	30.9				1
Left Tilt (15°)	Voice	512	1850.2	31.2	30.9				1
		661	1880.0	31.2	31.2	0.100	0.100		
		810	1909.8	31.2	30.9				1
Right Touch	Voice	512	1850.2	31.2	30.9				1
		661	1880.0	31.2	31.2	0.256	0.256		
		810	1909.8	31.2	30.9				1
Right Tilt (15°)	Voice	512	1850.2	31.2	30.9				1
		661	1880.0	31.2	31.2	0.097	0.097		
		810	1909.8	31.2	30.9				1

Head Exposure Conditions (VoIP mode)

Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
				Tune-up limit	Meas.	Meas.	Scaled		
Left Touch	GPRS 4 Slots	512	1850.2	26.7	26.7				1
		661	1880.0	26.7	26.6	0.504	**0.516**	4	
		810	1909.8	26.7	26.5				1
Left Tilt (15°)	GPRS 4 Slots	512	1850.2	26.7	26.7				1
		661	1880.0	26.7	26.6	0.159	0.163		
		810	1909.8	26.7	26.5				1
Right Touch	GPRS 4 Slots	512	1850.2	26.7	26.7				1
		661	1880.0	26.7	26.6	0.416	0.426		
		810	1909.8	26.7	26.5				1
Right Tilt (15°)	GPRS 4 Slots	512	1850.2	26.7	26.7				1
		661	1880.0	26.7	26.6	0.170	0.174		
		810	1909.8	26.7	26.5				1

Note(s):

1. According to KDB 447498, 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.

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12.2.2. Body-worn Accessory Exposure Conditions

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Rear	Voice	10	512	1850.2	31.2	30.9				1
			661	1880.0	31.2	31.2	0.421	**0.421**	5	
			810	1909.8	31.2	30.9				1
Front	Voice	10	512	1850.2	31.2	30.9				1
			661	1880.0	31.2	31.2	0.291	0.291		
			810	1909.8	31.2	30.9				1

Body-worn Accessory Exposure Conditions (VoIP mode)

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Rear	GPRS 4 slots	10	512	1850.2	26.7	26.7	0.782	0.782		
			661	1880.0	26.7	26.6	0.791	0.809		
			810	1909.8	26.7	26.5	0.718	0.752		
Front	GPRS 4 slots	10	512	1850.2	26.7	26.7				1
			661	1880.0	26.7	26.6	0.549	0.562		
			810	1909.8	26.7	26.5				1

Note(s):

1. According to KDB 447498, 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.

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12.2.3. Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Rear	GPRS 4 slots	10	512	1850.2	26.7	26.7	0.782	0.782		
			661	1880.0	26.7	26.6	0.791	**0.809**	6	
			810	1909.8	26.7	26.5	0.718	0.752		
Front	GPRS 4 slots	10	512	1850.2	26.7	26.7				1
			661	1880.0	26.7	26.6	0.549	0.562		
			810	1909.8	26.7	26.5				1
Edge 2	GPRS 4 slots	10	512	1850.2	26.7	26.7				1
			661	1880.0	26.7	26.6	0.103	0.105		
			810	1909.8	26.7	26.5				1
Edge 3	GPRS 4 slots	10	512	1850.2	26.7	26.7				1
			661	1880.0	26.7	26.6	0.573	0.586		
			810	1909.8	26.7	26.5				1
Edge 4	GPRS 4 slots	10	512	1850.2	26.7	26.7				1
			661	1880.0	26.7	26.6	0.264	0.270		
			810	1909.8	26.7	26.5				1

Note(s):

1. According to KDB 447498, 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

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12.3. W-CDMA Band II

12.3.1. Head Exposure Conditions

Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
				Tune-up limit	Meas.	Meas.	Scaled		
Left Touch	Rel 99 RMC 12.2kbps	9262	1852.4	24.2	24.1				1
		9400	1880.0	24.2	24.1	0.756	**0.774**	7	
		9538	1907.6	24.2	24.2				1
Left Tilt (15°)	Rel 99 RMC 12.2kbps	9262	1852.4	24.2	24.1				1
		9400	1880.0	24.2	24.1	0.245	0.251		
		9538	1907.6	24.2	24.2				1
Right Touch	Rel 99 RMC 12.2kbps	9262	1852.4	24.2	24.1				1
		9400	1880.0	24.2	24.1	0.607	0.621		
		9538	1907.6	24.2	24.2				1
Right Tilt (15°)	Rel 99 RMC 12.2kbps	9262	1852.4	24.2	24.1				1
		9400	1880.0	24.2	24.1	0.255	0.261		
		9538	1907.6	24.2	24.2				1

12.3.2. Body-worn Accessory & Hotspot Exposure Conditions

Body-worn Accessory & Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Rear	Rel 99 RMC 12.2kbps	10	9262	1852.4	24.2	24.1	1.050	1.074		
			9400	1880.0	24.2	24.1	1.050	**1.074**	8	
			9538	1907.6	24.2	24.2	1.000	1.000		
Front	Rel 99 RMC 12.2kbps	10	9262	1852.4	24.2	24.1	0.830	0.849		
			9400	1880.0	24.2	24.1	0.882	0.903		
			9538	1907.6	24.2	24.2	0.836	0.836		1

Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Edge 2	Rel 99 RMC 12.2kbps	10	9262	1852.4	24.2	24.1				1
			9400	1880.0	24.2	24.1	0.178	0.182		
			9538	1907.6	24.2	24.2				1
Edge 3	Rel 99 RMC 12.2kbps	10	9262	1852.4	24.2	24.1	1.010	1.034		1
			9400	1880.0	24.2	24.1	0.821	0.840		
			9538	1907.6	24.2	24.2	0.661	0.661		1
Edge 4	Rel 99 RMC 12.2kbps	10	9262	1852.4	24.2	24.1				1
			9400	1880.0	24.2	24.1	0.371	0.380		
			9538	1907.6	24.2	24.2				1

Note(s):

1. According to KDB 447498, 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.

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12.4. W-CDMA Band IV

12.4.1. Head Exposure Conditions

Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
				Tune-up limit	Meas.	Meas.	Scaled		
Left Touch	Rel 99 RMC 12.2kbps	1312	1712.4	23.9	23.8	0.764	0.782		1
		1413	1732.6	23.9	23.8	0.839	**0.859**	9	
		1513	1752.6	23.9	23.8	0.762	0.780		1
Left Tilt (15°)	Rel 99 RMC 12.2kbps	1312	1712.4	23.9	23.8				1
		1413	1732.6	23.9	23.8	0.293	0.300		
		1513	1752.6	23.9	23.8				1
Right Touch	Rel 99 RMC 12.2kbps	1312	1712.4	23.9	23.8				1
		1413	1732.6	23.9	23.8	0.758	0.776		
		1513	1752.6	23.9	23.8				1
Right Tilt (15°)	Rel 99 RMC 12.2kbps	1312	1712.4	23.9	23.8				1
		1413	1732.6	23.9	23.8	0.186	0.190		
		1513	1752.6	23.9	23.8				1

