



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

SAR EVALUATION REPORT

For
iPhone

**Model: A1428, A1429
FCC ID: BCG-E2599A**

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	8/8/2012	Initial Issue	--
A	9/6/2012	Made the following revision based on reviewer's comments: 1. Additional Head SAR for LTE band 4 and band 13. 2. Additional Body included Hotspot mode for LTE all available mode with 50% RB allocation. 3. Additional Body SAR EVDO Rev. B for two and three channels uses the minimum channel separation. 4. Added average output power for CDMA 1xAdvance mode 5. Updated highest SAR values due to additional tests. 6. Updated repeatability test results of Section 16.3.2 7. Updated Section 8.3 and 8.4 simultaneous Transmission Table	Devin Chang
A1	9/6/2012	1. Updated Section 8.3 and 8.4 simultaneous Transmission Table. 2. Added 1xAdvance power measurement procedures. 3. Added a statement after the SPLSR explanation at the beginning of Section 17 and 18 that the FCC has authorized the use of the draft SPLSR formula for this application. 4. Added a column for LTE VOIP mode into Sum of the SAR table in section 17.1.1 and 18.1.1 5. Added Section 17.4 Multi-band volume scan combined results. 6. Added appendix 19.26 for test plots for volume scans.	Devin Chang

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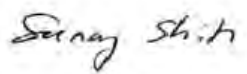

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1. Attestation of Test Results

Applicant	Apple Inc.	
DUT description	iPhone	
Model	A1428, A1429	
Test device is	An identical prototype	
Device category	Portable	
Exposure category	General Population/Uncontrolled Exposure	
Highest 1-g SAR	Refer to Sec. 7 Summary of Highest 1-g SAR	
Date tested	6/29/2012 – 8/4/2012 and 8/31/2012 – 9/5/2012	
	Applicable Standards	Test Results
	FCC OET Bulletin 65 Supplement C 01-01, IEEE Std 1528-2003 & IEEE 1528a-2005	Pass
<p>UL CCS 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 CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.</p> <p>Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.</p>		
Approved & Released For UL CCS By:		Tested By:
		
Sunny Shih Engineering Leader UL CCS		Devin Chang SAR Engineer UL CCS

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 1528a-2005 and the following published KDB procedures:

- 447498 D01 General RF Exposure Guidance v05 **(Draft)**
- 648474 D04 SAR Handsets Multi Xmitter and Ant v01 **(Draft)**
- 941225 D01 SAR test for 3G devices v02
- 941225 D02 Guidance for 3GPP R6 and R7 HSPA v02v01
- 941225 D03 SAR Test Reduction GSM GPRS EDGE v01
- 941225 D05 SAR for LTE Devices v02 **(Draft) and Preliminary Guideline dated August**
- 941225 D06 Hot Spot SAR v01
- 248227 D01 SAR Meas for 802 11abg v01r02
- 865664 D01 SAR Measurement 100 MHz to 6 GHz v01 **(Draft)**
- 865664 D02 SAR Reporting v01 **(Draft)**

KDB Inquiry tracking number: 583922 - Single FCC ID for two models and test reduction guideline

3. Facilities and Accreditation

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

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

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		
				MM	DD	Year
S-Parameter Network Analyzer	Agilent	8753ES	MY40001647	6	27	2013
Dielectronic Probe kit	HP	85070C	2569	N/A		
ENA Series Network Analyzer	Agilent	E5071B	MY42100131	2	11	2013
Dielectronic Probe kit	HP	85070E	594	N/A		
Synthesized Signal Generator	HP	8665B	3438A00633	2	22	2013
Power Meter	HP	438A	3513U04320	9	17	2013
Power Sensor A	HP	8481A	2237A31744	8	17	2013
Power Sensor B	HP	8481A	3318A95392	8	17	2013
Amplifier	MITEQ	4D00400600-50-30P	1622052	N/A		
Directional coupler	Werlatone	C8060-102	2149	N/A		
Synthesized Signal Generator	HP	8665B	3744A01084	5	3	2013
Power Meter	HP	438A	2822A05684	10	7	2013
Power Sensor A	HP	8481A	2702A66876	8	1	2013
Power Sensor B	HP	8482A	2349A08568	4	14	2013
Amplifier	MITEQ	4D00400600-50-30P	1620606	N/A		
Directional coupler	Werlatone	C8060-102	2141	N/A		
Base Station Simulator	R & S	CMU200	106301	6	6	2013
Base Station Simulator	R & S	CMU200	118339	5	20	2013
Base Station Simulator	R & S	CMW500	104245	12	14	2012
Base Station Simulator	R & S	CMW500	124593	7	1	2013
Base Station Simulator	Agilent	8960	GB42361452	4	4	2013
Thermometer	ERTCO	639-1S	8350	7	30	2013
E-Field Probe	SPEAG	EX3DV4	3686	2	16	2013
E-Field Probe	SPEAG	EX3DV4	3751	12	19	2012
E-Field Probe	SPEAG	EX3DV4	3772	2	16	2013
Data Acquisition Electronics	SPEAG	DAE4	1239	6	6	2013
Data Acquisition Electronics	SPEAG	DAE4	1258	3	8	2013
Data Acquisition Electronics	SPEAG	DAE4	1259	2	13	2013
System Validation Dipole	SPEAG	D750V3	1019	2	9	2013
System Validation Dipole	SPEAG	D835V2	4d002	3	26	2013
System Validation Dipole	SPEAG	D835V2	4d117	4	10	2013
System Validation Dipole	SPEAG	D1750V2	1050	4	19	2013
System Validation Dipole	SPEAG	D1900V2	5d140	4	12	2013
System Validation Dipole	SPEAG	D2450V2	748	2	7	2013
System Validation Dipole	SPEAG	D5GHzV2	1075	2	14	2013
Power Meter	R & S	NRP	100673	5	5	2013
Power Sensor	R & S	NRP - Z23	100168	5	5	2013

4.2. Measurement Uncertainty

Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram

Component	Error, %	Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	6.00	Normal	1	1	6.00
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	3.45	Rectangular	1.732	1	1.99
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	0.30	Normal	1	1	0.30
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	1.00	Rectangular	1.732	1	0.58
Test Sample Related					
Test Sample Positioning	2.90	Normal	1	1	2.90
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.64	1.85
Liquid Conductivity - measurement	4.49	Normal	1	0.64	2.87
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement uncertainty	-4.65	Normal	1	0.6	-2.79
Combined Standard Uncertainty Uc(y) =					10.53
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =					21.06 %
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =					1.66 dB

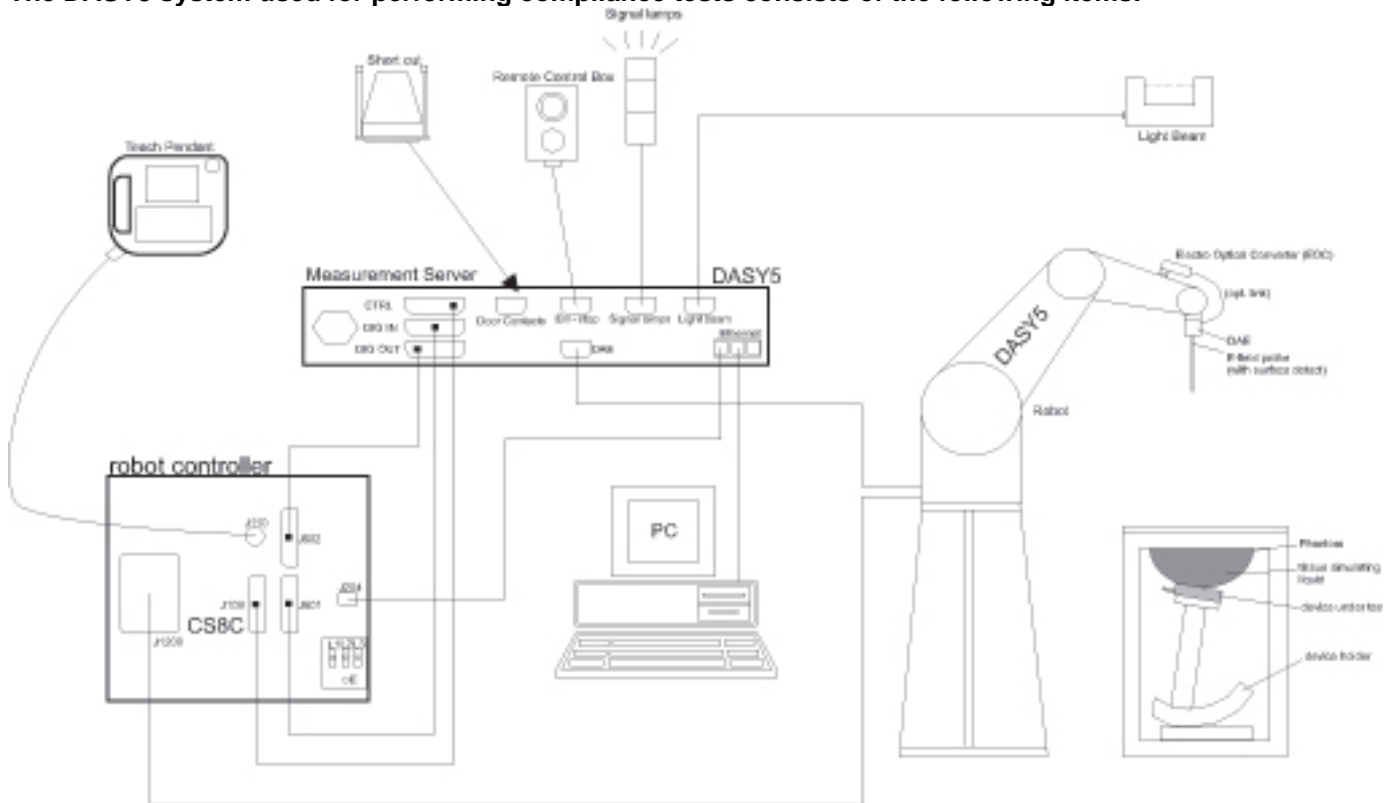
Measurement uncertainty for 300 MHz to 3 GHz averaged over 10 gram

Component	Error, %	Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	6.00	Normal	1	1	6.00
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	3.45	Rectangular	1.732	1	1.99
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	0.30	Normal	1	1	0.30
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	1.00	Rectangular	1.732	1	0.58
Test Sample Related					
Test Sample Positioning	2.90	Normal	1	1	2.90
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.43	1.24
Liquid Conductivity - measurement	4.49	Normal	1	0.43	1.93
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.49	1.41
Liquid Permittivity - measurement uncertainty	-4.65	Normal	1	0.49	-2.28
Combined Standard Uncertainty Uc(y), % =					10.05
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =					20.09 %
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =					1.59 dB

Measurement uncertainty for 3 to 6 GHz averaged over 1 gram					
Component	Error, %	Distribution	Divisor	Sensitivity	U (X), %
Measurement System					
Probe Calibration (k=1)	6.55	Normal	1	1	6.55
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	3.45	Rectangular	1.732	1	1.99
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	1.00	Normal	1	1	1.00
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	3.90	Rectangular	1.732	1	2.25
Test Sample Related					
Test Sample Positioning	1.10	Normal	1	1	1.10
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.64	1.85
Liquid Conductivity - measurement	3.88	Normal	1	0.64	2.48
Liquid Permittivity - deviation from target	10.00	Rectangular	1.732	0.6	3.46
Liquid Permittivity - measurement uncertainty	-5.35	Normal	1	0.6	-3.21
Combined Standard Uncertainty U _c (y), %:					11.21
Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =				21.97 %	
Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =				1.73 dB	
Measurement uncertainty for 3 to 6 GHz averaged over 10 gram					
Component	Error, %	Distribution	Divisor	Sensitivity	U (X), %
Measurement System					
Probe Calibration (k=1)	6.55	Normal	1	1	6.55
Axial Isotropy	4.03	Rectangular	1.732	0.7071	1.64
Hemispherical Isotropy	6.90	Rectangular	1.732	0.7071	2.82
Boundary Effect	1.00	Rectangular	1.732	1	0.58
Probe Linearity	9.20	Rectangular	1.732	1	5.31
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	1.00	Normal	1	1	1.00
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	3.90	Rectangular	1.732	1	2.25
Test Sample Related					
Test Sample Positioning	1.10	Normal	1	1	1.10
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.43	1.24
Liquid Conductivity - measurement	3.88	Normal	1	0.43	1.67
Liquid Permittivity - deviation from target	10.00	Rectangular	1.732	0.49	2.83
Liquid Permittivity - measurement uncertainty	-5.35	Normal	1	0.49	-2.62
Combined Standard Uncertainty U _c (y), %:					12.12
Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =				24.24 %	
Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =				1.88 dB	

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.
- 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.

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 (Draft)

	$\leq 3 \text{ GHz}$	$> 3 \text{ GHz}$
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	$5 \pm 1 \text{ mm}$	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5 \text{ mm}$
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
	$\leq 2 \text{ GHz: } \leq 15 \text{ mm}$ $2 - 3 \text{ GHz: } \leq 12 \text{ mm}$	$3 - 4 \text{ GHz: } \leq 12 \text{ mm}$ $4 - 6 \text{ GHz: } \leq 10 \text{ mm}$
Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$	When either the x or y dimension of the test device in the measurement plane is smaller than the above, the measurement resolution must be \leq the corresponding x and y dimensions of the test device, with at least one measurement point on the test device.	

Step 3: Zoom Scan

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

Zoom Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz 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 1 st two points closest to phantom surface	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
			$\Delta z_{Zoom}(n>1)$: between subsequent points
Minimum zoom scan volume	x, y, z	≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

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.

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.

7. Summary of Highest 1g SAR Results

7.1. Highest 1g SAR Results for A1428

Worst Case SAR data for each Frequency Band

FCC Rule Parts	Freq. Range	Highest 1-g SAR	Limit
22	824-849 MHz	Head: 0.826 W/kg (Left Touch) Body-worn & Hotspot: 0.913 W/kg (Rear w/ 10mm distance)	1.6 W/kg
24	1850-1910 MHz	Head: 1.13 W/kg (Right Touch) Body-worn & Hotspot: 1.14 W/kg (Rear w/ 10mm distance)	
27 (LTE Band 2)	1850-1910 MHz	Body-worn & Hotspot: 1.17 W/kg (Rear w/ 10 mm distance)	
27 (LTE Band 4)	1710-1755 MHz	Head: 1.25 W/kg (Right Touch) Body-worn & Hotspot: 1.18 W/kg (Rear w/ 10 mm distance)	
27 (LTE Band 5)	824-849 MHz	Body-worn & Hotspot: 0.724 W/kg (Front w/ 10 mm distance)	
27 (LTE Band 17)	704-716 MHz	Body-worn & Hotspot: 0.547 W/kg (Front w/ 10 mm distance)	
15.247	2412-2462 MHz	Head: 0.572 W/kg (Right Touch) Body-worn & Hotspot: 0.198 W/kg (Rear w/ 10 mm distance)	
	5725-5850 MHz	Head: 0.58 W/kg (Right Touch) Body-worn: 0.067 W/kg (Front w/ 10 mm distance)	
15.407	5150-5250 MHz	Head: 0.594 W/kg (Right Touch) Body-worn: 0.065 W/kg (Front w/ 10 mm distance)	
	5250-5350 MHz	Head: 0.538 W/kg (Right Touch) Body-worn: 0.071 W/kg (Front w/ 10 mm distance)	
	5500-5700 MHz	Head: 0.593 W/kg (Right Touch) Body-worn: 0.085 W/kg (Front w/ 10 mm distance)	
Simultaneous transmission condition		1.34 W/kg (refer to Section 17.4) (The highest SAR across exposure conditions)	

7.2. Highest 1g SAR Results for A1429

Worst Case SAR data for each Frequency Band

FCC Rule Parts	Freq. Range	Highest 1-g SAR	Limit
22	824-849 MHz	Head: 0.972 W/kg (Left Touch) Body-worn & Hotspot: 1.04 W/kg (Rear w/ 10mm distance)	1.6 W/kg
24	1850-1910 MHz	Head: 1.18 W/kg (Right Touch) Body-worn & Hotspot: 1.18 W/kg (Rear w/ 10mm distance)	
90	817.9-823.1 MHz	Head: 0.925 W/kg (Left Touch) Body-worn & Hotspot: 0.876 W/kg (Rear w/ 10mm distance)	
27 (LTE Band 5)	824-849 MHz	Body-worn & Hotspot: 0.703 W/kg (Rear w/ 10 mm distance)	
27 (LTE Band 13)	777-787 MHz	Head: 0.616 W/kg (Left Touch) Body-worn & Hotspot: 0.645 W/kg (Rear w/ 10 mm distance)	
27 (LTE Band 25)	1850-1915 MHz	Body-worn & Hotspot: 1.18 W/kg (Rear w/ 10 mm distance)	
15.247	2412-2462 MHz	Head: 0.522 W/kg (Right Touch) Body-worn & Hotspot: 0.171 W/kg (Rear w/ 10 mm distance)	
	5725-5850 MHz	Head: 0.593 W/kg (Right Touch) Body-worn: 0.066 W/kg (Front w/ 10 mm distance)	
15.407	5150-5250 MHz	Head: 0.587 W/kg (Left Touch) Body-worn: 0.13 W/kg (Front w/ 10 mm distance)	
	5250-5350 MHz	Head: 0.575 W/kg (Right Touch) Body-worn: 0.114 W/kg (Front w/ 10 mm distance)	
	5500-5700 MHz	Head: 0.58 W/kg (Right Touch) Body-worn: 0.089 W/kg (Front w/ 10 mm distance)	
Simultaneous transmission condition		1.566 W/kg (refer to Section 18.1.5) (The highest SAR across exposure conditions)	

8. Device Under Test

iPhone Model: A1428 and A1429	
Normal operation	<ul style="list-style-type: none"> Held to head, Body-worn (Rear and Front sides) with 10 mm separation distance. Hotspot (wireless router) with 10 mm separation distance to all sides and edges.
Accessory	1. Headset

8.1. Band and Air Interfaces

Tx Frequencies	Model: A1428	Model: A1429
	<ul style="list-style-type: none"> GSM850: 824 - 849 MHz GSM1900: 1850 - 1910 MHz W-CDMA Band II: 1850 - 1910 MHz W-CDMA Band V: 824 - 849 MHz LTE Band 2: 1850 - 1910 MHz LTE Band 4: 1710 - 1755 MHz LTE Band 5: 824 - 849 MHz LTE Band 17: 704 - 716 MHz 802.11a/b/g/n: 2412 - 2462 MHz 5180 – 5825 MHz Bluetooth: 2402 - 2480 MHz 	<ul style="list-style-type: none"> GSM850: 824 - 849 MHz GSM1900: 1850 - 1910 MHz W-CDMA Band II: 1850 - 1910 MHz W-CDMA Band V: 824 - 849 MHz CDMA BC 0: 824 - 849 MHz CDMA BC 1: 1850 - 1910 MHz CDMA BC 10: 817.9 – 823.1 MHz LTE Band 5: 824 - 849 MHz LTE Band 13: 777 - 787 MHz LTE Band 25: 1850 - 1915 MHz 802.11a/b/g/n: 2412 - 2462 MHz 5180 – 5825 MHz Bluetooth: 2402 - 2480 MHz
Mode	<ul style="list-style-type: none"> GSM/GPRS/EGPRS UMTS Rel 99 HSDPA (Rel 7, CAT 14) HSUPA (Rel 6, CAT 6) DC-HSDPA (Rel 8, CAT 24) HSPA+ (Rel 6, CAT 6) 802.11a/b/g/n HT20 Bluetooth 4.0 LE 	<ul style="list-style-type: none"> GSM/GPRS/EGPRS UMTS Rel 99 HSDPA (Rel 7, CAT 14) HSUPA (Rel 6, CAT 6) DC-HSDPA (Rel 8, CAT 24) HSPA+ (Rel 6, CAT 6) CDMA 1xRTT CDMA 1x Advanced EVDO Rev. 0, Rev. A, Rev. B (Rev B in BC0 for 16QAM only) 802.11a/b/g/n HT20 Bluetooth 4.0 LE
GPRS Multi-Slot Class	10	
GPRS Class	B	
DTM Class	Not supported	

8.2. Hotspot (Wireless router) Exposure Condition

The device is capable of personal hotspot mode with WiFi in the 2.4 GHz band. The hotspot mode can be enabled by the user. However, the 5 GHz bands do not support hotspot mode.

8.3. Simultaneous Transmission for A1428

WWAN Radio (GSM/GPRS/EGPRS/UMTS/LTE) can transmit simultaneously with WiFi/BT Radio.

- WiFi 2.4 GHz Radio cannot transmit simultaneously with Bluetooth Radio.
- WiFi 5 GHz Radio can transmit simultaneously with Bluetooth Radio

- TX1 = LAT/Primary Antenna
- TX2 = UAT/Secondary Antenna
- TX3 = WiFi/Bluetooth Antenna. WiFi 2.4 GHz and 5 GHz share the same antenna with each other and Bluetooth
- WWAN transmits using either TX1 or TX2 and not TX3, and TX1 and TX2 never transmit simultaneously. At any given time only one technology (GSM/UMTS/LTE) can transmit from Tx1 or Tx2.
- WiFi and BT transmit using only TX3

8.3.1. Head Exposure Conditions

A1428 Cellular + Wifi

User usage	SAR Test distance	Mode	Mode of Operation	Band	LTE data	GSM Voice	WCDMA Voice	GPRS/ EGPRS	DC-HSDPA	HSDPA / HSPA+ (HSDPA/HSUPA)	Wi-Fi 5GHz	Wi-Fi 2.4GHz	BT 2.4GHz	
Head	0 cm	Voice	GSM Voice	850	No	Tx1/2	No	No	No	No	No	Tx3	No	
			GSM Voice	1900	No	Tx1/2	No	No	No	No	No		No	
			WCDMA Voice	835	No	No	Tx1/2	No	No	No	No		No	
			WCDMA Voice	1900	No	No	Tx1/2	No	No	No	No		No	
			LTE VOIP*	710	Tx1/2	No	No	No	No	No	No		No	
			LTE VOIP*	850	Tx1/2	No	No	No	No	No	No		No	
			LTE VOIP*	1700	Tx1/2	No	No	No	No	No	No		No	
			LTE VOIP*	1900	Tx1/2	No	No	No	No	No	No		No	
			GSM Voice	850	No	Tx1/2	No	No	No	No	No	Tx3	No	No
			GSM Voice	1900	No	Tx1/2	No	No	No	No	No		No	No
			WCDMA Voice	835	No	No	Tx1/2	No	No	No	No		No	No
			WCDMA Voice	1900	No	No	Tx1/2	No	No	No	No		No	No
			LTE VOIP	710	Tx1/2	No	No	No	No	No	No	No	No	No
			LTE VOIP	850	Tx1/2	No	No	No	No	No	No		No	No
			LTE VOIP	1700	Tx1/2	No	No	No	No	No	No		No	No
			LTE VOIP	1900	Tx1/2	No	No	No	No	No	No		No	No

Notes:

*: Hot spot Mode

8.3.2. Body-worn Accessory Exposure Condition

A1428 Cellular + Wi-Fi, Cellular+ BT Simultaneous Transmission Configurations

User usage	SAR Test distance	Mode	Mode of Operation	Band	LTE	GSM Voice	WCDMA Voice	GPRS/ EGPRS	WCDMA	DC-HSDPA/HSPA+(HSDPA/HSUPA)	Wi-Fi 5GHz	Wi-Fi 2.4GHz	BT 2.4GHz	
Body-worn accessory	1 cm	Cellular + 2.4GHz Wifi	GSM Voice	850	No	Tx1/2	No	No	No	No	No	Tx3	No	
			GSM Voice	1900	No	Tx1/2	No	No	No	No	No		No	
			WCDMA Voice	835	No	No	Tx1/2	No	No	No	No		No	
			WCDMA Voice	1900	No	No	Tx1/2	No	No	No	No		No	
			GPRS/ EGPRS	850	No	No	No	Tx1/2	No	No	No	No	No	No
			GPRS/ EGPRS	1900	No	No	No	Tx1/2	No	No	No	No	No	No
			DC-HSDPA	835	No	No	No	No	Tx1/2	No	No	No	No	No
			DC-HSDPA	1900	No	No	No	No	Tx1/2	No	No	No	No	No
			HSPA+	835	No	No	No	No	No	Tx1/2	No	No	No	No
			HSPA+	1900	No	No	No	No	No	No	Tx1/2	No	No	No
			LTE data	710	Tx1/2	No	No	No	No	No	No	No	No	No
			LTE data	850	Tx1/2	No	No	No	No	No	No	No	No	No
			LTE data	1700	Tx1/2	No	No	No	No	No	No	No	No	No
			LTE data	1900	Tx1/2	No	No	No	No	No	No	No	No	No
		Cellular + 5GHz Wifi/Cellular + BT/ Cellular + 5GHz Wifi+ BT	GSM Voice	850	No	Tx1/2	No	No	No	No	No	Tx3	No	Tx3
			GSM Voice	1900	No	Tx1/2	No	No	No	No	No		No	
			WCDMA Voice	835	No	No	Tx1/2	No	No	No	No		No	
			WCDMA Voice	1900	No	No	Tx1/2	No	No	No	No		No	
			GPRS/ EGPRS	850	No	No	No	Tx1/2	No	No	No	No	No	
			GPRS/ EGPRS	1900	No	No	No	Tx1/2	No	No	No	No	No	
			DC-HSDPA	835	No	No	No	No	Tx1/2	No	No	No	No	
			DC-HSDPA	1900	No	No	No	No	Tx1/2	No	No	No	No	
			HSPA+	835	No	No	No	No	No	Tx1/2	No	No	No	
			HSPA+	1900	No	No	No	No	No	No	Tx1/2	No	No	
LTE data	710	Tx1/2	No	No	No	No	No	No	No	No	No			
LTE data	850	Tx1/2	No	No	No	No	No	No	No	No	No			
LTE data	1700	Tx1/2	No	No	No	No	No	No	No	No	No			
LTE data	1900	Tx1/2	No	No	No	No	No	No	No	No	No			

8.3.3. Wireless Router (hotspot) Exposure Condition

A1428 Hotspot simultaneous transmission

User usage	SAR Test distance	Mode	Mode of Operation	Band	LTE	WCDMA	GPRS/ EGPRS	DC-HSDPA	HSPA+ (HSDPA/HSUPA)	Wi-Fi HOTSPOT 2.4GHz Only)	BT 2.4GHz
Hotspot	1 cm	Cellular + 2.4GHz Wi-Fi HOTSPOT	GPRS/ EGPRS	850	No	No	Tx1/2	No	No	Tx3	No
			GPRS/ EGPRS	1900	No	No	Tx1/2	No	No		No
			DC-HSDPA	835	No	No	No	Tx1/2	No		No
			DC-HSDPA	1900	No	No	No	Tx1/2	No		No
			HSPA+	835	No	No	No	No	Tx1/2		No
			HSPA+	1900	No	No	No	No	Tx1/2		No
			LTE data	710	Tx1/2	No	No	No	No		No
			LTE data	850	Tx1/2	No	No	No	No		No
			LTE data	1700	Tx1/2	No	No	No	No		No
			LTE data	1900	Tx1/2	No	No	No	No		No

8.4. Simultaneous Transmission for A1429

WWAN Radio (GSM/GPRS/EGPRS/UMTS/LTE) can transmit simultaneously with WiFi/BT Radio.

- WiFi 2.4 GHz Radio cannot transmit simultaneously with Bluetooth Radio.
- WiFi 5 GHz Radio can transmit simultaneously with Bluetooth Radio

- TX1 = LAT/Primary Antenna
- TX2 = UAT/Secondary Antenna
- TX3 = WiFi/Bluetooth Antenna. WiFi 2.4 GHz and 5 GHz share the same antenna with each other and Bluetooth
- WWAN transmits using either TX1 or TX2 and not TX3, and TX1 and TX2 never transmit simultaneously. At any given time only one technology (GSM/UMTS/LTE/CDMA) can transmit from Tx1 or Tx2.
- WiFi and BT transmit using only TX3

8.4.1. Head Exposure Condition

A1429 Cellular + Wifi

User usage	SAR Test distance	Mode	Mode of Operation	Band	LTE VOIP	CDMA Voice (1xRTT)	GSM Voice	WCDMA Voice	CDMA Data 1xRTT, EV-DO	GPRS/ EGPRS	DC-HSDPA	HSDPA / HSPA+ (HSDPA/HSUPA)	Wi-Fi 5GHz	Wi-Fi 2.4GHz	BT 2.4GHz		
Head	0 cm	Voice	CDMA Voice (1xRTT)	835	No	Tx1/2	No	No	No	No	No	No	No	Tx3	No		
			CDMA Voice (1xRTT)	1900	No	Tx1/2	No	No	No	No	No	No	No		No	No	
			GSM Voice	850	No	No	Tx1/2	No	No	No	No	No	No		No	No	
			GSM Voice	1900	No	No	Tx1/2	No	No	No	No	No	No		No	No	
			WCDMA Voice	835	No	No	No	Tx1/2	No	No	No	No	No		No	No	
			WCDMA Voice	1900	No	No	No	Tx1/2	No	No	No	No	No		No	No	
			LTE VOIP*	782	Tx1/2	No	No	No	No	No	No	No	No		No	No	
			LTE VOIP*	850	Tx1/2	No	No	No	No	No	No	No	No		No	No	
			LTE VOIP*	1915	Tx1/2	No	No	No	No	No	No	No	No		No	No	
			CDMA Voice (1xRTT)	835	No	Tx1/2	No	No	No	No	No	No	No	No	Tx3	No	No
			CDMA Voice (1xRTT)	1900	No	Tx1/2	No	No	No	No	No	No	No	No		No	No
			GSM Voice	850	No	No	Tx1/2	No	No	No	No	No	No	No		No	No
			GSM Voice	1900	No	No	Tx1/2	No	No	No	No	No	No	No		No	No
			WCDMA Voice	835	No	No	No	Tx1/2	No	No	No	No	No	No		No	No
			WCDMA Voice	1900	No	No	No	Tx1/2	No	No	No	No	No	No		No	No
			LTE VOIP	782	Tx1/2	No	No	No	No	No	No	No	No	No	No	No	No
			LTE VOIP	850	Tx1/2	No	No	No	No	No	No	No	No	No		No	No
			LTE VOIP	1915	Tx1/2	No	No	No	No	No	No	No	No	No		No	No

*: Hot Spot Mode

8.4.2. Body-worn Accessory Exposure Condition

A1429 Cellular + Wi-Fi, Cellular+ BT Simultaneous Transmission Configurations

User usage	SAR Test distance	Mode	Mode of Operation	Band	LTE	CDMA Voice (1xRTT)	GSM Voice	WCDMA Voice	CDMA Data 1xRTT, EV-DO	GPRS/EGPRS	WCDMA	DC-HSDPA/HSPA+ (HSDPA/HSUPA)	Wi-Fi 5GHz	Wi-Fi 2.4GHz	BT 2.4GHz		
Body-worn accessory	1 cm	Cellular + 2.4GHz WiFi	CDMA voice 1xRTT	835	No	Tx1/2	No	No	No	No	No	No	No	TX3	No		
			CDMA voice 1xRTT	1900	No	Tx1/2	No	No	No	No	No	No	No		No	No	
			GSM Voice	850	No	No	Tx1/2	No	No	No	No	No	No		No	No	
			GSM Voice	1900	No	No	Tx1/2	No	No	No	No	No	No		No	No	
			WCDMA Voice	835	No	No	No	Tx1/2	No	No	No	No	No		No	No	
			WCDMA Voice	1900	No	No	No	Tx1/2	No	No	No	No	No		No	No	
			CDMA 1xRTT, EV-DO	835	No	No	No	No	Tx1/2	No	No	No	No	No	No	No	
			CDMA 1xRTT, EV-DO	1900	No	No	No	No	Tx1/2	No	No	No	No	No	No	No	
			GPRS/EGPRS	850	No	No	No	No	No	Tx1/2	No	No	No	No	No	No	
			GPRS/EGPRS	1900	No	No	No	No	No	No	Tx1/2	No	No	No	No	No	
			DC-HSDPA	835	No	No	No	No	No	No	No	Tx1/2	No	No	No	No	
			DC-HSDPA	1900	No	No	No	No	No	No	No	No	Tx1/2	No	No	No	
			HSPA+	835	No	No	No	No	No	No	No	No	No	Tx1/2	No	No	
			HSPA+	1900	No	No	No	No	No	No	No	No	No	No	Tx1/2	No	
			LTE data	782	Tx1/2	No	No	No	No	No	No	No	No	No	No	No	No
			LTE data	850	Tx1/2	No	No	No	No	No	No	No	No	No	No	No	No
			LTE data	1915	Tx1/2	No	No	No	No	No	No	No	No	No	No	No	No
			Cellular + 5GHz Wifi/Cellular + BT/ Cellular + 5GHz Wifi+ BT		TX3	CDMA voice 1xRTT	835	No	Tx1/2	No	No	No	No	No	No	TX3	No
		CDMA voice 1xRTT				1900	No	Tx1/2	No	No	No	No	No	No	No		No
		GSM Voice				850	No	No	Tx1/2	No	No	No	No	No	No		No
		GSM Voice				1900	No	No	Tx1/2	No	No	No	No	No	No		No
		WCDMA Voice				835	No	No	No	Tx1/2	No	No	No	No	No		No
		WCDMA Voice				1900	No	No	No	Tx1/2	No	No	No	No	No		No
		CDMA 1xRTT, EV-DO			835	No	No	No	No	Tx1/2	No	No	No	No	No	TX3	
		CDMA 1xRTT, EV-DO			1900	No	No	No	No	Tx1/2	No	No	No	No	No		No
		GPRS/EGPRS			850	No	No	No	No	No	Tx1/2	No	No	No	No		No
		GPRS/EGPRS			1900	No	No	No	No	No	No	Tx1/2	No	No	No		No
		DC-HSDPA			835	No	No	No	No	No	No	No	Tx1/2	No	No		No
		DC-HSDPA			1900	No	No	No	No	No	No	No	No	Tx1/2	No		No
		HSPA+			835	No	No	No	No	No	No	No	No	No	Tx1/2		No
		HSPA+			1900	No	No	No	No	No	No	No	No	No	No		Tx1/2
		LTE data	782	Tx1/2	No	No	No	No	No	No	No	No	No	No	No		
LTE data	850	Tx1/2	No	No	No	No	No	No	No	No	No	No	No				
LTE data	1915	Tx1/2	No	No	No	No	No	No	No	No	No	No	No				

8.4.3. Wireless Router (hotspot) Exposure Condition

A1429 Hotspot simultaneous transmission

User usage	SAR Test distance	Mode	Mode of Operation	Band	LTE	WCDMA	CDMA Data 1xRTT, EV-DO	GPRS/ EGPRS	DC-HSDPA	HSPA+ (HSDPA/HSUPA)	Wi-Fi HOTSPOT 2.4GHz Only)	BT 2.4GHz	
Hotspot	1 cm	Cellular + 2.4GHz Wifi	CDMA 1xRTT, EV-DO	835	No	No	Tx1/2	No	No	No	Tx3	No	
			CDMA 1xRTT, EV-DO	1900	No	No	Tx1/2	No	No	No		No	
			GPRS/ EGPRS	850	No	No	No	Tx1/2	No	No		No	
			GPRS/ EGPRS	1900	No	No	No	Tx1/2	No	No		No	
			DC-HSDPA	835	No	No	No	No	Tx1/2	No		No	
			DC-HSDPA	1900	No	No	No	No	Tx1/2	No		No	
			HSPA+	835	No	No	No	No	No	Tx1/2		No	
			HSPA+	1900	No	No	No	No	No	No		Tx1/2	No
			LTE data	782	Tx1/2	No	No	No	No	No		No	No
			LTE data	850	Tx1/2	No	No	No	No	No		No	No
			LTE data	1915	Tx1/2	No	No	No	No	No		No	No

8.5. 941225 D05 SAR for LTE Devices v02 (Draft)

8.5.1. LTE Bands for Model A1428

#	Description	Information						
A	List the frequency range and channel bandwidths used in each LTE band; 1.4, 3, 5, 10, 15, 20 MHz, etc.	Band 2						
		Tx: 1850 - 1910 MHz	Rx: 1930 - 1990 MHz					
		Band 4						
		Tx: 1710 – 1755 MHz	Rx: 2100 – 2155 MHz					
		Band 5						
		Tx: 824 - 849 MHz	Rx: 869 - 894 MHz					
		Band 17						
		Tx: 704 – 716 MHz	Rx: 734 – 746 MHz					
		Channel Bandwidths: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz						
B	Identify the high, middle and low (H, M, L) channel numbers and channel frequencies for each LTE bandwidth and frequency band	Band 2	Channel Bandwidth					
			20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
		Low	18700 /1860	18675/ 1857.5	18650/ 1855	18625/ 1852.5	18615/ 1851.5	18607/ 1850.7
		Mid	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880
		High	19100/ 1900	19125/ 1902.5	19150/ 1905	19175/ 1907.5	19184/ 1908.4	19192/ 1909.2
		Band 4	Channel Bandwidth					
			20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
		Low	20050/ 1720	20025/ 1717.5	20000/ 1715	19975/ 1712.5	19965/ 1711.5	19957/ 1710.7
		Mid	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5
		High	20300/ 1745	20325/ 1747.5	20350/ 1750	20375/ 1752.5	20384/ 1753.4	20392/ 1754.2
		Band 5	Channel Bandwidth					
			20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
		Low			20450/ 829	20425/ 826.5	20415/ 825.5	20407/ 824.7
		Mid			20525/ 836.5	20525/ 836.5	20525/ 836.5	20525/ 836.5
		High			20600/ 844	20625/ 846.5	20634/ 847.4	20642/ 848.2
		Band 17	Channel Bandwidth					
			20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
		Low			23780/ 709	23755/ 706.5		
		Mid			23790/ 710	23790/ 710		
		High			23800/ 711	23825/ 713.5		
		C	Descriptions of the LTE transmitter and antenna implementation, and identify if the transmitter operates independently of the other wireless transmitters in the device; i.e., whether the LTE hardware, components and/or antenna(s) are shared with other transmitters.	LTE can transmit from either UAT(Secondary Antenna) or LAT (Primary Antenna). The antenna switching is implemented with a physical, “break-before-make” switch such that only one antenna can be used for LTE transmission at a time.				

941225 D05 SAR for LTE Devices v02 (Continued)

#	Description	Information																																						
D	Identify the voice and data transmission requirements for all LTE operating modes and exposure conditions, for standalone and simultaneous transmission, with respect to the required head and body test configurations, antenna locations, handset flip or slide cover positions, antenna diversity requirements, etc.	VoLTE is not supported Exposure Conditions: <ul style="list-style-type: none"> • Head: SAM Right Touch, SAM Right Tilt, SAM Left Touch, SAM Left Tilt • Hotspot: Rear, Front, Edge 1, Edge 2, Edge 3 and Edge 4 of the DUT at a separation distance of 10 mm from the flat phantom. • Body-worn: Front 10mm, Rear 10mm 																																						
E	Identify if Maximum Power Reduction (MPR) is implemented as an optional or permanent feature, i.e., built-in by design: <ol style="list-style-type: none"> 1. MPR may be considered during SAR testing only when the maximum output power is permanently limited by the MPR implemented within the device, according to the RB (resource block) configurations specified in 3GPP/LTE standards. 2. Regardless of network requirements, only those RB configurations allowed (see 3GPP standards) for the channel bandwidth and modulation combinations may be tested with MPR active. Configurations with RB allocations less than the RB thresholds required by 3GPP must be tested without MPR. 3. A-MPR (additional MPR) must be disabled during SAR testing. 	As per 3GPP TS 36.101 v11.0.0 (2012-03) Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3 <table border="1" style="margin: 10px auto;"> <thead> <tr> <th rowspan="2">Modulation</th> <th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th> <th rowspan="2">MPR (dB)</th> </tr> <tr> <th>1.4 MHz</th> <th>3.0 MHz</th> <th>5 MHz</th> <th>10 MHz</th> <th>15 MHz</th> <th>20 MHz</th> </tr> </thead> <tbody> <tr> <td>QPSK</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 2</td> </tr> </tbody> </table> A-MPR is supported by design, but is disabled for SAR testing. A-MPR is disabled, by using Network Setting value of NS_01.	Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1	16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)																																	
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz																																		
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1																																	
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1																																	
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2																																	
F	When power reduction is required for one or more LTE modes to satisfy SAR compliance for simultaneous transmission or other equipment certification and operating requirements, maximum average conducted output power measurement results for each power reduction mode applicable to the simultaneous voice/data transmission configurations for such wireless configurations and frequency bands are required.	Not Applicable																																						

941225 D05 SAR for LTE Devices v02 (Continued)

G	Based on the design specifications and other information available to the manufacturer, through measurement and analysis during product development, when the maximum output power for different RB allocations and RB offset conditions within a channel bandwidth, modulation, or across the channels in a frequency band varies by more than 1 dB, a KDB inquiry is required to confirm if the required test channels are appropriate for SAR testing or if a different set of required test channels is necessary.	N/A
H	The maximum average conducted output power should be measured for the required test channels, for each channel bandwidth and uplink modulation, in each frequency band, using the following configurations to support the SAR test reduction and exclusion applied in the evaluation: <ol style="list-style-type: none"> 1. 100% RB allocation 2. 1 RB and also 50% RB allocation, offset to the upper and lower edges of each required test channel and also to the middle of the channel bandwidth 	Refer to the Section 10
I	Spectrum plots should be included in SAR reports to demonstrate the tested RB allocations have been established correctly at the maximum output power conditions.	Refer to the Section 10

8.5.2. LTE Bands for Model A1429

#	Description	Information						
A	List the frequency range and channel bandwidths used in each LTE band; 1.4, 3, 5, 10, 15, 20 MHz, etc.	Band 5						
		Tx: 824 - 849 MHz Rx: 869 - 894 MHz						
		Band 13						
		Tx: 777 - 787 MHz Rx: 746 - 756 MHz						
		Band 25						
		Tx: 1850 - 1915 MHz Rx: 1930 - 1995 MHz						
		1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz						
B	Identify the high, middle and low (H, M, L) channel numbers and frequencies in each LTE frequency band	Band 5						
		Channel Bandwidth						
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz	
		Low		20450/829	20425/826.5	20415/825.5	20407/824.7	
		Mid		20525/836.5	20525/836.5	20525/836.5	20525/836.5	
		High		20600/844	20625/846.5	20634/847.4	20642/848.2	
		Band 13	Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz	
		Low			23205/779.5			
		Mid		23230/782	23230/782			
		High			23255/784.5			
		Band 25	Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz	
		Low	26140/1860	26115/1857.5	26090/1855	26065/1852.5	26055/1851.5	26047/1850.7
		Mid	26365/1882.5	26365/1882.5	26365/1882.5	26365/1882.5	26365/1882.5	26365/1882.5
		High	26590/1905	26615/1907.5	26640/1910	26665/1912.5	26674/1913.4	26682/1914.2
		C	Descriptions of the LTE transmitter and antenna implementation, and identify if the transmitter operates independently of the other wireless transmitters in the device; i.e., whether the LTE hardware, components and/or antenna(s) are shared with other transmitters.	LTE can transmit from either UAT(Secondary Antenna) or LAT (Primary Antenna). The antenna switching is implemented with a physical, "break-before-make" switch such that only one antenna can be used for LTE transmission at a time.				
		D	Identify the voice and data transmission requirements for all LTE operating modes and exposure conditions, for standalone and simultaneous transmission, with respect to the required head and body test configurations, antenna locations, handset flip or slide cover positions, antenna diversity requirements, etc.	VoLTE is not supported Exposure Conditions: <ul style="list-style-type: none"> • Head: SAM Right Touch, SAM Right Tilt, SAM Left Touch, SAM Left Tilt • Hotspot: Rear, Front, Edge 1, Edge 2, Edge 3 and Edge 4 of the DUT at a separation distance of 10 mm from the flat phantom. • Body-worn: Front 10mm, Rear 10mm 				

941225 D05 SAR for LTE Devices v02 (Continued)

#	Description	Information																																						
E	<p>Identify if Maximum Power Reduction (MPR) is implemented as an optional or permanent feature, i.e., built-in by design:</p> <ol style="list-style-type: none"> MPR may be considered during SAR testing only when the maximum output power is permanently limited by the MPR implemented within the device, according to the RB (resource block) configurations specified in 3GPP/LTE standards. Regardless of network requirements, only those RB configurations allowed (see 3GPP standards) for the channel bandwidth and modulation combinations may be tested with MPR active. Configurations with RB allocations less than the RB thresholds required by 3GPP must be tested without MPR. A-MPR (additional MPR) must be disabled during SAR testing. 	<p>As per 3GPP TS 36.101 v11.0.0 (2012-03)</p> <p>Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3</p> <table border="1"> <thead> <tr> <th rowspan="2">Modulation</th> <th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th> <th rowspan="2">MPR (dB)</th> </tr> <tr> <th>1.4 MHz</th> <th>3.0 MHz</th> <th>5 MHz</th> <th>10 MHz</th> <th>15 MHz</th> <th>20 MHz</th> </tr> </thead> <tbody> <tr> <td>QPSK</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 2</td> </tr> </tbody> </table> <p>A-MPR is supported by design, but is disabled for SAR testing. A-MPR is disabled, by using Network Setting value of NS_01.</p>	Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1	16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)																																	
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz																																		
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1																																	
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1																																	
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2																																	
F	<p>When power reduction is required for one or more LTE modes to satisfy SAR compliance for simultaneous transmission or other equipment certification and operating requirements, maximum average conducted output power measurement results for each power reduction mode applicable to the simultaneous voice/data transmission configurations for such wireless configurations and frequency bands are required.</p>	<p>Not Applicable</p>																																						
G	<p>Based on the design specifications and other information available to the manufacturer, through measurement and analysis during product development, when the maximum output power for different RB allocations and RB offset conditions within a channel bandwidth, modulation, or across the channels in a frequency band varies by more than 1 dB, a KDB inquiry is required to confirm if the required test channels are appropriate for SAR testing or if a different set of required test channels is necessary.</p>	<p>N/A</p>																																						

941225 D05 SAR for LTE Devices v02 (Continued)

H	The maximum average conducted output power should be measured for the required test channels, for each channel bandwidth and uplink modulation, in each frequency band, using the following configurations to support the SAR test reduction and exclusion applied in the evaluation: <ol style="list-style-type: none">1. 100% RB allocation2. 1 RB and also 50% RB allocation, offset to the upper and lower edges of each required test channel and also to the middle of the channel bandwidth	Refer to the Section 11
I	Spectrum plots should be included in SAR reports to demonstrate the tested RB allocations have been established correctly at the maximum output power conditions.	Refer to the Section 11

9. Summary of Test Configurations

Refer to Section 21 “Antenna Location and Separation Distances” for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

9.1. Head Exposure Conditions for WWAN and WiFi

Applicable to both LAT/Primary Ant. (TX1), UAT/Secondary Ant. (TX2) and WiFi/BT Ant. (TX3)

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

9.2. Body-worn Accessory Exposure Conditions

Applicable to both LAT/Primary Ant. (TX1), UAT/Secondary Ant. (TX2) and WiFi/BT Ant. (TX3)

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	

9.3. Hotspot Mode Exposure Conditions

For WWAN and LTE (LAT/Primary Antenna)

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1	>25 mm	No	SAR is not required because the distance from the antenna to the edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 2	0 mm	Yes	
Edge 3	0 mm	Yes	
Edge 4	0 mm	Yes	

For WWAN and LTE (UAT/Secondary Antenna)

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1	0 mm	Yes	
Edge 2	0 mm	Yes	
Edge 3	>25 mm	No	SAR is not required because the distance from the antenna to the edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 4	0 mm	Yes	

For WiFi

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1	4.7 mm	Yes	
Edge 2	35.2 mm	Yes	
Edge 3	115.4 mm	No	SAR is not required because the distance from the antenna to the edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 4	10.5 mm	Yes	

Notes:

- Edge 1= Top Edge
- Edge 2= Left Edge
- Edge 3= Right Edge
- Edge 4= Bottom Edge

10. RF Output Power Measurement (Model A1428)

10.1. GSM850

GSM (GMSK) Voice Mode

Band	Ch No.	Freq. (MHz)	Primary Antenna		Secondary Antenna	
			Avg burst Pwr (dBm)		Avg burst Pwr (dBm)	
850	128	824.2	33.5		33.0	
	190	836.6	33.4		33.0	
	251	848.8	33.5		32.9	

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	Primary Antenna				Secondary Antenna			
			Avg burst Pwr (dBm)				Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr	1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr
850	128	824.2	33.4	24.4	31.5	25.5	33.0	24.0	32.4	26.4
	190	836.6	33.5	24.5	31.4	25.4	33.0	24.0	32.4	26.4
	251	848.8	33.3	24.3	31.4	25.4	33.0	24.0	32.3	26.3

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	Freq. (MHz)	Primary Antenna				Secondary Antenna			
			Avg burst Pwr (dBm)				Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr	1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr
850	128	824.2	29.0	20.0	28.5	22.5	28.5	19.5	28.5	22.5
	190	836.6	29.0	20.0	28.5	22.5	28.5	19.5	28.4	22.4
	251	848.8	29.0	20.0	28.5	22.5	28.5	19.5	28.4	22.4

Notes:

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

- Head & Body-worn: GMSK Voice Mode
- Hotspot: GMSK (GPRS) mode with 2 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

10.2. GSM1900

GSM (GMSK) Voice Mode

Band	Ch No.	Freq. (MHz)	Primary Antenna		Secondary Antenna	
			Avg burst Pwr (dBm)		Avg burst Pwr (dBm)	
1900	512	1850.2	31.0		30.4	
	661	1880.0	31.0		30.4	
	810	1909.8	31.0		30.5	

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	Primary Antenna				Secondary Antenna			
			Avg burst Pwr (dBm)				Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr	1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr
1900	512	1850.2	31.0	22.0	30.0	24.0	30.5	21.5	30.5	24.5
	661	1880.0	31.0	22.0	30.0	24.0	30.5	21.5	30.5	24.5
	810	1909.8	31.0	22.0	30.0	24.0	30.5	21.5	30.5	24.5

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	Freq. (MHz)	Primary Antenna				Secondary Antenna			
			Avg burst Pwr (dBm)				Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr	1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr
1900	512	1850.2	27.9	18.9	27.7	21.7	27.0	18.0	26.9	20.9
	661	1880.0	27.9	18.9	27.8	21.8	27.0	18.0	27.0	20.9
	810	1909.8	27.9	18.9	27.8	21.8	27.0	18.0	26.9	20.9

Notes:

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

- Head & Body-worn: GMSK Voice Mode
- Hotspot: GMSK (GPRS) mode with 2 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

10.3. W-CDMA Band V

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
	β_c/β_d	8/15

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Primary Antenna	Secondary Antenna
				Avg Pwr (dBm)	
W-CDMA Band V	Rel 99 (RMC, 12.2 kbps)	4132	826.4	24.5	24.0
		4183	836.6	24.5	24.0
		4233	846.6	24.5	23.9

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			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
CM (dB)	0	1	1.5	1.5	
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	$A_{hs} = \beta_{hs}/\beta_c$	30/15			

Results

Band	Mode	UL Ch No.	Freq. (MHz)	MPR	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
W-CDMA Band V	Subtest 1	4132	826.4	0	23.6	23.2
		4183	836.6	0	23.5	23.1
		4233	846.6	0	23.5	23.1
	Subtest 2	4132	826.4	0	23.6	23.2
		4183	836.6	0	23.5	23.1
		4233	846.6	0	23.5	23.1
	Subtest 3	4132	826.4	0.5	23.2	22.8
		4183	836.6	0.5	23.0	22.6
		4233	846.6	0.5	23.0	22.6
	Subtest 4	4132	826.4	0.5	23.2	22.8
		4183	836.6	0.5	23.0	22.6
		4233	846.6	0.5	23.1	22.7

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.

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				
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	15/15
	β_{ec}	209/225	12/15	30/15	2/15	24/15
	β_c/β_d	11/15	6/15	15/9	2/15	15/15
	β_{hs}	22/15	12/15	30/15	4/15	30/15
	β_{ed}	1309/225	94/75	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 = β_{hs}/β_c	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

Results

Band	Mode	UL Ch No.	Freq. (MHz)	MPR	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
WCDMA Band V	Subtest 1	4132	826.4	0	23.5	23.0
		4183	836.6	0	23.5	22.9
		4233	846.6	0	23.3	22.9
	Subtest 2	4132	826.4	2	21.7	21.2
		4183	836.6	2	21.6	21.0
		4233	846.6	2	21.6	21.2
	Subtest 3	4132	826.4	1	22.7	22.2
		4183	836.6	1	22.6	22.0
		4233	846.6	1	22.6	22.2
	Subtest 4	4132	826.4	2	21.7	21.2
		4183	836.6	2	21.6	21.0
		4233	846.6	2	21.6	21.2
	Subtest 5	4132	826.4	0	23.5	23.0
		4183	836.6	0	23.4	22.8
		4233	846.6	0	23.4	23.0

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.

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.		

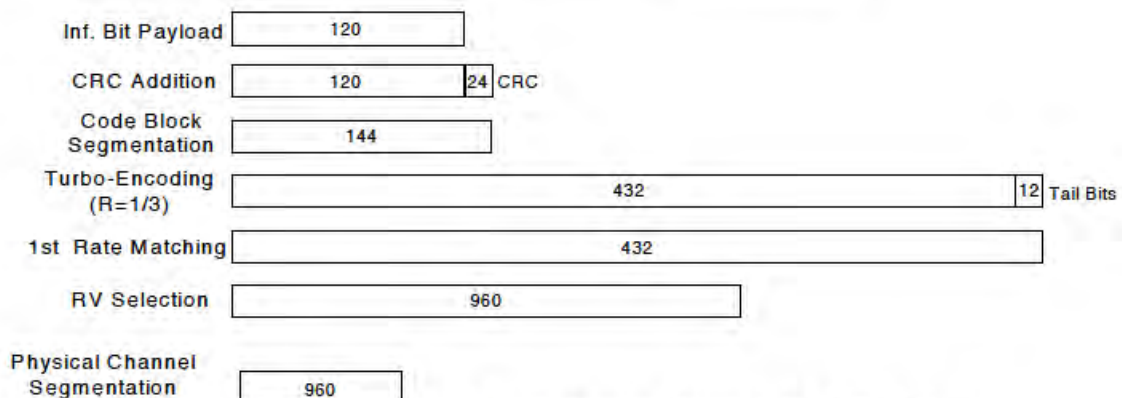


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

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:

	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			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	β_d (SF)	64			
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	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 = β_{hs}/β_c	30/15			

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

Results

Band	Mode	UL Ch No.	Freq. (MHz)	MPR	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
WCDMA Band V	Subtest 1	4132	826.4	0	23.4	23.1
		4183	836.6	0	23.4	23.1
		4233	846.6	0	23.4	23.1
	Subtest 2	4132	826.4	0	23.3	23.0
		4183	836.6	0	23.3	23.0
		4233	846.6	0	23.4	23.1
	Subtest 3	4132	826.4	0.5	23.4	23.1
		4183	836.6	0.5	23.4	23.1
		4233	846.6	0.5	23.4	23.1
	Subtest 4	4132	826.4	0.5	23.3	23.0
		4183	836.6	0.5	23.3	23.0
		4233	846.6	0.5	23.4	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.

10.4. W-CDMA Band II

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
	β_c/β_d	8/15

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Primary Antenna	Secondary Antenna
				Avg Pwr (dBm)	
W-CDMA (UMTS) Band II	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	22.5	21.3
		9400	1880.0	22.5	21.5
		9538	1907.6	22.5	21.4

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			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
CM (dB)	0	1	1.5	1.5	
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	$A_{hs} = \beta_{hs}/\beta_c$	30/15			

Results

Band	Mode	UL Ch No.	Freq. (MHz)	MPR	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
W-CDMA Band II	Subtest 1	9262	1852.4	0	21.5	20.7
		9400	1880.0	0	21.4	20.5
		9538	1907.6	0	21.4	20.7
	Subtest 2	9262	1852.4	0	21.5	20.7
		9400	1880.0	0	21.5	20.6
		9538	1907.6	0	21.5	20.8
	Subtest 3	9262	1852.4	0.5	21.1	20.3
		9400	1880.0	0.5	21.0	20.1
		9538	1907.6	0.5	21.0	20.3
	Subtest 4	9262	1852.4	0.5	21.0	20.2
		9400	1880.0	0.5	21.0	20.1
		9538	1907.6	0.5	21.0	20.3

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.

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					
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	15/15
β_{ec}	209/225	12/15	30/15	2/15	24/15	
β_c/β_d	11/15	6/15	15/9	2/15	15/15	
β_{hs}	22/15	12/15	30/15	4/15	30/15	
β_{ed}	1309/225	94/75	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 = β_{hs}/β_c						
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

Results

Band	Mode	UL Ch No.	Freq. (MHz)	MPR	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
WCDMA Band II	Subtest 1	9262	1852.4	0	21.5	20.6
		9400	1880.0	0	21.4	20.5
		9538	1907.6	0	21.5	20.6
	Subtest 2	9262	1852.4	2	19.5	18.6
		9400	1880.0	2	19.5	18.6
		9538	1907.6	2	19.6	18.7
	Subtest 3	9262	1852.4	1	20.6	19.7
		9400	1880.0	1	20.5	19.6
		9538	1907.6	1	20.6	19.7
	Subtest 4	9262	1852.4	2	19.5	18.6
		9400	1880.0	2	19.5	18.6
		9538	1907.6	2	19.6	18.7
	Subtest 5	9262	1852.4	0	21.4	20.5
		9400	1880.0	0	21.4	20.5
		9538	1907.6	0	21.5	20.6

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.

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.		

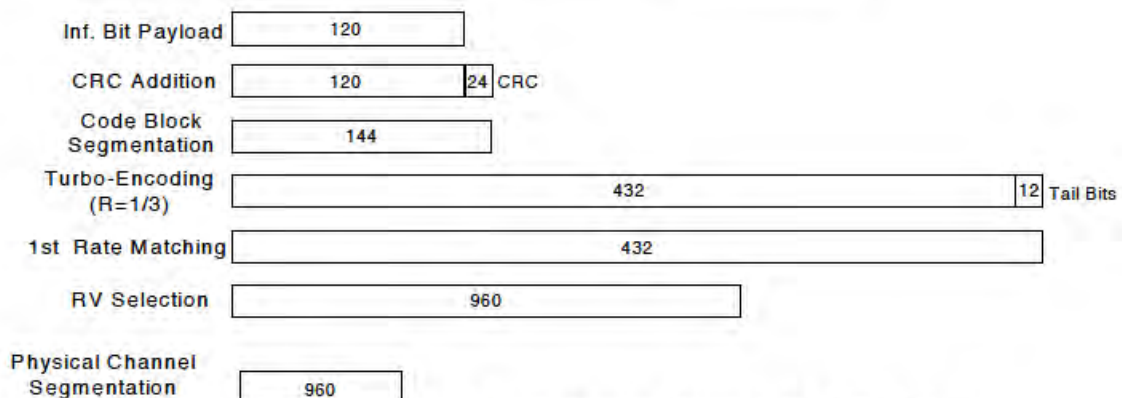


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

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:

	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			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	β_d (SF)	64			
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	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 = β_{hs}/β_c	30/15			

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

Results

Band	Mode	UL Ch No.	Freq. (MHz)	MPR	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
WCDMA Band II	Subtest 1	9262	1852.4	0	21.3	20.8
		9400	1880.0	0	21.4	20.8
		9538	1907.6	0	21.3	20.7
	Subtest 2	9262	1852.4	0	21.2	20.7
		9400	1880.0	0	21.2	20.6
		9538	1907.6	0	21.2	20.6
	Subtest 3	9262	1852.4	0.5	21.2	20.7
		9400	1880.0	0.5	21.4	20.8
		9538	1907.6	0.5	21.1	20.5
	Subtest 4	9262	1852.4	0.5	21.2	20.7
		9400	1880.0	0.5	21.3	20.7
		9538	1907.6	0.5	21.2	20.5

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.

10.5. LTE Band 2

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

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

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

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

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

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

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

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

Results

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
20	18700	1860.0	QPSK	1	0	0	22.5	22.9
				1	49	0	22.5	23.0
				1	99	0	22.5	23.0
				50	0	1	21.6	22.2
				50	24	1	21.7	22.4
				50	49	1	21.7	22.4
			16QAM	100	0	1	21.6	22.3
				1	0	1	21.7	22.3
				1	49	1	21.8	22.6
				1	99	1	21.7	22.3
				50	0	2	20.7	21.3
				50	24	2	20.7	21.4
	18900	1880.0	QPSK	50	49	2	20.7	21.4
				100	0	2	20.7	21.4
				1	0	0	22.4	23.0
				1	49	0	22.5	22.8
				1	99	0	22.5	22.8
				50	0	1	21.7	22.0
			16QAM	50	24	1	21.7	21.9
				50	49	1	21.7	21.8
				100	0	1	21.7	21.9
				1	0	1	21.8	22.3
				1	49	1	21.8	22.1
				1	99	1	21.8	22.0
	19100	1900.0	QPSK	50	0	2	20.8	21.1
				50	24	2	20.8	21.0
				50	49	2	20.7	20.9
				100	0	2	20.8	21.0
				1	0	0	22.5	22.8
				1	49	0	22.5	23.0
16QAM			1	99	0	22.5	22.8	
			50	0	1	21.7	22.0	
			50	24	1	21.6	22.2	
			50	49	1	21.7	22.1	
			100	0	1	21.7	22.1	
			1	0	1	21.8	22.0	
16QAM	1	49	1	21.8	22.4			
	1	99	1	21.8	21.9			
	50	0	2	20.7	21.1			
	50	24	2	20.7	21.2			
	50	49	2	20.7	21.2			
	100	0	2	20.7	21.2			

LTE Band 2 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
15	18675	1857.5	QPSK	1	0	0	22.5	22.8
				1	37	0	22.4	22.9
				1	74	0	22.3	23.0
				38	0	1	21.7	22.0
				38	18	1	21.7	22.0
				38	37	1	21.6	21.9
			16QAM	75	0	1	21.5	21.9
				1	0	1	21.5	22.4
				1	37	1	21.5	22.4
				1	74	1	21.5	22.5
				38	0	2	20.7	21.2
				38	18	2	20.6	21.2
	18900	1880.0	QPSK	38	37	2	20.6	21.1
				75	0	2	20.8	21.3
				1	0	0	22.2	23.0
				1	37	0	22.3	22.8
				1	74	0	22.4	22.5
				38	0	1	21.5	22.0
			16QAM	38	18	1	21.5	21.9
				38	37	1	21.6	21.9
				75	0	1	21.3	21.8
				1	0	1	21.3	22.6
				1	37	1	21.3	22.6
				1	74	1	21.4	22.7
	19125	1902.5	QPSK	38	0	2	20.7	20.9
				38	18	2	20.8	21.0
				38	37	2	20.6	20.9
				75	0	2	20.8	20.9
				1	0	0	22.4	23.0
				1	37	0	22.4	22.8
			16QAM	1	74	0	22.4	22.5
				38	0	1	21.5	22.0
				38	18	1	21.6	22.0
				38	37	1	21.5	21.9
				75	0	1	21.5	22.0
				1	0	1	21.4	22.4
16QAM	1	37	1	21.5	22.2			
	1	74	1	21.5	22.1			
	38	0	2	20.4	21.4			
	38	18	2	20.5	21.3			
	38	37	2	20.4	21.3			
	75	0	2	20.6	21.2			

LTE Band 2 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
10	18650	1855.0	QPSK	1	0	0	22.2	23.0
				1	24	0	22.3	23.0
				1	49	0	22.4	22.9
				25	0	1	21.6	22.0
				25	12	1	21.7	22.2
				25	24	1	21.6	22.1
			50	0	1	21.3	22.2	
			16QAM	1	0	1	21.3	22.3
				1	24	1	21.3	22.5
				1	49	1	21.4	22.7
				25	0	2	20.8	21.0
				25	12	2	20.8	21.1
	25	24		2	20.7	21.0		
	18900	1880.0	QPSK	1	0	0	22.5	22.9
				1	24	0	22.5	22.8
				1	49	0	22.5	22.8
				25	0	1	21.9	21.8
				25	12	1	21.9	21.8
				25	24	1	21.8	21.8
			50	0	1	21.8	21.8	
			16QAM	1	0	1	21.3	22.3
				1	24	1	21.4	22.0
				1	49	1	21.5	22.0
				25	0	2	20.9	21.0
				25	12	2	21.0	21.0
	25	24		2	20.8	21.0		
	19150	1905.0	QPSK	1	0	0	22.3	23.0
				1	24	0	22.3	22.9
				1	49	0	22.4	22.8
				25	0	1	21.9	22.0
25				12	1	21.9	22.1	
25				24	1	21.8	22.0	
50			0	1	21.4	22.0		
16QAM			1	0	1	21.3	21.8	
			1	24	1	21.4	21.8	
			1	49	1	21.5	22.0	
			25	0	2	21.0	21.4	
			25	12	2	21.0	21.4	
	25	24	2	21.0	21.4			
50	0	2	20.9	21.3				

LTE Band 2 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
5	18625	1855.0	QPSK	1	0	0	22.5	23.0
				1	12	0	22.5	23.0
				1	24	0	22.5	23.0
				12	0	1	23.6	22.0
				12	6	1	21.6	22.0
				12	11	1	21.5	22.0
			25	0	1	21.5	22.0	
			16QAM	1	0	1	21.7	22.8
				1	12	1	21.6	22.8
				1	24	1	21.6	22.8
				12	0	2	20.8	21.2
				12	6	2	20.8	21.3
	12	11		2	20.7	21.2		
	25	0	2	20.6	21.0			
	18900	1880.0	QPSK	1	0	0	22.4	22.9
				1	12	0	22.4	22.8
				1	24	0	22.5	22.8
				12	0	1	21.6	21.7
				12	6	1	21.6	21.8
				12	11	1	21.5	21.6
			25	0	1	21.5	21.8	
			16QAM	1	0	1	21.6	22.8
				1	12	1	21.6	22.7
				1	24	1	21.6	22.5
				12	0	2	0.7	21.0
				12	6	2	20.7	21.1
	12	11		2	20.7	21.0		
	25	0	2	20.6	20.9			
	19175	1907.5	QPSK	1	0	0	22.5	23.0
				1	12	0	22.4	22.8
1				24	0	22.4	22.7	
12				0	1	21.6	22.0	
12				6	1	21.6	22.0	
12				11	1	21.6	22.0	
25			0	1	21.4	21.9		
16QAM			1	0	1	21.6	22.9	
			1	12	1	21.5	22.8	
			1	24	1	21.5	22.7	
			12	0	2	20.5	21.4	
			12	6	2	20.5	21.4	
	12	11	2	20.5	21.3			
25	0	2	20.6	21.0				

LTE Band 2 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
3	18615	1851.5	QPSK	1	0	0	22.5	23.0
				1	7	0	22.5	23.0
				1	14	0	22.5	23.0
				8	0	1	21.5	22.4
				8	4	1	21.6	22.4
				8	7	1	21.5	22.4
			16QAM	15	0	1	21.5	22.5
				1	0	1	21.6	22.5
				1	7	1	21.5	22.5
				1	14	1	21.5	22.5
				8	0	2	20.5	21.0
				8	4	2	20.6	21.1
	18900	1880.0	QPSK	8	7	2	20.5	21.0
				8	7	2	20.5	21.0
				15	0	2	20.6	21.5
				1	0	0	22.5	23.0
				1	7	0	22.5	23.0
				1	14	0	22.5	23.0
			16QAM	8	0	1	21.5	22.0
				8	4	1	21.6	22.1
				8	7	1	21.5	22.0
				15	0	1	21.5	22.1
				1	0	1	21.5	22.6
				1	7	1	21.5	22.5
	19184	1908.4	QPSK	1	14	1	21.5	22.4
				8	0	2	20.6	21.3
				8	4	2	20.6	21.3
				8	7	2	20.6	21.3
				15	0	2	20.6	21.3
				1	0	0	22.5	23.0
			16QAM	1	7	0	22.5	23.0
				1	14	0	22.5	23.0
				8	0	1	21.6	22.1
				8	4	1	21.6	22.2
				8	7	1	21.5	22.1
				15	0	1	21.4	22.2
16QAM	1	0	1	21.5	22.4			
	1	7	1	21.4	22.3			
	1	14	1	21.4	22.3			
	8	0	2	20.6	21.3			
	8	4	2	20.6	21.3			
	8	7	2	20.6	21.3			
15	0	2	20.6	21.3				

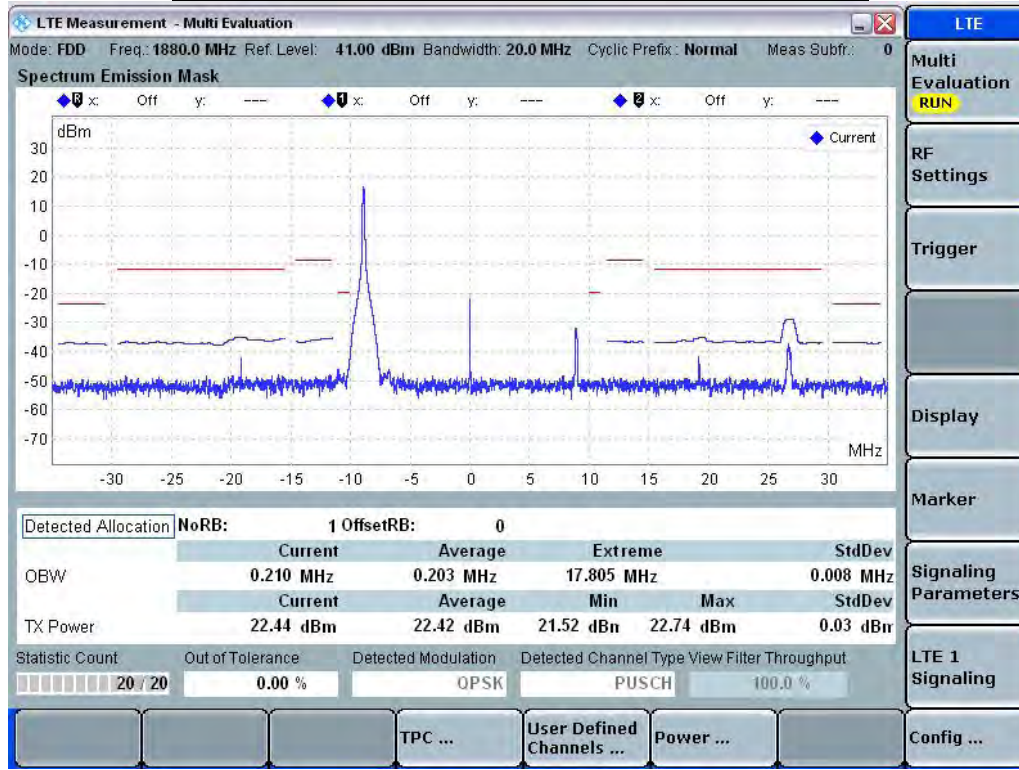
LTE Band 2 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
1.4	18607	1850.7	QPSK	1	0	0	22.5	22.7
				1	2	0	22.5	22.7
				1	5	0	22.5	22.7
				3	0	1	22.0	22.5
				3	1	1	22.1	22.4
				3	2	1	22.2	22.5
			6	0	1	21.3	21.6	
			16QAM	1	0	1	21.5	21.9
				1	2	1	21.5	21.8
				1	5	1	21.5	21.7
				3	0	2	21.4	21.4
				3	1	2	21.3	21.5
	3	2		2	21.4	21.5		
	18900	1880.0	QPSK	1	0	0	22.5	22.9
				1	2	0	22.5	22.8
				1	5	0	22.5	22.8
				3	0	1	22.5	22.7
				3	1	1	22.5	22.6
				3	2	1	22.5	22.8
			6	0	1	21.6	21.8	
			16QAM	1	0	1	21.4	21.9
				1	2	1	21.5	21.9
				1	5	1	21.5	21.9
				3	0	2	21.5	21.8
				3	1	2	21.8	21.8
	3	2		2	21.5	21.7		
	19192	1909.2	QPSK	1	0	0	22.4	22.9
				1	2	0	22.4	22.8
				1	5	0	22.4	22.8
				3	0	1	22.3	22.7
				3	1	1	22.3	22.6
				3	2	1	22.3	22.7
			6	0	1	21.5	21.7	
			16QAM	1	0	1	21.4	21.6
				1	2	1	21.4	21.6
				1	5	1	21.4	21.6
3				0	2	21.2	21.6	
3				1	2	21.1	21.5	
3	2	2		21.2	21.5			
6	0	2	20.3	20.8				

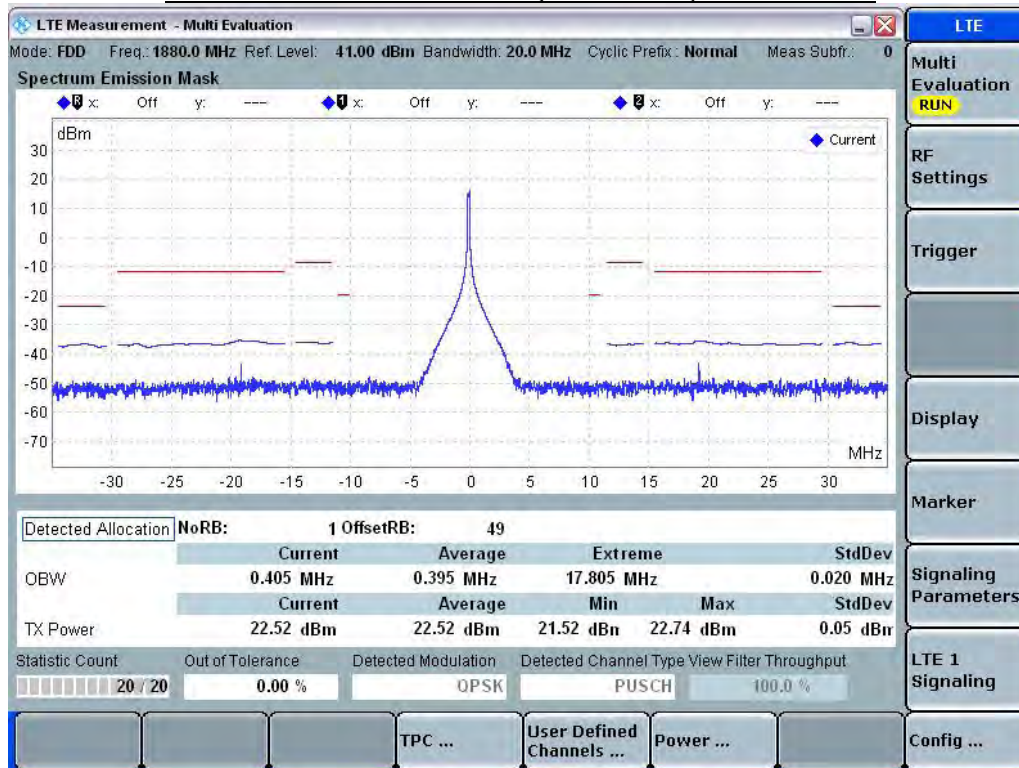
10.5.1. Spectrum Plots for the Test RB allocations

The following plots are to demonstrate the tested RB allocations have been established correctly at the maximum output power conditions.

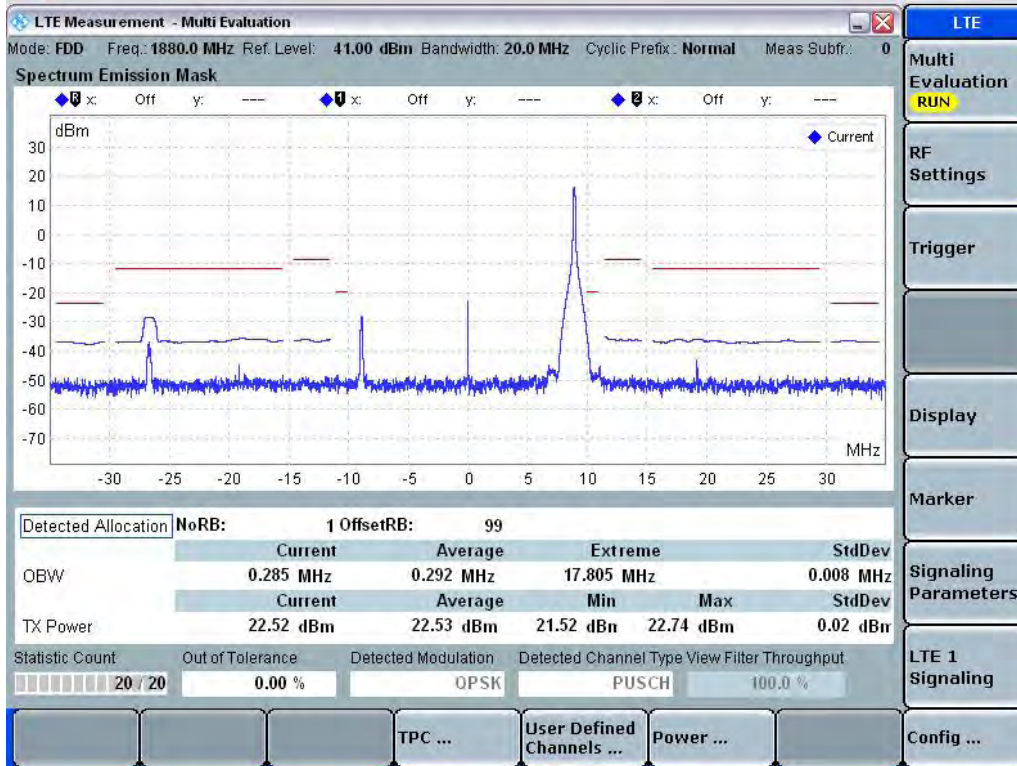
20MHz Band Width: Ch 18900, RB Size = 1; RB Offset = 0



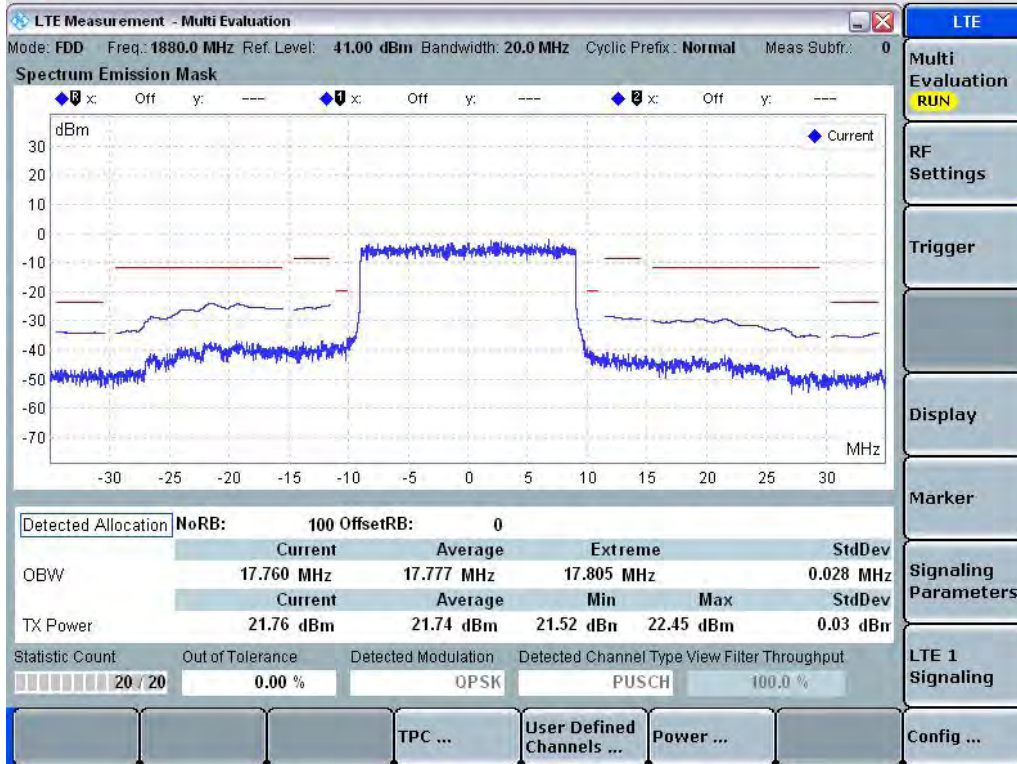
20MHz Band Width: Ch 18900, RB Size = 1; RB Offset = 49



20MHz Band Width: Ch 18900, RB Size = 1; RB Offset = 99



20MHz Band Width: Ch 18900, RB Size = 100; RB Offset = 0



10.6. LTE Band 4

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

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

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

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

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

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

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

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

Results

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
20	20050	1720.0	QPSK	1	0	0	23.8	22.9
				1	49	0	23.9	22.9
				1	99	0	23.9	23.0
				50	0	1	23.2	21.8
				50	24	1	23.1	21.8
				50	49	1	23.2	22.0
			16QAM	100	0	1	23.2	22.0
				1	0	1	23.0	22.0
				1	49	1	22.9	22.0
				1	99	1	22.8	22.4
				50	0	2	22.3	20.9
				50	24	2	22.2	20.9
	20175	1732.5	QPSK	50	49	2	22.2	21.1
				100	0	2	22.2	21.0
				1	0	0	23.9	23.0
				1	49	0	23.9	23.0
				1	99	0	23.9	23.0
				50	0	1	23.0	22.3
			16QAM	50	24	1	23.1	22.4
				50	49	1	23.1	22.4
				100	0	1	23.1	22.3
				1	0	1	23.3	22.2
				1	49	1	23.2	22.6
				1	99	1	23.4	22.6
	20300	1745.0	QPSK	50	0	2	22.2	21.3
				50	24	2	22.1	21.4
				50	49	2	22.2	21.4
				100	0	2	22.1	21.4
				1	0	0	23.9	23.0
				1	49	0	23.9	23.0
			16QAM	1	99	0	23.8	23.0
				50	0	1	23.2	22.4
				50	24	1	23.3	22.5
				50	49	1	23.3	22.4
				100	0	1	23.2	22.4
				1	0	1	23.2	22.5
16QAM	1	49	1	23.4	22.7			
	1	99	1	23.3	22.5			
	50	0	2	22.3	21.5			
	50	24	2	22.3	21.5			
	50	49	2	22.3	21.5			
	100	0	2	22.3	21.4			