12.4.2. Body-worn Accessory & Hotspot Mode Exposure Conditions

Body-worn Accessory & Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Rear	Rel 99 RMC 12.2kbps	10	1312	1712.4	23.9	23.8	1.250	**1.279**	10	1
			1413	1732.6	23.9	23.8	1.240	1.269		
			1513	1752.6	23.9	23.8	1.130	1.156		1
Front	Rel 99 RMC 12.2kbps	10	1312	1712.4	23.9	23.8	1.050	1.074		1
			1413	1732.6	23.9	23.8	1.080	1.105		
			1513	1752.6	23.9	23.8	1.000	1.023		1

12.4.3. Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Edge 2	Rel 99 RMC 12.2kbps	10	1312	1712.4	23.9	23.8				1
			1413	1732.6	23.9	23.8	0.249	0.255		
			1513	1752.6	23.9	23.8				1
Edge 3	Rel 99 RMC 12.2kbps	10	1312	1712.4	23.9	23.8	1.050	1.074		1
			1413	1732.6	23.9	23.8	0.949	0.971		
			1513	1752.6	23.9	23.8	0.963	0.985		1
Edge 4	Rel 99 RMC 12.2kbps	10	1312	1712.4	23.9	23.8				1
			1413	1732.6	23.9	23.8	0.462	0.473		
			1513	1752.6	23.9	23.8				1

Note(s):

1. According to KDB 447498, 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.

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12.5. W-CDMA Band V

12.5.1. Head Exposure Conditions

Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
				Tune-up limit	Meas.	Meas.	Scaled		
Left Touch	Rel 99 RMC 12.2kbps	4132	826.4	24.2	24.1				1
		4183	836.6	24.2	24.0	0.178	**0.186**	11	
		4233	846.6	24.2	24.0				1
Left Tilt (15°)	Rel 99 RMC 12.2kbps	4132	826.4	24.2	24.1				1
		4183	836.6	24.2	24.0	0.124	0.130		
		4233	846.6	24.2	24.0				1
Right Touch	Rel 99 RMC 12.2kbps	4132	826.4	24.2	24.1				1
		4183	836.6	24.2	24.0	0.162	0.170		
		4233	846.6	24.2	24.0				1
Right Tilt (15°)	Rel 99 RMC 12.2kbps	4132	826.4	24.2	24.1				1
		4183	836.6	24.2	24.0	0.115	0.120		
		4233	846.6	24.2	24.0				1

12.5.2. Body-worn Accessory & Hotspot Mode Exposure Conditions

Body-worn Accessory & Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Rear	Rel 99 RMC 12.2kbps	10	4132	826.4	24.2	24.1				1
			4183	836.6	24.2	24.0	0.574	**0.601**	12	
			4233	846.6	24.2	24.0				1
Front	Rel 99 RMC 12.2kbps	10	4132	826.4	24.2	24.1				1
			4183	836.6	24.2	24.0	0.250	0.262		
			4233	846.6	24.2	24.0				1

12.5.3. Hotspot Mode Exposure Conditions

Rear and Front Test Configuration is covered by Body-worn Accessory Exposure Conditions.

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Edge 2	Rel 99 RMC 12.2kbps	10	4132	826.4	24.2	24.1				1
			4183	836.6	24.2	24.0	0.227	0.238		
			4233	846.6	24.2	24.0				1
Edge 3	Rel 99 RMC 12.2kbps	10	4132	826.4	24.2	24.1				1
			4183	836.6	24.2	24.0	0.045	0.047		
			4233	846.6	24.2	24.0				1
Edge 4	Rel 99 RMC 12.2kbps	10	4132	826.4	24.2	24.1				1
			4183	836.6	24.2	24.0	0.343	0.359		
			4233	846.6	24.2	24.0				1

Note(s):

1. According to KDB 447498, 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.

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12.6. LTE Band 2 (10MHz Bandwidth)

12.6.1. Head Exposure Conditions

Test Position	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
						Tune-up limit	Meas.	Meas.	Scaled		
Left Touch	QPSK	18650	1855.0	1	0	23.7	23.7				1
				25	24	23.7	23.6				1
		18900	1885.0	1	0	23.7	23.6	0.667	**0.683**	13	
				25	0	23.7	23.6	0.511	0.523		
				50	0	23.7	23.4	0.493	0.528		
		19150	1905.0	1	0	23.7	23.6				1
				25	0	23.7	23.7				1
Left Tilt (15°)	QPSK	18650	1855.0	1	0	23.7	23.7				1
				25	24	23.7	23.6				1
		18900	1885.0	1	0	23.7	23.6	0.209	0.214		
				25	0	23.7	23.6	0.165	0.169		
		19150	1905.0	1	0	23.7	23.6				1
				25	0	23.7	23.7				1
Right Touch	QPSK	18650	1855.0	1	0	23.7	23.7				1
				25	24	23.7	23.6				1
		18900	1885.0	1	0	23.7	23.6	0.558	0.571		
				25	0	23.7	23.6	0.436	0.446		
		19150	1905.0	1	0	23.7	23.6				1
				25	0	23.7	23.7				1
Right Tilt (15°)	QPSK	18650	1855.0	1	0	23.7	23.6				1
				25	24	23.7	23.7				1
		18900	1885.0	1	0	23.7	23.6	0.231	0.236		
				25	0	23.7	23.6	0.180	0.184		
		19150	1905.0	1	0	23.7	23.6				1
				25	0	23.7	23.6				1

Note(s):

1. Per KDB 941225 D05 SAR for LTE Devices v02, SAR test reduction is applied using the following criteria:

- Testing for Low and High Channel 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 $\geq$ 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.

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12.6.2. Body-worn Accessory & Hotspot ModeExposure Conditions

Body-worn Accessory & Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
							Tune-up limit	Meas.	Meas.	Scaled		
Rear	QPSK	10	18650	1855.0	1	0	23.7	23.7	0.931	0.931		1
					25	0	23.7	23.6	0.667	0.683		1
					50	0	23.7	23.4	0.681	0.730		
			18900	1885.0	1	0	23.7	23.6	0.922	**0.943**	14	
					25	0	23.7	23.6	0.724	0.741		
					50	0	23.7	23.6	0.729	0.746		
			19150	1905.0	1	0	23.7	23.6	0.793	0.811		1
					25	12	23.7	23.7	0.677	0.677		1
Front	QPSK	10	18650	1855.0	1	0	23.7	23.7				1
					25	24	23.7	23.6				1
			18900	1885.0	1	0	23.7	23.6	0.673	0.689		
					25	0	23.7	23.6	0.557	0.570		
			19150	1905.0	1	0	23.7	23.6				1
					25	0	23.7	23.7				1

12.6.3. Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
							Tune-up limit	Meas.	Meas.	Scaled		
Edge 2	QPSK	10	18650	1855.0	1	0	23.7	23.7				1
					25	24	23.7	23.6				1
			18900	1885.0	1	0	23.7	23.6	0.151	0.155		
					25	0	23.7	23.6	0.126	0.129		
			19150	1905.0	1	0	23.7	23.6				1
					25	12	23.7	23.7				1
Edge 3	QPSK	10	18650	1855.0	1	0	23.7	23.7				1
					25	24	23.7	23.6				1
			18900	1885.0	1	0	23.7	23.6	0.649	0.664		
					25	0	23.7	23.6	0.538	0.551		
			19150	1905.0	1	0	23.7	23.6				1
					25	0	23.7	23.7				1
Edge 4	QPSK	10	18650	1855.0	1	0	23.7	23.7				1
					25	24	23.7	23.6				1
			18900	1885.0	1	0	23.7	23.6	0.297	0.304		
					25	0	23.7	23.6	0.243	0.249		
			19150	1905.0	1	0	23.7	23.6				1
					25	0	23.7	23.7				1

Note(s):

1. Per KDB 941225 D05 SAR for LTE Devices v02, SAR test reduction is applied using the following criteria:

- Testing for Low and High Channel 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.

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12.7. LTE Band 4 (20MHz Bandwidth)

12.7.1. Head Exposure Conditions

Test Position	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Left Touch	QPSK	20050	1720.0	1	0	23.7	23.7	0.760	0.760	
				50	0	23.7	23.6	0.621	0.635	
		20175	1732.5	1	0	23.7	23.5	0.803	**0.841**	15
				50	0	23.7	23.6	0.628	0.643	
				100	0	23.7	23.5	0.640	0.670	
		20300	1745.0	1	0	23.7	23.6	0.774	0.792	
				50	0	23.7	23.7	0.620	0.620	
Left Tilt (15°)	QPSK	20050	1720.0	1	0	23.7	23.7			
				50	0	23.7	23.6			
		20175	1732.5	1	0	23.7	23.5	0.272	0.285	
				50	0	23.7	23.6	0.211	0.216	
		20300	1745.0	1	0	23.7	23.6			
				50	0	23.7	23.7			
Right Touch	QPSK	20050	1720.0	1	0	23.7	23.7	0.757	0.757	
				50	0	23.7	23.6	0.601	0.615	
		20175	1732.5	1	0	23.7	23.5	0.771	0.807	
				50	0	23.7	23.6	0.636	0.651	
				100	0	23.7	23.5	0.676	0.708	
		20300	1745.0	1	0	23.7	23.6	0.786	0.804	
				50	0	23.7	23.7	0.600	0.600	
Right Tilt (15°)	QPSK	20050	1720.0	1	0	23.7	23.7			
				50	0	23.7	23.6			
		20175	1732.5	1	0	23.7	23.5	0.233	0.244	
				50	0	23.7	23.6	0.177	0.181	
		20300	1745.0	1	0	23.7	23.6			
				50	0	23.7	23.7			

Note(s):

1. Per KDB 941225 D05 SAR for LTE Devices v02, SAR test reduction is applied using the following criteria:

- Testing for Low and High Channel 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.

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12.7.2. Body-worn Accessory & Hotspot Mode Exposure Conditions

Body-worn Accessory & Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
							Tune-up limit	Meas.	Meas.	Scaled		
Rear	QPSK	10	20050	1720.0	1	0	23.7	23.7	1.270	1.270		1
					50	0	23.7	23.6	1.050	1.074		1
			20175	1732.5	1	0	23.7	23.5	1.220	**1.277**	16	
					50	0	23.7	23.6	0.931	0.953		
					100	0	23.7	23.5	0.870	0.911		
			20300	1745.0	1	0	23.7	23.6	1.040	1.064		1
					50	0	23.7	23.7	0.812	0.812		1
Front	QPSK	10	20050	1720.0	1	0	23.7	23.7	1.050	1.050		1
					50	0	23.7	23.6	0.828	0.847		1
			20175	1732.5	1	0	23.7	23.5	1.030	1.079		
					50	0	23.7	23.6	0.803	0.822		
					100	0	23.7	23.5	0.760	0.796		
			20300	1745.0	1	0	23.7	23.6	0.945	0.967		1
					50	0	23.7	23.7	0.724	0.724		1

12.7.3. Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
							Tune-up limit	Meas.	Meas.	Scaled		
Edge 2	QPSK	10	20050	1720.0	1	0	23.7	23.7				1
					50	0	23.7	23.6				1
			20175	1732.5	1	0	23.7	23.5	0.232	0.243		
					50	0	23.7	23.6	0.184	0.188		
			20300	1745.0	1	0	23.7	23.6				1
					50	0	23.7	23.7				1
Edge 3	QPSK	10	20050	1720.0	1	0	23.7	23.7	1.020	1.020		1
					50	0	23.7	23.6	0.822	0.841		1
			20175	1732.5	1	0	23.7	23.5	1.010	1.058		
					50	0	23.7	23.6	0.771	0.789		
					100	0	23.7	23.5	0.720	0.754		
			20300	1745.0	1	0	23.7	23.6	0.870	0.890		1
					50	0	23.7	23.7	0.704	0.704		1
Edge 4	QPSK	10	20050	1720.0	1	0	23.7	23.7				1
					50	0	23.7	23.6				1
			20175	1732.5	1	0	23.7	23.5	0.392	0.410		
					50	0	23.7	23.6	0.314	0.321		
			20300	1745.0	1	0	23.7	23.6				1
					50	0	23.7	23.7				1

Note(s):

1. Per KDB 941225 D05 SAR for LTE Devices v02, SAR test reduction is applied using the following criteria:

- Testing for Low and High Channel 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.