LTE Band 4 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
15	20025	1717.5	QPSK	1	0	0	23.9	23.0
				1	37	0	23.9	23.0
				1	74	0	23.9	22.9
				38	0	1	23.2	22.0
				38	18	1	23.2	22.0
				38	37	1	23.1	22.0
			75	0	1	23.1	22.0	
			16QAM	1	0	1	22.9	22.5
				1	37	1	22.9	22.4
				1	74	1	22.9	22.3
				38	0	2	22.6	21.0
				38	18	2	22.7	21.0
				38	37	2	22.6	21.0
			75	0	2	22.1	21.0	
	20175	1732.5	QPSK	1	0	0	23.9	22.8
				1	37	0	23.8	23.0
				1	74	0	23.8	23.0
				38	0	1	23.0	22.1
				38	18	1	23.0	22.2
				38	37	1	23.1	22.2
			75	0	1	22.9	22.2	
			16QAM	1	0	1	22.9	22.4
				1	37	1	22.8	22.6
				1	74	1	22.8	22.8
				38	0	2	22.0	21.2
				38	18	2	22.0	21.3
				38	37	2	22.0	21.2
				75	0	2	22.0	21.3
	75	0		2	22.0	21.3		
	20325	1747.5	QPSK	1	0	0	23.9	23.0
				1	37	0	23.9	22.9
				1	74	0	23.9	22.7
				38	0	1	23.0	22.0
				38	18	1	23.0	21.9
				38	37	1	23.0	22.0
			75	0	1	23.1	22.0	
			16QAM	1	0	1	22.9	22.7
				1	37	1	22.9	22.6
				1	74	1	22.9	22.5
				38	0	2	22.0	20.9
				38	18	2	22.0	21.0
				38	37	2	21.9	21.0
75				0	2	22.1	21.0	
75	0	2		22.1	21.0			

LTE Band 4 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
10	20000	1715.0	QPSK	1	0	0	23.9	23.0
				1	24	0	23.8	22.8
				1	49	0	23.8	22.5
				25	0	1	23.5	21.9
				25	12	1	23.7	21.9
				25	24	1	23.5	21.9
			16QAM	50	0	1	23.7	21.9
				1	0	1	23.6	22.2
				1	24	1	23.6	22.0
				1	49	1	23.6	22.0
				25	0	2	22.5	20.8
				25	12	2	22.5	20.9
				25	24	2	22.5	20.9
				50	0	2	23.8	20.9
				20175	1732.5	QPSK	1	0
	1	24	0				23.8	23.2
	1	49	0				23.8	23.4
	25	0	1				23.0	22.4
	25	12	1				23.0	22.3
	25	24	1				23.0	22.4
	16QAM	50	0			1	23.2	22.4
		1	0			1	22.8	22.4
		1	24			1	22.8	22.6
		1	49			1	22.8	23.0
		25	0			2	22.0	21.5
		25	12			2	22.2	21.5
		25	24			2	22.2	21.4
		50	0			2	22.2	21.5
		20350	1750.0			QPSK	1	0
	1			24	0		23.9	22.9
1	49			0	23.9		22.9	
25	0			1	23.0		22.0	
25	12			1	23.2		22.0	
25	24			1	23.2		21.9	
16QAM	50			0	1	23.2	22.0	
	1			0	1	22.9	22.9	
	1			24	1	22.9	22.7	
	1			49	1	22.9	22.4	
	25			0	2	22.2	21.0	
	25			12	2	22.3	21.1	
	25			24	2	22.2	21.0	
	50			0	2	22.2	21.0	

LTE Band 4 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
5	19975	1712.5	QPSK	1	0	0	23.9	22.9
				1	12	0	23.9	22.7
				1	24	0	23.9	22.6
				12	0	1	23.4	21.7
				12	6	1	23.4	21.8
				12	11	1	23.2	21.7
			25	0	1	23.0	21.8	
			16QAM	1	0	1	23.2	22.7
				1	12	1	23.1	22.6
				1	24	1	23.2	22.4
				12	0	2	22.0	21.1
				12	6	2	22.2	21.0
	12	11		2	22.1	20.9		
	20175	1732.5	QPSK	1	0	0	23.9	22.8
				1	12	0	23.4	22.8
				1	24	0	23.2	22.9
				12	0	1	22.8	21.8
				12	6	1	22.8	21.8
				12	11	1	22.7	21.7
			25	0	1	22.8	21.8	
			16QAM	1	0	1	23.0	22.4
				1	12	1	23.2	22.2
				1	24	1	23.4	22.2
				12	0	2	22.2	22.5
				12	6	2	22.2	22.5
	12	11		2	22.0	22.3		
	25	0	2	21.9	20.9			
	20375	1752.5	QPSK	1	0	0	23.9	22.9
				1	12	0	23.9	22.9
				1	24	0	23.9	23.0
				12	0	1	23.1	21.8
				12	6	1	23.2	21.8
				12	11	1	23.1	21.9
			25	0	1	23.2	21.9	
			16QAM	1	0	1	23.2	22.6
				1	12	1	23.3	22.6
1				24	1	23.4	22.7	
12				0	2	22.3	21.1	
12				6	2	22.4	21.2	
12	11	2		22.3	21.1			
25	0	2	22.3	21.0				

LTE Band 4 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna		
							Avg Pwr (dBm)			
3	19965	1711.5	QPSK	1	0	0	23.9	22.9		
				1	7	0	23.9	22.7		
				1	14	0	23.9	22.5		
				8	0	1	23.1	21.9		
				8	4	1	23.1	21.8		
				8	7	1	23.0	21.9		
			15	0	1	23.2	21.9			
			16QAM	1	0	1	22.9	21.8		
				1	7	1	22.9	21.6		
				1	14	1	22.9	21.5		
				8	0	2	22.0	21.0		
				8	4	2	22.2	20.9		
				8	7	2	22.1	20.8		
			20175	1732.5	QPSK	1	0	0	23.9	22.9
						1	7	0	23.9	23.0
	1	14				0	23.9	23.0		
	8	0				1	23.0	22.0		
	8	4				1	23.0	22.2		
	8	7				1	23.0	22.1		
	15	0			1	23.0	22.2			
	16QAM	1			0	1	22.9	21.8		
		1			7	1	22.9	21.9		
		1			14	1	22.9	22.0		
		8			0	2	22.1	21.0		
		8			4	2	22.1	21.2		
		8			7	2	22.0	21.1		
		15			0	2	22.0	21.1		
		20384			1753.4	QPSK	1	0	0	23.9
			1	7			0	23.9	22.9	
	1		14	0			23.9	22.8		
	8		0	1			23.0	22.0		
	8		4	1			23.1	21.9		
	8		7	1			23.0	22.0		
	15		0	1		23.1	22.0			
	16QAM		1	0		1	22.8	21.8		
			1	7		1	23.0	22.0		
			1	14		1	22.9	21.9		
			8	0		2	22.0	21.0		
			8	4		2	22.2	21.0		
			8	7		2	22.0	21.0		
			15	0		2	22.1	20.9		

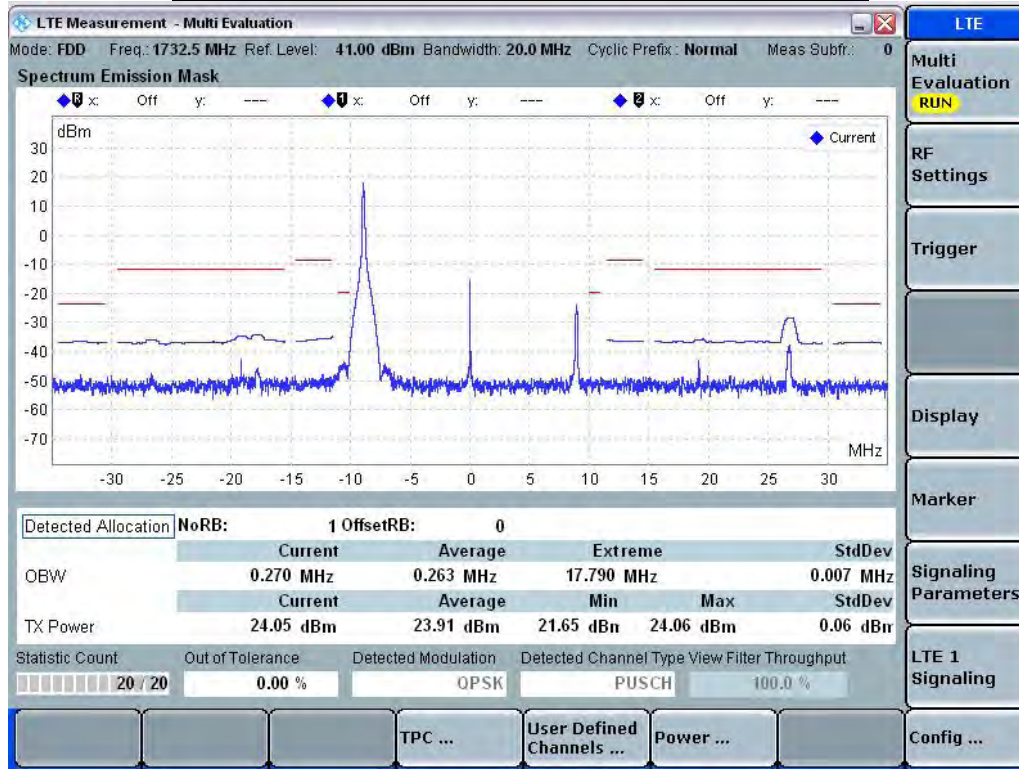
LTE Band 4 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
1.4	19957	1710.7	QPSK	1	0	0	23.9	22.9
				1	2	0	23.9	22.9
				1	5	0	23.9	22.8
				3	0	1	23.5	22.5
				3	1	1	23.5	22.7
				3	2	1	23.5	22.6
			6	0	1	23.3	21.8	
			16QAM	1	0	1	23.6	21.9
				1	2	1	23.5	21.9
				1	5	1	23.6	21.8
				3	0	2	22.4	20.7
				3	1	2	22.4	20.7
	3	2		2	22.4	20.7		
	20175	1732.5	QPSK	1	0	0	23.7	23.0
				1	2	0	23.7	23.0
				1	5	0	23.7	23.0
				3	0	1	23.5	22.8
				3	1	1	23.6	22.8
				3	2	1	23.5	22.8
			6	0	1	22.7	21.9	
			16QAM	1	0	1	22.7	22.0
				1	2	1	22.6	22.0
				1	5	1	22.7	21.9
				3	0	2	21.8	20.9
				3	1	2	21.7	20.9
	3	2		2	21.7	20.8		
	20392	1754.2	QPSK	1	0	0	23.9	22.8
				1	2	0	23.8	22.8
				1	5	0	23.8	22.8
				3	0	1	23.7	22.7
				3	1	1	23.6	22.7
				3	2	1	23.7	22.7
			6	0	1	23.3	21.8	
			16QAM	1	0	1	22.7	21.8
				1	2	1	22.8	21.8
				1	5	1	22.6	21.8
3				0	2	21.6	20.7	
3				1	2	21.7	20.6	
3	2	2		21.7	20.7			
6	0	2	21.5	20.7				

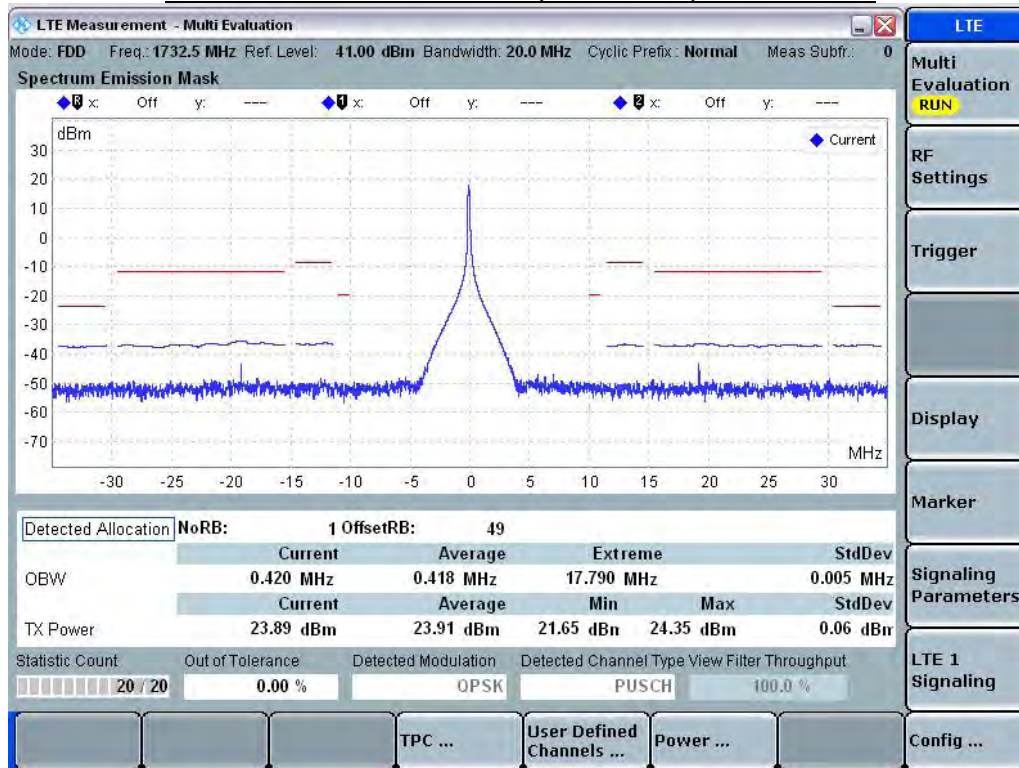
10.6.1. Spectrum Plots for the Test RB allocations

The following plots are to demonstrate the tested RB allocations have been established correctly at the maximum output power conditions.

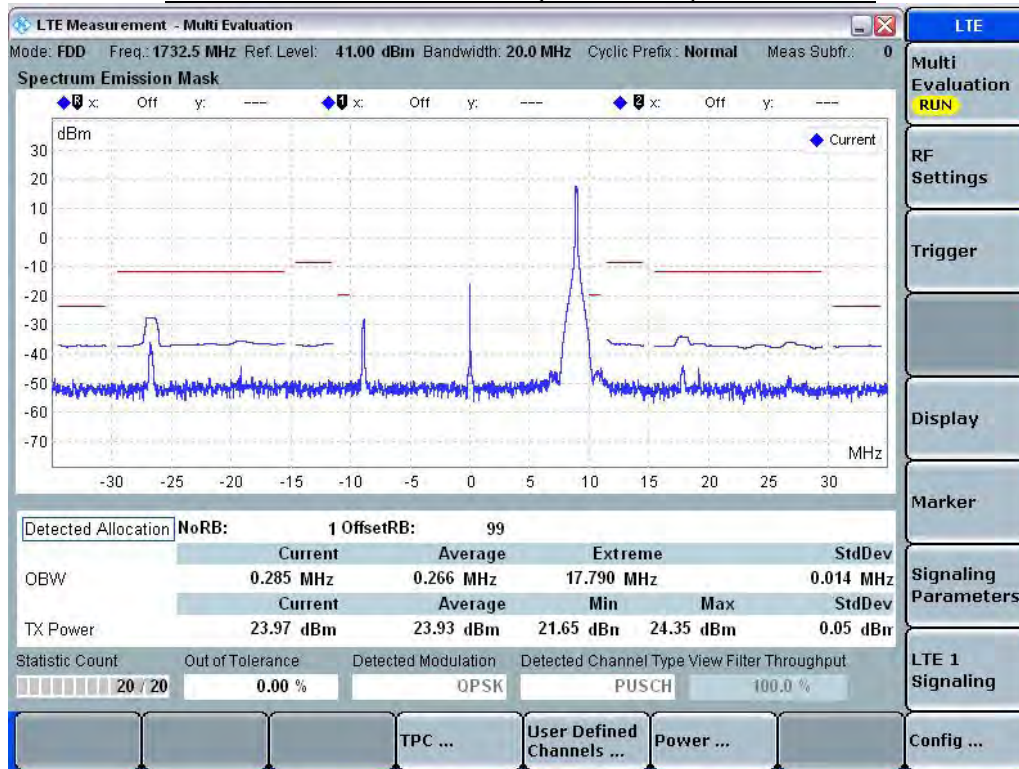
20MHz Band Width: Ch 20175, RB Size = 1; RB Offset = 0



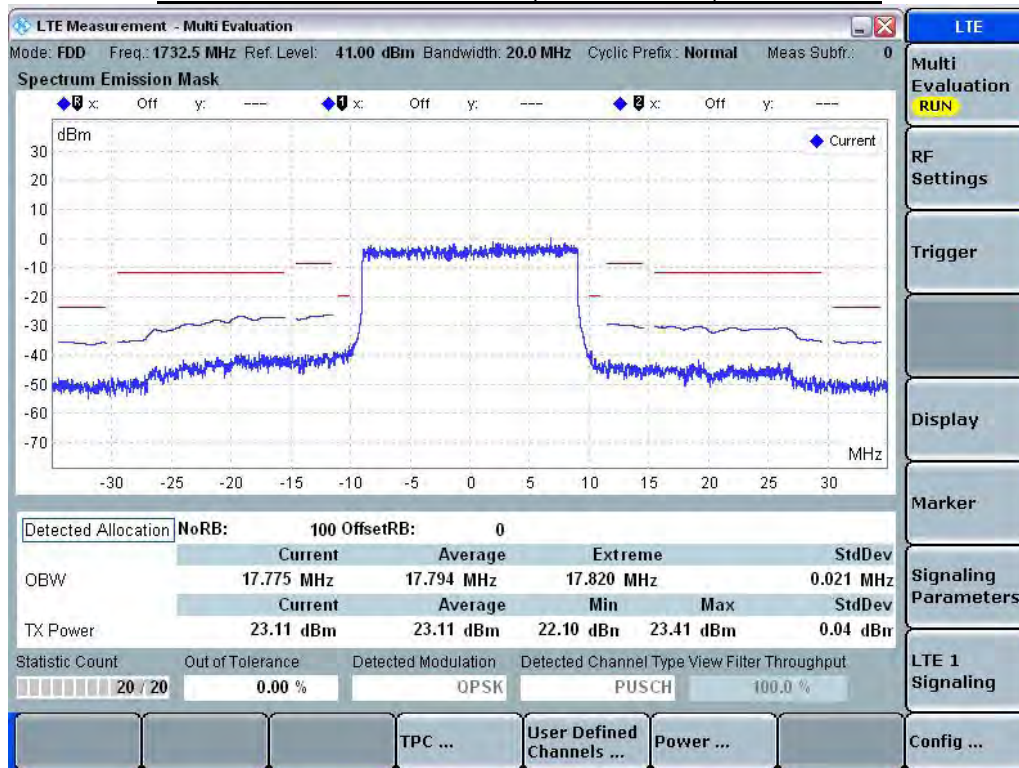
20MHz Band Width: Ch 20175, RB Size = 1; RB Offset = 49



20MHz Band Width: Ch 20175, RB Size = 1; RB Offset = 99



20MHz Band Width: Ch 20175, RB Size = 100; RB Offset = 0



10.7. LTE Band 5

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

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

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

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

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

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

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

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

Results

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna	
							Avg Pwr (dBm)		
10	20450	829.0	QPSK	1	0	0	24.0	23.5	
				1	24	0	24.0	23.5	
				1	49	0	24.0	23.4	
				25	0	1	23.2	22.8	
				25	12	1	23.2	22.8	
				25	24	1	23.2	22.7	
			16QAM	50	0	1	23.2	22.7	
				1	0	1	23.3	22.7	
				1	24	1	23.3	22.7	
				1	49	1	23.2	22.6	
				25	0	2	22.2	21.9	
				25	12	2	22.2	21.9	
	20525	836.5	QPSK	25	24	2	22.2	21.9	
				50	0	2	22.2	21.8	
				1	0	0	24.0	23.4	
				1	24	0	24.0	23.4	
				1	49	0	24.0	23.5	
				25	0	1	23.1	22.7	
				25	12	1	23.1	22.7	
				25	24	1	23.1	22.8	
				50	0	1	23.1	22.7	
			16QAM	1	0	1	22.9	22.6	
				1	24	1	22.8	22.6	
				1	49	1	22.8	22.7	
				25	0	2	22.2	21.8	
				25	12	2	22.2	21.9	
				25	24	2	22.2	21.9	
				50	0	2	22.1	21.8	
				QPSK	1	0	0	24.0	23.5
					1	24	0	23.9	23.4
1	49	0	23.8		23.4				
25	0	1	23.1		22.7				
25	12	1	23.1		22.7				
25	24	1	23.1		22.7				
50	0	1	22.9		22.7				
16QAM	1	0	1		23.3	22.9			
	1	24	1		23.1	22.6			
	1	49	1	22.7	22.6				
	25	0	2	22.1	21.8				
	25	12	2	22.1	21.8				
	25	24	2	22.1	21.9				
	50	0	2	22.0	21.7				

LTE Band 5 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
5	20425	826.5	QPSK	1	0	0	23.9	23.4
				1	12	0	23.8	23.4
				1	24	0	23.8	23.4
				12	0	1	22.7	22.8
				12	6	1	22.8	22.8
				12	11	1	22.9	22.8
			16QAM	25	0	1	22.9	22.7
				1	0	1	23.6	22.7
				1	12	1	23.5	22.7
				1	24	1	23.5	22.6
				12	0	2	22.4	21.9
				12	6	2	22.2	21.9
	20525	836.5	QPSK	12	11	2	22.3	21.8
				25	0	2	22.0	21.8
				1	0	0	23.8	23.4
				1	12	0	23.7	23.5
				1	24	0	23.7	23.5
				12	0	1	22.7	22.7
			16QAM	12	6	1	22.8	22.7
				12	11	1	22.8	22.7
				25	0	1	22.9	22.6
				1	0	1	23.6	22.6
				1	12	1	23.4	22.6
				1	24	1	23.5	22.7
	20625	846.5	QPSK	12	0	2	22.2	21.8
				12	6	2	22.2	21.9
				12	11	2	22.2	21.9
				25	0	2	22.0	21.8
				1	0	0	23.8	23.5
				1	12	0	23.7	23.4
			16QAM	1	24	0	23.6	23.4
				12	0	1	22.8	22.7
				12	6	1	22.8	22.7
				12	11	1	22.8	22.6
				25	0	1	22.8	22.7
				1	0	1	23.2	22.6
16QAM	1	12	1	23.2	22.6			
	1	24	1	23.2	22.6			
	12	0	2	22.1	21.8			
	12	6	2	22.1	21.7			
	12	11	2	22.1	21.9			
	25	0	2	21.8	21.7			

LTE Band 5 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
3	20415	825.5	QPSK	1	0	0	23.9	23.5
				1	7	0	23.8	23.5
				1	14	0	23.7	23.5
				8	0	1	22.8	22.8
				8	4	1	22.8	22.8
				8	7	1	22.8	22.7
			15	0	1	22.9	22.8	
			16QAM	1	0	1	23.4	22.8
				1	7	1	23.0	22.7
				1	14	1	23.0	22.6
				8	0	2	22.9	22.7
				8	4	2	21.8	21.8
	8	7		2	21.9	21.8		
	20525	836.5	QPSK	1	0	0	23.9	23.4
				1	7	0	23.8	23.3
				1	14	0	23.8	23.3
				8	0	1	22.8	22.5
				8	4	1	22.8	22.5
				8	7	1	22.7	22.5
			15	0	1	22.9	22.1	
			16QAM	1	0	1	23.2	22.5
				1	7	1	23.2	22.5
				1	14	1	23.2	22.5
				8	0	2	22.0	21.4
				8	4	2	21.9	21.5
	8	7		2	22.0	21.6		
	20634	847.4	QPSK	1	0	0	23.9	23.5
				1	7	0	23.7	23.0
				1	14	0	23.6	22.7
				8	0	1	22.7	22.7
				8	4	1	22.7	22.5
				8	7	1	22.6	22.5
			15	0	1	22.7	22.5	
			16QAM	1	0	1	23.3	22.5
				1	7	1	23.1	22.5
				1	14	1	23.1	22.5
8				0	2	21.8	21.6	
8				4	2	21.8	21.7	
8	7	2		21.7	21.6			
15	0	2	21.7	21.5				

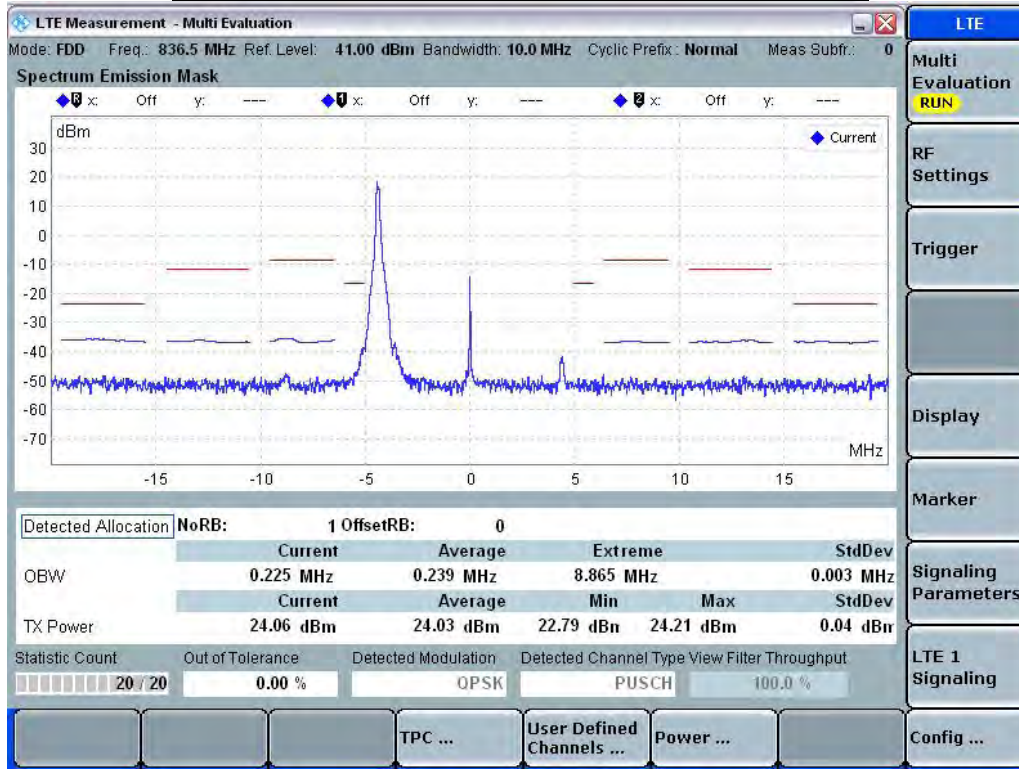
LTE Band 5 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
1.4	20407	824.7	QPSK	1	0	0	24.0	23.5
				1	2	0	24.0	23.5
				1	5	0	23.9	23.4
				3	0	1	23.9	23.4
				3	1	1	23.9	23.4
				3	2	1	23.9	23.4
			6	0	1	23.0	22.7	
			16QAM	1	0	1	22.5	22.7
				1	2	1	22.5	22.5
				1	5	1	22.5	22.6
				3	0	2	22.4	22.5
				3	1	2	22.4	22.5
	3	2		2	22.0	21.5		
	20525	836.5	QPSK	1	0	0	24.0	23.3
				1	2	0	24.0	23.3
				1	5	0	24.0	23.3
				3	0	1	23.8	23.2
				3	1	1	23.8	23.2
				3	2	1	23.8	23.2
			6	0	1	23.0	22.4	
			16QAM	1	0	1	23.6	22.5
				1	2	1	23.5	22.5
				1	5	1	23.5	22.5
				3	0	2	22.9	22.0
				3	1	2	22.9	22.2
	3	2		2	22.9	22.1		
	20642	848.2	QPSK	1	0	0	24.0	23.4
				1	2	0	24.0	23.4
				1	5	0	23.8	23.2
				3	0	1	23.8	23.2
				3	1	1	23.8	23.2
				3	2	1	23.7	23.0
			6	0	1	22.9	22.5	
			16QAM	1	0	1	23.1	22.5
				1	2	1	23.0	22.5
				1	5	1	22.7	22.5
3				0	2	23.0	22.4	
3				1	2	23.0	22.4	
3	2	2		22.9	22.3			
6	0	2	21.9	21.4				

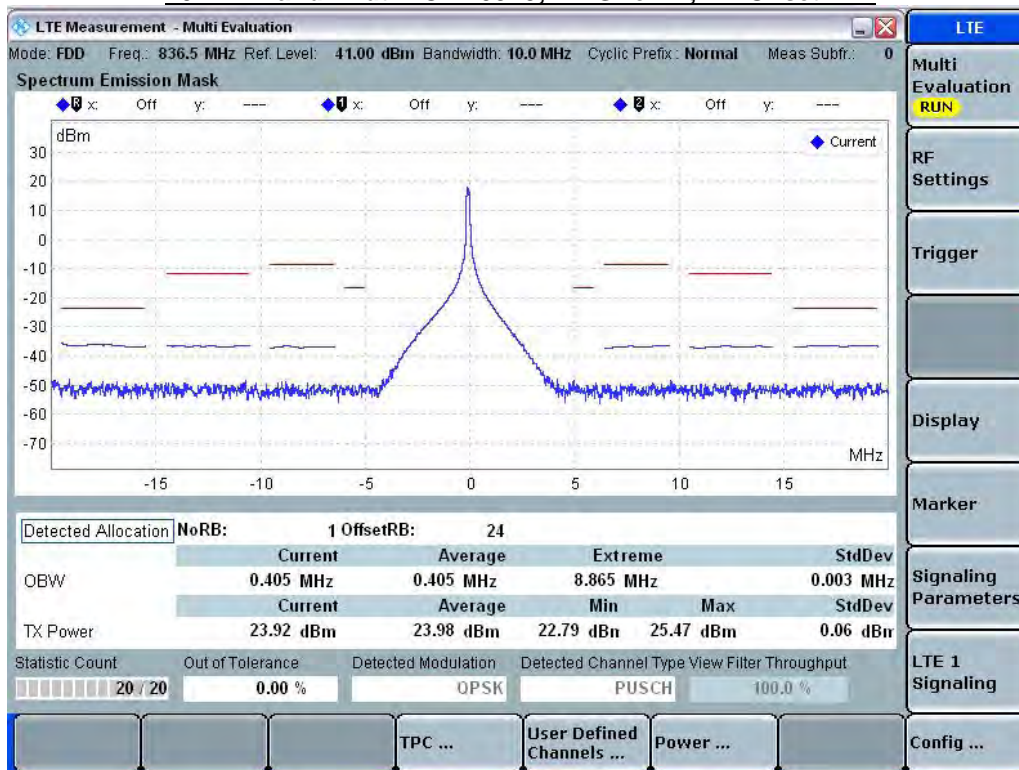
10.7.1. Spectrum Plots for the Test RB allocations

The following plots are to demonstrate the tested RB allocations have been established correctly at the maximum output power conditions.

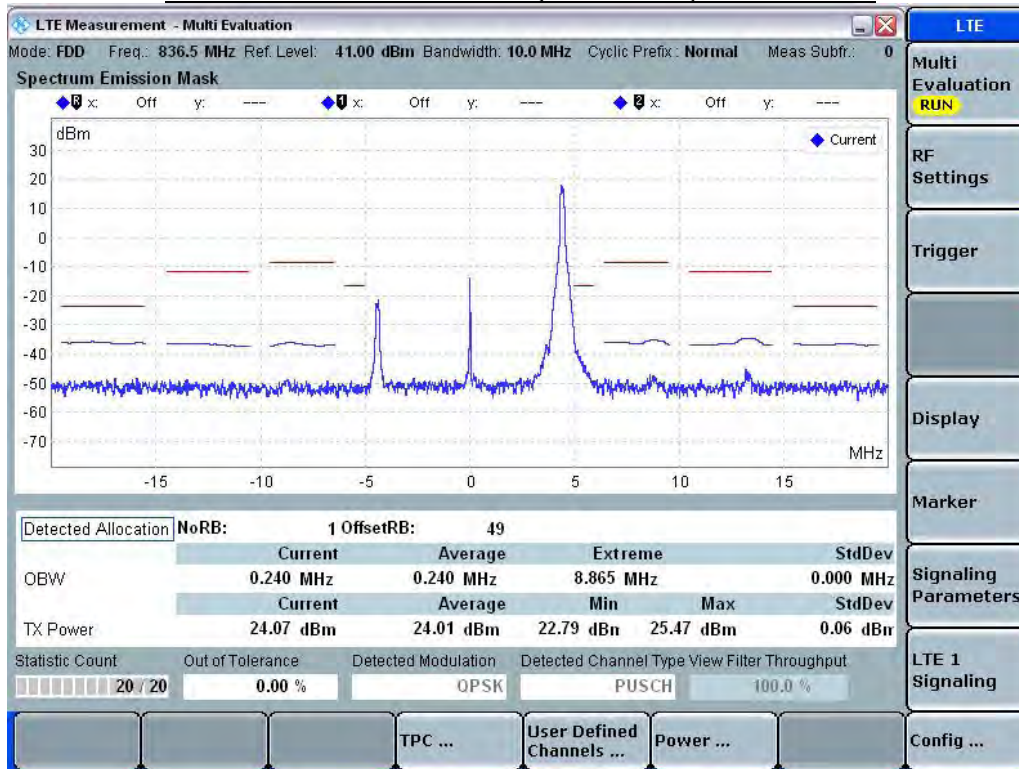
10MHz Band Width: Ch 20525, RB Size = 1; RB Offset = 0



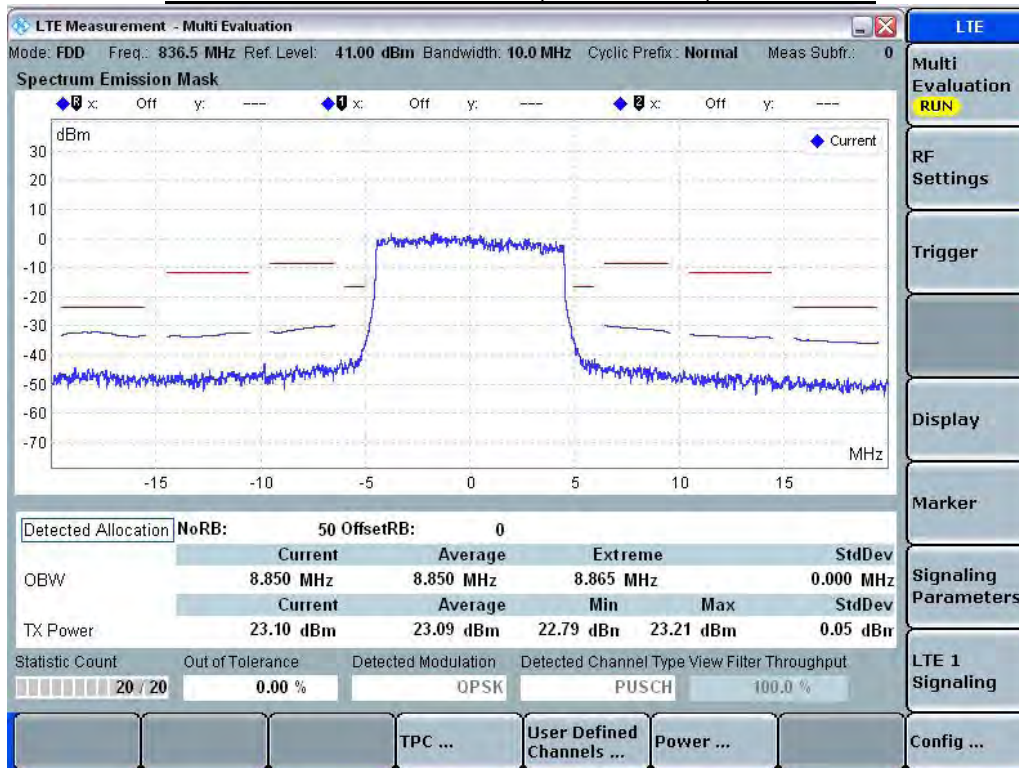
10MHz Band Width: Ch 20525, RB Size = 1; RB Offset = 24



10MHz Band Width: Ch 20525, RB Size = 1; RB Offset = 49



10MHz Band Width: Ch 20525, RB Size = 50; RB Offset = 0



10.8. LTE Band 17

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

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

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

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

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

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

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

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

Results

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
10	23789	709.0	QPSK	1	0	0	23.9	23.4
				1	24	0	24.0	23.4
				1	49	0	24.0	23.5
				25	0	1	23.0	22.5
				25	12	1	23.1	22.6
				25	24	1	23.0	22.7
			16QAM	50	0	1	23.0	22.6
				1	0	1	23.2	22.5
				1	24	1	23.0	22.5
				1	49	1	23.4	23.0
				25	0	2	22.0	21.6
				25	12	2	22.1	21.7
	23790	710.0	QPSK	25	24	2	22.1	21.8
				50	0	2	22.1	21.8
				1	0	0	24.0	23.4
				1	24	0	24.0	23.4
				1	49	0	24.0	23.5
				25	0	1	23.0	22.5
			16QAM	25	12	1	23.0	22.6
				25	24	1	23.0	22.7
				50	0	1	23.0	22.6
				1	0	1	23.2	22.5
				1	24	1	23.1	22.4
				1	49	1	23.4	23.0
	23800	711.0	QPSK	25	0	2	22.0	21.6
				25	12	2	22.1	21.7
				25	24	2	22.0	21.8
				50	0	2	22.0	21.8
				1	0	0	23.8	23.4
				1	24	0	23.8	23.3
			16QAM	1	49	0	24.0	23.3
				25	0	1	23.0	22.5
				25	12	1	23.1	22.6
				25	24	1	23.0	22.8
				50	0	1	23.0	22.7
				1	0	1	22.9	22.3
16QAM	1	24	1	23.2	22.4			
	1	49	1	23.4	22.9			
	25	0	2	22.1	21.6			
	25	12	2	22.1	21.7			
	25	24	2	22.1	21.9			
	50	0	2	22.1	21.8			

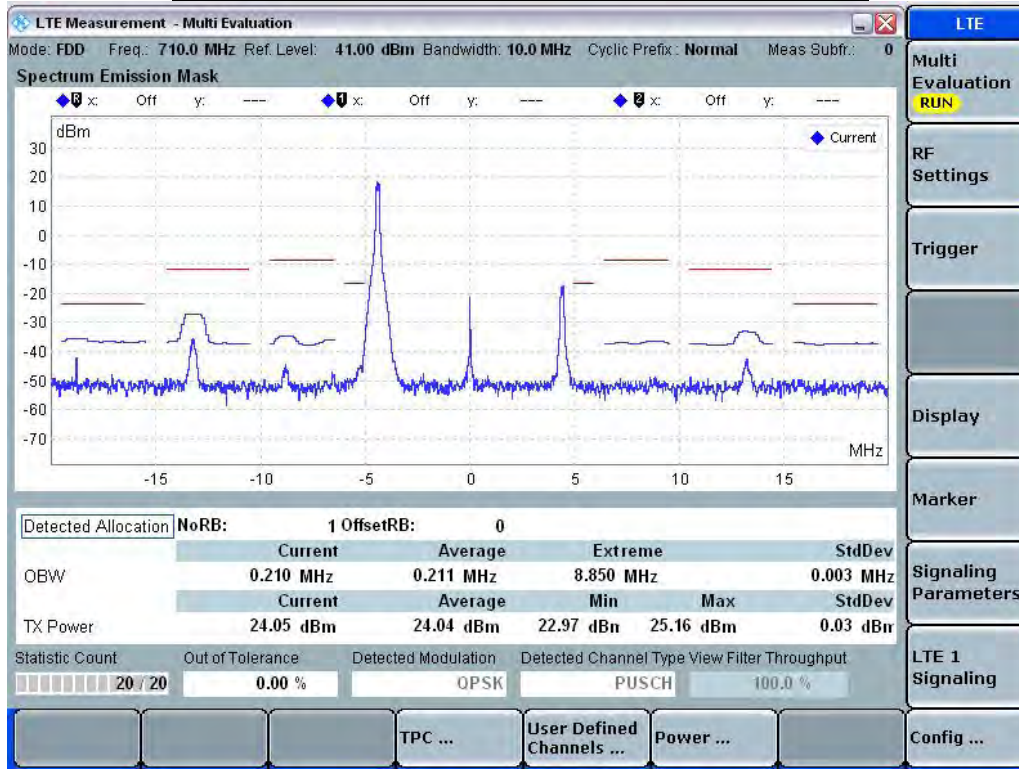
LTE Band 17 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
5	23755	706.5	QPSK	1	0	0	24.0	23.4
				1	12	0	23.9	23.4
				1	24	0	23.8	23.4
				12	0	1	22.9	22.5
				12	6	1	22.9	22.5
				12	11	1	22.9	22.4
			16QAM	25	0	1	23.0	22.4
				1	0	1	23.9	22.5
				1	12	1	23.7	22.5
				1	24	1	23.4	22.6
				12	0	2	22.0	21.5
				12	6	2	22.2	21.5
	23790	710.0	QPSK	12	11	2	22.2	21.5
				25	0	2	22.0	21.5
				1	0	0	23.8	23.3
				1	12	0	23.7	23.4
				1	24	0	23.6	23.5
				12	0	1	22.9	22.5
			16QAM	12	6	1	22.9	22.5
				12	11	1	22.9	22.4
				25	0	1	23.0	22.4
				1	0	1	23.6	22.5
				1	12	1	23.4	22.5
				1	24	1	23.1	22.6
	23825	713.5	QPSK	12	0	2	22.0	21.5
				12	6	2	22.2	21.6
				12	11	2	22.1	21.5
				25	0	2	22.1	21.6
				1	0	0	23.9	23.5
				1	12	0	23.9	23.4
			16QAM	1	24	0	23.9	23.4
				12	0	1	23.0	22.5
				12	6	1	23.0	22.6
				12	11	1	23.0	22.5
				25	0	1	23.0	22.5
				1	0	1	23.7	22.5
16QAM	1	12	1	23.7	22.4			
	1	24	1	23.7	22.4			
	12	0	2	22.2	21.5			
	12	6	2	22.3	21.6			
	12	11	2	22.2	21.5			
	25	0	2	22.0	21.6			

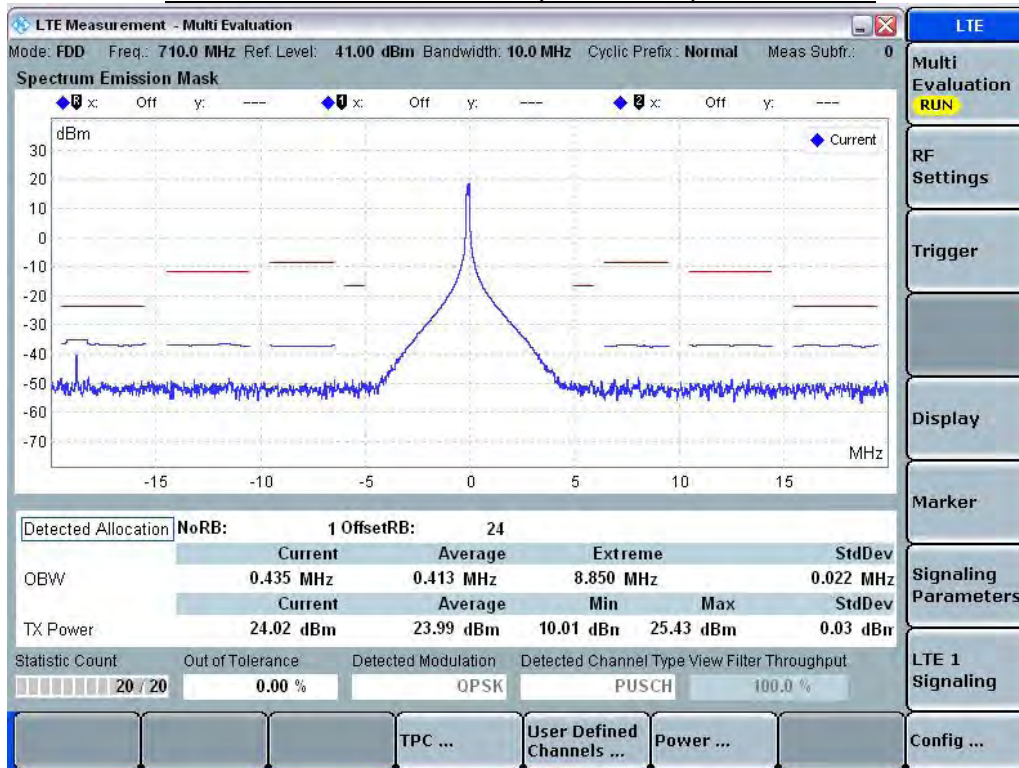
10.8.1. Spectrum Plots for the Test RB allocations

The following plots are to demonstrate the tested RB allocations have been established correctly at the maximum output power conditions.