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12.8. LTE Band 17 (10MHz Bandwidth)

12.8.1. Head Exposure Conditions

Test Position	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
						Tune-up limit	Meas.	Meas.	Scaled		
Left Touch	QPSK	23789	709.0	1	24	23.7	23.7				1
				25	0	23.7	23.4				1
		23790	710.0	1	49	23.7	23.7	0.094	0.094		
				25	12	23.7	23.6	0.053	0.054		
		23800	711.0	1	0	23.7	23.6				1
				25	0	23.7	23.5				1
Left Tilt (15°)	QPSK	23789	709.0	1	24	23.7	23.7				1
				25	0	23.7	23.4				1
		23790	710.0	1	49	23.7	23.7	0.056	0.056		
				25	12	23.7	23.6	0.031	0.032		
		23800	711.0	1	0	23.7	23.6				1
				25	0	23.7	23.5				1
Right Touch	QPSK	23789	709.0	1	0	23.7	23.7				1
				25	0	23.7	23.4				1
		23790	710.0	1	49	23.7	23.7	0.150	**0.150**	17	
				25	12	23.7	23.6	0.087	0.089		
		23800	711.0	1	0	23.7	23.6				1
				25	0	23.7	23.5				1
Right Tilt (15°)	QPSK	23789	709.0	1	0	23.7	23.7				1
				25	0	23.7	23.4				1
		23790	710.0	1	0	23.7	23.7	0.080	0.080		
				25	0	23.7	23.6	0.045	0.046		
		23800	711.0	1	0	23.7	23.6				1
				25	12	23.7	23.5				1

Note(s):

1. Per KDB 941225 D05 SAR for LTE Devices v02, SAR test reduction is applied using the following criteria:

- Testing for Low and High Channel 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 $\geq$ 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.

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12.8.2. Body-worn Accessory Exposure Conditions

Body-worn Accessory & Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
							Tune-up limit	Meas.	Meas.	Scaled		
Rear	QPSK	10	23789	709.0	1	24	23.7	23.7				1
					25	0	23.7	23.4				1
			23790	710.0	1	49	23.7	23.7	0.429	**0.429**	18	
					25	12	23.7	23.6	0.265	0.271		
			23800	711.0	1	0	23.7	23.6				1
					25	0	23.7	23.5				1
Front	QPSK	10	23789	709.0	1	24	23.7	23.7				1
					25	0	23.7	23.4				1
			23790	710.0	1	49	23.7	23.7	0.194	0.194		
					25	12	23.7	23.6	0.117	0.120		
			23800	711.0	1	0	23.7	23.6				1
					25	0	23.7	23.5				1

12.8.3. Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
							Tune-up limit	Meas.	Meas.	Scaled		
Edge 2	QPSK	10	23789	709.0	1	0	23.7	23.7				1
					25	0	23.7	23.4				1
			23790	710.0	1	49	23.7	23.7	0.261	0.261		
					25	12	23.7	23.6	0.159	0.163		
			23800	711.0	1	0	23.7	23.6				1
					25	0	23.7	23.5				1
Edge 3	QPSK	10	23789	709.0	1	24	23.7	23.7				1
					25	0	23.7	23.4				1
			23790	710.0	1	49	23.7	23.7	0.084	0.084		
					25	12	23.7	23.6	0.052	0.053		
			23800	711.0	1	0	23.7	23.6				1
					25	12	23.7	23.5				1
Edge 4	QPSK	10	23789	709.0	1	24	23.7	23.7				1
					25	0	23.7	23.4				1
			23790	710.0	1	49	23.7	23.7	0.042	0.042		
					25	12	23.7	23.6	0.024	0.025		
			23800	711.0	1	0	23.7	23.6				1
					25	0	23.7	23.5				1

Note(s):

1. Per KDB 941225 D05 SAR for LTE Devices v02, SAR test reduction is applied using the following criteria:

- Testing for Low and High Channel 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.

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12.9. Wi-Fi (2.4 GHz Band)

12.9.1. Head Exposure Conditions

Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
				Tune-up limit	Meas.	Meas.	Scaled		
Left Touch	802.11b	1	2412	17.0	16.5				1
		6	2437	17.0	16.2	0.174	0.209		
		11	2462	17.0	16.0				1
Left Tilt (15°)	802.11b	1	2412	17.0	16.5				1
		6	2437	17.0	16.2	0.141	0.170		
		11	2462	17.0	16.0				1
Right Touch	802.11b	1	2412	17.0	16.5				1
		6	2437	17.0	16.2	0.348	**0.418**	19	
		11	2462	17.0	16.0				1
Right Tilt (15°)	802.11b	1	2412	17.0	16.5				1
		6	2437	17.0	16.2	0.189	0.227		
		11	2462	17.0	16.0				1

Note(s):

1. According to KDB 447498, 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.

12.9.2. Body-worn Accessory & Hotspot Mode Exposure Conditions

Body-worn Accessory & Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Rear	802.11b	10	1	2412	17.0	16.5				1
			6	2437	17.0	16.2	0.210	**0.252**	20	
			11	2462	17.0	16.0				1
Front	802.11b	10	1	2412	17.0	16.5				1
			6	2437	17.0	16.2	0.072	0.087		
			11	2462	17.0	16.0				1

12.9.3. Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Edge 1	802.11b	10	1	2412	17.0	16.5				1
			6	2437	17.0	16.2	0.066	0.079		
			11	2462	17.0	16.0				1
Edge 4	802.11b	10	1	2412	17.0	16.5				1
			6	2437	17.0	16.2	0.132	0.159		
			11	2462	17.0	16.0				1

Note(s):

1. According to KDB 447498, 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.

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12.10. Wi-Fi (5 GHz Bands)

12.10.1. Head Exposure Conditions

Band	Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
					Tune-up limit	Meas.	Meas.	Scaled	
5.2GHz	Left Touch	802.11a	36	5180	12.0	11.1	0.018	0.023	
			48	5240	12.0	11.1	0.023	0.028	
	Left Tilt (15°)	802.11a	36	5180	12.0	11.1	0.021	0.025	
			48	5240	12.0	11.1	0.022	0.027	
	Right Touch	802.11a	36	5180	12.0	11.1	0.025	0.030	
			48	5240	12.0	11.1	0.024	0.030	
	Right Tilt (15°)	802.11a	36	5180	12.0	11.1	0.020	0.025	
			48	5240	12.0	11.1	0.021	0.026	
5.3GHz	Left Touch	802.11a	52	5260	12.0	11.1	0.021	0.025	
			64	5320	12.0	11.1	0.025	0.030	
	Left Tilt (15°)	802.11a	52	5260	12.0	11.1	0.026	0.032	
			64	5320	12.0	11.1	0.024	0.029	
	Right Touch	802.11a	52	5260	12.0	11.3	0.036	**0.043**	21
			64	5320	12.0	11.3	0.027	0.032	
	Right Tilt (15°)	802.11a	52	5260	12.0	11.3	0.034	0.039	
			64	5320	12.0	11.3	0.034	0.040	
5.5GHz	Left Touch	802.11a	104	5520	12.0	11.3	0.030	0.036	
			116	5580	12.0	11.3	0.030	0.035	
			124	5620	not supported				
			136	5680	12.0	11.3	0.033	0.038	
	Left Tilt (15°)	802.11a	104	5520	12.0	11.3	0.031	0.037	
			116	5580	12.0	11.3	0.032	0.038	
			124	5620	not supported				
			136	5680	12.0	11.3	0.031	0.036	
	Right Touch	802.11a	104	5520	12.0	11.3	0.023	0.027	
			116	5580	12.0	11.3	0.025	0.029	
			124	5620	not supported				
			136	5680	12.0	11.3	0.028	0.033	
	Right Tilt (15°)	802.11a	104	5520	12.0	11.3	0.029	0.035	
			116	5580	12.0	11.3	0.026	0.031	
			124	5620	not supported				
			136	5680	12.0	11.3	0.037	0.043	
5.8GHz	Left Touch	802.11a	149	5745	12.0	11.3	0.036	0.042	
			157	5785	12.0	11.3	0.027	0.031	
			165	5825	12.0	11.3	0.031	0.036	
	Left Tilt (15°)	802.11a	149	5745	12.0	11.3	0.030	0.035	
			157	5785	12.0	11.3	0.029	0.034	
			165	5825	12.0	11.3	0.036	0.042	
	Right Touch	802.11a	149	5745	12.0	11.3	0.034	0.040	
			157	5785	12.0	11.3	0.045	0.053	
			165	5825	12.0	11.3	0.034	0.039	
	Right Tilt (15°)	802.11a	149	5745	12.0	11.3	0.033	0.039	
			157	5785	12.0	11.3	0.030	0.035	
			165	5825	12.0	11.3	0.033	0.039	

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12.10.2. Body-worn Accessory and Wi-Fi direct Exposure Conditions

Body-worn Accessory Exposure Conditions

Band	Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
5.2	Rear	802.11a	10	36	5180	12.0	11.1	0.064	0.079	
				48	5240	12.0	11.1	0.066	0.082	
	Front	802.11a	10	36	5180	12.0	11.1	0.070	0.086	
				48	5240	12.0	11.1	0.072	0.089	
5.3	Rear	802.11a	10	52	5260	12.0	11.3	0.121	0.142	
				64	5320	12.0	11.3	0.117	0.137	
	Front	802.11a	10	52	5260	12.0	11.3	0.075	0.088	
				64	5320	12.0	11.3	0.073	0.086	
5.5	Rear	802.11a	10	104	5520	12.0	11.3	0.107	0.126	
				116	5580	12.0	11.3	0.134	0.157	
				124	5620	not supported				
				136	5680	11.7	11.3	0.165	**0.181**	22
	Front	802.11a	10	104	5520	12.0	11.3	0.078	0.092	
				116	5580	12.0	11.3	0.069	0.081	
				124	5620	not supported				
				136	5680	12.0	11.3	0.075	0.088	
5.8	Rear	802.11a	10	149	5745	12.0	11.3	0.160	0.188	
				157	5785	12.0	11.3	0.154	0.181	
				165	5825	12.0	11.3	0.162	0.190	
	Front	802.11a	10	149	5745	12.0	11.3	0.051	0.060	
				157	5785	12.0	11.3	0.056	0.066	
				165	5825	12.0	11.3	0.060	0.070	

WiFi Direct (Group Owner) Exposure Conditions

Band	Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
5.8	Rear	802.11a	10	149	5745	12.0	11.3	0.160	0.188	
				157	5785	12.0	11.3	0.154	0.181	
				161	5825	12.0	11.3	0.162	0.190	
	Front	802.11a	10	149	5745	12.0	11.3	0.051	0.060	
				157	5785	12.0	11.3	0.056	0.066	
				161	5825	12.0	11.3	0.060	0.070	
	Edge 1	802.11a	10	149	5745	12.0	11.3	0.039	0.046	
				157	5785	12.0	11.3	0.028	0.033	
				161	5825	12.0	11.3	0.038	0.045	
	Edge 4	802.11a	10	149	5745	12.0	11.3	0.085	0.100	
				157	5785	12.0	11.3	0.062	0.073	
				161	5825	12.0	11.3	0.053	0.063	

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13. SAR Measurement Variability

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz v01. 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 < 0.80 W/kg; steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.80 W/kg, 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 W/kg (~ 10% from the 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

13.1. The Highest Measured SAR Configuration in Each Frequency Band

Head Exposure Condition

Frequency band	Test Position	Mode	Ch. #	Freq. (MHz)	Measured 1g SAR (W/kg)
LTE Band 17	Left Touch	QPSK	23790	710	0.144
WCDMA Band V	Left Touch	Rel. 99, RMC 12.2kbps	4183	836.6	0.178
WCDMA Band IV	Left Touch	Rel. 99, RMC 12.2kbps	1413	1732.6	0.839
LTE Band II	Left Touch	QPSK	18900	1885	0.667
Wi-Fi 2.4GHz	Right Touch	802.11b	6	2437	0.348
Wi-Fi 5.2GHz	Right Touch	802.11a	36	5180	0.025
Wi-Fi 5.3GHz	Right Touch	802.11a	52	5260	0.036
Wi-Fi 5.5GHz	Left Tilt	802.11a	116	5580	0.032
Wi-Fi 5.8GHz	Right Touch	802.11a	157	5785	0.045

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Body-worn Accessory Exposure Condition

Frequency band	Test Position	Mode	Ch. #	Freq. (MHz)	Measured 1g SAR (W/kg)
LTE Band 17	Rear	QPSK	23790	710	0.144
WCDMA Band 5	Rear	Rel. 99, RMC 12.2kbps	4183	836.6	0.574
WCDMA Band 4	Rear	Rel. 99, RMC 12.2kbps	1312	1712.4	1.25
WCDMA Band 2	Rear	Rel. 99, RMC 12.2kbps	9400	1880	1.05
Wi-Fi 2.4GHz	Rear	802.11b	6	2437	0.210
Wi-Fi 5.2GHz	Front	802.11a	48	5240	0.072
Wi-Fi 5.3GHz	Rear	802.11a	52	5260	0.121
Wi-Fi 5.5GHz	Rear	802.11a	136	5680	0.136
Wi-Fi 5.8GHz	Rear	802.11a	165	5825	0.162

Hotspot Mode Exposure Condition

Frequency band	Test Position	Mode	Ch. #	Freq. (MHz)	Measured 1g SAR (W/kg)
LTE Band 17	Edge 2	QPSK	23790	710	0.187
GSM850	Rear	GPRS 4 slots	190	836.6	0.653
LTE Band 4	Edge 3	QPSK	20050	1720	1.02
GSM1900	Rear	GPRS 4 slots	661	1880	0.791
Wi-Fi 2.4GHz	Edge 4	802.11b	6	2437	0.132

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13.2. Repeated Measurement Results

1700MHz band

Frequency band	Test Position	Mode	Ch #.	Freq. (MHz)	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio	Note
					Original	Repeated		
WCDMA Band 4	Rear	Rel.99, RMC 12.2kbps	1312	1712.4	1.250	1.230	1.02	1

1900MHz band

Frequency band	Test Position	Mode	Ch #.	Freq. (MHz)	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio	Note
					Original	Repeated		
WCDMA Band 2	Rear	Rel.99, RMC 12.2kbps	9400	1880.0	1.050	1.030	1.02	1

Note(s):

1. 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.