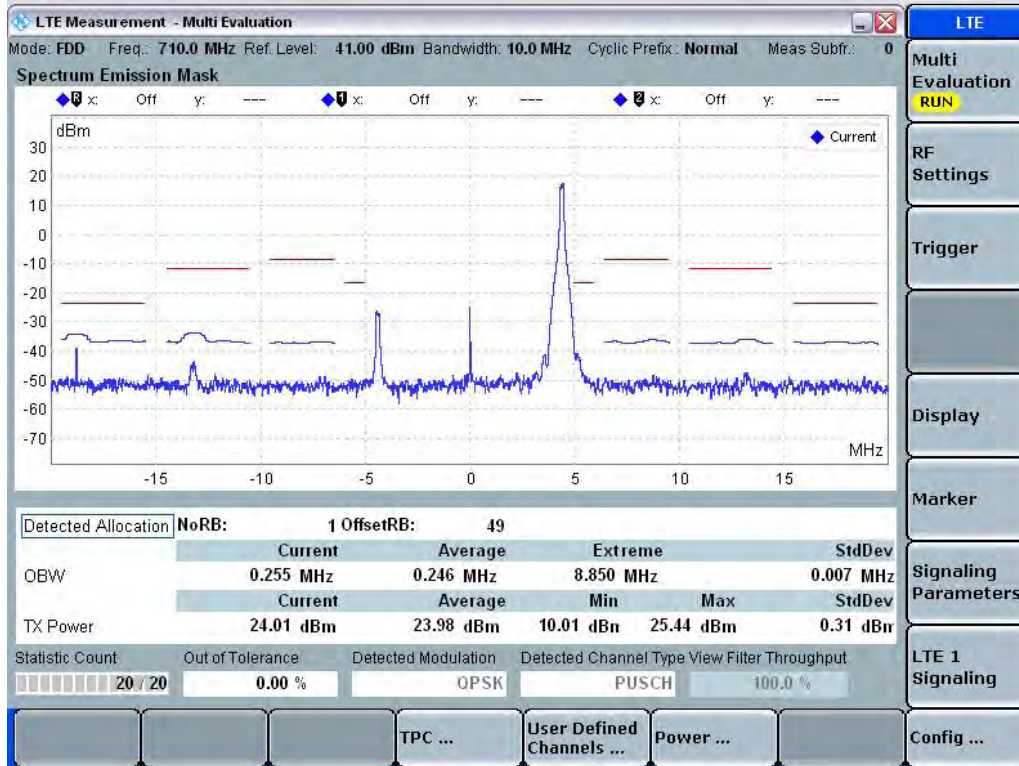
10MHz Band Width: Ch 23790, RB Size = 1; RB Offset = 0



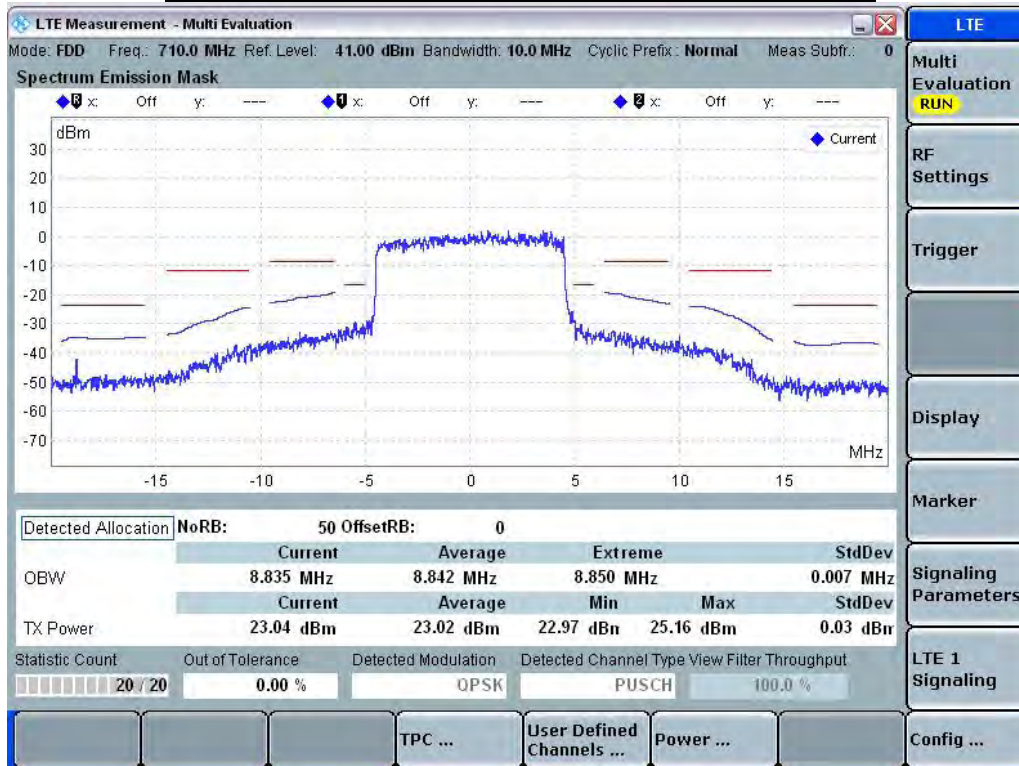
10MHz Band Width: Ch 23790, RB Size = 1; RB Offset = 24



10MHz Band Width: Ch 23790, RB Size = 1; RB Offset = 49



10MHz Band Width: Ch 23790, RB Size = 50; RB Offset = 0



10.9. WiFi (2.4 GHz Band)

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 $\frac{1}{4}$ dB \geq 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	16.0	
		6	2437	16.0	
		11	2462	16.0	
	802.11g	1	2412	16.0	
		6	2437	15.9	
		11	2462	15.5	
	802.11n (HT20)	1	2412	16.0	
		6	2437	16.0	
		11	2462	15.1	

Note(s):

- 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 802.11a/b channels. As per KDB 248227

10.10. WiFi (5 GHz Bands)

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		*	
	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.

Band (MHz)	Mode	Ch #	Freq. (MHz)	Avg Pwr (dBm)	Note
5.2	802.11a	36	5180	14.0	
		40	5200	14.0	
		44	5220	14.0	
		48	5240	14.0	
	802.11n (HT20)	36	5180	14.0	
		40	5200	14.1	
		48	5240	14.1	
	802.11n (HT40)	38	5190	14.1	
		46	5230	14.0	
	5.3	802.11a	52	5260	13.5
56			5280	13.5	
60			5300	13.5	
64			5320	13.5	
802.11n (HT20)		52	5260	13.5	
		60	5300	13.5	
		64	5320	13.5	
802.11n (HT40)		54	5270	13.5	
		62	5310	13.5	
5.5		802.11a	100	5500	12.0
	104		5520	12.0	
	108		5540	12.0	
	112		5560	12.0	
	116		5580	12.0	
	120		5600	12.0	
	124		5620	12.0	
	128		5640	12.0	
	132		5660	12.0	
	136		5680	12.0	
	140	5700	12.0		
	802.11n (HT20)	100	5500	12.0	
		120	5600	12.0	
		140	5700	12.1	
	802.11n (HT40)	102	5510	12.0	
		118	5590	12.0	
		134	5670	12.0	
	5.8	802.11a	149	5745	13.0
153			5765	13.0	
157			5785	13.0	
161			5805	13.0	
165			5825	13.0	
802.11n (HT20)		149	5745	13.0	
		157	5785	13.1	
		161	5805	13.0	
802.11n (HT40)		151	5755	13.0	
		159	5795	13.0	

Note(s):

- 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

10.11. Bluetooth

Mode	Channel #	Freq. (MHz)	Avg Pwr (dBm)
GFSK	0	2402	13.2
	39	2441	13.4
	78	2480	13.4
QPSK	0	2402	11.5
	39	2441	11.4
	78	2480	11.3
8-PSK	0	2402	11.4
	39	2441	11.3
	78	2480	11.3

11. RF Output Power Measurement (Model A1429)

11.1. GSM850

GSM (GMSK) Voice Mode

Band	Ch No.	Freq. (MHz)	Primary Antenna		Secondary Antenna	
			Avg burst Pwr (dBm)		Avg burst Pwr (dBm)	
850	128	824.2	33.5		33.0	
	190	836.6	33.5		33.0	
	251	848.8	33.5		33.0	

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	Primary Antenna				Secondary Antenna			
			Avg burst Pwr (dBm)				Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr	1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr
850	128	824.2	33.4	24.4	31.5	25.5	33.0	24.0	32.4	26.4
	190	836.6	33.4	24.4	31.5	25.5	32.8	23.8	32.5	26.5
	251	848.8	33.3	24.3	31.4	25.4	32.9	23.9	32.4	26.4

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	Freq. (MHz)	Primary Antenna				Secondary Antenna			
			Avg burst Pwr (dBm)				Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr	1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr
850	128	824.2	29.0	20.0	28.5	22.4	28.5	19.4	28.4	22.3
	190	836.6	29.0	19.9	28.5	22.4	28.4	19.3	28.3	22.3
	251	848.8	28.9	19.9	28.5	22.5	28.4	19.4	28.4	22.3

Notes:

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

- Head & Body-worn: GMSK Voice Mode
- Hotspot: GMSK (GPRS) mode with 2 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

11.2. GSM1900

GSM (GMSK) Voice Mode

Band	Ch No.	Freq. (MHz)	Primary Antenna		Secondary Antenna	
			Avg burst Pwr (dBm)		Avg burst Pwr (dBm)	
1900	512	1850.2	31.0		30.5	
	661	1880.0	31.0		30.5	
	810	1909.8	31.0		30.5	

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	Primary Antenna				Secondary Antenna			
			Avg burst Pwr (dBm)				Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr	1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr
1900	512	1850.2	31.0	22.0	29.9	23.9	30.5	21.5	30.5	24.5
	661	1880.0	31.0	22.0	29.9	23.9	30.5	21.5	30.5	24.5
	810	1909.8	31.0	22.0	29.8	23.8	30.5	21.5	30.5	24.5

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	Freq. (MHz)	Primary Antenna				Secondary Antenna			
			Avg burst Pwr (dBm)				Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr	1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr
1900	512	1850.2	28.0	18.9	27.8	21.8	27.0	17.9	26.9	20.9
	661	1880.0	28.0	19.0	27.7	21.7	26.9	17.9	26.9	20.8
	810	1909.8	28.0	19.0	27.8	21.8	27.0	18.0	27.0	20.9

Notes:

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

- Head & Body-worn: GMSK Voice Mode
- Hotspot: GMSK (GPRS) mode with 2 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

11.3. W-CDMA Band V

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
	β_c/β_d	8/15

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Primary Antenna	Secondary Antenna
				Avg Pwr (dBm)	
W-CDMA Band V	Rel 99 (RMC, 12.2 kbps)	4132	826.4	24.5	24.0
		4183	836.6	24.5	24.0
		4233	846.6	24.5	23.9

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			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
CM (dB)	0	1	1.5	1.5	
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	$A_{hs} = \beta_{hs}/\beta_c$	30/15			

Results

Band	Mode	UL Ch No.	Freq. (MHz)	MPR	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
W-CDMA Band V	Subtest 1	4132	826.4	0	23.5	23.1
		4183	836.6	0	23.5	23.2
		4233	846.6	0	23.5	23.1
	Subtest 2	4132	826.4	0	23.6	23.2
		4183	836.6	0	23.5	23.2
		4233	846.6	0	23.5	23.1
	Subtest 3	4132	826.4	0.5	23.3	22.9
		4183	836.6	0.5	23.1	22.7
		4233	846.6	0.5	23.0	22.6
	Subtest 4	4132	826.4	0.5	23.1	22.7
		4183	836.6	0.5	23.0	22.7
		4233	846.6	0.5	23.0	22.6

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.

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					
	β_c	11/15	6/15	15/15	2/15	15/15
β_d	15/15	15/15	9/15	15/15	15/15	
β_{ec}	209/225	12/15	30/15	2/15	24/15	
β_c/β_d	11/15	6/15	15/9	2/15	15/15	
β_{hs}	22/15	12/15	30/15	4/15	30/15	
β_{ed}	1309/225	94/75	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 = β_{hs}/β_c						
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

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Target MPR	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
WCDMA Band V	Subtest 1	4132	826.4	0	23.5	23.0
		4183	836.6	0	23.5	22.9
		4233	846.6	0	23.3	22.9
	Subtest 2	4132	826.4	2	21.7	21.2
		4183	836.6	2	21.6	21.0
		4233	846.6	2	21.6	21.2
	Subtest 3	4132	826.4	1	22.7	22.2
		4183	836.6	1	22.6	22.0
		4233	846.6	1	22.6	22.2
	Subtest 4	4132	826.4	2	21.7	21.2
		4183	836.6	2	21.6	21.0
		4233	846.6	2	21.6	21.2
	Subtest 5	4132	826.4	0	23.5	23.0
		4183	836.6	0	23.5	22.9
		4233	846.6	0	23.4	23.0

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.

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.		

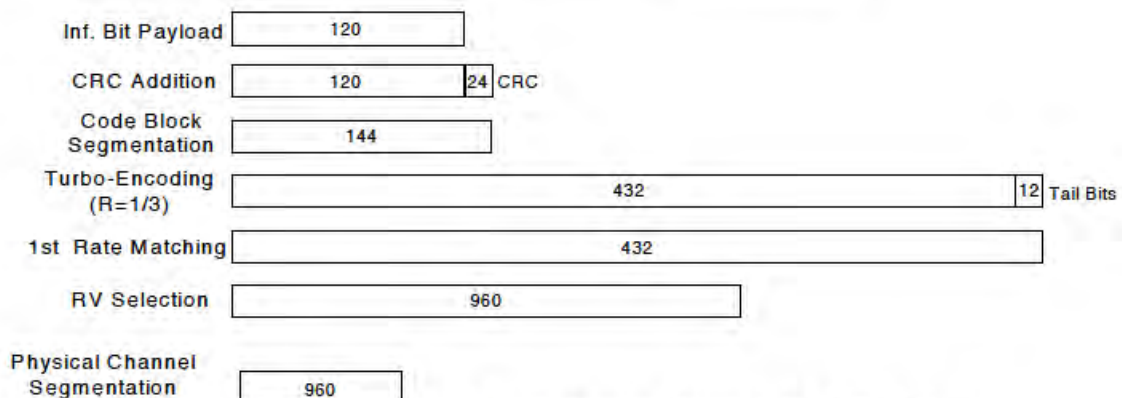


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

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:

	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			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	β_d (SF)	64			
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	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 = β_{hs}/β_c	30/15			

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

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Target MPR	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
WCDMA Band V	Subtest 1	4132	826.4	0	23.4	23.1
		4183	836.6	0	23.4	23.1
		4233	846.6	0	23.4	23.1
	Subtest 2	4132	826.4	0	23.3	23.0
		4183	836.6	0	23.3	23.0
		4233	846.6	0	23.3	23.0
	Subtest 3	4132	826.4	0.5	23.3	23.0
		4183	836.6	0.5	23.3	23.0
		4233	846.6	0.5	23.3	23.0
	Subtest 4	4132	826.4	0.5	23.3	23.0
		4183	836.6	0.5	23.3	23.0
		4233	846.6	0.5	23.3	23.0

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.

11.4. W-CDMA Band II

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
	β_c/β_d	8/15

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Primary Antenna	Secondary Antenna
				Avg Pwr (dBm)	
W-CDMA (UMTS) Band II	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	22.5	21.5
		9400	1880.0	22.5	21.5
		9538	1907.6	22.5	21.5

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			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
CM (dB)	0	1	1.5	1.5	
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	$A_{hs} = \beta_{hs}/\beta_c$	30/15			

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Target MPR	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
W-CDMA Band II	Subtest 1	9262	1852.4	0	21.5	20.7
		9400	1880.0	0	21.4	20.6
		9538	1907.6	0	21.4	20.7
	Subtest 2	9262	1852.4	0	21.5	20.8
		9400	1880.0	0	21.5	20.7
		9538	1907.6	0	21.6	20.8
	Subtest 3	9262	1852.4	0.5	21.2	20.4
		9400	1880.0	0.5	21.1	20.3
		9538	1907.6	0.5	21.1	20.3
	Subtest 4	9262	1852.4	0.5	21.0	20.3
		9400	1880.0	0.5	21.1	20.2
		9538	1907.6	0.5	21.0	20.3

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.

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					
	β_c	11/15	6/15	15/15	2/15	15/15
β_d	15/15	15/15	9/15	15/15	15/15	
β_{ec}	209/225	12/15	30/15	2/15	24/15	
β_c/β_d	11/15	6/15	15/9	2/15	15/15	
β_{hs}	22/15	12/15	30/15	4/15	30/15	
β_{ed}	1309/225	94/75	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 = β_{hs}/β_c						
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

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Target MPR	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
WCDMA Band II	Subtest 1	9262	1852.4	0	21.5	20.6
		9400	1880.0	0	21.5	20.5
		9538	1907.6	0	21.5	20.6
	Subtest 2	9262	1852.4	2	19.5	18.6
		9400	1880.0	2	19.5	18.6
		9538	1907.6	2	19.6	18.7
	Subtest 3	9262	1852.4	1	20.6	19.7
		9400	1880.0	1	20.6	19.6
		9538	1907.6	1	20.6	19.7
	Subtest 4	9262	1852.4	2	19.5	18.6
		9400	1880.0	2	19.5	18.6
		9538	1907.6	2	19.6	18.7
	Subtest 5	9262	1852.4	0	21.4	20.5
		9400	1880.0	0	21.5	20.5
		9538	1907.6	0	21.5	20.6

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.

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.		

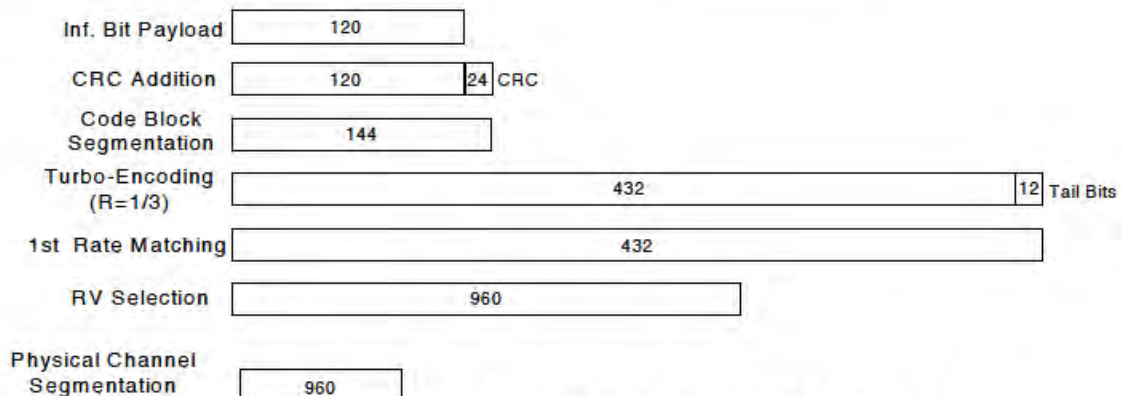


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

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:

	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			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	β_d (SF)	64			
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	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			
	A _{hs} = β_{hs}/β_c	30/15			

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

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Target MPR	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
WCDMA Band II	Subtest 1	9262	1852.4	0	21.3	20.8
		9400	1880.0	0	21.4	20.8
		9538	1907.6	0	21.4	20.7
	Subtest 2	9262	1852.4	0	21.2	20.7
		9400	1880.0	0	21.2	20.6
		9538	1907.6	0	21.2	20.6
	Subtest 3	9262	1852.4	0.5	21.2	20.7
		9400	1880.0	0.5	21.4	20.8
		9538	1907.6	0.5	21.1	20.5
	Subtest 4	9262	1852.4	0.5	21.2	20.6
		9400	1880.0	0.5	21.3	20.7
		9538	1907.6	0.5	21.2	20.5

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.

1x Advanced

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

Application Rev. License

CDMA2000 Mobile Test B.19.07, L

- Protocol Rev > 6 (IS-2000-0)
- System ID: 331; NID: 65535, Reg. Ch. #: 387 for BC0
- Radio Config (RC) > Fwd11,Rvs8
- Service Option (SO) Setup > SO75 (Loopback)
- Traffic Data Rate > Full
- Rvs Power Ctrl > All Up bits (Maximum TxPout)
- Reverse Power Control Mode: 00-200 to 400 bps
- Smart blanking was disabled.

RESULTS

Band	Mode	Ch	Freq. (MHz)	Primary Antenna	Secondary Antenna
				Avg Pwr (dBm)	
BC 0	Fwd11/Rvs8 SO75 (Loopback)	1013	824.7	24.9	24.3
		384	836.52	24.9	24.4
		777	848.31	24.9	24.4

1xEV-Do Rel. 0

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

<u>Application</u>	<u>Rev. License</u>
1xEV-DO Terminal Test	B.13.10, L

EVDO Release 0 - RTAPS

- Call Setup > Shift & Preset
- Call Control:
 - Access Network Info > Cell Parameters > Sector ID > 00000000 : 00000000 : 00000000 : 00000000 >
 - Subnet Mask > 0
 - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parm:
 - Cell Power > -93 dBm/1.23 MHz
 - System ID: 7; NID: 1, Reg. Ch. #: 610 for BC0, 600 for BC1 & 500 for BC10
 - Channel > (Enter channel number)
 - Application Config > Enhanced Test Application Protocol > RTAP
 - RTAP Rate > 153.6 kbps
 - Rvs Power Ctrl > Active bits
 - Protocol Rel > 0 (1xEV-DO)
- Press "Start Data Connection" when "Session Open" appear in "Active Cell"
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

EVDO Release 0 - FTAP

- Call Setup > Shift & Preset
- Call Control:
 - Access Network Info > Cell Parameters > Sector ID > 00000000 : 00000000 : 00000000 : 00000000 >
 - Subnet Mask > 0
 - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parm:
 - Cell Power > -93 dBm/1.23 MHz
 - Cell Band > (Select US Cellular or US PCS)
 - Channel > (Enter channel number)
 - Application Config > Enhanced Test Application Protocol > FTAP (default)
 - FTAP Rate > 307.2 kbps (2 Slot, QPSK)
 - Rvs Power Ctrl > Active bits
 - Protocol Rel > 0 (1xEV-DO)
- Press "Start Data Connection" when "Session Open" appear in "Active Cell"
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

RESULTS

Band	FTAP Rate	RTAP Rate	Channel	f (MHz)	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
BC0	307.2 kbps (2 slot, QPSK)	153.6 kbps	1013	824.7	25.0	24.5
			384	836.52	25.0	24.5
			777	848.31	25.0	24.5

1xEv-Do Rev. A

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

<u>Application</u>	<u>Rev. License</u>
1xEV-DO Terminal Test	B.13.10, L

EVDO Rev. A – RETAP

- Call Setup > Shift & Preset
- Cell Power > --93 and -96 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > RETAP
- R-Data Pkt Size > 4096
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots
- Rvs Power Ctrl > All Up bits (to get the maximum power)

EVDO Rev. A - FETAP

- Call Setup > Shift & Preset
- Cell Power > -93, and -96 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > FETAP
- F-Traffic Format > 4 (1024, 2,128) Canonical (307.2k, QPSK)
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots
- Rvs Power Ctrl > All Up bits (to get the maximum power)

RESULTS

Band	FETAP Traffic Format	RETAP Data Payload Size	Channel	f (MHz)	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
BC0	307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	1013	824.7	25.0	24.4
			384	836.52	25.0	24.5
			777	848.31	25.0	24.4

1xEV-DO Rev. B

This procedure assumes the Rohde & Schwarz CMW 500 CDMA Rev. B Test Set has the following applications installed and with valid license.

Application Rev. License
 1xEV-DO Terminal Test V.2.1.25

1xEV-DO Release B –

- CMW 500 Signal Generator > 1xEV-DO Taskbar Enable
- CMW 500 1xEV-DO Signaling Configuration Window >
- 1xEV-DO Signaling On Window:
 Under Access Network Control:
 Band Class: BC0: US Cellular
 RF Channel: 31
 1xEV-DO Power: -70 dBm
 Release B
- 1xEV-DO Signaling Configuration Window

Under RF Frequency Band / Channel: Enter Ch. Frequency

- Under Carrier Configuration: RF Frequency
 For Two Carriers: Low Channel (1013)

	RF Channel	RF Channel Offset
Carrier [0]	31	0
Carrier [1]	1013	982

- Under Carrier Configuration: RF Pilot

	Carrier Sector	Active on AN	Assigned to AT
Pilot [0]	C0/S0	✓	✓
	CA/S1	✓	✓

For Three Carriers: Low Channel (1013)

	RF Channel	RF Channel Offset
Carrier [0]	72	0
Carrier [1]	31	-41
Carrier [2]	1013	941

- Under Carrier Configuration: RF Pilot

	Carrier Sector	Active on AN	Assigned to AT
Pilot [0]	C0/S0	✓	✓
Pilot [1]	C1/S1	✓	✓
Pilot [2]	C2/S2	✓	✓

- Rvs Power Ctrl > All Up bits (to get the maximum power)

RESULTS

Two Carrier Mini Separation

Band	Test Set #	Channel	f (MHz)	Primary Antenna	Secondary Antenna
				Avg Pwr (dBm)	
BC0	1	1013+31	824.70+825.93	21.3	21.1
		384+425	836.52+837.75	21.4	21.1
		736+777	847.08+848.31	21.3	21.2

Two Carrier Max Separation

Band	Test Set #	Channel	f (MHz)	Primary Antenna	Secondary Antenna
				Avg Pwr (dBm)	
BC0	2	1013+156	824.70+829.68	21.2	21.2
		384+550	836.52+841.50	21.4	21.3
		611+777	843.33+848.31	21.3	21.2

Three Carrier Min Separation

Band	Test Set #	Channel	f (MHz)	Primary Antenna	Secondary Antenna
				Avg Pwr (dBm)	
BC0	3	1013+31+72	824.70+825.93+827.16	20.8	20.7
		384+425+466	836.52+837.75+838.98	20.9	20.8
		695+736+777	845.85+847.08+848.31	20.7	20.7

11.6. CDMA BC1

Only Model A1429 supports EVDO Rev B in BC0 for 16QAM only. Device does not support simultaneous EV-DO Rev.B and voice. Device will use carriers as assigned by network. All channels are tested at max power without independent power control.

1xRTT

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

- | Application | Rev, License |
|----------------------|--------------|
| CDMA2000 Mobile Test | B.13.08, L |
- Call Setup > Shift & Preset
 - Cell Info > Cell Parameters > System ID (SID) > 600 for BC1
 > Network ID (NID) > 65535
 - Protocol Rev > 6 (IS-2000-0)
 - Radio Config (RC) > Please see following table or details
 - FCH Service Option (SO) Setup > Please see following table or details
 - Traffic Data Rate > Full
 - TDSO SCH Info > F-SCH Parameters > F-SCH Data Rate > 153.6 kbps
 > R-SCH Parameters > R-SCH Data Rate > 153.6 kbps
 - Rvs Power Ctrl > Active bits
 - o Rvs Power Ctrl > All Up bits (Maximum TxPout)

RESULTS

Band	Mode	Ch	Freq. (MHz)	Primary Antenna	Secondary Antenna
				Avg Pwr (dBm)	
BC 1	RC1 SO55 (Loopback)	25	1851.25	22.4	21.3
		600	1880.00	22.4	21.3
		1175	1908.75	22.3	21.4
	RC3 SO55 (Loopback)	25	1851.25	22.5	21.3
		600	1880.00	22.5	21.5
		1175	1908.75	22.5	21.5
	RC3 SO32 (+F-SCH)	25	1851.25	22.5	21.2
		600	1880.00	22.5	21.2
		1175	1908.75	22.4	21.2

1x Advanced

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

Application Rev. License
 CDMA2000 Mobile Test B.19.07, L

- Protocol Rev > 6 (IS-2000-0)
- System ID: 331; NID: 65535, Reg. Ch. #: 600 for BC1
- Radio Config (RC) > Fwd11,Rvs8
- Service Option (SO) Setup > SO75 (Loopback)
- Traffic Data Rate > Full
- Rvs Power Ctrl > All Up bits (Maximum TxPout)
- Reverse Power Control Mode: 00-200 to 400 bps
- Smart blanking was disabled.

RESULTS

Band	Mode	Ch	Freq. (MHz)	Primary Antenna	Secondary Antenna
				Avg Pwr (dBm)	
BC 1	Fwd11/Rvs8 SO75 (Loopback)	25	1851.25	22.3	21.3
		600	1880.00	22.5	21.3
		1175	1908.75	22.2	21.3

1xEV-Do Rel. 0

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

<u>Application</u>	<u>Rev. License</u>
1xEV-DO Terminal Test	B.13.10, L

EVDO Release 0 - RTAPS

- Call Setup > Shift & Preset
- Call Control:
 - Access Network Info > Cell Parameters > Sector ID > 00000000 : 00000000 : 00000000 : 00000000 >
 - Subnet Mask > 0
 - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parm:
 - Cell Power > -93 dBm/1.23 MHz
 - System ID: 7; NID: 1, Reg. Ch. #: 610 for BC0, 600 for BC1 & 500 for BC10
 - Channel > (Enter channel number)
 - Application Config > Enhanced Test Application Protocol > RTAP
 - RTAP Rate > 153.6 kbps
 - Rvs Power Ctrl > Active bits
 - Protocol Rel > 0 (1xEV-DO)
- Press "Start Data Connection" when "Session Open" appear in "Active Cell"
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

EVDO Release 0 - FTAP

- Call Setup > Shift & Preset
- Call Control:
 - Access Network Info > Cell Parameters > Sector ID > 00000000 : 00000000 : 00000000 : 00000000 >
 - Subnet Mask > 0
 - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parm:
 - Cell Power > -93 dBm/1.23 MHz
 - Cell Band > (Select US Cellular or US PCS)
 - Channel > (Enter channel number)
 - Application Config > Enhanced Test Application Protocol > FTAP (default)
 - FTAP Rate > 307.2 kbps (2 Slot, QPSK)
 - Rvs Power Ctrl > Active bits
 - Protocol Rel > 0 (1xEV-DO)
- Press "Start Data Connection" when "Session Open" appear in "Active Cell"
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

RESULTS

Band	FTAP Rate	RTAP Rate	Channel	f (MHz)	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
BC1	307.2 kbps (2 slot, QPSK)	153.6 kbps	25	1851.25	22.5	21.5
			600	1880.00	22.5	21.4
			1175	1908.75	22.5	21.5

1xEV-Do Rev. A

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

<u>Application</u>	<u>Rev. License</u>
1xEV-DO Terminal Test	B.13.10, L

EVDO Rev. A – RETAP

- Call Setup > Shift & Preset
- Cell Power > --93 and -96 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > RETAP
- R-Data Pkt Size > 4096
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots
- Rvs Power Ctrl > All Up bits (to get the maximum power)

EVDO Rev. A - FETAP

- Call Setup > Shift & Preset
- Cell Power > -93, and -96 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > FETAP
- F-Traffic Format > 4 (1024, 2,128) Canonical (307.2k, QPSK)
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots
- Rvs Power Ctrl > All Up bits (to get the maximum power)

RESULTS

Band	FETAP Traffic Format	RETAP Data Payload Size	Channel	f (MHz)	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
BC1	307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	25	1851.25	22.5	21.4
			600	1880.00	22.5	21.4
			1175	1908.75	22.3	21.5

11.7. CDMA BC10

Only Model A1429 supports EVDO Rev B in BC0 for 16QAM only. Device does not support simultaneous EV-DO Rev.B and voice. Device will use carriers as assigned by network. All channels are tested at max power without independent power control.

1xRTT

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

Application Rev, License
 CDMA2000 Mobile Test B.13.08, L

- Call Setup > Shift & Preset
- Cell Info > Cell Parameters > System ID (SID) > 387 (BC0), 600(BC1), 580(BC10)
 > Network ID (NID) > 65535
- Protocol Rev > 6 (IS-2000-0)
- Radio Config (RC) > Please see following table or details
- FCH Service Option (SO) Setup > Please see following table or details
- Traffic Data Rate > Full
- TDSO SCH Info > F-SCH Parameters > F-SCH Data Rate > 153.6 kbps
 > R-SCH Parameters > R-SCH Data Rate > 153.6 kbps
- Rvs Power Ctrl > Active bits
 - Rvs Power Ctrl > All Up bits (Maximum TxPout)

RESULTS

Band	Mode	Ch	Freq. (MHz)	Primary Antenna	Secondary Antenna
				Avg Pwr (dBm)	
BC 10	RC1 SO55 (Loopback)	476	817.9	24.4	23.9
		580	820.5	24.4	23.9
		684	823.1	24.5	23.9
	RC3 SO55 (Loopback)	476	817.9	24.4	23.9
		580	820.5	24.5	23.9
		684	823.1	24.5	24.0
	RC3 SO32 (+F-SCH)	476	817.9	24.4	23.9
		580	820.5	24.5	23.9
		684	823.1	24.5	24.0

1x Advanced

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

Application Rev. License

CDMA2000 Mobile Test B.19.07, L

- Protocol Rev > 6 (IS-2000-0)
- System ID: 331; NID: 65535, Reg. Ch. #: 387 for BC0, 600 for BC1 & 500 for BC10
- Radio Config (RC) > Fwd11,Rvs8
- Service Option (SO) Setup > SO75 (Loopback)
- Traffic Data Rate > Full
- Rvs Power Ctrl > All Up bits (Maximum TxPout)
- Reverse Power Control Mode: 00-200 to 400 bps
- Smart blanking was disabled.

RESULTS

Band	Mode	Ch	Freq. (MHz)	Primary Antenna	Secondary Antenna
				Avg Pwr (dBm)	
BC 10	Fwd11/Rvs8 SO75 (Loopback)	476	817.9	24.4	23.9
		580	820.5	24.4	23.9
		684	823.1	24.4	23.8

1xEV-Do Rel. 0

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

<u>Application</u>	<u>Rev. License</u>
1xEV-DO Terminal Test	B.13.10, L

EVDO Release 0 - RTAPS

- Call Setup > Shift & Preset
- Call Control:
 - Access Network Info > Cell Parameters > Sector ID > 00000000 : 00000000 : 00000000 : 00000000 >
 - Subnet Mask > 0
 - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parm:
 - Cell Power > -93 dBm/1.23 MHz
 - System ID: 7; NID: 1, Reg. Ch. #: 610 for BC0, 600 for BC1 & 500 for BC10
 - Channel > (Enter channel number)
 - Application Config > Enhanced Test Application Protocol > RTAP
 - RTAP Rate > 153.6 kbps
 - Rvs Power Ctrl > Active bits
 - Protocol Rel > 0 (1xEV-DO)
- Press "Start Data Connection" when "Session Open" appear in "Active Cell"
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

EVDO Release 0 - FTAP

- Call Setup > Shift & Preset
- Call Control:
 - Access Network Info > Cell Parameters > Sector ID > 00000000 : 00000000 : 00000000 : 00000000 >
 - Subnet Mask > 0
 - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parm:
 - Cell Power > -93 dBm/1.23 MHz
 - Cell Band > (Select US Cellular or US PCS)
 - Channel > (Enter channel number)
 - Application Config > Enhanced Test Application Protocol > FTAP (default)
 - FTAP Rate > 307.2 kbps (2 Slot, QPSK)
 - Rvs Power Ctrl > Active bits
 - Protocol Rel > 0 (1xEV-DO)
- Press "Start Data Connection" when "Session Open" appear in "Active Cell"
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

RESULTS

Band	FTAP Rate	RTAP Rate	Channel	f (MHz)	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
BC10	307.2 kbps (2 slot, QPSK)	153.6 kbps	476	817.9	24.4	23.9
			580	820.5	24.5	23.9
			684	823.1	24.5	24.0

1xEV-Do Rev. A

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

<u>Application</u>	<u>Rev. License</u>
1xEV-DO Terminal Test	B.13.10, L

EVDO Rev. A – RETAP

- Call Setup > Shift & Preset
- Cell Power > --93 and -96 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > RETAP
- R-Data Pkt Size > 4096
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots
- Rvs Power Ctrl > All Up bits (to get the maximum power)

EVDO Rev. A - FETAP

- Call Setup > Shift & Preset
- Cell Power > -93, and -96 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > FETAP
- F-Traffic Format > 4 (1024, 2,128) Canonical (307.2k, QPSK)
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots
- Rvs Power Ctrl > All Up bits (to get the maximum power)

RESULTS

Band	FETAP Traffic Format	RETAP Data Payload Size	Channel	f (MHz)	Primary Antenna	Secondary Antenna
					Avg Pwr (dBm)	
BC10	307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	476	817.9	24.4	23.9
			580	820.5	24.4	23.9
			684	823.1	24.5	24.0

11.8. LTE Band 5

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

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

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

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

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

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

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

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

Results

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
10	20450	829.0	QPSK	1	0	0	24.0	23.5
				1	24	0	24.0	23.5
				1	49	0	24.0	23.3
				25	0	1	23.1	22.8
				25	12	1	23.1	22.9
				25	24	1	23.0	22.7
			16QAM	50	0	1	23.0	22.8
				1	0	1	22.6	22.7
				1	24	1	22.6	22.8
				1	49	1	22.6	22.6
				25	0	2	22.1	21.9
				25	12	2	22.1	22.0
	20525	836.5	QPSK	25	24	2	22.1	21.9
				25	24	2	22.1	21.9
				50	0	2	22.0	21.9
				1	0	0	24.0	23.5
				1	24	0	24.0	23.4
				1	49	0	24.0	23.4
			16QAM	25	0	1	22.8	22.6
				25	12	1	22.8	22.6
				25	24	1	22.7	22.6
				50	0	1	22.8	22.5
				1	0	1	23.2	22.7
				1	24	1	23.3	22.6
	20600	844.0	QPSK	1	49	1	23.1	22.7
				25	0	2	21.8	21.7
				25	12	2	21.8	21.7
				25	24	2	21.8	21.7
				50	0	2	22.0	21.6
				1	0	0	24.0	23.4
			16QAM	1	24	0	24.0	23.4
				1	49	0	23.8	23.4
				25	0	1	23.0	22.7
				25	12	1	23.0	22.7
				25	24	1	23.0	22.6
				50	0	1	23.0	22.7
1	0	1	22.6	22.7				
1	24	1	22.6	22.7				
1	49	1	22.4	22.7				
25	0	2	22.0	21.7				
25	12	2	22.1	21.8				
25	24	2	22.0	21.7				
50	0	2	22.0	21.8				

LTE Band 5 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
5	20425	826.5	QPSK	1	0	0	23.9	23.5
				1	12	0	23.9	23.4
				1	24	0	23.8	23.4
				12	0	1	22.8	22.9
				12	6	1	22.8	22.9
				12	11	1	22.8	22.8
			16QAM	25	0	1	22.9	22.8
				1	0	1	23.6	22.5
				1	12	1	23.5	22.4
				1	24	1	23.5	22.4
				12	0	2	22.0	21.9
				12	6	2	22.2	21.9
	20525	836.5	QPSK	12	11	2	22.1	21.8
				25	0	2	22.0	21.8
				1	0	0	23.8	23.5
				1	12	0	23.7	23.5
				1	24	0	23.7	23.5
				12	0	1	22.8	22.5
			16QAM	12	6	1	22.8	22.6
				12	11	1	22.8	22.6
				25	0	1	22.9	22.6
				1	0	1	23.6	22.9
				1	12	1	23.5	22.9
				1	24	1	23.5	22.9
	20625	846.5	QPSK	12	0	2	22.1	21.7
				12	6	2	22.2	21.7
				12	11	2	22.2	21.6
				25	0	2	22.0	21.6
				1	0	0	23.8	23.5
				1	12	0	23.7	23.3
			16QAM	1	24	0	23.6	22.8
				12	0	1	22.8	22.7
				12	6	1	22.8	22.7
				12	11	1	22.8	22.6
				25	0	1	22.8	22.7
				1	0	1	23.2	22.5
16QAM	1	12	1	23.1	22.4			
	1	24	1	23.2	21.8			
	12	0	2	22.0	21.7			
	12	6	2	22.1	21.8			
	12	11	2	21.8	21.7			
	25	0	2	21.8	21.8			

LTE Band 5 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
3	20415	825.5	QPSK	1	0	0	23.9	23.5
				1	7	0	23.8	23.5
				1	14	0	23.7	23.5
				8	0	1	22.8	22.8
				8	4	1	22.8	22.8
				8	7	1	22.8	22.7
			15	0	1	22.9	22.8	
			16QAM	1	0	1	23.4	22.8
				1	7	1	23.3	22.7
				1	14	1	23.0	22.6
				8	0	2	21.8	21.7
				8	4	2	21.8	21.8
	8	7		2	22.0	21.6		
	20525	836.5	QPSK	1	0	0	23.9	23.4
				1	7	0	23.8	23.3
				1	14	0	23.8	23.3
				8	0	1	22.8	22.5
				8	4	1	22.8	22.5
				8	7	1	22.9	22.4
			15	0	1	22.9	22.1	
			16QAM	1	0	1	23.2	22.5
				1	7	1	23.2	22.5
				1	14	1	23.2	22.5
				8	0	2	21.9	21.5
				8	4	2	21.9	21.5
	8	7		2	22.0	21.6		
	20634	847.4	QPSK	1	0	0	23.9	23.5
				1	7	0	23.8	23.3
				1	14	0	23.6	22.7
				8	0	1	22.7	22.4
				8	4	1	22.7	22.5
				8	7	1	22.7	22.6
			15	0	1	22.7	22.5	
			16QAM	1	0	1	23.3	22.5
				1	7	1	23.2	22.4
				1	14	1	23.1	22.5
8				0	2	21.8	21.7	
8				4	2	21.8	21.7	
8	7	2		21.7	21.6			
15	0	2	21.7	21.5				

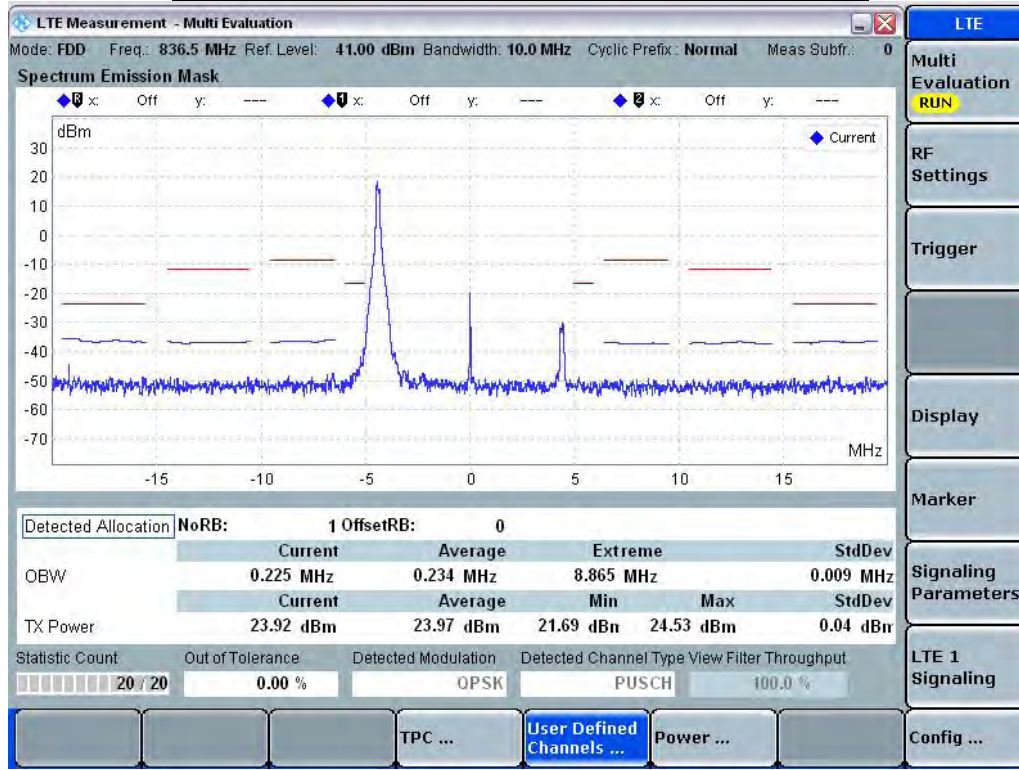
LTE Band 5 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
1.4	20407	824.7	QPSK	1	0	0	24.0	23.5
				1	2	0	24.0	23.5
				1	5	0	23.9	23.4
				3	0	1	23.9	23.4
				3	1	1	23.9	23.4
				3	2	1	23.9	23.4
			6	0	1	23.0	22.7	
			16QAM	1	0	1	22.5	22.7
				1	2	1	22.5	22.6
				1	5	1	22.5	22.6
				3	0	2	22.5	22.5
				3	1	2	22.4	22.5
	3	2		2	22.4	22.4		
	6	0	2	22.0	21.5			
	20525	836.5	QPSK	1	0	0	24.0	23.3
				1	2	0	24.0	23.3
				1	5	0	24.0	23.3
				3	0	1	23.8	23.0
				3	1	1	23.8	23.2
				3	2	1	23.7	23.1
			6	0	1	23.0	22.4	
			16QAM	1	0	1	23.6	22.5
				1	2	1	23.5	0.5
				1	5	1	23.5	22.5
				3	0	2	22.9	22.0
				3	1	2	22.9	22.2
	3	2		2	22.8	22.1		
	6	0	2	22.0	21.2			
	20642	848.2	QPSK	1	0	0	24.0	23.4
				1	2	0	23.9	23.3
				1	5	0	23.8	23.2
				3	0	1	23.8	23.2
				3	1	1	23.8	23.2
				3	2	1	23.7	23.1
			6	0	1	22.9	22.5	
			16QAM	1	0	1	23.1	22.4
1				2	1	23.0	22.4	
1				5	1	22.7	22.5	
3				0	2	23.1	22.4	
3				1	2	23.1	22.4	
3	2	2		23.0	22.3			
6	0	2	21.9	21.4				

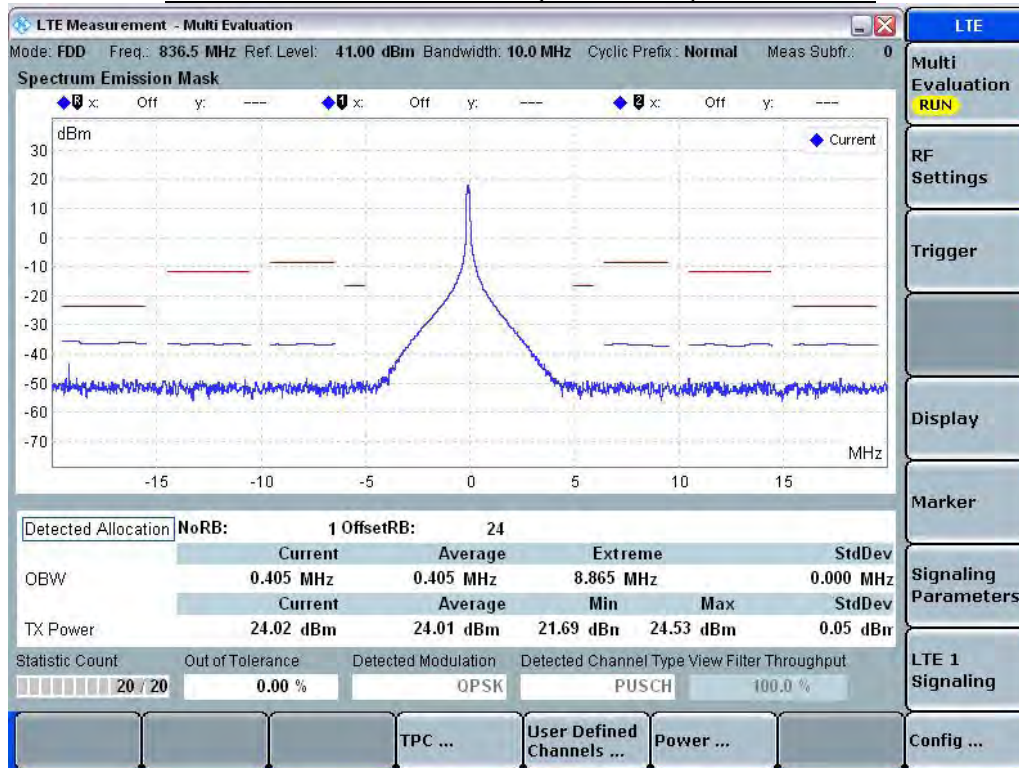
11.8.1. Spectrum Plots for the Test RB allocations

The following plots are to demonstrate the tested RB allocations have been established correctly at the maximum output power conditions.

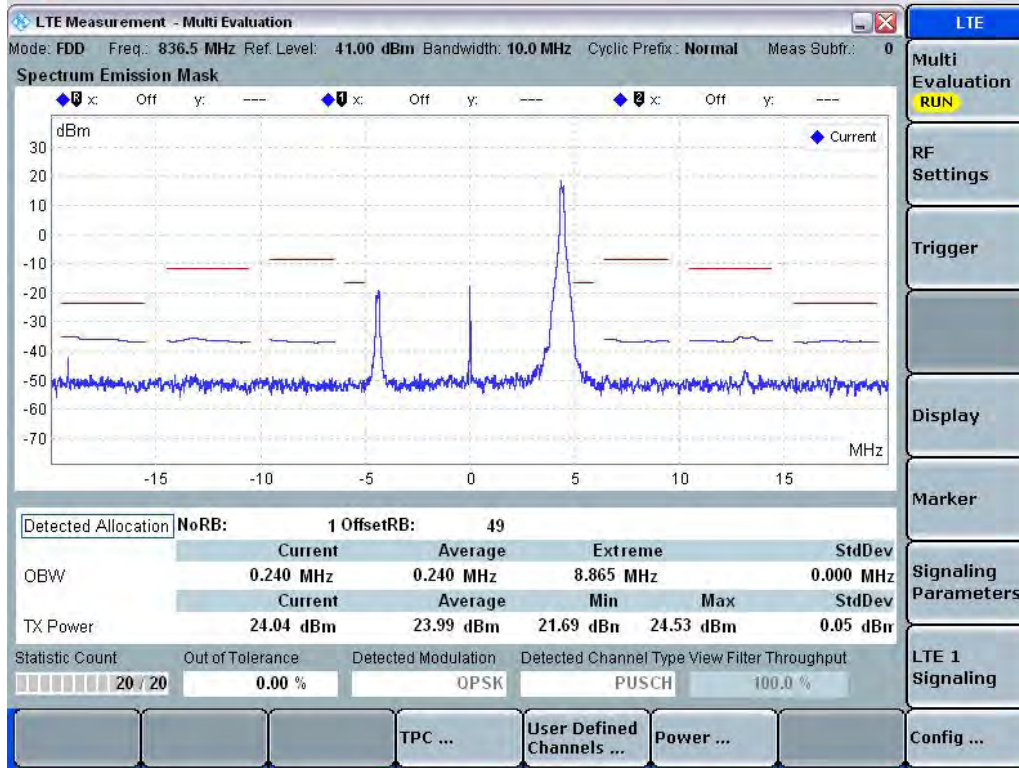
10MHz Band Width: Ch 20525, RB Size = 1; RB Offset = 0



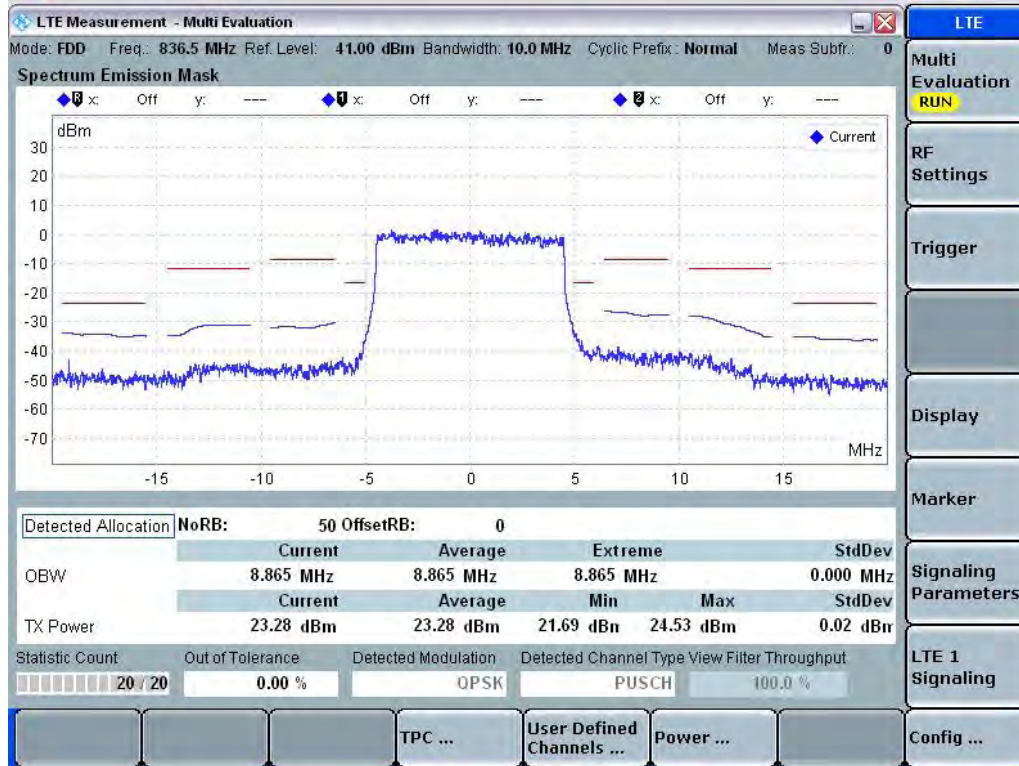
10MHz Band Width: Ch 20525, RB Size = 1; RB Offset = 24



10MHz Band Width: Ch 20525, RB Size = 1; RB Offset = 49



10MHz Band Width: Ch 20525, RB Size = 50; RB Offset = 0



11.9. LTE Band 13

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

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

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

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

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

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

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

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

Band 13

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
10	23230	782.0	QPSK	1	0	0	24.0	23.5
				1	24	0	24.0	23.4
				1	49	0	23.8	23.4
				25	0	1	22.8	22.3
				25	12	1	22.8	22.3
				25	24	1	22.7	22.4
				50	0	1	22.7	22.3
			16QAM	1	0	1	22.9	22.5
				1	24	1	22.9	22.5
				1	49	1	22.9	22.5
				25	0	2	21.8	21.3
				25	12	2	21.8	21.3
				25	24	2	21.8	21.3
				50	0	2	21.8	21.3

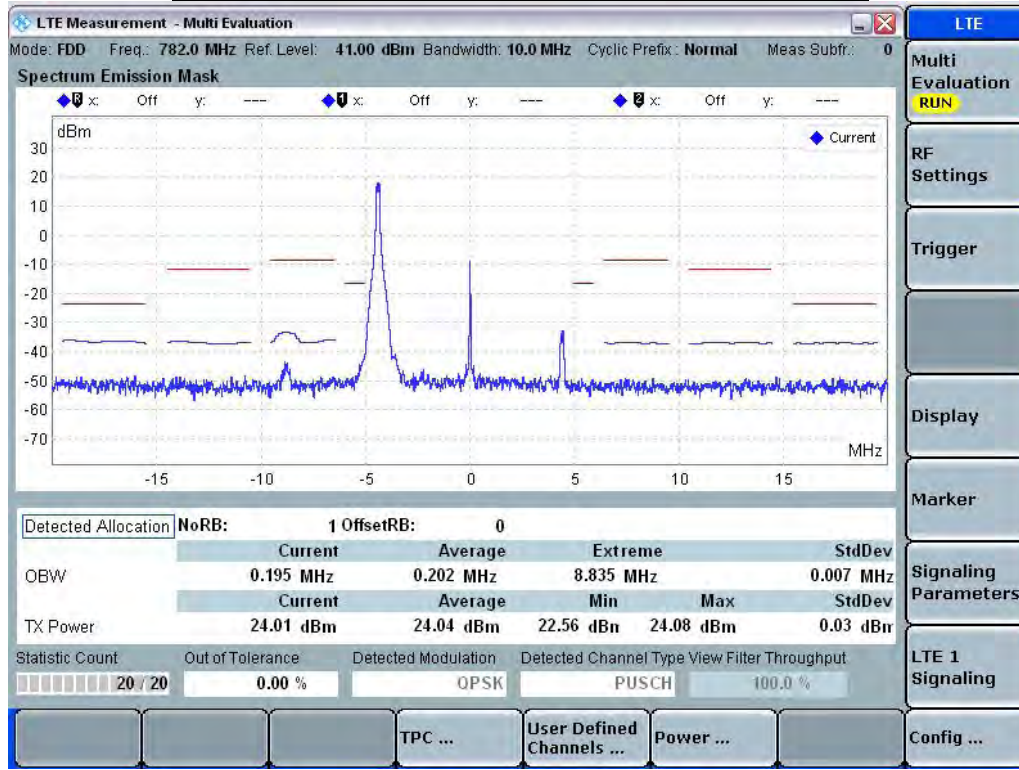
LTE Band 13 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
5	23205	779.5	QPSK	1	0	0	23.9	23.5
				1	12	0	23.8	23.5
				1	24	0	23.8	23.5
				12	0	1	23.0	22.6
				12	6	1	23.0	22.6
				12	11	1	23.0	22.6
			16QAM	25	0	1	23.0	22.7
				1	0	1	23.5	23.3
				1	12	1	23.4	23.3
				1	24	1	23.4	23.3
				12	0	2	22.2	22.0
				12	6	2	22.3	22.0
	23230	782.0	QPSK	12	11	2	22.2	22.0
				25	0	2	22.0	21.7
				1	0	0	24.0	23.5
				1	12	0	23.9	23.5
				1	24	0	23.8	23.5
				12	0	1	23.0	22.6
			16QAM	12	6	1	23.0	22.7
				12	11	1	23.0	22.8
				25	0	1	23.0	22.8
				1	0	1	23.5	23.3
				1	12	1	23.4	23.3
				1	24	1	23.3	23.3
	23255	784.5	QPSK	12	0	2	22.3	22.0
				12	6	2	22.3	22.0
				12	11	2	22.0	21.9
				25	0	2	22.0	21.9
				1	0	0	24.0	23.5
				1	12	0	23.9	23.4
16QAM			1	24	0	23.8	23.4	
			12	0	1	23.0	22.5	
			12	6	1	23.0	22.6	
			12	11	1	23.0	22.6	
			25	0	1	23.0	22.7	
			1	0	1	23.6	23.5	
16QAM	1	12	1	23.5	23.3			
	1	24	1	23.3	23.0			
	12	0	2	22.0	21.9			
	12	6	2	22.2	22.0			
	12	11	2	22.1	22.0			
	25	0	2	22.1	21.8			

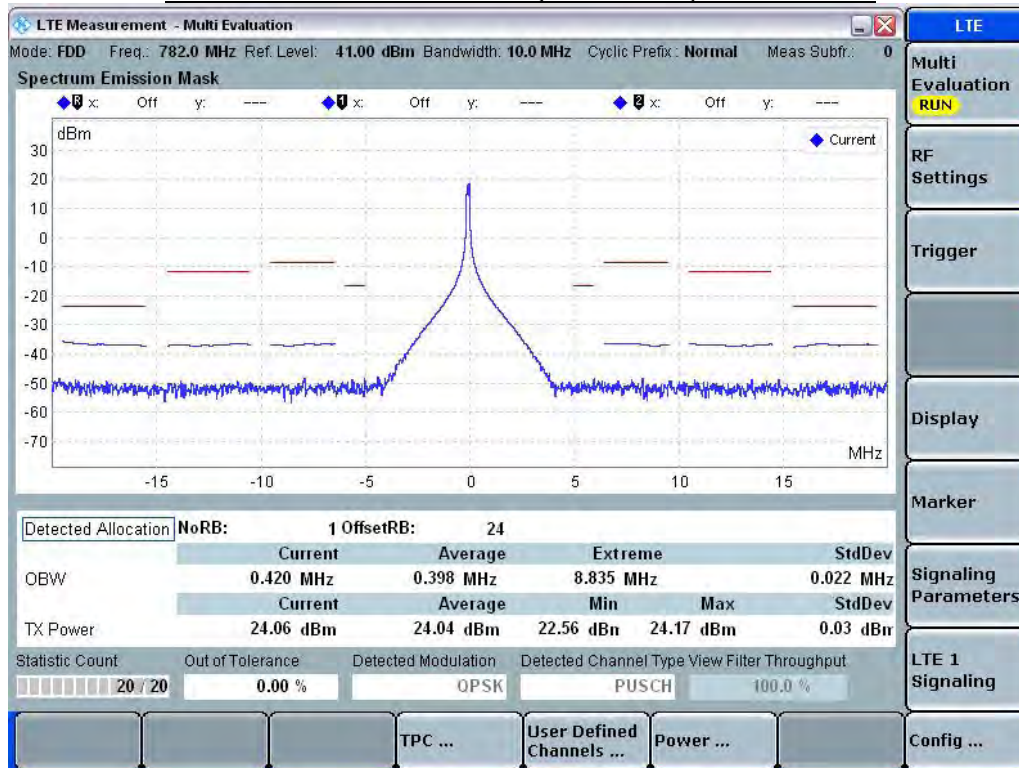
11.9.1. Spectrum Plots for the Test RB allocations

The following plots are to demonstrate the tested RB allocations have been established correctly at the maximum output power conditions.

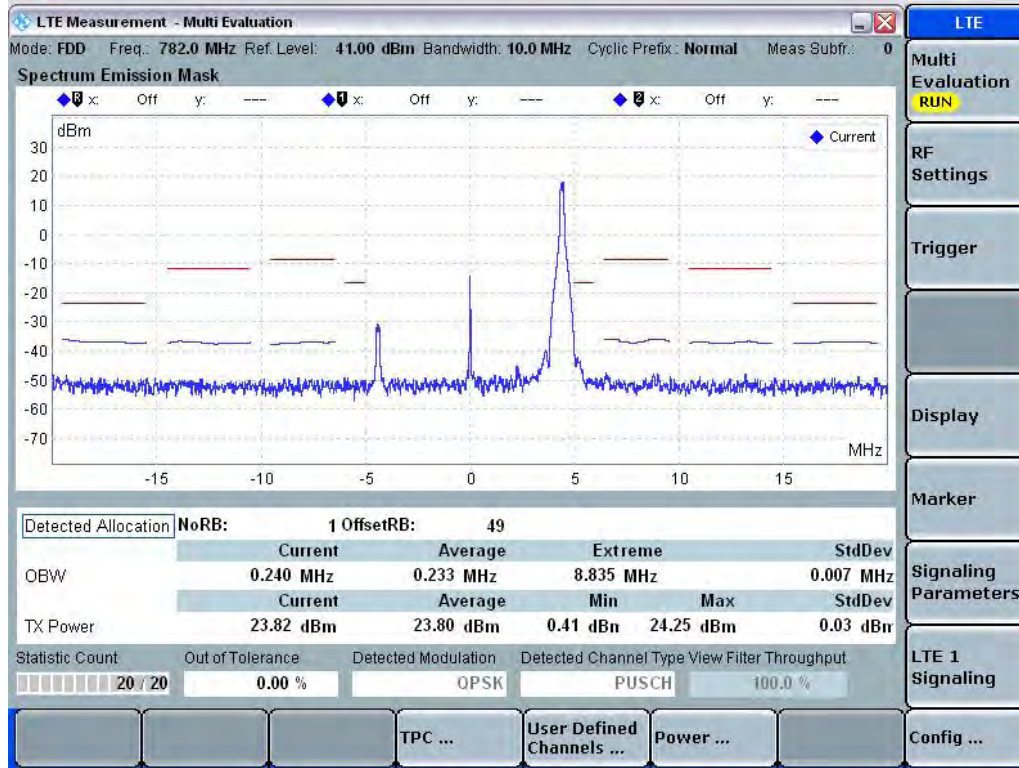
10MHz Band Width: Ch 23230, RB Size = 1; RB Offset = 0



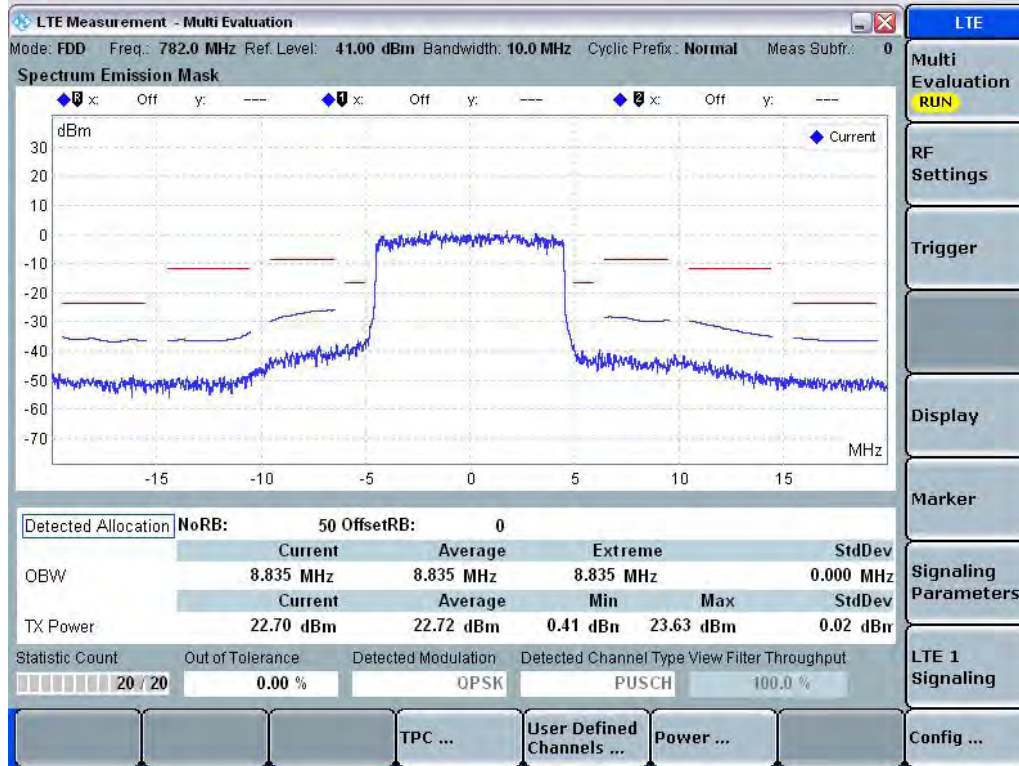
10MHz Band Width: Ch 23230, RB Size = 1; RB Offset = 24



10MHz Band Width: Ch 23230, RB Size = 1; RB Offset = 49



10MHz Band Width: Ch 23230, RB Size = 50; RB Offset = 0



11.10. LTE Band 25

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

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

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

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

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

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

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

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

Results

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna			
							Avg Pwr (dBm)				
20	26140	1860.0	QPSK	1	0	0	22.5	23.0			
				1	49	0	22.5	23.0			
				1	99	0	22.5	23.0			
				50	0	1	21.6	21.3			
				50	24	1	21.6	21.3			
				50	49	1	21.6	21.4			
			16QAM	100	0	1	21.6	21.3			
				1	0	1	21.8	21.4			
				1	49	1	21.7	21.3			
				1	99	1	22.0	21.9			
				50	0	2	20.6	20.2			
				50	24	2	20.6	20.2			
	26365	1882.5	QPSK	50	49	2	20.6	20.4			
				100	0	2	20.7	20.4			
				1	0	0	22.5	23.0			
				1	49	0	22.5	23.0			
				1	99	0	22.5	22.9			
				50	0	1	21.7	22.1			
				50	24	1	21.7	22.1			
				50	49	1	21.8	21.8			
				100	0	1	21.6	22.0			
			16QAM	1	0	1	21.7	22.2			
				1	49	1	22.0	22.2			
				1	99	1	21.8	21.8			
				50	0	2	20.7	20.2			
				50	24	2	20.7	21.1			
				50	49	2	20.7	20.9			
				100	0	2	20.7	21.0			
				26590	1905.0	QPSK	1	0	0	22.5	23.0
							1	49	0	22.5	22.9
1	99	0	22.4				22.8				
50	0	1	21.7				21.8				
50	24	1	21.8				22.1				
50	49	1	21.8				21.9				
16QAM	100	0	1			21.7	21.9				
	1	0	1			21.7	21.7				
	1	49	1			21.7	22.1				
	1	99	1			21.7	21.6				
	50	0	2			20.7	20.8				
	50	24	2			20.7	21.0				
50	49	2	20.7	21.0							
100	0	2	20.7	20.9							

LTE Band 25 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
15	26115	1857.5	QPSK	1	0	0	22.5	23.0
				1	37	0	22.5	22.9
				1	74	0	22.5	22.8
				38	0	1	21.6	22.7
				38	18	1	21.7	22.7
				38	37	1	21.7	22.6
			16QAM	75	0	1	21.6	22.5
				1	0	1	21.6	22.7
				1	37	1	21.5	22.6
				1	74	1	21.5	22.7
				38	0	2	20.9	21.7
				38	18	2	20.9	21.7
	26365	1882.5	QPSK	38	37	2	21.0	21.6
				75	0	2	20.7	21.7
				1	0	0	22.5	23.3
				1	37	0	22.5	23.1
				1	74	0	22.5	23.0
				38	0	1	21.5	22.0
			16QAM	38	18	1	21.6	22.2
				38	37	1	21.5	22.2
				75	0	1	21.4	22.3
				1	0	1	21.5	22.8
				1	37	1	21.5	22.3
				1	74	1	21.4	22.3
	26615	1907.5	QPSK	38	0	2	20.6	21.7
				38	18	2	20.6	21.5
				38	37	2	20.5	21.5
				75	0	2	20.6	21.4
				1	0	0	22.2	23.0
				1	37	0	22.2	22.8
			16QAM	1	74	0	22.3	22.8
				38	0	1	21.7	22.1
				38	18	1	21.7	22.3
				38	37	1	21.6	22.2
				75	0	1	20.9	22.3
				1	0	1	21.2	22.5
16QAM	1	37	1	21.1	22.4			
	1	74	1	21.1	22.4			
	38	0	2	20.8	21.5			
	38	18	2	20.8	21.5			
	38	37	2	20.7	21.4			
	75	0	2	20.8	21.4			

LTE Band 25 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
10	26090	1855.0	QPSK	1	0	0	22.5	23.0
				1	24	0	22.5	23.0
				1	49	0	22.5	23.0
				25	0	1	21.5	23.0
				25	12	1	21.5	23.0
				25	24	1	21.4	22.9
			16QAM	50	0	1	21.4	23.0
				1	0	1	21.5	22.6
				1	24	1	21.5	22.4
				1	49	1	21.5	22.2
				25	0	2	20.5	22.0
				25	12	2	20.5	22.0
	26365	1882.5	QPSK	25	24	2	20.6	22.1
				50	0	2	20.6	22.0
				1	0	0	22.5	23.0
				1	24	0	22.5	23.0
				1	49	0	22.5	22.9
				25	0	1	21.5	23.0
			16QAM	25	12	1	21.6	23.0
				25	24	1	21.5	22.9
				50	0	1	21.5	22.9
				1	0	1	21.5	22.8
				1	24	1	21.4	22.7
				1	49	1	21.4	22.6
	26640	1910.0	QPSK	25	0	2	20.6	22.0
				25	12	2	20.5	22.0
				25	24	2	20.5	22.0
				50	0	2	20.6	22.0
				1	0	0	22.5	23.0
				1	24	0	22.4	22.8
			16QAM	1	49	0	22.4	22.8
				25	0	1	21.5	22.6
				25	12	1	21.5	22.7
				25	24	1	21.4	22.5
				50	0	1	21.4	22.7
				1	0	1	21.5	22.5
16QAM	1	24	1	21.4	22.5			
	1	49	1	21.4	22.5			
	25	0	2	20.6	21.8			
	25	12	2	20.5	21.8			
	25	24	2	20.5	21.7			
	50	0	2	20.5	21.7			

LTE Band 25 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
5	26065	1852.5	QPSK	1	0	0	22.5	23.0
				1	12	0	22.5	22.9
				1	24	0	22.5	22.9
				12	0	1	21.5	22.4
				12	6	1	21.6	22.4
				12	11	1	21.5	22.3
			16QAM	25	0	1	21.4	22.4
				1	0	1	21.5	23.0
				1	12	1	21.5	23.0
				1	24	1	21.6	23.0
				12	0	2	20.5	21.7
				12	6	2	20.6	21.8
	26365	1882.5	QPSK	12	11	2	20.5	21.7
				12	6	2	20.6	21.8
				12	11	2	20.5	21.7
				25	0	2	20.6	21.5
				1	0	0	22.5	23.0
				1	12	0	22.5	23.0
				1	24	0	22.5	23.0
				12	0	1	21.5	22.1
				12	6	1	21.5	22.2
			12	11	1	21.4	22.0	
			16QAM	25	0	1	21.4	22.4
				1	0	1	21.5	22.9
				1	12	1	21.5	22.8
				1	24	1	21.6	22.7
				12	0	2	20.5	21.5
				12	6	2	20.6	21.5
				12	11	2	20.5	21.5
				25	0	2	20.6	21.5
26665	1912.5	QPSK		1	0	0	22.5	23.0
			1	12	0	22.5	23.0	
			1	24	0	22.5	23.0	
			12	0	1	21.5	22.0	
			12	6	1	21.5	22.1	
			12	11	1	21.4	22.0	
			25	0	1	21.3	22.4	
			16QAM	1	0	1	21.5	22.8
				1	12	1	21.5	22.8
		1		24	1	21.5	22.8	
		12		0	2	20.5	21.5	
		12		6	2	20.5	21.4	
		12		11	2	20.5	21.4	
		25		0	2	20.5	21.3	

LTE Band 25 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
3	26055	1851.5	QPSK	1	0	0	22.5	23.0
				1	7	0	22.5	23.0
				1	14	0	22.5	23.0
				8	0	1	21.5	22.0
				8	4	1	21.6	22.2
				8	7	1	21.5	22.2
			15	0	1	21.5	22.3	
			16QAM	1	0	1	21.5	22.4
				1	7	1	21.4	22.5
				1	14	1	21.4	22.7
				8	0	2	20.5	21.3
				8	4	2	20.6	21.3
				8	7	2	20.5	21.4
			15	0	2	20.6	21.5	
			26365	1882.5	QPSK	1	0	0
	1	7				0	22.5	23.0
	1	14				0	22.5	23.0
	8	0				1	21.5	22.0
	8	4				1	21.6	22.0
	8	7				1	21.5	22.0
	15	0			1	21.4	22.1	
	16QAM	1			0	1	21.5	22.4
		1			7	1	21.5	22.5
		1			14	1	21.5	22.6
		8			0	2	20.5	21.1
		8			4	2	20.6	21.2
		8			7	2	20.5	21.1
	15	0			2	20.5	21.3	
	26674	1913.4			QPSK	1	0	0
			1	7		0	22.5	22.9
1			14	0		22.5	22.9	
8			0	1		21.5	22.0	
8			4	1		21.5	22.2	
8			7	1		21.4	22.1	
15			0	1	21.4	22.2		
16QAM			1	0	1	21.4	22.4	
			1	7	1	21.4	22.5	
			1	14	1	21.4	22.8	
			8	0	2	20.5	21.7	
			8	4	2	20.5	21.7	
			8	7	2	20.5	21.5	
15			0	2	20.5	21.3		

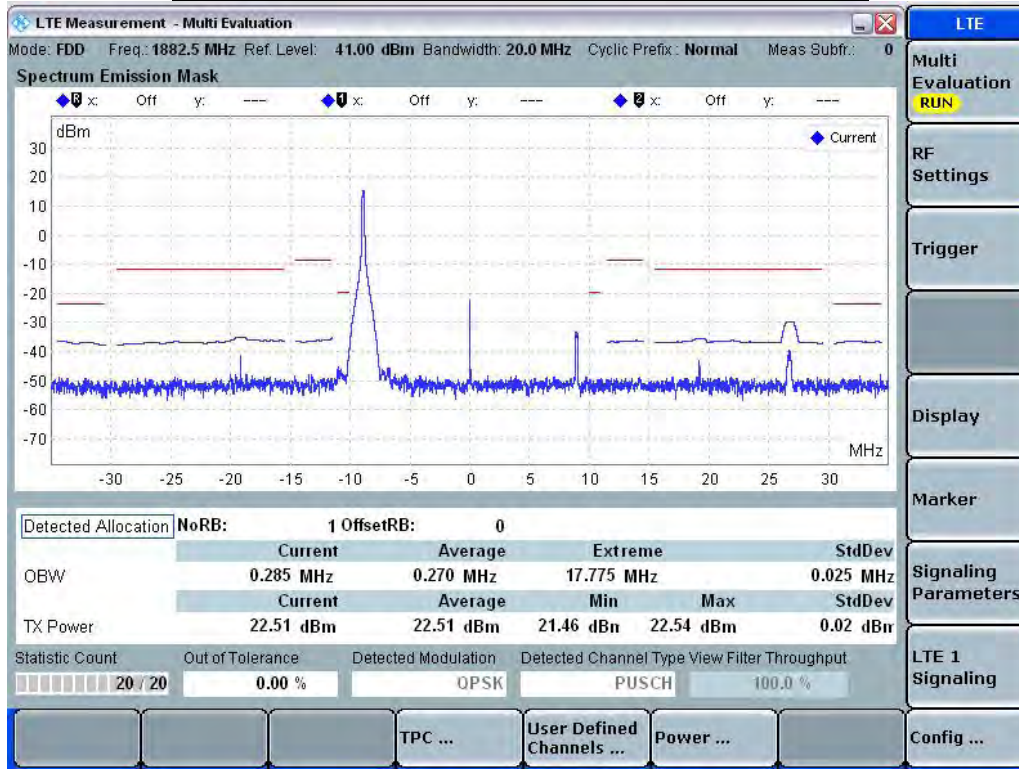
LTE Band 25 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Primary Antenna	Secondary Antenna
							Avg Pwr (dBm)	
1.4	26047	1850.7	QPSK	1	0	0	22.5	23.0
				1	2	0	22.5	23.0
				1	5	0	22.5	23.0
				3	0	1	22.5	22.9
				3	1	1	22.5	22.9
				3	2	1	22.5	22.8
			6	0	1	21.4	22.6	
			16QAM	1	0	1	21.5	22.3
				1	2	1	21.5	22.2
				1	5	1	21.5	22.3
				3	0	2	21.5	22.2
				3	1	2	21.4	22.3
	3	2		2	21.4	22.0		
	6	0	2	20.5	21.6			
	26365	1882.5	QPSK	1	0	0	22.5	23.0
				1	2	0	22.5	23.0
				1	5	0	22.5	23.0
				3	0	1	22.5	22.9
				3	1	1	22.5	22.9
				3	2	1	22.5	22.8
			6	0	1	21.5	22.8	
			16QAM	1	0	1	21.4	22.8
				1	2	1	21.4	22.7
				1	5	1	21.4	22.7
				3	0	2	21.5	22.5
				3	1	2	21.4	22.6
	3	2		2	21.4	22.5		
	6	0	2	20.5	21.7			
	16682	1914.2	QPSK	1	0	0	22.4	23.0
				1	2	0	22.4	23.0
				1	5	0	22.4	23.0
				3	0	1	22.3	22.9
				3	1	1	22.3	22.9
				3	2	1	22.2	22.8
			6	0	1	21.3	22.8	
			16QAM	1	0	1	21.4	22.7
1				2	1	21.4	22.7	
1				5	1	21.4	22.8	
3				0	2	21.3	22.6	
3				1	2	21.3	22.6	
3	2	2		21.1	22.5			
6	0	2	20.4	21.6				

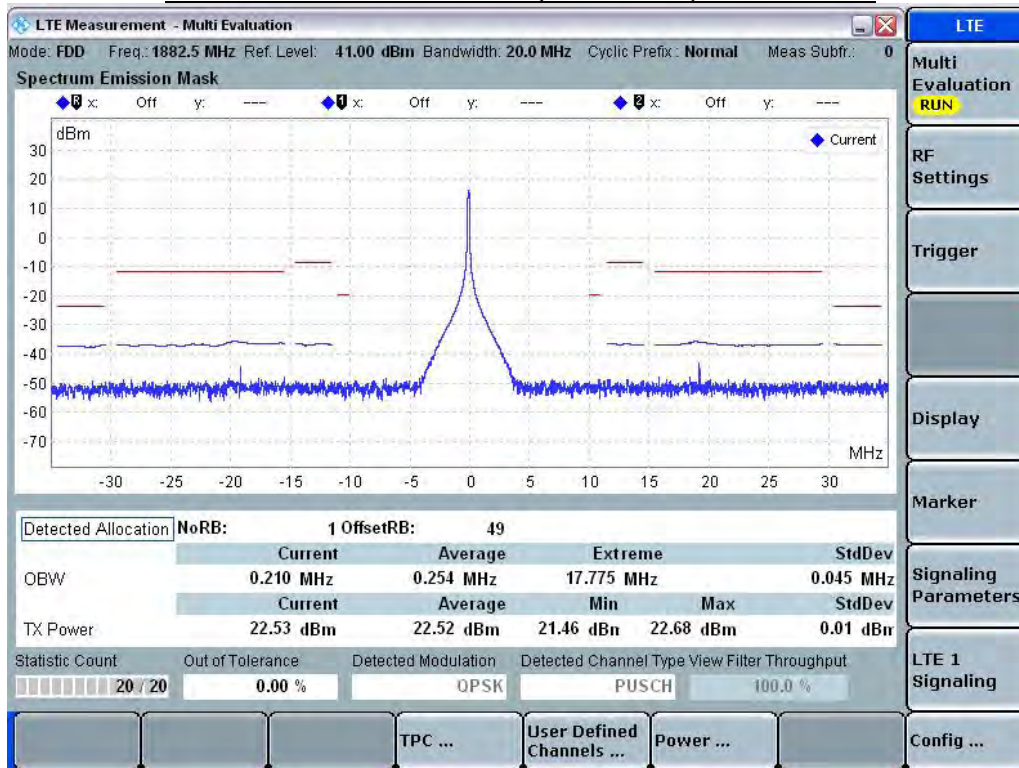
11.10.1. Spectrum Plots for the Test RB allocations

The following plots are to demonstrate the tested RB allocations have been established correctly at the maximum output power conditions.