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14. Simultaneous Transmission SAR Analysis

KDB 447498 D01 General RF Exposure Guidance v05, introduces a new formula for calculating the SAR to Peak Location Ratio (SPLSR) between pairs of simultaneously transmitting antennas:

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

Where:

SAR_1 is the highest measured or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

SAR_2 is the highest measured 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

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

A new threshold of 0.04 is also introduced in the draft KDB. Thus, 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:

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

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14.1. Estimated SAR for Bluetooth

14.1.1. Standalone SAR Test Exclusion

Based on the criteria for Standalone SAR test exclusion listed in Section 4.3.1. of KDB 447498 D01 General RF Exposure Guidance v05:

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

Body-worn Accessory Exposure Conditions

Max. Power of Channel		Min. Test Separation Distance (mm)	Frequency (GHz)	Result
(dBm)	(mW)			
11.5	11	10	2.441	1.8

Conclusion:

The computed value is < 3; therefore, Bluetooth qualifies for Standalone SAR test exclusion.

14.1.2. Estimated SAR

As SAR was not measured for Bluetooth, estimated Standalone SAR values were computed for Bluetooth for the purpose of Simultaneous Transmission SAR Analysis using the following formula:

(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]·[$\sqrt{f_{(GHz)}}/x$] W/kg,

With x = 7.5 for 1-g SAR

This standalone SAR estimation was performed in accordance with the separation distances listed in Section 17.“Antenna Locations” and only at the applicable simultaneous transmission test positions. The estimated SAR results are as follow:

Test Position	Max. Power of Channel (mW)	Min. Test Separation Distance (mm)	Frequency (GHz)	Estimated 1-g SAR Values (W/kg)
Rear/Front	11	10	2.441	0.23

Note(s):

1. Power and distance are rounded to the nearest mW and mm before calculation
2. If the minimum test separation distance is <5mm then 5mm is used in the calculation

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14.2. Head Exposure Conditions

14.2.1. Sum of the SAR for GSM 850, Wi-Fi 2.4 and 5 GHz Bands

Test Position	Voice/Data (Highest SAR)	Data					∑ 1-g SAR (mW/g)
	GSM 850	WiFi 2.4 GHz	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	
Left Touch	0.252	0.209					0.461
	0.252		0.028				0.280
	0.252			0.030			0.282
	0.252				0.038		0.290
	0.252					0.042	0.294
Left Tilt	0.182	0.170					0.352
	0.182		0.027				0.209
	0.182			0.032			0.214
	0.182				0.038		0.220
	0.182					0.042	0.224
Right Touch	0.247	0.418					0.665
	0.247		0.030				0.277
	0.247			0.043			0.290
	0.247				0.033		0.280
	0.247					0.053	0.300
Right Tilt	0.191	0.227					0.418
	0.191		0.026				0.217
	0.191			0.040			0.231
	0.191				0.043		0.234
	0.191					0.039	0.230

SAR to Peak Location Separation Ratio (SPLSR)
As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

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.

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14.2.2. Sum of the SAR for GSM 1900, Wi-Fi 2.4 and 5 GHz Bands

Test Position	Voice/Data (Highest SAR)	Data					∑ 1-g SAR (mW/g)
	GSM 1900	WiFi 2.4 GHz	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	
Left Touch	0.516	0.209					0.725
	0.516		0.028				0.544
	0.516			0.030			0.546
	0.516				0.038		0.554
	0.516					0.042	0.558
	0.516						0.516
Left Tilt	0.163	0.170					0.333
	0.163		0.027				0.190
	0.163			0.032			0.195
	0.163				0.038		0.201
	0.163					0.042	0.205
	0.163						0.163
Right Touch	0.426	0.418					0.844
	0.426		0.030				0.456
	0.426			0.043			0.469
	0.426				0.033		0.459
	0.426					0.053	0.479
	0.426						0.426
Right Tilt	0.174	0.227					0.401
	0.174		0.026				0.200
	0.174			0.040			0.214
	0.174				0.043		0.217
	0.174					0.039	0.213
	0.174						0.174

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

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.

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14.2.3. Sum of the SAR for W-CDMA Band II, Wi-Fi 2.4 and 5 GHz Bands

Test Position	Voice/Data (Highest SAR)	Data					∑ 1-g SAR (mW/g)
	WCDMA Band II	WiFi 2.4 GHz	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	
Left Touch	0.774	0.209					0.983
	0.774		0.028				0.802
	0.774			0.030			0.804
	0.774				0.038		0.812
	0.774					0.042	0.816
Left Tilt	0.251	0.170					0.421
	0.251		0.027				0.278
	0.251			0.032			0.283
	0.251				0.038		0.289
	0.251					0.042	0.293
Right Touch	0.621	0.418					1.039
	0.621		0.030				0.651
	0.621			0.043			0.664
	0.621				0.033		0.654
	0.621					0.053	0.674
Right Tilt	0.261	0.227					0.488
	0.261		0.026				0.287
	0.261			0.040			0.301
	0.261				0.043		0.304
	0.261					0.039	0.300

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

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.

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14.2.4. Sum of the SAR for W-CDMA Band IV Wi-Fi 2.4 and 5 GHz Bands

Test Position	Voice/Data (Highest SAR)	Data					∑ 1-g SAR (mW/g)
	WCDMA Band IV	WiFi 2.4 GHz	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	
Left Touch	0.859	0.209					1.068
	0.859		0.028				0.887
	0.859			0.030			0.889
	0.859				0.038		0.897
	0.859					0.042	0.901
Left Tilt	0.300	0.170					0.470
	0.300		0.027				0.327
	0.300			0.032			0.332
	0.300				0.038		0.338
	0.300					0.042	0.342
Right Touch	0.776	0.418					1.194
	0.776		0.030				0.806
	0.776			0.043			0.819
	0.776				0.033		0.809
	0.776					0.053	0.829
Right Tilt	0.190	0.227					0.417
	0.190		0.026				0.216
	0.190			0.040			0.230
	0.190				0.043		0.233
	0.190					0.039	0.229

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

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.