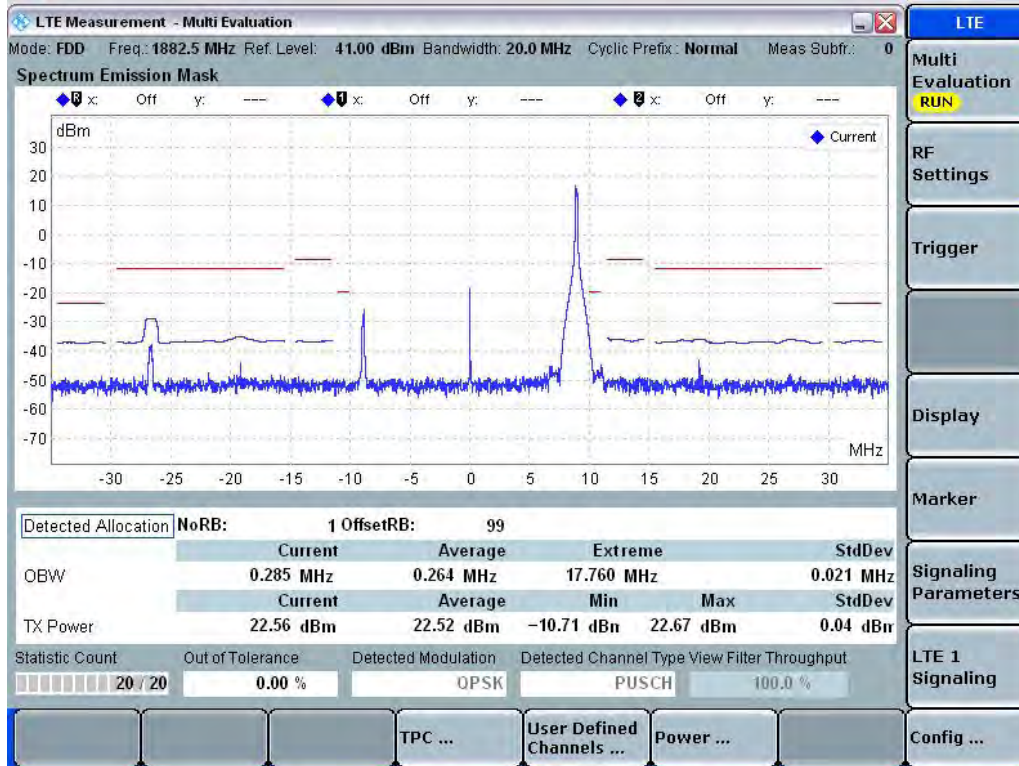
20MHz Band Width: Ch 26365, RB Size = 1; RB Offset = 0



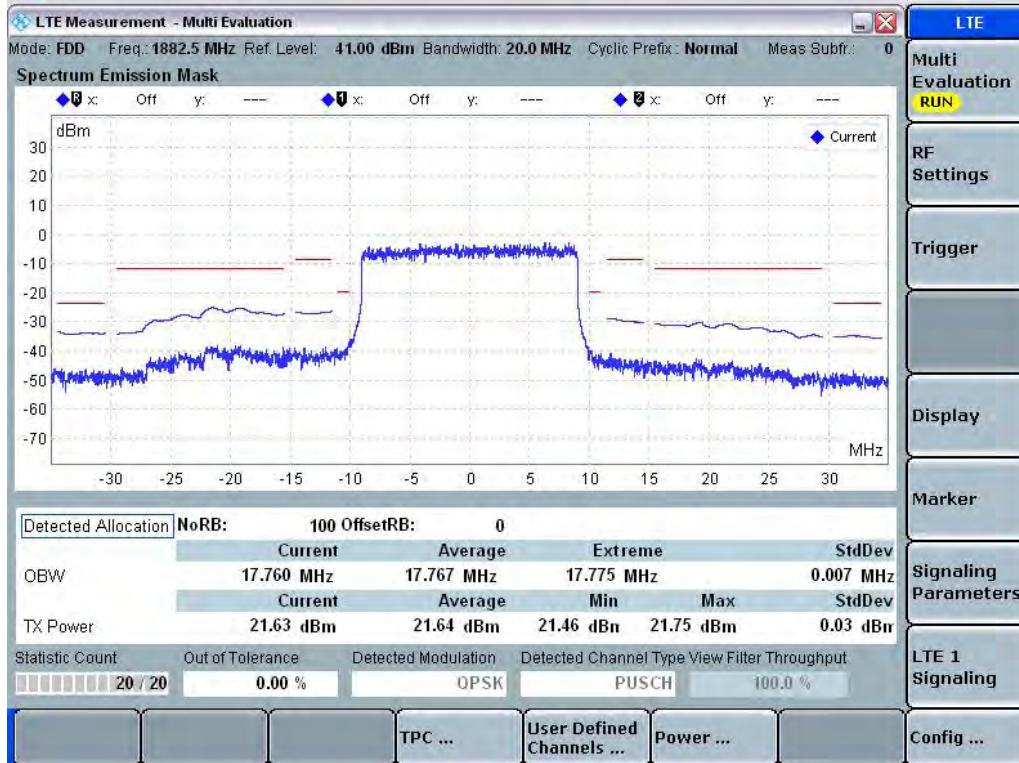
20MHz Band Width: Ch 26365, RB Size = 1; RB Offset = 49



20MHz Band Width: Ch 26365, RB Size = 1; RB Offset = 99



20MHz Band Width: Ch 26365, RB Size = 100; RB Offset = 0



11.11. WiFi (2.4 GHz Band)

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 $\frac{1}{4}$ dB \geq 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	16.0	
		6	2437	16.0	
		11	2462	16.0	
	802.11g	1	2412	16.0	
		6	2437	15.9	
		11	2462	15.5	
	802.11n (HT20)	1	2412	16.0	
		6	2437	16.0	
		11	2462	15.1	

Note(s):

- 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 802.11a/b channels. As per KDB 248227

11.12. WiFi (5 GHz Bands)

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		*	
	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.

Band (MHz)	Mode	Ch #	Freq. (MHz)	Avg Pwr (dBm)	Note	
5.2	802.11a	36	5180	14.0		
		40	5200	14.0		
		44	5220	14.0		
		48	5240	14.0		
	802.11n (HT20)	36	5180	14.0		
		40	5200	14.1		
		48	5240	14.1		
	802.11n (HT40)	38	5190	14.1		
		46	5230	14.0		
	5.3	802.11a	52	5260	13.5	
56			5280	13.5		
60			5300	13.5		
64			5320	13.5		
802.11n (HT20)		52	5260	13.5		
		60	5300	13.5		
		64	5320	13.5		
802.11n (HT40)		54	5270	13.5		
		62	5310	13.5		
5.5		802.11a	100	5500	12.0	
	104		5520	12.0		
	108		5540	12.0		
	112		5560	12.0		
	116		5580	12.0		
	120		5600	12.0		
	124		5620	12.0		
	128		5640	12.0		
	132		5660	12.0		
	136		5680	12.0		
	802.11n (HT20)	100	5500	12.0		
		120	5600	12.0		
		140	5700	12.1		
	802.11n (HT40)	102	5510	12.0		
		118	5590	12.0		
		134	5670	12.0		
	5.8	802.11a	149	5745	13.0	
			153	5765	13.0	
157			5785	13.0		
161			5805	13.0		
165			5825	13.0		
802.11n (HT20)		149	5745	13.0		
		157	5785	13.1		
		161	5805	13.0		
802.11n (HT40)		151	5755	13.0		
		159	5795	13.0		

Note(s):

- 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

11.13. Bluetooth

Mode	Channel #	Freq. (MHz)	Avg Pwr (dBm)
GFSK	0	2402	13.2
	39	2441	13.4
	78	2480	13.4
QPSK	0	2402	11.5
	39	2441	11.4
	78	2480	11.3
8-PSK	0	2402	11.4
	39	2441	11.3
	78	2480	11.3

12. 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

12.1. 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

MSL/HSL750 (Body and Head liquids for 700 – 800 MHz)

Item	Head Tissue Simulation Liquids HSL750 Muscle (body) Tissue Simulation Liquids MSL750
Type No	SL AAH 075
Manufacturer	SPEAG
The item is composed of the following ingredients:	
H ² O	Water, 35 – 58%
Sucrose	Sugar, white, refined, 40-60%
NaCl	Sodium Chloride, 0-6%
Hydroxyethyl-cellulose	Medium Viscosity (CAS# 9004-62-0), <0.3%
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone, 0.1-0.7%

MSL/HSL1750 (Body and Head liquids for 1700 – 1800 MHz)

Item	Head Tissue Simulation Liquids HSL1750 Muscle (body) Tissue Simulation Liquids MSL1750
Type No	SL AAM 175
Manufacturer	SPEAG
-The item is composed of the following ingredients:	
H ² O	Water, 52 – 75%
C8H18O3	Diethylene glycol monobutyl ether (DGBE), 25-48%
NaCl	Sodium Chloride, <1.0%

Simulating Liquids for 5 GHz, Manufactured by SPEAG

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

12.2. Tissue Dielectric Parameter Check Results

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 \pm (%)	
6/29/2012	Head 2450	e'	40.8931	Relative Permittivity (ϵ_r):	40.89	39.20	4.32	5
		e"	13.0407	Conductivity (σ):	1.78	1.80	-1.31	5
	Head 2410	e'	40.9916	Relative Permittivity (ϵ_r):	40.99	39.28	4.36	5
		e"	12.9011	Conductivity (σ):	1.73	1.76	-1.80	5
	Head 2435	e'	40.9188	Relative Permittivity (ϵ_r):	40.92	39.24	4.29	5
		e"	13.0764	Conductivity (σ):	1.77	1.78	-0.67	5
Head 2475	e'	40.7848	Relative Permittivity (ϵ_r):	40.78	39.17	4.13	5	
	e"	13.0943	Conductivity (σ):	1.80	1.83	-1.37	5	
6/29/2012	Head 1900	e'	41.0110	Relative Permittivity (ϵ_r):	41.01	40.00	2.53	5
		e"	13.3380	Conductivity (σ):	1.41	1.40	0.65	5
	Head 1850	e'	41.3162	Relative Permittivity (ϵ_r):	41.32	40.00	3.29	5
		e"	13.0132	Conductivity (σ):	1.34	1.40	-4.38	5
	Head 1880	e'	41.1793	Relative Permittivity (ϵ_r):	41.18	40.00	2.95	5
		e"	13.1892	Conductivity (σ):	1.38	1.40	-1.52	5
Head 1910	e'	41.0588	Relative Permittivity (ϵ_r):	41.06	40.00	2.65	5	
	e"	13.2213	Conductivity (σ):	1.40	1.40	0.29	5	
6/29/2012	Body 1900	e'	55.2885	Relative Permittivity (ϵ_r):	55.29	53.30	3.73	5
		e"	14.6172	Conductivity (σ):	1.54	1.52	1.60	5
	Body 1850	e'	55.4026	Relative Permittivity (ϵ_r):	55.40	53.30	3.94	5
		e"	14.6239	Conductivity (σ):	1.50	1.52	-1.03	5
	Body 1880	e'	55.5167	Relative Permittivity (ϵ_r):	55.52	53.30	4.16	5
		e"	14.7103	Conductivity (σ):	1.54	1.52	1.17	5
Body 1910	e'	55.1199	Relative Permittivity (ϵ_r):	55.12	53.30	3.41	5	
	e"	14.5804	Conductivity (σ):	1.55	1.52	1.87	5	
6/30/2012	Head 5180	e'	35.2605	Relative Permittivity (ϵ_r):	35.26	36.01	-2.09	10
		e"	16.6009	Conductivity (σ):	4.78	4.63	3.26	5
	Head 5200	e'	35.2291	Relative Permittivity (ϵ_r):	35.23	35.99	-2.11	10
		e"	16.6147	Conductivity (σ):	4.80	4.65	3.29	5
	Head 5500	e'	34.8319	Relative Permittivity (ϵ_r):	34.83	35.65	-2.29	10
		e"	16.7132	Conductivity (σ):	5.11	4.96	3.09	5
Head 5800	e'	34.2983	Relative Permittivity (ϵ_r):	34.30	35.30	-2.84	10	
	e"	16.7148	Conductivity (σ):	5.39	5.27	2.29	5	
Head 5825	e'	34.2205	Relative Permittivity (ϵ_r):	34.22	35.30	-3.06	10	
	e"	16.7950	Conductivity (σ):	5.44	5.27	3.22	5	
6/30/2012	Head 1900	e'	39.2042	Relative Permittivity (ϵ_r):	39.20	40.00	-1.99	5
		e"	13.5546	Conductivity (σ):	1.43	1.40	2.28	5
	Head 1850	e'	39.3626	Relative Permittivity (ϵ_r):	39.36	40.00	-1.59	5
		e"	13.3005	Conductivity (σ):	1.37	1.40	-2.27	5
	Head 1880	e'	39.2560	Relative Permittivity (ϵ_r):	39.26	40.00	-1.86	5
		e"	13.4367	Conductivity (σ):	1.40	1.40	0.33	5
Head 1910	e'	39.1600	Relative Permittivity (ϵ_r):	39.16	40.00	-2.10	5	
	e"	13.6235	Conductivity (σ):	1.45	1.40	3.35	5	

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
6/30/2012	Body 1900	e'	54.1515	Relative Permittivity (ϵ_r):	54.15	53.30	1.60	5
		e"	14.3384	Conductivity (σ):	1.51	1.52	-0.34	5
	Body 1850	e'	54.3166	Relative Permittivity (ϵ_r):	54.32	53.30	1.91	5
		e"	14.2002	Conductivity (σ):	1.46	1.52	-3.90	5
	Body 1880	e'	54.2154	Relative Permittivity (ϵ_r):	54.22	53.30	1.72	5
		e"	14.2856	Conductivity (σ):	1.49	1.52	-1.75	5
	Body 1910	e'	54.1209	Relative Permittivity (ϵ_r):	54.12	53.30	1.54	5
		e"	14.3652	Conductivity (σ):	1.53	1.52	0.37	5
7/1/2012	Head 5180	e'	34.4411	Relative Permittivity (ϵ_r):	34.44	36.01	-4.36	10
		e"	15.9040	Conductivity (σ):	4.58	4.63	-1.08	5
	Head 5200	e'	34.4106	Relative Permittivity (ϵ_r):	34.41	35.99	-4.39	10
		e"	15.9145	Conductivity (σ):	4.60	4.65	-1.06	5
	Head 5500	e'	33.9898	Relative Permittivity (ϵ_r):	33.99	35.65	-4.65	10
		e"	16.1117	Conductivity (σ):	4.93	4.96	-0.62	5
	Head 5800	e'	33.4793	Relative Permittivity (ϵ_r):	33.48	35.30	-5.16	10
		e"	16.1776	Conductivity (σ):	5.22	5.27	-1.00	5
	Head 5825	e'	33.4525	Relative Permittivity (ϵ_r):	33.45	35.30	-5.23	10
		e"	16.2853	Conductivity (σ):	5.27	5.27	0.09	5
7/1/2012	Head 835	e'	41.7505	Relative Permittivity (ϵ_r):	41.75	41.50	0.60	5
		e"	18.8960	Conductivity (σ):	0.88	0.90	-2.52	5
	Head 820	e'	41.9447	Relative Permittivity (ϵ_r):	41.94	41.60	0.82	5
		e"	18.9315	Conductivity (σ):	0.86	0.90	-3.93	5
	Head 850	e'	41.5556	Relative Permittivity (ϵ_r):	41.56	41.50	0.13	5
		e"	18.8650	Conductivity (σ):	0.89	0.92	-2.56	5
7/2/2012	Head 5180	e'	36.1786	Relative Permittivity (ϵ_r):	36.18	36.01	0.46	10
		e"	16.2787	Conductivity (σ):	4.69	4.63	1.26	5
	Head 5200	e'	36.1403	Relative Permittivity (ϵ_r):	36.14	35.99	0.42	10
		e"	16.2958	Conductivity (σ):	4.71	4.65	1.31	5
	Head 5500	e'	35.6595	Relative Permittivity (ϵ_r):	35.66	35.65	0.03	10
		e"	16.5088	Conductivity (σ):	5.05	4.96	1.83	5
	Head 5800	e'	35.1453	Relative Permittivity (ϵ_r):	35.15	35.30	-0.44	10
		e"	16.6796	Conductivity (σ):	5.38	5.27	2.07	5
	Head 5825	e'	35.1091	Relative Permittivity (ϵ_r):	35.11	35.30	-0.54	10
		e"	16.7210	Conductivity (σ):	5.42	5.27	2.77	5
7/2/2012	Head 1900	e'	39.2531	Relative Permittivity (ϵ_r):	39.25	40.00	-1.87	5
		e"	13.2651	Conductivity (σ):	1.40	1.40	0.10	5
	Head 1850	e'	39.4305	Relative Permittivity (ϵ_r):	39.43	40.00	-1.42	5
		e"	13.1430	Conductivity (σ):	1.35	1.40	-3.43	5
	Head 1880	e'	39.3447	Relative Permittivity (ϵ_r):	39.34	40.00	-1.64	5
		e"	13.2105	Conductivity (σ):	1.38	1.40	-1.36	5
	Head 1910	e'	39.2010	Relative Permittivity (ϵ_r):	39.20	40.00	-2.00	5
		e"	13.2651	Conductivity (σ):	1.41	1.40	0.63	5
7/2/2012	Head 835	e'	41.8449	Relative Permittivity (ϵ_r):	41.84	41.50	0.83	5
		e"	18.9148	Conductivity (σ):	0.88	0.90	-2.42	5
	Head 820	e'	42.0283	Relative Permittivity (ϵ_r):	42.03	41.60	1.02	5
		e"	18.9528	Conductivity (σ):	0.86	0.90	-3.82	5
	Head 850	e'	41.6714	Relative Permittivity (ϵ_r):	41.67	41.50	0.41	5
		e"	18.8773	Conductivity (σ):	0.89	0.92	-2.49	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)		
7/3/2012	Head 5180	e'	36.4527	Relative Permittivity (ϵ_r):	36.45	36.01	1.22	10	
		e"	16.4110	Conductivity (σ):	4.73	4.63	2.08	5	
	Head 5200	e'	36.4168	Relative Permittivity (ϵ_r):	36.42	35.99	1.19	10	
		e"	16.4389	Conductivity (σ):	4.75	4.65	2.20	5	
	Head 5500	e'	35.8959	Relative Permittivity (ϵ_r):	35.90	35.65	0.70	10	
		e"	16.6584	Conductivity (σ):	5.09	4.96	2.75	5	
	Head 5800	e'	35.3470	Relative Permittivity (ϵ_r):	35.35	35.30	0.13	10	
		e"	16.7550	Conductivity (σ):	5.40	5.27	2.53	5	
	Head 5825	e'	35.2642	Relative Permittivity (ϵ_r):	35.26	35.30	-0.10	10	
		e"	16.8451	Conductivity (σ):	5.46	5.27	3.53	5	
	7/5/2012	Head 5180	e'	36.4886	Relative Permittivity (ϵ_r):	36.49	36.01	1.32	10
			e"	16.4421	Conductivity (σ):	4.74	4.63	2.27	5
Head 5200		e'	36.2681	Relative Permittivity (ϵ_r):	36.27	35.99	0.77	10	
		e"	16.3980	Conductivity (σ):	4.74	4.65	1.94	5	
Head 5500		e'	35.7526	Relative Permittivity (ϵ_r):	35.75	35.65	0.29	10	
		e"	16.5613	Conductivity (σ):	5.06	4.96	2.15	5	
Head 5800		e'	35.3400	Relative Permittivity (ϵ_r):	35.34	35.30	0.11	10	
		e"	16.7897	Conductivity (σ):	5.41	5.27	2.74	5	
Head 5825		e'	35.3266	Relative Permittivity (ϵ_r):	35.33	35.30	0.08	10	
		e"	16.7108	Conductivity (σ):	5.41	5.27	2.70	5	
7/5/2012		Body 1900	e'	52.2170	Relative Permittivity (ϵ_r):	52.22	53.30	-2.03	5
			e"	14.4517	Conductivity (σ):	1.53	1.52	0.44	5
	Body 1850	e'	52.3767	Relative Permittivity (ϵ_r):	52.38	53.30	-1.73	5	
		e"	14.2899	Conductivity (σ):	1.47	1.52	-3.29	5	
	Body 1880	e'	52.2728	Relative Permittivity (ϵ_r):	52.27	53.30	-1.93	5	
		e"	14.3894	Conductivity (σ):	1.50	1.52	-1.04	5	
	Body 1910	e'	52.1881	Relative Permittivity (ϵ_r):	52.19	53.30	-2.09	5	
		e"	14.4852	Conductivity (σ):	1.54	1.52	1.21	5	
7/6/2012	Head 5180	e'	34.7875	Relative Permittivity (ϵ_r):	34.79	36.01	-3.40	10	
		e"	15.8037	Conductivity (σ):	4.55	4.63	-1.70	5	
	Head 5200	e'	34.7421	Relative Permittivity (ϵ_r):	34.74	35.99	-3.47	10	
		e"	15.8284	Conductivity (σ):	4.58	4.65	-1.60	5	
	Head 5500	e'	34.2187	Relative Permittivity (ϵ_r):	34.22	35.65	-4.01	10	
		e"	16.0439	Conductivity (σ):	4.91	4.96	-1.04	5	
	Head 5800	e'	33.7208	Relative Permittivity (ϵ_r):	33.72	35.30	-4.47	10	
		e"	16.3841	Conductivity (σ):	5.28	5.27	0.26	5	
	Head 5825	e'	33.6595	Relative Permittivity (ϵ_r):	33.66	35.30	-4.65	10	
		e"	16.2668	Conductivity (σ):	5.27	5.27	-0.03	5	
	7/6/2012	Body 2450	e'	51.3080	Relative Permittivity (ϵ_r):	51.31	52.70	-2.64	5
			e"	14.0460	Conductivity (σ):	1.91	1.95	-1.87	5
Body 2410		e'	51.4573	Relative Permittivity (ϵ_r):	51.46	52.76	-2.47	5	
		e"	13.9574	Conductivity (σ):	1.87	1.91	-1.95	5	
Body 2435		e'	51.4212	Relative Permittivity (ϵ_r):	51.42	52.73	-2.48	5	
		e"	14.0899	Conductivity (σ):	1.91	1.93	-1.21	5	
Body 2475		e'	51.2627	Relative Permittivity (ϵ_r):	51.26	52.67	-2.67	5	
		e"	14.2122	Conductivity (σ):	1.96	1.99	-1.48	5	

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
7/6/2012	Body 1900	e'	51.8001	Relative Permittivity (ϵ_r):	51.80	53.30	-2.81	5
		e"	14.6179	Conductivity (σ):	1.54	1.52	1.60	5
	Body 1850	e'	51.9604	Relative Permittivity (ϵ_r):	51.96	53.30	-2.51	5
		e"	14.4339	Conductivity (σ):	1.48	1.52	-2.32	5
	Body 1880	e'	51.8616	Relative Permittivity (ϵ_r):	51.86	53.30	-2.70	5
		e"	14.5410	Conductivity (σ):	1.52	1.52	0.00	5
	Body 1910	e'	51.7704	Relative Permittivity (ϵ_r):	51.77	53.30	-2.87	5
		e"	14.6511	Conductivity (σ):	1.56	1.52	2.37	5
7/6/2012	Body 835	e'	53.6621	Relative Permittivity (ϵ_r):	53.66	55.20	-2.79	5
		e"	21.0699	Conductivity (σ):	0.98	0.97	0.85	5
	Body 820	e'	53.8933	Relative Permittivity (ϵ_r):	53.89	55.28	-2.50	5
		e"	21.0466	Conductivity (σ):	0.96	0.97	-0.91	5
	Body 850	e'	53.4076	Relative Permittivity (ϵ_r):	53.41	55.16	-3.17	5
		e"	20.9777	Conductivity (σ):	0.99	0.99	0.44	5
7/7/2012	Body 5180	e'	46.8993	Relative Permittivity (ϵ_r):	46.90	49.05	-4.38	10
		e"	18.3928	Conductivity (σ):	5.30	5.27	0.50	5
	Body 5200	e'	46.8565	Relative Permittivity (ϵ_r):	46.86	49.02	-4.41	10
		e"	18.4235	Conductivity (σ):	5.33	5.29	0.61	5
	Body 5500	e'	46.3192	Relative Permittivity (ϵ_r):	46.32	48.61	-4.72	10
		e"	18.7748	Conductivity (σ):	5.74	5.64	1.72	5
	Body 5800	e'	45.7813	Relative Permittivity (ϵ_r):	45.78	48.20	-5.02	10
		e"	18.9686	Conductivity (σ):	6.12	6.00	1.96	5
	Body 5825	e'	45.6835	Relative Permittivity (ϵ_r):	45.68	48.20	-5.22	10
		e"	19.0725	Conductivity (σ):	6.18	6.00	2.96	5
7/7/2012	Body 1900	e'	51.6299	Relative Permittivity (ϵ_r):	51.63	53.30	-3.13	5
		e"	14.3579	Conductivity (σ):	1.52	1.52	-0.21	5
	Body 1850	e'	51.7881	Relative Permittivity (ϵ_r):	51.79	53.30	-2.84	5
		e"	14.1758	Conductivity (σ):	1.46	1.52	-4.07	5
	Body 1880	e'	51.6919	Relative Permittivity (ϵ_r):	51.69	53.30	-3.02	5
		e"	14.2790	Conductivity (σ):	1.49	1.52	-1.80	5
	Body 1910	e'	51.5989	Relative Permittivity (ϵ_r):	51.60	53.30	-3.19	5
		e"	14.3917	Conductivity (σ):	1.53	1.52	0.55	5
7/7/2012	Body 835	e'	53.8412	Relative Permittivity (ϵ_r):	53.84	55.20	-2.46	5
		e"	21.0298	Conductivity (σ):	0.98	0.97	0.66	5
	Body 820	e'	54.2897	Relative Permittivity (ϵ_r):	54.29	55.28	-1.79	5
		e"	21.0310	Conductivity (σ):	0.96	0.97	-0.99	5
	Body 850	e'	53.7331	Relative Permittivity (ϵ_r):	53.73	55.16	-2.58	5
		e"	20.8625	Conductivity (σ):	0.99	0.99	-0.11	5
7/9/2012	Body 5180	e'	47.0223	Relative Permittivity (ϵ_r):	47.02	49.05	-4.13	10
		e"	18.6997	Conductivity (σ):	5.39	5.27	2.17	5
	Body 5200	e'	46.9868	Relative Permittivity (ϵ_r):	46.99	49.02	-4.15	10
		e"	18.6495	Conductivity (σ):	5.39	5.29	1.84	5
	Body 5500	e'	46.6935	Relative Permittivity (ϵ_r):	46.69	48.61	-3.95	10
		e"	18.9707	Conductivity (σ):	5.80	5.64	2.78	5
	Body 5800	e'	46.1300	Relative Permittivity (ϵ_r):	46.13	48.20	-4.29	10
		e"	19.1791	Conductivity (σ):	6.19	6.00	3.09	5
	Body 5825	e'	46.0501	Relative Permittivity (ϵ_r):	46.05	48.20	-4.46	10
		e"	19.1351	Conductivity (σ):	6.20	6.00	3.29	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)		
7/9/2012	Body 1900	e'	53.3530	Relative Permittivity (ϵ_r):	53.35	53.30	0.10	5	
		e"	14.8188	Conductivity (σ):	1.57	1.52	3.00	5	
	Body 1850	e'	53.5410	Relative Permittivity (ϵ_r):	53.54	53.30	0.45	5	
		e"	14.6084	Conductivity (σ):	1.50	1.52	-1.14	5	
	Body 1880	e'	53.4266	Relative Permittivity (ϵ_r):	53.43	53.30	0.24	5	
		e"	14.7401	Conductivity (σ):	1.54	1.52	1.37	5	
	Body 1910	e'	53.3140	Relative Permittivity (ϵ_r):	53.31	53.30	0.03	5	
		e"	14.8602	Conductivity (σ):	1.58	1.52	3.83	5	
7/9/2012	Body 835	e'	53.6576	Relative Permittivity (ϵ_r):	53.66	55.20	-2.79	5	
		e"	21.2320	Conductivity (σ):	0.99	0.97	1.63	5	
	Body 820	e'	53.7186	Relative Permittivity (ϵ_r):	53.72	55.28	-2.82	5	
		e"	21.4775	Conductivity (σ):	0.98	0.97	1.11	5	
	Body 850	e'	53.3152	Relative Permittivity (ϵ_r):	53.32	55.16	-3.34	5	
		e"	21.3031	Conductivity (σ):	1.01	0.99	2.00	5	
7/10/2012	Body 5180	e'	46.9511	Relative Permittivity (ϵ_r):	46.95	49.05	-4.27	10	
		e"	18.5078	Conductivity (σ):	5.33	5.27	1.13	5	
	Body 5200	e'	46.9128	Relative Permittivity (ϵ_r):	46.91	49.02	-4.30	10	
		e"	18.5223	Conductivity (σ):	5.36	5.29	1.15	5	
	Body 5500	e'	46.5132	Relative Permittivity (ϵ_r):	46.51	48.61	-4.32	10	
		e"	18.6756	Conductivity (σ):	5.71	5.64	1.18	5	
	Body 5800	e'	46.2064	Relative Permittivity (ϵ_r):	46.21	48.20	-4.14	10	
		e"	18.8168	Conductivity (σ):	6.07	6.00	1.14	5	
	Body 5825	e'	46.1880	Relative Permittivity (ϵ_r):	46.19	48.20	-4.17	10	
		e"	18.8916	Conductivity (σ):	6.12	6.00	1.98	5	
	7/10/2012	Body 835	e'	53.2299	Relative Permittivity (ϵ_r):	53.23	55.20	-3.57	5
			e"	21.1431	Conductivity (σ):	0.98	0.97	1.20	5
Body 820		e'	53.5843	Relative Permittivity (ϵ_r):	53.58	55.28	-3.06	5	
		e"	21.2138	Conductivity (σ):	0.97	0.97	-0.13	5	
Body 850		e'	53.3838	Relative Permittivity (ϵ_r):	53.38	55.16	-3.22	5	
		e"	21.0824	Conductivity (σ):	1.00	0.99	0.94	5	
7/11/2012	Body 5180	e'	47.5637	Relative Permittivity (ϵ_r):	47.56	49.05	-3.02	10	
		e"	18.5860	Conductivity (σ):	5.35	5.27	1.55	5	
	Body 5200	e'	47.5772	Relative Permittivity (ϵ_r):	47.58	49.02	-2.94	10	
		e"	18.6484	Conductivity (σ):	5.39	5.29	1.84	5	
	Body 5500	e'	47.0213	Relative Permittivity (ϵ_r):	47.02	48.61	-3.27	10	
		e"	18.9459	Conductivity (σ):	5.79	5.64	2.65	5	
	Body 5800	e'	46.4162	Relative Permittivity (ϵ_r):	46.42	48.20	-3.70	10	
		e"	19.2567	Conductivity (σ):	6.21	6.00	3.50	5	
	Body 5825	e'	46.5485	Relative Permittivity (ϵ_r):	46.55	48.20	-3.43	10	
		e"	19.1918	Conductivity (σ):	6.22	6.00	3.60	5	
7/11/2012	Body 1900	e'	51.9653	Relative Permittivity (ϵ_r):	51.97	53.30	-2.50	5	
		e"	14.4999	Conductivity (σ):	1.53	1.52	0.78	5	
	Body 1850	e'	52.1734	Relative Permittivity (ϵ_r):	52.17	53.30	-2.11	5	
		e"	14.4177	Conductivity (σ):	1.48	1.52	-2.43	5	
	Body 1880	e'	52.0529	Relative Permittivity (ϵ_r):	52.05	53.30	-2.34	5	
		e"	14.5298	Conductivity (σ):	1.52	1.52	-0.08	5	
	Body 1910	e'	51.9980	Relative Permittivity (ϵ_r):	52.00	53.30	-2.44	5	
		e"	14.6238	Conductivity (σ):	1.55	1.52	2.18	5	

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)		
7/11/2012	Body 835	e'	54.5420	Relative Permittivity (ϵ_r):	54.54	55.20	-1.19	5	
		e"	21.2184	Conductivity (σ):	0.99	0.97	1.56	5	
	Body 820	e'	54.5850	Relative Permittivity (ϵ_r):	54.59	55.28	-1.25	5	
		e"	21.3921	Conductivity (σ):	0.98	0.97	0.71	5	
	Body 850	e'	54.3487	Relative Permittivity (ϵ_r):	54.35	55.16	-1.47	5	
		e"	21.2217	Conductivity (σ):	1.00	0.99	1.61	5	
7/12/2012	Body 5180	e'	47.0655	Relative Permittivity (ϵ_r):	47.07	49.05	-4.04	10	
		e"	18.7655	Conductivity (σ):	5.40	5.27	2.53	5	
	Body 5200	e'	46.9173	Relative Permittivity (ϵ_r):	46.92	49.02	-4.29	10	
		e"	18.7318	Conductivity (σ):	5.42	5.29	2.29	5	
	Body 5500	e'	46.5570	Relative Permittivity (ϵ_r):	46.56	48.61	-4.23	10	
		e"	19.0281	Conductivity (σ):	5.82	5.64	3.09	5	
	Body 5800	e'	45.9404	Relative Permittivity (ϵ_r):	45.94	48.20	-4.69	10	
		e"	19.1547	Conductivity (σ):	6.18	6.00	2.96	5	
	Body 5825	e'	45.8810	Relative Permittivity (ϵ_r):	45.88	48.20	-4.81	10	
		e"	19.1259	Conductivity (σ):	6.19	6.00	3.24	5	
	7/12/2012	Body 1900	e'	51.6742	Relative Permittivity (ϵ_r):	51.67	53.30	-3.05	5
			e"	14.5360	Conductivity (σ):	1.54	1.52	1.03	5
Body 1850		e'	51.8163	Relative Permittivity (ϵ_r):	51.82	53.30	-2.78	5	
		e"	14.4853	Conductivity (σ):	1.49	1.52	-1.97	5	
Body 1880		e'	51.7452	Relative Permittivity (ϵ_r):	51.75	53.30	-2.92	5	
		e"	14.5619	Conductivity (σ):	1.52	1.52	0.15	5	
Body 1910		e'	51.5770	Relative Permittivity (ϵ_r):	51.58	53.30	-3.23	5	
		e"	14.6556	Conductivity (σ):	1.56	1.52	2.40	5	
7/12/2012	Body 835	e'	53.8651	Relative Permittivity (ϵ_r):	53.87	55.20	-2.42	5	
		e"	21.5567	Conductivity (σ):	1.00	0.97	3.18	5	
	Body 820	e'	54.0220	Relative Permittivity (ϵ_r):	54.02	55.28	-2.27	5	
		e"	21.6085	Conductivity (σ):	0.99	0.97	1.73	5	
	Body 850	e'	53.7014	Relative Permittivity (ϵ_r):	53.70	55.16	-2.64	5	
		e"	21.5051	Conductivity (σ):	1.02	0.99	2.96	5	
7/12/2012	Head 835	e'	41.7107	Relative Permittivity (ϵ_r):	41.71	41.50	0.51	5	
		e"	19.2612	Conductivity (σ):	0.89	0.90	-0.64	5	
	Head 820	e'	41.8973	Relative Permittivity (ϵ_r):	41.90	41.60	0.71	5	
		e"	19.2921	Conductivity (σ):	0.88	0.90	-2.10	5	
	Head 850	e'	41.5258	Relative Permittivity (ϵ_r):	41.53	41.50	0.06	5	
		e"	19.2281	Conductivity (σ):	0.91	0.92	-0.68	5	
7/13/2012	Body 5180	e'	46.8756	Relative Permittivity (ϵ_r):	46.88	49.05	-4.43	10	
		e"	18.4167	Conductivity (σ):	5.30	5.27	0.63	5	
	Body 5200	e'	47.8411	Relative Permittivity (ϵ_r):	47.84	49.02	-2.40	10	
		e"	18.4330	Conductivity (σ):	5.33	5.29	0.66	5	
	Body 5500	e'	46.3541	Relative Permittivity (ϵ_r):	46.35	48.61	-4.65	10	
		e"	18.7324	Conductivity (σ):	5.73	5.64	1.49	5	
	Body 5800	e'	45.7370	Relative Permittivity (ϵ_r):	45.74	48.20	-5.11	10	
		e"	18.7974	Conductivity (σ):	6.06	6.00	1.04	5	
	Body 5825	e'	45.6217	Relative Permittivity (ϵ_r):	45.62	48.20	-5.35	10	
		e"	19.0454	Conductivity (σ):	6.17	6.00	2.81	5	