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14.2.5. Sum of the SAR for W-CDMA Band V, Wi-Fi 2.4 and 5 GHz Bands

Test Position	Voice/Data (Highest SAR)	Data					∑ 1-g SAR (mW/g)
	W-CDMA Band V	WiFi 2.4 GHz	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	
Left Touch	0.186	0.209					0.395
	0.186		0.028				0.214
	0.186			0.030			0.216
	0.186				0.038		0.224
	0.186					0.042	0.228
Left Tilt	0.130	0.170					0.300
	0.130		0.027				0.157
	0.130			0.032			0.162
	0.130				0.038		0.168
	0.130					0.042	0.172
Right Touch	0.170	0.418					0.588
	0.170		0.030				0.200
	0.170			0.043			0.213
	0.170				0.033		0.203
	0.170					0.053	0.223
Right Tilt	0.120	0.227					0.347
	0.120		0.026				0.146
	0.120			0.040			0.160
	0.120				0.043		0.163
	0.120					0.039	0.159

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

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.

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14.2.6. Sum of the SAR for W-CDMA LTE Band 2, Wi-Fi 2.4 and 5 GHz Bands

Test Position	Voice/Data (Highest SAR)	Data					∑ 1-g SAR (mW/g)
	LTE Band 2	WiFi 2.4 GHz	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	
Left Touch	0.683	0.209					0.892
	0.683		0.028				0.711
	0.683			0.030			0.713
	0.683				0.038		0.721
	0.683					0.042	0.725
Left Tilt	0.214	0.170					0.384
	0.214		0.027				0.241
	0.214			0.032			0.246
	0.214				0.038		0.252
	0.214					0.042	0.256
Right Touch	0.571	0.418					0.989
	0.571		0.030				0.601
	0.571			0.043			0.614
	0.571				0.033		0.604
	0.571					0.053	0.624
Right Tilt	0.236	0.227					0.463
	0.236		0.026				0.262
	0.236			0.040			0.276
	0.236				0.043		0.279
	0.236					0.039	0.275

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

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.

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14.2.7. Sum of the SAR for W-CDMA LTE Band 4, Wi-Fi 2.4 and 5 GHz Bands

Test Position	Voice/Data (Highest SAR)	Data					∑ 1-g SAR (mW/g)
	LTE Band 4	WiFi 2.4 GHz	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	
Left Touch	0.841	0.209					1.050
	0.841		0.028				0.869
	0.841			0.030			0.871
	0.841				0.038		0.879
	0.841					0.042	0.883
Left Tilt	0.285	0.170					0.455
	0.285		0.027				0.312
	0.285			0.032			0.317
	0.285				0.038		0.323
	0.285					0.042	0.327
Right Touch	0.807	0.418					1.225
	0.807		0.030				0.837
	0.807			0.043			0.850
	0.807				0.033		0.840
	0.807					0.053	0.860
Right Tilt	0.244	0.227					0.471
	0.244		0.026				0.270
	0.244			0.040			0.284
	0.244				0.043		0.287
	0.244					0.039	0.283

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

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.

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14.2.8. Sum of the SAR for W-CDMA LTE Band 17, Wi-Fi 2.4 and 5 GHz Bands

Test Position	Voice/Data (Highest SAR)	Data					∑ 1-g SAR (mW/g)
	LTE Band 17	WiFi 2.4 GHz	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	
Left Touch	0.094	0.209					0.303
	0.094		0.028				0.122
	0.094			0.030			0.124
	0.094				0.038		0.132
	0.094					0.042	0.136
Left Tilt	0.056	0.170					0.226
	0.056		0.027				0.083
	0.056			0.032			0.088
	0.056				0.038		0.094
	0.056					0.042	0.098
Right Touch	0.150	0.418					0.568
	0.150		0.030				0.180
	0.150			0.043			0.193
	0.150				0.033		0.183
	0.150					0.053	0.203
Right Tilt	0.080	0.227					0.307
	0.080		0.026				0.106
	0.080			0.040			0.120
	0.080				0.043		0.123
	0.080					0.039	0.119

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

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.

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14.3. Body-worn Accessory Exposure Conditions

14.3.1. Sum of the SAR for GSM, Wi-Fi 2.4 GHz and 5 GHz Bands and Bluetooth

Test Position	Voice/Data (Highest SAR)	Data						∑ 1-g SAR (mW/g)
	GSM 850	WiFi 2.4 GHz	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	Bluetooth	
Rear	0.716	0.252						0.968
	0.716		0.082					0.798
	0.716			0.142				0.858
	0.716				0.181			0.897
	0.716					0.190		0.906
	0.716						0.229	0.945
Front	0.308	0.089						0.397
	0.308		0.089					0.397
	0.308			0.088				0.396
	0.308				0.092			0.400
	0.308					0.070		0.378
	0.308						0.229	0.537

Test Position	Voice/Data (Highest SAR)	Data						∑ 1-g SAR (mW/g)
	GSM 1900	WiFi 2.4 GHz	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	Bluetooth	
Rear	0.809	0.252						1.061
	0.809		0.082					0.891
	0.809			0.142				0.951
	0.809				0.181			0.990
	0.809					0.190		0.999
	0.809						0.229	1.038
Front	0.562	0.089						0.651
	0.562		0.089					0.651
	0.562			0.088				0.650
	0.562				0.092			0.654
	0.562					0.070		0.632
	0.562						0.229	0.791

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

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.

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14.3.2. Sum of the SAR for W-CDMA, Wi-Fi 2.4 GHz and 5 GHz Bands and Bluetooth

Test Position	Voice/Data (Highest SAR)	Data						∑ 1-g SAR (mW/g)
	WCDMA Band II	WiFi 2.4 GHz	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	Bluetooth	
Rear	1.074	0.252						1.326
	1.074		0.082					0.082
	1.074			0.142				1.216
	1.074				0.181			1.255
	1.074					0.190		1.264
	1.074						0.229	1.303
Front	0.903	0.089						0.992
	0.903		0.089					0.992
	0.903			0.088				0.991
	0.903				0.092			0.995
	0.903					0.070		0.973
	0.903						0.229	1.132

Test Position	Voice/Data (Highest SAR)	Data						∑ 1-g SAR (mW/g)
	WCDMA Band IV	WiFi 2.4 GHz	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	Bluetooth	
Rear	1.279	0.252						**1.531**
	1.279		0.082					0.082
	1.279			0.142				1.421
	1.279				0.181			**1.460**
	1.279					0.190		1.469
	1.279						0.229	1.508
Front	1.105	0.089						1.194
	1.105		0.089					1.194
	1.105			0.088				1.193
	1.105				0.092			1.197
	1.105					0.070		1.175
	1.105						0.229	1.334

Test Position	Voice/Data (Highest SAR)	Data						∑ 1-g SAR (mW/g)
	WCDMA Band V	WiFi 2.4 GHz	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	Bluetooth	
Rear	0.601	0.252						0.853
	0.601		0.082					0.082
	0.601			0.142				0.743
	0.601				0.181			0.782
	0.601					0.190		0.791
	0.601						0.229	0.830
Front	0.262	0.089						0.351
	0.262		0.089					0.351
	0.262			0.088				0.350
	0.262				0.092			0.354
	0.262					0.070		0.332
	0.262						0.229	0.491

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

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.