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
7/13/2012	Body 1900	e'	52.8270	Relative Permittivity (ϵ_r):	52.83	53.30	-0.89	5
		e"	14.7873	Conductivity (σ):	1.56	1.52	2.78	5
	Body 1850	e'	52.9849	Relative Permittivity (ϵ_r):	52.98	53.30	-0.59	5
		e"	14.6163	Conductivity (σ):	1.50	1.52	-1.08	5
	Body 1880	e'	52.8372	Relative Permittivity (ϵ_r):	52.84	53.30	-0.87	5
		e"	14.7311	Conductivity (σ):	1.54	1.52	1.31	5
	Body 1910	e'	52.7446	Relative Permittivity (ϵ_r):	52.74	53.30	-1.04	5
		e"	14.8822	Conductivity (σ):	1.58	1.52	3.98	5
7/13/2012	Body 835	e'	53.4777	Relative Permittivity (ϵ_r):	53.48	55.20	-3.12	5
		e"	21.1748	Conductivity (σ):	0.98	0.97	1.35	5
	Body 820	e'	53.6049	Relative Permittivity (ϵ_r):	53.60	55.28	-3.02	5
		e"	21.2192	Conductivity (σ):	0.97	0.97	-0.10	5
	Body 850	e'	53.3345	Relative Permittivity (ϵ_r):	53.33	55.16	-3.30	5
		e"	21.1277	Conductivity (σ):	1.00	0.99	1.16	5
7/13/2012	Head 835	e'	42.7329	Relative Permittivity (ϵ_r):	42.73	41.50	2.97	5
		e"	19.3129	Conductivity (σ):	0.90	0.90	-0.37	5
	Head 820	e'	42.9322	Relative Permittivity (ϵ_r):	42.93	41.60	3.20	5
		e"	19.2468	Conductivity (σ):	0.88	0.90	-2.33	5
	Head 850	e'	42.4951	Relative Permittivity (ϵ_r):	42.50	41.50	2.40	5
		e"	19.2747	Conductivity (σ):	0.91	0.92	-0.44	5
7/14/2012	Body 5180	e'	47.9220	Relative Permittivity (ϵ_r):	47.92	49.05	-2.29	10
		e"	18.3873	Conductivity (σ):	5.30	5.27	0.47	5
	Body 5200	e'	47.9517	Relative Permittivity (ϵ_r):	47.95	49.02	-2.18	10
		e"	18.3903	Conductivity (σ):	5.32	5.29	0.43	5
	Body 5500	e'	47.4587	Relative Permittivity (ϵ_r):	47.46	48.61	-2.37	10
		e"	18.5858	Conductivity (σ):	5.68	5.64	0.70	5
	Body 5800	e'	46.9788	Relative Permittivity (ϵ_r):	46.98	48.20	-2.53	10
		e"	18.7370	Conductivity (σ):	6.04	6.00	0.71	5
	Body 5825	e'	46.9224	Relative Permittivity (ϵ_r):	46.92	48.20	-2.65	10
		e"	18.7933	Conductivity (σ):	6.09	6.00	1.45	5
7/14/2012	Body 1900	e'	51.3966	Relative Permittivity (ϵ_r):	51.40	53.30	-3.57	5
		e"	14.5129	Conductivity (σ):	1.53	1.52	0.87	5
	Body 1850	e'	51.5738	Relative Permittivity (ϵ_r):	51.57	53.30	-3.24	5
		e"	14.3402	Conductivity (σ):	1.48	1.52	-2.95	5
	Body 1880	e'	51.4703	Relative Permittivity (ϵ_r):	51.47	53.30	-3.43	5
		e"	14.4490	Conductivity (σ):	1.51	1.52	-0.63	5
	Body 1910	e'	51.3630	Relative Permittivity (ϵ_r):	51.36	53.30	-3.63	5
		e"	14.5455	Conductivity (σ):	1.54	1.52	1.63	5
7/16/2012	Body 5180	e'	47.3526	Relative Permittivity (ϵ_r):	47.35	49.05	-3.45	10
		e"	18.4748	Conductivity (σ):	5.32	5.27	0.94	5
	Body 5200	e'	47.4850	Relative Permittivity (ϵ_r):	47.49	49.02	-3.13	10
		e"	18.4583	Conductivity (σ):	5.34	5.29	0.80	5
	Body 5500	e'	46.9562	Relative Permittivity (ϵ_r):	46.96	48.61	-3.41	10
		e"	18.9231	Conductivity (σ):	5.79	5.64	2.53	5
	Body 5800	e'	46.4805	Relative Permittivity (ϵ_r):	46.48	48.20	-3.57	10
		e"	18.8261	Conductivity (σ):	6.07	6.00	1.19	5
	Body 5825	e'	46.6166	Relative Permittivity (ϵ_r):	46.62	48.20	-3.29	10
		e"	19.0895	Conductivity (σ):	6.18	6.00	3.05	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
7/16/2012	Body 1900	e'	51.7524	Relative Permittivity (ϵ_r):	51.75	53.30	-2.90	5
		e"	14.3496	Conductivity (σ):	1.52	1.52	-0.26	5
	Body 1850	e'	50.9397	Relative Permittivity (ϵ_r):	50.94	53.30	-4.43	5
		e"	14.2607	Conductivity (σ):	1.47	1.52	-3.49	5
	Body 1880	e'	51.8856	Relative Permittivity (ϵ_r):	51.89	53.30	-2.65	5
		e"	14.2334	Conductivity (σ):	1.49	1.52	-2.11	5
Body 1910	e'	51.7208	Relative Permittivity (ϵ_r):	51.72	53.30	-2.96	5	
	e"	14.4168	Conductivity (σ):	1.53	1.52	0.73	5	
7/16/2012	Head 1900	e'	39.1330	Relative Permittivity (ϵ_r):	39.13	40.00	-2.17	5
		e"	13.4467	Conductivity (σ):	1.42	1.40	1.47	5
	Head 1850	e'	39.2761	Relative Permittivity (ϵ_r):	39.28	40.00	-1.81	5
		e"	13.2970	Conductivity (σ):	1.37	1.40	-2.30	5
	Head 1880	e'	39.2397	Relative Permittivity (ϵ_r):	39.24	40.00	-1.90	5
		e"	13.3628	Conductivity (σ):	1.40	1.40	-0.22	5
Head 1910	e'	39.0513	Relative Permittivity (ϵ_r):	39.05	40.00	-2.37	5	
	e"	13.4095	Conductivity (σ):	1.42	1.40	1.72	5	
7/16/2012	Body 1720	e'	53.4285	Relative Permittivity (ϵ_r):	53.43	53.52	-0.17	5
		e"	15.1799	Conductivity (σ):	1.45	1.47	-1.09	5
	Body 1735	e'	53.3807	Relative Permittivity (ϵ_r):	53.38	53.48	-0.18	5
		e"	15.2247	Conductivity (σ):	1.47	1.48	-0.55	5
	Body 1750	e'	53.3223	Relative Permittivity (ϵ_r):	53.32	53.44	-0.22	5
		e"	15.2663	Conductivity (σ):	1.49	1.49	-0.04	5
7/17/2012	Body 5180	e'	47.3567	Relative Permittivity (ϵ_r):	47.36	49.05	-3.45	10
		e"	17.9394	Conductivity (σ):	5.17	5.27	-1.98	5
	Body 5200	e'	47.3372	Relative Permittivity (ϵ_r):	47.34	49.02	-3.43	10
		e"	17.8324	Conductivity (σ):	5.16	5.29	-2.62	5
	Body 5500	e'	46.7991	Relative Permittivity (ϵ_r):	46.80	48.61	-3.73	10
		e"	18.3526	Conductivity (σ):	5.61	5.64	-0.57	5
Body 5800	e'	46.4243	Relative Permittivity (ϵ_r):	46.42	48.20	-3.68	10	
	e"	18.3622	Conductivity (σ):	5.92	6.00	-1.30	5	
Body 5825	e'	46.4077	Relative Permittivity (ϵ_r):	46.41	48.20	-3.72	10	
	e"	18.5267	Conductivity (σ):	6.00	6.00	0.01	5	
7/17/2012	Body 1900	e'	51.7429	Relative Permittivity (ϵ_r):	51.74	53.30	-2.92	5
		e"	14.8231	Conductivity (σ):	1.57	1.52	3.03	5
	Body 1850	e'	51.9596	Relative Permittivity (ϵ_r):	51.96	53.30	-2.51	5
		e"	14.6678	Conductivity (σ):	1.51	1.52	-0.74	5
	Body 1880	e'	51.9065	Relative Permittivity (ϵ_r):	51.91	53.30	-2.61	5
		e"	14.6623	Conductivity (σ):	1.53	1.52	0.84	5
Body 1910	e'	51.6252	Relative Permittivity (ϵ_r):	51.63	53.30	-3.14	5	
	e"	14.8538	Conductivity (σ):	1.58	1.52	3.78	5	
7/17/2012	Body 1720	e'	52.8752	Relative Permittivity (ϵ_r):	52.88	53.52	-1.20	5
		e"	15.2066	Conductivity (σ):	1.45	1.47	-0.91	5
	Body 1735	e'	52.8116	Relative Permittivity (ϵ_r):	52.81	53.48	-1.25	5
		e"	15.3012	Conductivity (σ):	1.48	1.48	-0.05	5
	Body 1750	e'	52.8369	Relative Permittivity (ϵ_r):	52.84	53.44	-1.13	5
		e"	15.3540	Conductivity (σ):	1.49	1.49	0.53	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
7/18/2012	Body 5180	e'	47.2736	Relative Permittivity (ϵ_r):	47.27	49.05	-3.62	10
		e"	18.5759	Conductivity (σ):	5.35	5.27	1.50	5
	Body 5200	e'	47.2379	Relative Permittivity (ϵ_r):	47.24	49.02	-3.63	10
		e"	18.6283	Conductivity (σ):	5.39	5.29	1.73	5
	Body 5500	e'	46.6131	Relative Permittivity (ϵ_r):	46.61	48.61	-4.11	10
		e"	18.7934	Conductivity (σ):	5.75	5.64	1.82	5
	Body 5800	e'	46.2638	Relative Permittivity (ϵ_r):	46.26	48.20	-4.02	10
		e"	19.2104	Conductivity (σ):	6.20	6.00	3.26	5
	Body 5825	e'	46.0392	Relative Permittivity (ϵ_r):	46.04	48.20	-4.48	10
		e"	19.1001	Conductivity (σ):	6.19	6.00	3.10	5
7/18/2012	Body 750	e'	54.8999	Relative Permittivity (ϵ_r):	54.90	55.55	-1.16	5
		e"	22.6725	Conductivity (σ):	0.95	0.96	-1.83	5
	Body 775	e'	54.5257	Relative Permittivity (ϵ_r):	54.53	55.45	-1.67	5
		e"	22.5619	Conductivity (σ):	0.97	0.97	0.75	5
	Body 790	e'	54.4638	Relative Permittivity (ϵ_r):	54.46	55.39	-1.68	5
		e"	22.5924	Conductivity (σ):	0.99	0.97	2.72	5
7/18/2012	Body 1720	e'	51.3984	Relative Permittivity (ϵ_r):	51.40	53.52	-3.96	5
		e"	14.9759	Conductivity (σ):	1.43	1.47	-2.41	5
	Body 1735	e'	51.4512	Relative Permittivity (ϵ_r):	51.45	53.48	-3.79	5
		e"	15.0312	Conductivity (σ):	1.45	1.48	-1.82	5
	Body 1750	e'	51.4020	Relative Permittivity (ϵ_r):	51.40	53.44	-3.82	5
		e"	15.1099	Conductivity (σ):	1.47	1.49	-1.07	5
7/19/2012	Body 5180	e'	47.1440	Relative Permittivity (ϵ_r):	47.14	49.05	-3.88	10
		e"	18.1904	Conductivity (σ):	5.24	5.27	-0.61	5
	Body 5200	e'	47.0591	Relative Permittivity (ϵ_r):	47.06	49.02	-4.00	10
		e"	18.1745	Conductivity (σ):	5.25	5.29	-0.75	5
	Body 5500	e'	46.5651	Relative Permittivity (ϵ_r):	46.57	48.61	-4.21	10
		e"	18.2421	Conductivity (σ):	5.58	5.64	-1.16	5
	Body 5800	e'	46.0391	Relative Permittivity (ϵ_r):	46.04	48.20	-4.48	10
		e"	18.3545	Conductivity (σ):	5.92	6.00	-1.35	5
	Body 5825	e'	45.9769	Relative Permittivity (ϵ_r):	45.98	48.20	-4.61	10
		e"	18.2442	Conductivity (σ):	5.91	6.00	-1.52	5
7/19/2012	Head 5180	e'	34.9690	Relative Permittivity (ϵ_r):	34.97	36.01	-2.90	10
		e"	16.7014	Conductivity (σ):	4.81	4.63	3.88	5
	Head 5200	e'	34.9740	Relative Permittivity (ϵ_r):	34.97	35.99	-2.82	10
		e"	16.6710	Conductivity (σ):	4.82	4.65	3.64	5
	Head 5500	e'	34.5260	Relative Permittivity (ϵ_r):	34.53	35.65	-3.15	10
		e"	16.6398	Conductivity (σ):	5.09	4.96	2.64	5
	Head 5800	e'	34.0587	Relative Permittivity (ϵ_r):	34.06	35.30	-3.52	10
		e"	16.4851	Conductivity (σ):	5.32	5.27	0.88	5
	Head 5825	e'	34.0667	Relative Permittivity (ϵ_r):	34.07	35.30	-3.49	10
		e"	16.5155	Conductivity (σ):	5.35	5.27	1.50	5
7/19/2012	Body 750	e'	55.8444	Relative Permittivity (ϵ_r):	55.84	55.55	0.54	5
		e"	23.1293	Conductivity (σ):	0.96	0.96	0.15	5
	Body 775	e'	55.4399	Relative Permittivity (ϵ_r):	55.44	55.45	-0.02	5
		e"	22.8895	Conductivity (σ):	0.99	0.97	2.21	5
	Body 790	e'	55.3557	Relative Permittivity (ϵ_r):	55.36	55.39	-0.07	5
		e"	22.7562	Conductivity (σ):	1.00	0.97	3.46	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
7/19/2012	Body 1720	e'	52.3932	Relative Permittivity (ϵ_r):	52.39	53.52	-2.10	5
		e"	14.8357	Conductivity (σ):	1.42	1.47	-3.33	5
	Body 1735	e'	52.4420	Relative Permittivity (ϵ_r):	52.44	53.48	-1.94	5
		e"	14.9085	Conductivity (σ):	1.44	1.48	-2.62	5
	Body 1750	e'	52.3705	Relative Permittivity (ϵ_r):	52.37	53.44	-2.00	5
		e"	14.8846	Conductivity (σ):	1.45	1.49	-2.54	5
7/20/2012	Head 5180	e'	35.1053	Relative Permittivity (ϵ_r):	35.11	36.01	-2.52	10
		e"	16.6219	Conductivity (σ):	4.79	4.63	3.39	5
	Head 5200	e'	35.0766	Relative Permittivity (ϵ_r):	35.08	35.99	-2.54	10
		e"	16.5836	Conductivity (σ):	4.79	4.65	3.09	5
	Head 5500	e'	34.6390	Relative Permittivity (ϵ_r):	34.64	35.65	-2.83	10
		e"	16.5476	Conductivity (σ):	5.06	4.96	2.07	5
	Head 5800	e'	34.1316	Relative Permittivity (ϵ_r):	34.13	35.30	-3.31	10
		e"	16.5480	Conductivity (σ):	5.34	5.27	1.27	5
	Head 5825	e'	34.1034	Relative Permittivity (ϵ_r):	34.10	35.30	-3.39	10
		e"	16.4829	Conductivity (σ):	5.34	5.27	1.30	5
7/20/2012	Body 750	e'	54.5097	Relative Permittivity (ϵ_r):	54.51	55.55	-1.87	5
		e"	22.5651	Conductivity (σ):	0.94	0.96	-2.29	5
	Body 775	e'	54.0569	Relative Permittivity (ϵ_r):	54.06	55.45	-2.51	5
		e"	22.5221	Conductivity (σ):	0.97	0.97	0.57	5
	Body 790	e'	53.9597	Relative Permittivity (ϵ_r):	53.96	55.39	-2.59	5
		e"	22.3504	Conductivity (σ):	0.98	0.97	1.62	5
7/20/2012	Body 1720	e'	51.8330	Relative Permittivity (ϵ_r):	51.83	53.52	-3.15	5
		e"	14.9359	Conductivity (σ):	1.43	1.47	-2.68	5
	Body 1735	e'	51.8740	Relative Permittivity (ϵ_r):	51.87	53.48	-3.00	5
		e"	14.9833	Conductivity (σ):	1.45	1.48	-2.13	5
	Body 1750	e'	51.7335	Relative Permittivity (ϵ_r):	51.73	53.44	-3.20	5
		e"	15.0035	Conductivity (σ):	1.46	1.49	-1.77	5
7/21/2012	Head 5180	e'	35.0861	Relative Permittivity (ϵ_r):	35.09	36.01	-2.57	10
		e"	16.5802	Conductivity (σ):	4.78	4.63	3.13	5
	Head 5200	e'	35.0497	Relative Permittivity (ϵ_r):	35.05	35.99	-2.61	10
		e"	16.5513	Conductivity (σ):	4.79	4.65	2.89	5
	Head 5500	e'	34.5518	Relative Permittivity (ϵ_r):	34.55	35.65	-3.07	10
		e"	16.7651	Conductivity (σ):	5.13	4.96	3.41	5
	Head 5800	e'	33.8611	Relative Permittivity (ϵ_r):	33.86	35.30	-4.08	10
		e"	16.8111	Conductivity (σ):	5.42	5.27	2.88	5
	Head 5825	e'	33.8548	Relative Permittivity (ϵ_r):	33.85	35.30	-4.09	10
		e"	16.7907	Conductivity (σ):	5.44	5.27	3.19	5
7/21/2012	Body 835	e'	53.6623	Relative Permittivity (ϵ_r):	53.66	55.20	-2.79	5
		e"	20.9446	Conductivity (σ):	0.97	0.97	0.25	5
	Body 820	e'	53.8171	Relative Permittivity (ϵ_r):	53.82	55.28	-2.64	5
		e"	21.0056	Conductivity (σ):	0.96	0.97	-1.11	5
	Body 850	e'	53.5263	Relative Permittivity (ϵ_r):	53.53	55.16	-2.96	5
		e"	20.8910	Conductivity (σ):	0.99	0.99	0.02	5
7/21/2012	Body 1720	e'	52.5541	Relative Permittivity (ϵ_r):	52.55	53.52	-1.80	5
		e"	15.2042	Conductivity (σ):	1.45	1.47	-0.93	5
	Body 1735	e'	52.5171	Relative Permittivity (ϵ_r):	52.52	53.48	-1.80	5
		e"	15.2451	Conductivity (σ):	1.47	1.48	-0.42	5
	Body 1750	e'	52.5873	Relative Permittivity (ϵ_r):	52.59	53.44	-1.60	5
		e"	15.2505	Conductivity (σ):	1.48	1.49	-0.15	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
7/23/2012	Head 5180	e'	34.6894	Relative Permittivity (ϵ_r):	34.69	36.01	-3.68	10
		e"	16.1842	Conductivity (σ):	4.66	4.63	0.67	5
	Head 5200	e'	34.6517	Relative Permittivity (ϵ_r):	34.65	35.99	-3.72	10
		e"	16.2026	Conductivity (σ):	4.68	4.65	0.73	5
	Head 5500	e'	34.1321	Relative Permittivity (ϵ_r):	34.13	35.65	-4.25	10
		e"	16.3923	Conductivity (σ):	5.01	4.96	1.11	5
	Head 5800	e'	33.6635	Relative Permittivity (ϵ_r):	33.66	35.30	-4.64	10
		e"	16.5704	Conductivity (σ):	5.34	5.27	1.40	5
	Head 5825	e'	33.6194	Relative Permittivity (ϵ_r):	33.62	35.30	-4.76	10
		e"	16.5949	Conductivity (σ):	5.37	5.27	1.99	5
7/23/2012	Body 835	e'	53.7872	Relative Permittivity (ϵ_r):	53.79	55.20	-2.56	5
		e"	21.2759	Conductivity (σ):	0.99	0.97	1.84	5
	Body 820	e'	53.8608	Relative Permittivity (ϵ_r):	53.86	55.28	-2.56	5
		e"	21.3689	Conductivity (σ):	0.97	0.97	0.60	5
	Body 850	e'	53.5277	Relative Permittivity (ϵ_r):	53.53	55.16	-2.95	5
		e"	21.2221	Conductivity (σ):	1.00	0.99	1.61	5
7/23/2012	Body 1720	e'	51.7711	Relative Permittivity (ϵ_r):	51.77	53.52	-3.26	5
		e"	15.4421	Conductivity (σ):	1.48	1.47	0.62	5
	Body 1735	e'	51.6684	Relative Permittivity (ϵ_r):	51.67	53.48	-3.39	5
		e"	15.3723	Conductivity (σ):	1.48	1.48	0.41	5
	Body 1750	e'	51.6143	Relative Permittivity (ϵ_r):	51.61	53.44	-3.42	5
		e"	15.4078	Conductivity (σ):	1.50	1.49	0.88	5
7/24/2012	Head 5180	e'	36.1102	Relative Permittivity (ϵ_r):	36.11	36.01	0.27	10
		e"	16.3729	Conductivity (σ):	4.72	4.63	1.84	5
	Head 5200	e'	36.0670	Relative Permittivity (ϵ_r):	36.07	35.99	0.21	10
		e"	16.3436	Conductivity (σ):	4.73	4.65	1.60	5
	Head 5500	e'	35.7451	Relative Permittivity (ϵ_r):	35.75	35.65	0.27	10
		e"	16.5703	Conductivity (σ):	5.07	4.96	2.21	5
	Head 5800	e'	35.3072	Relative Permittivity (ϵ_r):	35.31	35.30	0.02	10
		e"	16.7613	Conductivity (σ):	5.41	5.27	2.57	5
	Head 5825	e'	35.1635	Relative Permittivity (ϵ_r):	35.16	35.30	-0.39	10
		e"	16.7211	Conductivity (σ):	5.42	5.27	2.77	5
7/24/2012	Body 5180	e'	47.3717	Relative Permittivity (ϵ_r):	47.37	49.05	-3.42	10
		e"	18.2627	Conductivity (σ):	5.26	5.27	-0.21	5
	Body 5200	e'	47.4263	Relative Permittivity (ϵ_r):	47.43	49.02	-3.25	10
		e"	18.2574	Conductivity (σ):	5.28	5.29	-0.30	5
	Body 5500	e'	47.0776	Relative Permittivity (ϵ_r):	47.08	48.61	-3.16	10
		e"	18.5047	Conductivity (σ):	5.66	5.64	0.26	5
	Body 5800	e'	46.6184	Relative Permittivity (ϵ_r):	46.62	48.20	-3.28	10
		e"	18.5519	Conductivity (σ):	5.98	6.00	-0.28	5
	Body 5825	e'	46.3510	Relative Permittivity (ϵ_r):	46.35	48.20	-3.84	10
		e"	18.7227	Conductivity (σ):	6.06	6.00	1.07	5
7/24/2012	Body 835	e'	53.5590	Relative Permittivity (ϵ_r):	53.56	55.20	-2.97	5
		e"	21.1280	Conductivity (σ):	0.98	0.97	1.13	5
	Body 820	e'	53.6090	Relative Permittivity (ϵ_r):	53.61	55.28	-3.02	5
		e"	21.1923	Conductivity (σ):	0.97	0.97	-0.23	5
	Body 850	e'	53.6302	Relative Permittivity (ϵ_r):	53.63	55.16	-2.77	5
		e"	21.1325	Conductivity (σ):	1.00	0.99	1.18	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
7/25/2012	Body 5180	e'	47.7919	Relative Permittivity (ϵ_r):	47.79	49.05	-2.56	10
		e"	17.9947	Conductivity (σ):	5.18	5.27	-1.68	5
	Body 5200	e'	47.7580	Relative Permittivity (ϵ_r):	47.76	49.02	-2.57	10
		e"	18.0152	Conductivity (σ):	5.21	5.29	-1.62	5
	Body 5500	e'	47.2565	Relative Permittivity (ϵ_r):	47.26	48.61	-2.79	10
		e"	18.2408	Conductivity (σ):	5.58	5.64	-1.17	5
	Body 5800	e'	46.7910	Relative Permittivity (ϵ_r):	46.79	48.20	-2.92	10
		e"	18.4909	Conductivity (σ):	5.96	6.00	-0.61	5
	Body 5825	e'	46.7808	Relative Permittivity (ϵ_r):	46.78	48.20	-2.94	10
		e"	18.4877	Conductivity (σ):	5.99	6.00	-0.20	5
7/25/2012	Body 1900	e'	51.7060	Relative Permittivity (ϵ_r):	51.71	53.30	-2.99	5
		e"	14.4676	Conductivity (σ):	1.53	1.52	0.56	5
	Body 1850	e'	52.0004	Relative Permittivity (ϵ_r):	52.00	53.30	-2.44	5
		e"	14.2375	Conductivity (σ):	1.46	1.52	-3.65	5
	Body 1880	e'	51.8325	Relative Permittivity (ϵ_r):	51.83	53.30	-2.75	5
		e"	14.3719	Conductivity (σ):	1.50	1.52	-1.16	5
	Body 1910	e'	51.6241	Relative Permittivity (ϵ_r):	51.62	53.30	-3.14	5
		e"	14.3637	Conductivity (σ):	1.53	1.52	0.36	5
7/25/2012	Head 1900	e'	38.5873	Relative Permittivity (ϵ_r):	38.59	40.00	-3.53	5
		e"	13.3146	Conductivity (σ):	1.41	1.40	0.47	5
	Head 1850	e'	38.8232	Relative Permittivity (ϵ_r):	38.82	40.00	-2.94	5
		e"	13.1520	Conductivity (σ):	1.35	1.40	-3.36	5
	Head 1880	e'	38.5787	Relative Permittivity (ϵ_r):	38.58	40.00	-3.55	5
		e"	13.2388	Conductivity (σ):	1.38	1.40	-1.15	5
	Head 1910	e'	38.4302	Relative Permittivity (ϵ_r):	38.43	40.00	-3.92	5
		e"	13.3019	Conductivity (σ):	1.41	1.40	0.91	5
7/26/2012	Head 2450	e'	39.7103	Relative Permittivity (ϵ_r):	39.71	39.20	1.30	5
		e"	13.4697	Conductivity (σ):	1.83	1.80	1.94	5
	Head 2410	e'	39.9021	Relative Permittivity (ϵ_r):	39.90	39.28	1.59	5
		e"	13.3852	Conductivity (σ):	1.79	1.76	1.89	5
	Head 2435	e'	39.7763	Relative Permittivity (ϵ_r):	39.78	39.24	1.38	5
		e"	13.4140	Conductivity (σ):	1.82	1.78	1.89	5
	Head 2475	e'	39.5736	Relative Permittivity (ϵ_r):	39.57	39.17	1.03	5
		e"	13.5784	Conductivity (σ):	1.87	1.83	2.28	5
7/26/2012	Body 2450	e'	51.5896	Relative Permittivity (ϵ_r):	51.59	52.70	-2.11	5
		e"	14.6170	Conductivity (σ):	1.99	1.95	2.11	5
	Body 2410	e'	51.7161	Relative Permittivity (ϵ_r):	51.72	52.76	-1.98	5
		e"	14.4997	Conductivity (σ):	1.94	1.91	1.86	5
	Body 2435	e'	51.6153	Relative Permittivity (ϵ_r):	51.62	52.73	-2.11	5
		e"	14.6305	Conductivity (σ):	1.98	1.93	2.58	5
	Body 2475	e'	51.5148	Relative Permittivity (ϵ_r):	51.51	52.67	-2.19	5
		e"	14.7359	Conductivity (σ):	2.03	1.99	2.16	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
7/26/2012	Body 1900	e'	51.5764	Relative Permittivity (ϵ_r):	51.58	53.30	-3.23	5
		e"	14.6210	Conductivity (σ):	1.54	1.52	1.62	5
	Body 1850	e'	51.8063	Relative Permittivity (ϵ_r):	51.81	53.30	-2.80	5
		e"	14.4836	Conductivity (σ):	1.49	1.52	-1.98	5
	Body 1880	e'	51.6650	Relative Permittivity (ϵ_r):	51.67	53.30	-3.07	5
		e"	14.5379	Conductivity (σ):	1.52	1.52	-0.02	5
	Body 1910	e'	51.5708	Relative Permittivity (ϵ_r):	51.57	53.30	-3.24	5
		e"	14.7115	Conductivity (σ):	1.56	1.52	2.79	5
7/27/2012	Head 5180	e'	35.2828	Relative Permittivity (ϵ_r):	35.28	36.01	-2.03	10
		e"	15.6063	Conductivity (σ):	4.49	4.63	-2.93	5
	Head 5200	e'	35.2611	Relative Permittivity (ϵ_r):	35.26	35.99	-2.03	10
		e"	15.6237	Conductivity (σ):	4.52	4.65	-2.87	5
	Head 5500	e'	34.8127	Relative Permittivity (ϵ_r):	34.81	35.65	-2.34	10
		e"	15.6790	Conductivity (σ):	4.79	4.96	-3.29	5
	Head 5800	e'	34.4045	Relative Permittivity (ϵ_r):	34.40	35.30	-2.54	10
		e"	16.8845	Conductivity (σ):	5.45	5.27	3.32	5
	Head 5825	e'	34.4297	Relative Permittivity (ϵ_r):	34.43	35.30	-2.47	10
		e"	16.7703	Conductivity (σ):	5.43	5.27	3.07	5
7/27/2012	Head 1900	e'	38.5088	Relative Permittivity (ϵ_r):	38.51	40.00	-3.73	5
		e"	13.2450	Conductivity (σ):	1.40	1.40	-0.05	5
	Head 1850	e'	38.6576	Relative Permittivity (ϵ_r):	38.66	40.00	-3.36	5
		e"	13.0720	Conductivity (σ):	1.34	1.40	-3.95	5
	Head 1880	e'	38.4561	Relative Permittivity (ϵ_r):	38.46	40.00	-3.86	5
		e"	13.2035	Conductivity (σ):	1.38	1.40	-1.41	5
	Head 1910	e'	38.4129	Relative Permittivity (ϵ_r):	38.41	40.00	-3.97	5
		e"	13.2744	Conductivity (σ):	1.41	1.40	0.70	5
7/27/2012	Body 835	e'	53.5474	Relative Permittivity (ϵ_r):	53.55	55.20	-2.99	5
		e"	20.9431	Conductivity (σ):	0.97	0.97	0.24	5
	Body 820	e'	53.5820	Relative Permittivity (ϵ_r):	53.58	55.28	-3.07	5
		e"	20.9461	Conductivity (σ):	0.96	0.97	-1.39	5
	Body 850	e'	53.2646	Relative Permittivity (ϵ_r):	53.26	55.16	-3.43	5
		e"	20.8644	Conductivity (σ):	0.99	0.99	-0.10	5
7/28/2012	Head 5180	e'	36.6175	Relative Permittivity (ϵ_r):	36.62	36.01	1.68	10
		e"	16.2439	Conductivity (σ):	4.68	4.63	1.04	5
	Head 5200	e'	36.6643	Relative Permittivity (ϵ_r):	36.66	35.99	1.87	10
		e"	16.3193	Conductivity (σ):	4.72	4.65	1.45	5
	Head 5500	e'	36.2149	Relative Permittivity (ϵ_r):	36.21	35.65	1.59	10
		e"	16.4653	Conductivity (σ):	5.04	4.96	1.56	5
	Head 5800	e'	35.6863	Relative Permittivity (ϵ_r):	35.69	35.30	1.09	10
		e"	16.4802	Conductivity (σ):	5.31	5.27	0.85	5
	Head 5825	e'	35.6608	Relative Permittivity (ϵ_r):	35.66	35.30	1.02	10
		e"	16.5468	Conductivity (σ):	5.36	5.27	1.69	5
7/28/2012	Body 835	e'	52.6357	Relative Permittivity (ϵ_r):	52.64	55.20	-4.65	5
		e"	20.7850	Conductivity (σ):	0.97	0.97	-0.51	5
	Body 820	e'	52.7486	Relative Permittivity (ϵ_r):	52.75	55.28	-4.57	5
		e"	20.9924	Conductivity (σ):	0.96	0.97	-1.17	5
	Body 850	e'	52.4869	Relative Permittivity (ϵ_r):	52.49	55.16	-4.84	5
		e"	20.7893	Conductivity (σ):	0.98	0.99	-0.46	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
7/30/2012	Head 5180	e'	35.1763	Relative Permittivity (ϵ_r):	35.18	36.01	-2.32	10
		e"	16.0532	Conductivity (σ):	4.62	4.63	-0.15	5
	Head 5200	e'	35.1681	Relative Permittivity (ϵ_r):	35.17	35.99	-2.28	10
		e"	16.0790	Conductivity (σ):	4.65	4.65	-0.04	5
	Head 5500	e'	34.6566	Relative Permittivity (ϵ_r):	34.66	35.65	-2.78	10
		e"	16.1542	Conductivity (σ):	4.94	4.96	-0.36	5
	Head 5800	e'	34.1830	Relative Permittivity (ϵ_r):	34.18	35.30	-3.16	10
		e"	16.4431	Conductivity (σ):	5.30	5.27	0.62	5
	Head 5825	e'	34.2680	Relative Permittivity (ϵ_r):	34.27	35.30	-2.92	10
		e"	16.3295	Conductivity (σ):	5.29	5.27	0.36	5
7/30/2012	Body 835	e'	53.5564	Relative Permittivity (ϵ_r):	53.56	55.20	-2.98	5
		e"	21.1538	Conductivity (σ):	0.98	0.97	1.25	5
	Body 820	e'	53.6708	Relative Permittivity (ϵ_r):	53.67	55.28	-2.91	5
		e"	21.2106	Conductivity (σ):	0.97	0.97	-0.14	5
	Body 850	e'	53.4254	Relative Permittivity (ϵ_r):	53.43	55.16	-3.14	5
		e"	21.0851	Conductivity (σ):	1.00	0.99	0.95	5
7/30/2012	Head 835	e'	43.0517	Relative Permittivity (ϵ_r):	43.05	41.50	3.74	5
		e"	19.3881	Conductivity (σ):	0.90	0.90	0.02	5
	Head 820	e'	43.2846	Relative Permittivity (ϵ_r):	43.28	41.60	4.04	5
		e"	19.4792	Conductivity (σ):	0.89	0.90	-1.15	5
	Head 850	e'	42.8439	Relative Permittivity (ϵ_r):	42.84	41.50	3.24	5
		e"	19.1665	Conductivity (σ):	0.91	0.92	-1.00	5
7/31/2012	Head 1900	e'	40.5097	Relative Permittivity (ϵ_r):	40.51	40.00	1.27	5
		e"	13.3384	Conductivity (σ):	1.41	1.40	0.65	5
	Head 1850	e'	40.8524	Relative Permittivity (ϵ_r):	40.85	40.00	2.13	5
		e"	13.0819	Conductivity (σ):	1.35	1.40	-3.88	5
	Head 1880	e'	40.5766	Relative Permittivity (ϵ_r):	40.58	40.00	1.44	5
		e"	13.1487	Conductivity (σ):	1.37	1.40	-1.82	5
	Head 1910	e'	40.4853	Relative Permittivity (ϵ_r):	40.49	40.00	1.21	5
		e"	13.2674	Conductivity (σ):	1.41	1.40	0.64	5
7/31/2012	Body 1900	e'	51.1053	Relative Permittivity (ϵ_r):	51.11	53.30	-4.12	5
		e"	14.8770	Conductivity (σ):	1.57	1.52	3.40	5
	Body 1850	e'	51.4197	Relative Permittivity (ϵ_r):	51.42	53.30	-3.53	5
		e"	14.7811	Conductivity (σ):	1.52	1.52	0.03	5
	Body 1880	e'	51.1131	Relative Permittivity (ϵ_r):	51.11	53.30	-4.10	5
		e"	14.8225	Conductivity (σ):	1.55	1.52	1.94	5
	Body 1910	e'	51.0695	Relative Permittivity (ϵ_r):	51.07	53.30	-4.18	5
		e"	14.9544	Conductivity (σ):	1.59	1.52	4.49	5
7/31/2012	Body 2450	e'	51.3783	Relative Permittivity (ϵ_r):	51.38	52.70	-2.51	5
		e"	14.3204	Conductivity (σ):	1.95	1.95	0.04	5
	Body 2410	e'	51.5976	Relative Permittivity (ϵ_r):	51.60	52.76	-2.20	5
		e"	14.0697	Conductivity (σ):	1.89	1.91	-1.16	5
	Body 2435	e'	51.4857	Relative Permittivity (ϵ_r):	51.49	52.73	-2.35	5
		e"	14.2361	Conductivity (σ):	1.93	1.93	-0.19	5
	Body 2475	e'	51.2758	Relative Permittivity (ϵ_r):	51.28	52.67	-2.64	5
		e"	14.5016	Conductivity (σ):	2.00	1.99	0.53	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
7/31/2012	Body 835	e'	54.7671	Relative Permittivity (ϵ_r):	54.77	55.20	-0.78	5
		e"	21.2379	Conductivity (σ):	0.99	0.97	1.65	5
	Body 820	e'	55.1689	Relative Permittivity (ϵ_r):	55.17	55.28	-0.20	5
		e"	21.3492	Conductivity (σ):	0.97	0.97	0.51	5
	Body 850	e'	54.7727	Relative Permittivity (ϵ_r):	54.77	55.16	-0.70	5
		e"	21.2680	Conductivity (σ):	1.01	0.99	1.83	5
7/31/2012	Head 835	e'	42.9053	Relative Permittivity (ϵ_r):	42.91	41.50	3.39	5
		e"	19.5636	Conductivity (σ):	0.91	0.90	0.92	5
	Head 820	e'	42.8957	Relative Permittivity (ϵ_r):	42.90	41.60	3.11	5
		e"	19.6116	Conductivity (σ):	0.89	0.90	-0.48	5
	Head 850	e'	42.7410	Relative Permittivity (ϵ_r):	42.74	41.50	2.99	5
		e"	19.4859	Conductivity (σ):	0.92	0.92	0.65	5
7/31/2012	Body 1720	e'	51.3295	Relative Permittivity (ϵ_r):	51.33	53.52	-4.09	5
		e"	14.9406	Conductivity (σ):	1.43	1.47	-2.64	5
	Body 1735	e'	51.3015	Relative Permittivity (ϵ_r):	51.30	53.48	-4.07	5
		e"	14.9364	Conductivity (σ):	1.44	1.48	-2.44	5
	Body 1750	e'	51.2009	Relative Permittivity (ϵ_r):	51.20	53.44	-4.19	5
		e"	15.0018	Conductivity (σ):	1.46	1.49	-1.78	5
7/31/2012	Body 750	e'	54.3940	Relative Permittivity (ϵ_r):	54.39	55.55	-2.07	5
		e"	22.6436	Conductivity (σ):	0.94	0.96	-1.95	5
	Body 775	e'	54.1816	Relative Permittivity (ϵ_r):	54.18	55.45	-2.29	5
		e"	22.3449	Conductivity (σ):	0.96	0.97	-0.22	5
	Body 790	e'	54.0198	Relative Permittivity (ϵ_r):	54.02	55.39	-2.48	5
		e"	22.2376	Conductivity (σ):	0.98	0.97	1.10	5
8/3/2012	Head 2450	e'	40.0403	Relative Permittivity (ϵ_r):	40.04	39.20	2.14	5
		e"	13.2205	Conductivity (σ):	1.80	1.80	0.06	5
	Head 2410	e'	39.2428	Relative Permittivity (ϵ_r):	39.24	39.28	-0.09	5
		e"	12.7463	Conductivity (σ):	1.71	1.76	-2.98	5
	Head 2435	e'	39.7808	Relative Permittivity (ϵ_r):	39.78	39.24	1.39	5
		e"	13.1883	Conductivity (σ):	1.79	1.78	0.18	5
	Head 2475	e'	39.7956	Relative Permittivity (ϵ_r):	39.80	39.17	1.60	5
		e"	12.9125	Conductivity (σ):	1.78	1.83	-2.74	5
7/30/2012	Head 5180	e'	35.6828	Relative Permittivity (ϵ_r):	35.68	36.01	-0.92	10
		e"	16.0527	Conductivity (σ):	4.62	4.63	-0.15	5
	Head 5200	e'	35.6201	Relative Permittivity (ϵ_r):	35.62	35.99	-1.03	10
		e"	15.8914	Conductivity (σ):	4.59	4.65	-1.21	5
	Head 5500	e'	34.7192	Relative Permittivity (ϵ_r):	34.72	35.65	-2.61	10
		e"	16.3685	Conductivity (σ):	5.01	4.96	0.96	5
	Head 5800	e'	34.3423	Relative Permittivity (ϵ_r):	34.34	35.30	-2.71	10
		e"	16.2657	Conductivity (σ):	5.25	5.27	-0.46	5
	Head 5825	e'	34.0338	Relative Permittivity (ϵ_r):	34.03	35.30	-3.59	10
		e"	16.4935	Conductivity (σ):	5.34	5.27	1.37	5

Additional Tissue Dielectric Parameter Check Results

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
8/31/2012	Head 1750	e'	39.2452	Relative Permittivity (ϵ_r):	39.25	40.08	-2.09	5
		e"	13.8467	Conductivity (σ):	1.35	1.37	-1.58	5
	Head 1720	e'	39.3733	Relative Permittivity (ϵ_r):	39.37	40.13	-1.89	5
		e"	13.7689	Conductivity (σ):	1.32	1.35	-2.61	5
	Head 1735	e'	39.3137	Relative Permittivity (ϵ_r):	39.31	40.11	-1.98	5
		e"	13.8057	Conductivity (σ):	1.33	1.36	-2.11	5
8/31/2012	Body 835	e'	55.2206	Relative Permittivity (ϵ_r):	55.22	55.20	0.04	5
		e"	21.1389	Conductivity (σ):	0.98	0.97	1.18	5
	Body 815	e'	55.6863	Relative Permittivity (ϵ_r):	55.69	55.30	0.71	5
		e"	21.2738	Conductivity (σ):	0.96	0.97	-0.42	5
	Body 820	e'	55.4515	Relative Permittivity (ϵ_r):	55.45	55.28	0.32	5
		e"	21.3001	Conductivity (σ):	0.97	0.97	0.28	5
	Body 850	e'	55.1543	Relative Permittivity (ϵ_r):	55.15	55.16	-0.01	5
		e"	21.0469	Conductivity (σ):	0.99	0.99	0.77	5
9/1/2012	Head 1750	e'	39.7253	Relative Permittivity (ϵ_r):	39.73	40.08	-0.90	5
		e"	13.6719	Conductivity (σ):	1.33	1.37	-2.82	5
	Head 1720	e'	39.8549	Relative Permittivity (ϵ_r):	39.85	40.13	-0.69	5
		e"	13.6055	Conductivity (σ):	1.30	1.35	-3.76	5
	Head 1735	e'	39.7922	Relative Permittivity (ϵ_r):	39.79	40.11	-0.79	5
		e"	13.6407	Conductivity (σ):	1.32	1.36	-3.28	5
9/1/2012	Body 835	e'	55.0009	Relative Permittivity (ϵ_r):	55.00	55.20	-0.36	5
		e"	21.3059	Conductivity (σ):	0.99	0.97	1.98	5
	Body 815	e'	55.1400	Relative Permittivity (ϵ_r):	55.14	55.30	-0.28	5
		e"	21.3886	Conductivity (σ):	0.97	0.97	0.12	5
	Body 820	e'	55.1031	Relative Permittivity (ϵ_r):	55.10	55.28	-0.31	5
		e"	21.3713	Conductivity (σ):	0.97	0.97	0.61	5
	Body 850	e'	54.8869	Relative Permittivity (ϵ_r):	54.89	55.16	-0.49	5
		e"	21.2379	Conductivity (σ):	1.00	0.99	1.68	5
9/1/2012	Body 1900	e'	53.5166	Relative Permittivity (ϵ_r):	53.52	53.30	0.41	5
		e"	14.3641	Conductivity (σ):	1.52	1.52	-0.16	5
	Body 1850	e'	53.7197	Relative Permittivity (ϵ_r):	53.72	53.30	0.79	5
		e"	14.1644	Conductivity (σ):	1.46	1.52	-4.14	5
	Body 1880	e'	53.6011	Relative Permittivity (ϵ_r):	53.60	53.30	0.56	5
		e"	14.2859	Conductivity (σ):	1.49	1.52	-1.75	5
	Body 1910	e'	53.4769	Relative Permittivity (ϵ_r):	53.48	53.30	0.33	5
		e"	14.4053	Conductivity (σ):	1.53	1.52	0.65	5
9/2/2012	Head 1750	e'	39.0210	Relative Permittivity (ϵ_r):	39.02	40.08	-2.65	5
		e"	13.6732	Conductivity (σ):	1.33	1.37	-2.81	5
	Head 1720	e'	39.1680	Relative Permittivity (ϵ_r):	39.17	40.13	-2.40	5
		e"	13.6004	Conductivity (σ):	1.30	1.35	-3.80	5
	Head 1735	e'	39.0971	Relative Permittivity (ϵ_r):	39.10	40.11	-2.52	5
		e"	13.6356	Conductivity (σ):	1.32	1.36	-3.31	5