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14.3.3. Sum of the SAR for LTE, Wi-Fi 2.4 GHz and 5 GHz Bands and Bluetooth

Test Position	Voice/Data (Highest SAR)	Data						∑ 1-g SAR (mW/g)
	LTE Band 2	WiFi 2.4 GHz	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	Bluetooth	
Rear	0.943	0.252						1.195
	0.943		0.082					1.025
	0.943			0.142				1.085
	0.943				0.181			1.124
	0.943					0.190		1.133
	0.943						0.229	1.172
Front	0.689	0.089						0.778
	0.689		0.089					0.778
	0.689			0.088				0.777
	0.689				0.092			0.781
	0.689					0.070		0.759
	0.689						0.229	0.918

Test Position	Voice/Data (Highest SAR)	Data						∑ 1-g SAR (mW/g)
	LTE Band 4	WiFi 2.4 GHz	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	Bluetooth	
Rear	1.277	0.252						1.529
	1.277		0.082					1.359
	1.277			0.142				1.419
	1.277				0.181			1.458
	1.277					0.190		1.467
	1.277						0.229	1.506
Front	1.079	0.089						1.168
	1.079		0.089					1.168
	1.079			0.088				1.167
	1.079				0.092			1.171
	1.079					0.070		1.149
	1.079						0.229	1.308

Test Position	Voice/Data (Highest SAR)	Data						∑ 1-g SAR (mW/g)
	LTE Band 17	WiFi 2.4 GHz	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	Bluetooth	
Rear	0.348	0.252						0.600
	0.348		0.082					0.430
	0.348			0.142				0.490
	0.348				0.181			0.529
	0.348					0.190		0.538
	0.348						0.229	0.577
Front	0.169	0.089						0.258
	0.169		0.089					0.258
	0.169			0.088				0.257
	0.169				0.092			0.261
	0.169					0.070		0.239
	0.169						0.229	0.398

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

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.

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14.4. Hotspot Mode Exposure Conditions

Sum of the SAR for GSM & Wi-Fi 2.4 GHz Band

Rear and Front Test Configuration is covered by Body-worn Accessory Exposure Conditions.

Test Position	Data			∑ 1-g SAR (mW/g)
	GSM 850	GSM 1900	WiFi 2.4 GHz	
Edge 1	0		0.079	0.079
		0	0.079	0.079
Edge 2	0.240		0	0.240
		0.105	0	0.105
Edge 3	0.065		0	0.065
		0.586	0	0.586
Edge 4	0.396		0.159	0.555
		0.270	0.159	0.429

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

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.

Sum of the SAR for W-CDMA & Wi-Fi 2.4 GHz Band

Rear and Front Test Configuration is covered by Body-worn Accessory Exposure Conditions.

Test Position	Data				∑ 1-g SAR (mW/g)
	W-CDMA Band II	W-CDMA Band IV	W-CDMA Band V	WiFi 2.4 GHz	
Edge 1	0			0.079	0.079
		0		0.079	0.079
			0	0.079	0.079
Edge 2	0.182			0	0.182
		0.255		0	0.255
			0.238	0	0.238
Edge 3	1.034			0	1.034
		1.074		0	1.074
			0.047	0	0.047
Edge 4	0.380			0.159	0.539
		0.473		0.159	0.632
			0.359	0.159	0.518

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

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.

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Sum of the SAR for LTE & Wi-Fi 2.4 GHz Band

Rear and Front Test Configuration is covered by Body-worn Accessory Exposure Conditions.

Test Position	Data				∑ 1-g SAR (mW/g)
	LTE Band 2	LTE Band 4	LTE Band 17	WiFi 2.4 GHz	
Edge 1	0			0.079	0.079
		0		0.079	0.079
			0	0.079	0.079
Edge 2	0			0	0.155
		0.243		0	0.243
			0.187	0	0.187
Edge 3	0.664			0	0.664
		1.058		0	1.058
			0.084	0	0.084
Edge 4	0.304			0.159	0.463
		0.410		0.159	0.569
			0.013	0.159	0.172

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

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.

14.1. Wi-Fi Direct Mode Exposure Conditions

The 2.4 GHz band is covered by body worn accessory and hotspot exposure conditions.

The 5GHz bands only operate in Group Client (GC) mode.

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Sum of the SAR for W-CDMA & Wi-Fi 5.8 GHz Band

Rear and Front Test Configuration is covered by Body-worn Accessory Exposure Conditions.

Test Position	Data				∑ 1-g SAR (mW/g)
	W-CDMA Band II	W-CDMA Band IV	W-CDMA Band V	WiFi 5.8 GHz	
Edge 1	0			0.046	0.046
		0		0.046	0.046
			0	0.046	0.046
Edge 2	0.182			0	0.182
		0.255		0	0.255
			0.238	0	0.238
Edge 3	1.034			0	1.034
		1.074		0	1.074
			0.047	0	0.047
Edge 4	0.380			0.100	0.480
		0.473		0.100	0.573
			0.359	0.100	0.459

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

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.

Sum of the SAR for LTE & Wi-Fi 5.8 GHz Band

Rear and Front Test Configuration is covered by Body-worn Accessory Exposure Conditions.

Test Position	Data				∑ 1-g SAR (mW/g)
	LTE Band 2	LTE Band 4	LTE Band 17	WiFi 5.8 GHz	
Edge 1	0			0.046	0.046
		0		0.046	0.046
			0	0.046	0.046
Edge 2	0			0	0.155
		0.243		0	0.243
			0.187	0	0.187
Edge 3	0.664			0	0.664
		1.058		0	1.058
			0.084	0	0.084
Edge 4	0.304			0.100	0.404
		0.410		0.100	0.510
			0.013	0.100	0.113

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

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.

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Appendixes

Refer to separated files for the following appendixes.

14.2. System Performance Check Plots

14.3. Highest SAR Test Plots

14.4. Calibration Certificate for E-Field Probe EX3DV3 - SN 3531

14.5. Calibration Certificate for E-Field Probe EX3DV4 - SN 3901

14.6. Calibration Certificate for D750V3 - SN 1019

14.7. Calibration Certificate for D835V2 - SN 4d002

14.8. Calibration Certificate for D1750V2 - SN 1053

14.9. Calibration Certificate for D1900V2 - SN 5d043

14.10. Calibration Certificate for D2450V2 - SN 899

14.11. Calibration Certificate for D5GHzV2 - SN 1138

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