Additional Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
9/2/2012	Body 835	e'	56.4053	Relative Permittivity (ϵ_r):	56.41	55.20	2.18	5
		e"	21.1796	Conductivity (σ):	0.98	0.97	1.38	5
	Body 815	e'	56.5775	Relative Permittivity (ϵ_r):	56.58	55.30	2.32	5
		e"	21.3752	Conductivity (σ):	0.97	0.97	0.06	5
	Body 820	e'	56.3950	Relative Permittivity (ϵ_r):	56.40	55.28	2.02	5
		e"	21.4798	Conductivity (σ):	0.98	0.97	1.13	5
Body 850	e'	56.1765	Relative Permittivity (ϵ_r):	56.18	55.16	1.85	5	
	e"	21.2323	Conductivity (σ):	1.00	0.99	1.66	5	
9/2/2012	Body 1900	e'	52.0018	Relative Permittivity (ϵ_r):	52.00	53.30	-2.44	5
		e"	14.0784	Conductivity (σ):	1.49	1.52	-2.15	5
	Body 1850	e'	52.2127	Relative Permittivity (ϵ_r):	52.21	53.30	-2.04	5
		e"	14.0691	Conductivity (σ):	1.45	1.52	-4.79	5
	Body 1880	e'	52.0279	Relative Permittivity (ϵ_r):	52.03	53.30	-2.39	5
		e"	14.1325	Conductivity (σ):	1.48	1.52	-2.81	5
Body 1910	e'	51.8767	Relative Permittivity (ϵ_r):	51.88	53.30	-2.67	5	
	e"	14.1743	Conductivity (σ):	1.51	1.52	-0.96	5	
9/3/2012	Head 1750	e'	39.1509	Relative Permittivity (ϵ_r):	39.15	40.08	-2.33	5
		e"	14.1322	Conductivity (σ):	1.38	1.37	0.45	5
	Head 1720	e'	39.2076	Relative Permittivity (ϵ_r):	39.21	40.13	-2.30	5
		e"	14.0248	Conductivity (σ):	1.34	1.35	-0.80	5
	Head 1735	e'	39.1403	Relative Permittivity (ϵ_r):	39.14	40.11	-2.41	5
		e"	14.0213	Conductivity (σ):	1.35	1.36	-0.58	5
9/3/2012	Head 2450	e'	39.1601	Relative Permittivity (ϵ_r):	39.16	39.20	-0.10	5
		e"	13.4007	Conductivity (σ):	1.83	1.80	1.42	5
	Head 2410	e'	39.3336	Relative Permittivity (ϵ_r):	39.33	39.28	0.14	5
		e"	13.2933	Conductivity (σ):	1.78	1.76	1.19	5
	Head 2435	e'	39.2698	Relative Permittivity (ϵ_r):	39.27	39.24	0.09	5
		e"	13.3925	Conductivity (σ):	1.81	1.78	1.73	5
Head 2475	e'	39.1083	Relative Permittivity (ϵ_r):	39.11	39.17	-0.15	5	
	e"	13.4706	Conductivity (σ):	1.85	1.83	1.47	5	
9/3/2012	Body 750	e'	54.4017	Relative Permittivity (ϵ_r):	54.40	55.55	-2.06	5
		e"	22.8024	Conductivity (σ):	0.95	0.96	-1.26	5
	Body 775	e'	54.4411	Relative Permittivity (ϵ_r):	54.44	55.45	-1.82	5
		e"	22.5325	Conductivity (σ):	0.97	0.97	0.62	5
	Body 790	e'	54.2409	Relative Permittivity (ϵ_r):	54.24	55.39	-2.08	5
		e"	22.5264	Conductivity (σ):	0.99	0.97	2.42	5
9/3/2012	Body 1900	e'	52.1526	Relative Permittivity (ϵ_r):	52.15	53.30	-2.15	5
		e"	14.3667	Conductivity (σ):	1.52	1.52	-0.15	5
	Body 1850	e'	52.2749	Relative Permittivity (ϵ_r):	52.27	53.30	-1.92	5
		e"	14.1971	Conductivity (σ):	1.46	1.52	-3.92	5
	Body 1880	e'	52.1345	Relative Permittivity (ϵ_r):	52.13	53.30	-2.19	5
		e"	14.2867	Conductivity (σ):	1.49	1.52	-1.75	5
Body 1910	e'	52.1184	Relative Permittivity (ϵ_r):	52.12	53.30	-2.22	5	
	e"	14.3280	Conductivity (σ):	1.52	1.52	0.11	5	
9/4/2012	Head 1750	e'	39.7058	Relative Permittivity (ϵ_r):	39.71	40.08	-0.95	5
		e"	13.8074	Conductivity (σ):	1.34	1.37	-1.86	5
	Head 1720	e'	39.8287	Relative Permittivity (ϵ_r):	39.83	40.13	-0.75	5
		e"	13.7351	Conductivity (σ):	1.31	1.35	-2.84	5
	Head 1735	e'	39.7629	Relative Permittivity (ϵ_r):	39.76	40.11	-0.86	5
		e"	13.7695	Conductivity (σ):	1.33	1.36	-2.36	5

Additional Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
9/4/2012	Head 2450	e'	37.3955	Relative Permittivity (ϵ_r):	37.40	39.20	-4.60	5
		e"	13.6142	Conductivity (σ):	1.85	1.80	3.04	5
	Head 2410	e'	37.5467	Relative Permittivity (ϵ_r):	37.55	39.28	-4.41	5
		e"	13.4987	Conductivity (σ):	1.81	1.76	2.75	5
	Head 2435	e'	37.4521	Relative Permittivity (ϵ_r):	37.45	39.24	-4.54	5
		e"	13.5680	Conductivity (σ):	1.84	1.78	3.06	5
	Head 2475	e'	37.2993	Relative Permittivity (ϵ_r):	37.30	39.17	-4.77	5
		e"	13.6899	Conductivity (σ):	1.88	1.83	3.12	5
9/4/2012	Body 750	e'	55.2334	Relative Permittivity (ϵ_r):	55.23	55.55	-0.56	5
		e"	22.7486	Conductivity (σ):	0.95	0.96	-1.50	5
	Body 775	e'	54.9522	Relative Permittivity (ϵ_r):	54.95	55.45	-0.90	5
		e"	22.5503	Conductivity (σ):	0.97	0.97	0.70	5
	Body 790	e'	54.6799	Relative Permittivity (ϵ_r):	54.68	55.39	-1.29	5
		e"	22.3367	Conductivity (σ):	0.98	0.97	1.55	5
9/4/2012	Body 835	e'	53.5143	Relative Permittivity (ϵ_r):	53.51	55.20	-3.05	5
		e"	20.9647	Conductivity (σ):	0.97	0.97	0.35	5
	Body 815	e'	53.5251	Relative Permittivity (ϵ_r):	53.53	55.30	-3.20	5
		e"	21.2183	Conductivity (σ):	0.96	0.97	-0.68	5
	Body 820	e'	53.4922	Relative Permittivity (ϵ_r):	53.49	55.28	-3.23	5
		e"	21.1127	Conductivity (σ):	0.96	0.97	-0.60	5
	Body 850	e'	53.1831	Relative Permittivity (ϵ_r):	53.18	55.16	-3.58	5
		e"	20.8765	Conductivity (σ):	0.99	0.99	-0.05	5
9/4/2012	Body 1720	e'	51.5562	Relative Permittivity (ϵ_r):	51.56	53.52	-3.67	5
		e"	14.8745	Conductivity (σ):	1.42	1.47	-3.08	5
	Body 1735	e'	51.5122	Relative Permittivity (ϵ_r):	51.51	53.48	-3.68	5
		e"	14.9013	Conductivity (σ):	1.44	1.48	-2.67	5
	Body 1750	e'	51.4706	Relative Permittivity (ϵ_r):	51.47	53.44	-3.69	5
		e"	14.9372	Conductivity (σ):	1.45	1.49	-2.20	5
9/4/2012	Head 750	e'	40.4111	Relative Permittivity (ϵ_r):	40.41	41.96	-3.69	5
		e"	20.5953	Conductivity (σ):	0.86	0.89	-3.83	5
	Head 780	e'	40.2136	Relative Permittivity (ϵ_r):	40.21	41.81	-3.81	5
		e"	20.5889	Conductivity (σ):	0.89	0.90	-0.27	5
	Head 790	e'	40.1478	Relative Permittivity (ϵ_r):	40.15	41.76	-3.85	5
		e"	20.4306	Conductivity (σ):	0.90	0.90	0.14	5
9/5/2012	Body 835	e'	56.6498	Relative Permittivity (ϵ_r):	56.65	55.20	2.63	5
		e"	21.7124	Conductivity (σ):	1.01	0.97	3.93	5
	Body 815	e'	56.8127	Relative Permittivity (ϵ_r):	56.81	55.30	2.74	5
		e"	21.7954	Conductivity (σ):	0.99	0.97	2.03	5
	Body 820	e'	56.7746	Relative Permittivity (ϵ_r):	56.77	55.28	2.71	5
		e"	21.7747	Conductivity (σ):	0.99	0.97	2.51	5
	Body 850	e'	56.5454	Relative Permittivity (ϵ_r):	56.55	55.16	2.52	5
		e"	21.6431	Conductivity (σ):	1.02	0.99	3.62	5

13. System Performance Check

The system performance check is performed prior to any usage of the system in order to verify SAR system measurement accuracy. The system performance check verifies that the system operates within its specifications of $\pm 10\%$.

13.1. 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 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.

13.2. 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	2/9/12	750	1g	8.44	8.84
				10g	5.53	5.84
D835V2	4d117	4/10/12	835	1g	9.38	9.52
				10g	6.15	6.31
D1750V2	1050	4/19/12	1750	1g	35.9	36.9
				10g	19.1	19.9
D1900V2	5d140	4/12/12	1900	1g	39.8	40.2
				10g	20.8	21.3
D2450V2	748	2/7/12	2450	1g	52.7	49.9
				10g	24.6	23.4
D5GHzV2	1075	2/14/12	5200	1g	79.4	72.7
				10g	22.8	20.5
			5500	1g	85.7	77.7
				10g	24.3	21.7
			5800	1g	78.9	72.5
				10g	22.5	20.2
D835V2	4d002	3/26/12	835	1g	9.32	9.41
				10g	6.08	6.20

13.3. System Performance Check Results

Date Tested	System Dipole		T.S. Liquid	SAR Measured (Normalized to 1 W)		Target (Ref. Value)	Delta (%)	Tolerance (%)
	Type	Serial No.		1g	10g			
6/29/2012	D2450V2	748	Head	1g	53.9	52.7	2.28	±10
				10g	24.9	24.6	1.22	
6/29/2012	D1900V2	5d140	Head	1g	40.6	39.8	2.01	±10
				10g	21.3	20.8	2.40	
6/29/2012	D1900V2	5d140	Body	1g	40.5	40.2	0.75	±10
				10g	21.5	21.3	0.94	
6/30/2012	D5GHzV2 (5.2GHz)	1075	Head	1g	79.6	79.4	0.25	±10
				10g	23.0	22.8	0.88	
6/30/2012	D1900V2	5d140	Head	1g	40.9	39.8	2.76	±10
				10g	21.4	20.8	2.88	
6/30/2012	D1900V2	5d140	Body	1g	39.8	40.2	-1.00	±10
				10g	21.0	21.3	-1.41	
7/1/2012	D5GHzV2 (5.2GHz)	1075	Head	1g	80.6	79.4	1.51	±10
				10g	23.2	22.8	1.75	
7/1/2012	D835V2	4d117	Head	1g	9.61	9.38	2.45	±10
				10g	6.31	6.15	2.60	
7/2/2012	D5GHzV2 (5.5GHz)	1075	Head	1g	81.8	85.7	-4.55	±10
				10g	23.3	24.3	-4.12	
7/2/2012	D1900V2	5d140	Head	1g	40.3	39.8	1.26	±10
				10g	20.9	20.8	0.48	
7/2/2012	D835V2	4d117	Head	1g	9.85	9.38	5.01	±10
				10g	6.47	6.15	5.20	
7/3/2012	D5GHzV2 (5.5GHz)	1075	Head	1g	81.5	85.7	-4.90	±10
				10g	23.2	24.3	-4.53	
7/3/2012	D5GHzV2 (5.8GHz)	1075	Head	1g	84.9	78.9	7.60	±10
				10g	24.2	22.5	7.56	
7/5/2012	D5GHzV2 (5.8GHz)	1075	Head	1g	84.6	78.9	7.22	±10
				10g	24.1	22.5	7.11	
7/5/2012	D1900V2	5d140	Body	1g	39.8	40.2	-1.00	±10
				10g	20.6	21.3	-3.29	
7/6/2012	D5GHzV2 (5.2GHz)	1075	Head	1g	75.0	79.4	-5.54	±10
				10g	21.7	22.8	-4.82	
7/6/2012	D2450V2	748	Body	1g	53.2	49.9	6.61	±10
				10g	24.9	23.4	6.41	
7/6/2012	D1900V2	5d140	Body	1g	43.0	40.2	6.97	±10
				10g	22.2	21.3	4.23	
7/6/2012	D835V2	4d117	Body	1g	9.79	9.52	2.84	±10
				10g	6.44	6.31	2.06	
7/7/2012	D5GHzV2 (5.2GHz)	1075	Body	1g	74.4	72.7	2.34	±10
				10g	21.0	20.5	2.44	
7/7/2012	D1900V2	5d140	Body	1g	41.5	40.2	3.23	±10
				10g	21.5	21.3	0.94	
7/7/2012	D835V2	4d117	Body	1g	9.53	9.52	0.11	±10
				10g	6.27	6.31	-0.63	
7/9/2012	D5GHzV2 (5.2GHz)	1075	Body	1g	74.4	72.7	2.34	±10
				10g	21.2	20.5	3.41	
7/9/2012	D1900V2	5d140	Body	1g	40.1	40.2	-0.25	±10
				10g	20.7	21.3	-2.82	

Tissue Dielectric Parameter Check Results (continued)

Date Tested	System Dipole		T.S. Liquid	SAR Measured (Normalized to 1 W)		Target (Ref. Value)	Delta (%)	Tolerance (%)
	Type	Serial No.						
7/9/2012	D835V2	4d117	Body	1g	9.80	9.52	2.94	±10
				10g	6.44	6.31	2.06	
7/10/2012	D5GHzV2 (5.2GHz)	1075	Body	1g	73.9	72.7	1.65	±10
				10g	20.9	20.5	1.95	
7/10/2012	D835V2	4d117	Body	1g	10.0	9.52	5.04	±10
				10g	6.61	6.31	4.75	
7/11/2012	D5GHzV2 (5.5GHz)	1075	Body	1g	84.2	77.7	8.37	±10
				10g	23.6	21.7	8.76	
7/11/2012	D5GHzV2 (5.2GHz)	1075	Body	1g	77.9	72.7	7.15	±10
				10g	22.0	20.5	7.32	
7/11/2012	D1900V2	5d140	Body	1g	41.6	40.2	3.48	±10
				10g	21.7	21.3	1.88	
7/11/2012	D835V2	4d117	Body	1g	10.1	9.52	6.09	±10
				10g	6.68	6.31	5.86	
7/12/2012	D5GHzV2 (5.5GHz)	1075	Body	1g	82.9	77.7	6.69	±10
				10g	23.7	21.7	9.22	
7/12/2012	D1900V2	5d140	Body	1g	41.1	40.2	2.24	±10
				10g	21.2	21.3	-0.47	
7/12/2012	D835V2	4d117	Body	1g	9.80	9.52	2.94	±10
				10g	6.45	6.31	2.22	
7/12/2012	D835V2	4d117	Head	1g	9.73	9.38	3.73	±10
				10g	6.40	6.15	4.07	
7/13/2012	D5GHzV2 (5.5GHz)	1075	Body	1g	84.5	77.7	8.75	±10
				10g	23.7	21.7	9.22	
7/13/2012	D1900V2	5d140	Body	1g	40.5	40.2	0.75	±10
				10g	20.9	21.3	-1.88	
7/13/2012	D835V2	4d117	Body	1g	9.70	9.52	1.89	±10
				10g	6.38	6.31	1.11	
7/13/2012	D835V2	4d117	Head	1g	10.0	9.38	6.61	±10
				10g	6.58	6.15	6.99	
7/14/2012	D5GHzV2 (5.5GHz)	1075	Body	1g	82.9	77.7	6.69	±10
				10g	23.3	21.7	7.37	
7/14/2012	D1900V2	5d140	Body	1g	41.1	40.2	2.24	±10
				10g	21.3	21.3	0.00	
7/16/2012	D5GHzV2 (5.5GHz)	1075	Body	1g	82.6	77.7	6.31	±10
				10g	23.2	21.7	6.91	
7/16/2012	D5GHzV2 (5.8GHz)	1075	Body	1g	67.2	72.5	-7.31	±10
				10g	18.8	20.2	-6.93	
7/16/2012	D1900V2	5d140	Body	1g	39.8	40.2	-1.00	±10
				10g	20.6	21.3	-3.29	
7/16/2012	D1900V2	5d140	Head	1g	41.6	39.8	4.52	±10
				10g	21.5	20.8	3.37	
7/16/2012	D1750V2	1050	Body	1g	36.1	36.9	-2.17	±10
				10g	19.2	19.9	-3.52	
7/17/2012	D5GHzV2 (5.8GHz)	1075	Body	1g	75.6	72.5	4.28	±10
				10g	21.2	20.2	4.95	
7/17/2012	D1900V2	5d140	Body	1g	41.4	40.2	2.99	±10
				10g	21.3	21.3	0.00	

Tissue Dielectric Parameter Check Results (continued)

Date Tested	System Dipole		T.S. Liquid	SAR Measured (Normalized to 1 W)		Target (Ref. Value)	Delta (%)	Tolerance (%)
	Type	Serial No.		1g	10g			
7/17/2012	D1750V2	1050	Body	1g	37.7	36.9	2.17	±10
				10g	20.0			
7/18/2012	D5GHzV2 (5.2GHz)	1075	Body	1g	75.8	72.7	4.26	±10
				10g	21.5			
7/18/2012	D750V3	1019	Body	1g	9.43	8.84	6.67	±10
				10g	6.00			
7/18/2012	D1750V2	1050	Body	1g	36.3	36.9	-1.63	±10
				10g	19.3			
7/19/2012	D5GHzV2 (5.8GHz)	1075	Body	1g	69.6	72.5	-4.00	±10
				10g	19.5			
7/19/2012	D5GHzV2 (5.5GHz)	1075	Head	1g	83.3	85.7	-2.80	±10
				10g	23.7			
7/19/2012	D750V3	1019	Body	1g	9.00	8.84	1.81	±10
				10g	5.99			
7/19/2012	D1750V2	1050	Body	1g	35.1	36.9	-4.88	±10
				10g	18.6			
7/20/2012	D5GHzV2 (5.5GHz)	1075	Head	1g	83.5	85.7	-2.57	±10
				10g	23.9			
7/20/2012	D5GHzV2 (5.8GHz)	1075	Head	1g	79.0	78.9	0.13	±10
				10g	22.6			
7/20/2012	D750V3	1019	Body	1g	9.29	8.84	5.09	±10
				10g	5.89			
7/20/2012	D1750V2	1050	Body	1g	37.1	36.9	0.54	±10
				10g	19.7			
7/21/2012	D5GHzV2 (5.8GHz)	1075	Head	1g	76.7	78.9	-2.79	±10
				10g	21.7			
7/21/2012	D835V2	4d117	Body	1g	9.95	9.52	4.52	±10
				10g	6.53			
7/21/2012	D1750V2	1050	Body	1g	38.2	36.9	3.52	±10
				10g	20.3			
7/23/2012	D5GHzV2 (5.2GHz)	1075	Head	1g	78.0	79.4	-1.76	±10
				10g	22.6			
7/23/2012	D5GHzV2 (5.8GHz)	1075	Head	1g	82.0	78.9	3.93	±10
				10g	23.5			
7/23/2012	D835V2	4d117	Body	1g	9.30	9.52	-2.31	±10
				10g	6.12			
7/23/2012	D1750V2	1050	Body	1g	38.4	36.9	4.07	±10
				10g	20.4			
7/24/2012	D5GHzV2 (5.2GHz)	1075	Head	1g	78.9	79.4	-0.63	±10
				10g	22.7			
7/24/2012	D5GHzV2 (5.2GHz)	1075	Body	1g	74.1	72.7	1.93	±10
				10g	21.1			
7/24/2012	D835V2	4d117	Body	1g	9.83	9.52	3.26	±10
				10g	6.45			
7/25/2012	D5GHzV2 (5.2GHz)	1075	Body	1g	70.9	72.7	-2.48	±10
				10g	20.1			
7/25/2012	D1900V2	5d140	Body	1g	41.9	40.2	4.23	±10
				10g	21.7			

Tissue Dielectric Parameter Check Results (continued)

Date Tested	System Dipole		T.S. Liquid	SAR Measured (Normalized to 1 W)		Target (Ref. Value)	Delta (%)	Tolerance (%)
	Type	Serial No.		1g	10g			
7/25/2012	D1900V2	5d140	Head	1g	41.2	39.8	3.52	±10
				10g	21.2	20.8	1.92	
7/26/2012	D2450V2	748	Head	1g	49.7	52.7	-5.69	±10
				10g	22.8	24.6	-7.32	
7/26/2012	D2450V2	748	Body	1g	51.1	49.9	2.40	±10
				10g	23.7	23.4	1.28	
7/26/2012	D1900V2	5d140	Body	1g	42.2	40.2	4.98	±10
				10g	21.9	21.3	2.82	
7/27/2012	D5GHzV2 (5.2GHz)	1075	Head	1g	80.6	79.4	1.51	±10
				10g	23.3	22.8	2.19	
7/27/2012	D1900V2	5d140	Head	1g	42.4	39.8	6.53	±10
				10g	22.0	20.8	5.77	
7/28/2012	D5GHzV2 (5.2GHz)	1075	Head	1g	76.1	79.4	-4.16	±10
				10g	21.8	22.8	-4.39	
7/28/2012	D835V2	4d117	Body	1g	9.88	9.52	3.78	±10
				10g	6.49	6.31	2.85	
7/30/2012	D5GHzV2 (5.5GHz)	1075	Head	1g	85.1	85.7	-0.70	±10
				10g	24.3	24.3	0.00	
7/30/2012	D5GHzV2 (5.8GHz)	1075	Head	1g	83.6	78.9	5.96	±10
				10g	23.8	22.5	5.78	
7/30/2012	D835V2	4d117	Body	1g	9.42	9.52	-1.05	±10
				10g	6.19	6.31	-1.90	
7/30/2012	D835V2	4d117	Head	1g	9.16	9.38	-2.35	±10
				10g	6.02	6.15	-2.11	
7/31/2012	D1900V2	5d140	Head	1g	39.9	39.8	0.25	±10
				10g	20.9	20.8	0.48	
7/31/2012	D1900V2	5d140	Body	1g	41.2	40.2	2.49	±10
				10g	21.5	21.3	0.94	
7/31/2012	D2450V2	748	Body	1g	47.9	49.9	-4.01	±10
				10g	22.2	23.4	-5.13	
7/31/2012	D835V2	4d117	Body	1g	9.73	9.52	2.21	±10
				10g	6.40	6.31	1.43	
7/31/2012	D835V2	4d117	Head	1g	9.43	9.38	0.53	±10
				10g	6.19	6.15	0.65	
7/31/2012	D1750V2	1050	Body	1g	38.3	36.9	3.79	±10
				10g	20.4	19.9	2.51	
7/31/2012	D750V3	1019	Body	1g	8.38	8.84	-5.20	±10
				10g	5.57	5.84	-4.62	
8/3/2012	D2450V2	748	Head	1g	51.4	52.7	-2.47	±10
				10g	23.5	24.6	-4.47	
8/3/2012	D5GHzV2 (5.2GHz)	1075	Head	1g	82.5	79.4	3.90	±10
				10g	23.6	22.8	3.51	
8/3/2012	D5GHzV2 (5.5GHz)	1075	Head	1g	79.8	85.7	-6.88	±10
				10g	22.7	24.3	-6.58	
8/3/2012	D5GHzV2 (5.6GHz)	1075	Head	1g	78.6	85.7	-8.28	±10
				10g	22.2	24.3	-8.64	
8/3/2012	D5GHzV2 (5.8GHz)	1075	Head	1g	78.4	78.9	-0.63	±10
				10g	22.3	22.5	-0.89	

Additional System Performance Check Results

Date Tested	System Dipole		T.S. Liquid	SAR Measured (Normalized to 1 W)		Target (Ref. Value)	Delta (%)	Tolerance (%)
	Type	Serial No.		1g	10g			
8/31/2012	D1750V2	1050	Head	1g	34.5	35.9	-3.90	±10
				10g	18.3			
8/31/2012	D835V2	4d002	Body	1g	9.50	9.41	0.96	±10
				10g	6.25			
9/1/2012	D1750V2	1050	Head	1g	35.7	35.9	-0.56	±10
				10g	18.8			
9/1/2012	D835V2	4d002	Body	1g	9.25	9.41	-1.70	±10
				10g	6.07			
9/1/2012	D1900V2	5d140	Body	1g	39.4	40.2	-1.99	±10
				10g	20.7			
9/2/2012	D1750V2	1050	Head	1g	34.9	35.9	-2.79	±10
				10g	18.4			
9/2/2012	D835V2	4d002	Body	1g	9.37	9.41	-0.43	±10
				10g	6.19			
9/2/2012	D1900V2	5d140	Body	1g	39.6	40.2	-1.49	±10
				10g	20.8			
9/3/2012	D1750V2	1050	Head	1g	35.0	35.9	-2.51	±10
				10g	18.5			
9/3/2012	D2450V2	748	Head	1g	52.0	52.7	-1.33	±10
				10g	23.7			
9/3/2012	D750V3	1019	Body	1g	9.10	8.84	2.94	±10
				10g	5.78			
9/3/2012	D1900V2	5d140	Body	1g	40.8	40.2	1.49	±10
				10g	21.4			
9/4/2012	D1750V2	1050	Head	1g	36.2	35.9	0.84	±10
				10g	19.0			
9/4/2012	D750V3	1019	Body	1g	8.81	8.84	-0.34	±10
				10g	5.60			
9/4/2012	D835V2	4d002	Body	1g	9.73	9.41	3.40	±10
				10g	6.40			
9/4/2012	D1750V2	1050	Body	1g	37.9	36.9	2.71	±10
				10g	20.2			
9/4/2012	D750V3	1019	Head	1g	8.92	8.44	5.69	±10
				10g	5.57			
9/5/2012	D835V2	4d002	Body	1g	9.66	9.41	2.66	±10
				10g	6.36			

14. SAR Test Results (Model A1428)

14.1. GSM850

14.1.1. Head Exposure Conditions

Test Position	Mode	Antenna	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	Voice	Primary	128	824.20	33.5		1
			190	836.60	33.4	0.716	
			251	848.80	33.5		1
Left Tilt (15°)	Voice	Primary	128	824.20	33.5		1
			190	836.60	33.4	0.356	
			251	848.80	33.5		1
Right Touch	Voice	Primary	128	824.20	33.5		1
			190	836.60	33.4	0.666	
			251	848.80	33.5		1
Right Tilt (15°)	Voice	Primary	128	824.20	33.5		1
			190	836.60	33.4	0.366	
			251	848.80	33.5		1
Test Position	Mode	Antenna	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	Voice	Secondary	128	824.20	33.0		1
			190	836.60	33.0	0.660	
			251	848.80	32.9		1
Left Tilt (15°)	Voice	Secondary	128	824.20	33.0		1
			190	836.60	33.0	0.551	
			251	848.80	32.9		1
Right Touch	Voice	Secondary	128	824.20	33.0		1
			190	836.60	33.0	0.439	
			251	848.80	32.9		1
Right Tilt (15°)	Voice	Secondary	128	824.20	33.0		1
			190	836.60	33.0	0.375	
			251	848.80	32.9		1

Note(s):

- SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel is optional.

14.1.2. Body-worn Accessory Exposure Conditions

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	Voice	Primary	10	128	824.20	33.5	0.829	
				190	836.60	33.4	0.896	
				190	836.60	33.4	0.385	2
				251	848.80	33.5	0.891	
Front	Voice	Primary	10	128	824.20	33.5		1
				190	836.60	33.4	0.712	
				251	848.80	33.5		1
Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	Voice	Secondary	10	128	824.20	33.0		1
				190	836.60	33.0	0.246	
				190	836.60	33.0	0.238	2
				251	848.80	32.9		1
Front	Voice	Secondary	10	128	824.20	33.0		1
				190	836.60	33.0	0.191	
				251	848.80	32.9		1

Note(s):

- SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel is optional.
- With headset attached.(The difference between the SAR values of the primary antenna without the headset and with the headset is dramatic, but this has been verified to be true through repeated testing)

14.1.3. Hotspot Mode Exposure Conditions

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	GPRS 2 slots	Primary	10	128	824.20	31.5	0.732	
				190	836.60	31.4	0.770	
				251	848.80	31.4	0.831	
Front	GPRS 2 slots	Primary	10	128	824.20	31.5		1
				190	836.60	31.4	0.646	
				251	848.80	31.4		1
Edge 2	GPRS 2 slots	Primary	10	128	824.20	31.5		1
				190	836.60	31.4	0.373	
				251	848.80	31.4		1
Edge 3	GPRS 2 slots	Primary	10	128	824.20	31.5		1
				190	836.60	31.4	0.147	
				251	848.80	31.4		1
Edge 4	GPRS 2 slots	Primary	10	128	824.20	31.5		1
				190	836.60	31.4	0.493	
				251	848.80	31.4		1
Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	GPRS 2 slots	Secondary	10	128	824.20	32.4		1
				190	836.60	32.4	0.294	
				251	848.80	32.3		1
Front	GPRS 2 slots	Secondary	10	128	824.20	32.4		1
				190	836.60	32.4	0.242	
				251	848.80	32.3		1
Edge 1	GPRS 2 slots	Secondary	10	128	824.20	32.4		1
				190	836.60	32.4	0.156	
				251	848.80	32.3		1
Edge 2	GPRS 2 slots	Secondary	10	128	824.20	32.4		1
				190	836.60	32.4	0.244	
				251	848.80	32.3		1
Edge 4	GPRS 2 slots	Secondary	10	128	824.20	32.4		1
				190	836.60	32.4	0.081	
				251	848.80	32.3		1

Note(s):

- SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel is optional.
- With headset attached.

14.2. GSM1900

14.2.1. Head Exposure Conditions

Test Position	Mode	Antenna	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	Voice	Primary	512	1850.2	31.0		1
			661	1880.0	31.0	0.631	
			810	1909.8	31.0		1
Left Tilt (15°)	Voice	Primary	512	1850.2	31.0		1
			661	1880.0	31.0	0.350	
			810	1909.8	31.0		1
Right Touch	Voice	Primary	512	1850.2	31.0	1.030	
			661	1880.0	31.0	0.998	
			810	1909.8	31.0	0.910	
Right Tilt (15°)	Voice	Primary	512	1850.2	31.0		1
			661	1880.0	31.0	0.324	
			810	1909.8	31.0		1
Test Position	Mode	Antenna	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	Voice	Secondary	512	1850.2	30.4		1
			661	1880.0	30.4	0.484	
			810	1909.8	30.5		1
Left Tilt (15°)	Voice	Secondary	512	1850.2	30.4		1
			661	1880.0	30.4	0.552	
			810	1909.8	30.5		1
Right Touch	Voice	Secondary	512	1850.2	30.4	0.776	
			661	1880.0	30.4	0.805	
			810	1909.8	30.5	0.901	
Right Tilt (15°)	Voice	Secondary	512	1850.2	30.4	0.583	
			661	1880.0	30.4	0.695	
			810	1909.8	30.5	0.788	

Note(s):

- SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel is optional.

14.2.2. Body-worn Accessory Exposure Conditions

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	Voice	Primary	10	512	1850.2	31.0	0.746	
				661	1880.0	31.0	0.762	
				661	1880.0	31.0	0.821	2
				810	1909.8	31.0	0.736	
Front	Voice	Primary	10	512	1850.2	31.0		1
				661	1880.0	31.0	0.600	
				810	1909.8	31.0		1
Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	Voice	Secondary	10	512	1850.2	30.3		1
				661	1880.0	30.3	0.331	
				661	1880.0	30.3	0.323	2
				810	1909.8	30.5		1
Front	Voice	Secondary	10	512	1850.2	30.3		1
				661	1880.0	30.3	0.252	
				810	1909.8	30.5		1

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.
2. With headset attached.

14.2.3. Hotspot Mode Exposure Conditions

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	GPRS 2 slots	Primary	10	512	1850.2	30.0	1.040	
				661	1880.0	30.0	1.070	
				810	1909.8	30.0	1.080	
Front	GPRS 2 slots	Primary	10	512	1850.2	30.0	0.900	
				661	1880.0	30.0	0.932	
				810	1909.8	30.0	0.919	
Edge 2	GPRS 2 slots	Primary	10	512	1850.2	30.0	0.762	
				661	1880.0	30.0	0.799	
				810	1909.8	30.0	0.845	
Edge 3	GPRS 2 slots	Primary	10	512	1850.2	30.0	0.765	
				661	1880.0	30.0	0.907	
				810	1909.8	30.0	0.957	
Edge 4	GPRS 2 slots	Primary	10	512	1850.2	30.0		1
				661	1880.0	30.0	0.125	
				810	1909.8	30.0		1
Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	GPRS 2 slots	Secondary	10	512	1850.2	30.5		1
				661	1880.0	30.5	0.625	
				810	1909.8	30.5		1
Front	GPRS 2 slots	Secondary	10	512	1850.2	30.5		1
				661	1880.0	30.5	0.470	
				810	1909.8	30.5		1
Edge 1	GPRS 2 slots	Secondary	10	512	1850.2	30.5		1
				661	1880.0	30.5	0.529	
				810	1909.8	30.5		1
Edge 2	GPRS 2 slots	Secondary	10	512	1850.2	30.5		1
				661	1880.0	30.5	0.146	
				810	1909.8	30.5		1
Edge 4	GPRS 2 slots	Secondary	10	512	1850.2	30.5		1
				661	1880.0	30.5	0.406	
				810	1909.8	30.5		1

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.

14.3. W-CDMA Band V

Test reduction considerations

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 as per KDB 941225 D01

14.3.1. Head Exposure Conditions

Test Position	Mode	Antenna	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	Rel 99 RMC 12.2kbps	Primary	4132	826.4	24.5	0.665	
			4183	836.6	24.5	0.756	
			4233	846.6	24.5	0.791	
Left Tilt (15°)	Rel 99 RMC 12.2kbps	Primary	4132	826.4	24.5		1
			4183	836.6	24.5	0.435	
			4233	846.6	24.5		1
Right Touch	Rel 99 RMC 12.2kbps	Primary	4132	826.4	24.5		1
			4183	836.6	24.5	0.704	
			4233	846.6	24.5		1
Right Tilt (15°)	Rel 99 RMC 12.2kbps	Primary	4132	826.4	24.5		1
			4183	836.6	24.5	0.437	
			4233	846.6	24.5		1
Test Position	Mode	Antenna	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	Rel 99 RMC 12.2kbps	Secondary	4132	826.4	24.0	0.582	
			4183	836.6	24.0	0.797	
			4233	846.6	23.9	0.826	
Left Tilt (15°)	Rel 99 RMC 12.2kbps	Secondary	4132	826.4	24.0		1
			4183	836.6	24.0	0.620	
			4233	846.6	23.9		1
Right Touch	Rel 99 RMC 12.2kbps	Secondary	4132	826.4	24.0		1
			4183	836.6	24.0	0.501	
			4233	846.6	23.9		1
Right Tilt (15°)	Rel 99 RMC 12.2kbps	Secondary	4132	826.4	24.0		1
			4183	836.6	24.0	0.421	
			4233	846.6	23.9		1

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.

14.3.2. Body-worn Accessory & Hotspot Mode Exposure Conditions

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	Rel 99 RMC 12.2kbps	Primary	10	4132	826.4	24.5	0.811	
				4183	836.6	24.5	0.898	
				4233	846.6	24.5	0.913	
				4233	846.6	24.5	0.345	2
Front	Rel 99 RMC 12.2kbps	Primary	10	4132	826.4	24.5		1
				4183	836.6	24.5	0.743	
				4233	846.6	24.5		1
Edge 2	Rel 99 RMC 12.2kbps	Primary	10	4132	826.4	24.5		1
				4183	836.6	24.5	0.619	
				4233	846.6	24.5		1
Edge 3	Rel 99 RMC 12.2kbps	Primary	10	4132	826.4	24.5		1
				4183	836.6	24.5	0.177	
				4233	846.6	24.5		1
Edge 4	Rel 99 RMC 12.2kbps	Primary	10	4132	826.4	24.5	0.726	
				4183	836.6	24.5	0.781	
				4233	846.6	24.5	0.694	
Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	Rel 99 RMC 12.2kbps	Secondary	10	4132	826.4	24.0		1
				4183	836.6	24.0	0.303	
				4183	836.6	24.0	0.262	2
				4233	846.6	23.9		1
Front	Rel 99 RMC 12.2kbps	Secondary	10	4132	826.4	24.0		1
				4183	836.6	24.0	0.253	
				4233	846.6	23.9		1
Edge 1	Rel 99 RMC 12.2kbps	Secondary	10	4132	826.4	24.0		1
				4183	836.6	24.0	0.134	
				4233	846.6	23.9		1
Edge 2	Rel 99 RMC 12.2kbps	Secondary	10	4132	826.4	24.0		1
				4183	836.6	24.0	0.233	
				4233	846.6	23.9		1
Edge 4	Rel 99 RMC 12.2kbps	Secondary	10	4132	826.4	24.0		1
				4183	836.6	24.0	0.113	
				4233	846.6	23.9		1

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.
2. With headset attached. (The difference between the SAR values of the primary antenna without the headset and with the headset is dramatic, but this has been verified to be true through repeated testing)

14.4. W-CDMA Band II

Test reduction considerations

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 as per KDB 941225 D01

14.4.1. Head Exposure Conditions

Test Position	Mode	Antenna	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	Rel 99 RMC 12.2kbps	Primary	9262	1852.4	22.5	0.819	
			9400	1880.0	22.5	0.826	
			9538	1907.6	22.5	0.762	
Left Tilt (15°)	Rel 99 RMC 12.2kbps	Primary	9262	1852.4	22.5		1
			9400	1880.0	22.5	0.487	
			9538	1907.6	22.5		1
Right Touch	Rel 99 RMC 12.2kbps	Primary	9262	1852.4	22.5	1.130	
			9400	1880.0	22.5	1.120	
			9538	1907.6	22.5	1.040	
Right Tilt (15°)	Rel 99 RMC 12.2kbps	Primary	9262	1852.4	22.5		1
			9400	1880.0	22.5	0.426	
			9538	1907.6	22.5		1
Test Position	Mode	Antenna	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	Rel 99 RMC 12.2kbps	Secondary	9262	1852.4	21.3		1
			9400	1880.0	21.5	0.463	
			9538	1907.6	21.4		1
Left Tilt (15°)	Rel 99 RMC 12.2kbps	Secondary	9262	1852.4	21.3		1
			9400	1880.0	21.5	0.509	
			9538	1907.6	21.4		1
Right Touch	Rel 99 RMC 12.2kbps	Secondary	9262	1852.4	21.3	0.753	
			9400	1880.0	21.5	0.848	
			9538	1907.6	21.4	0.892	
Right Tilt (15°)	Rel 99 RMC 12.2kbps	Secondary	9262	1852.4	21.3		1
			9400	1880.0	21.5	0.700	
			9538	1907.6	21.4		1

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.

14.4.2. Body-worn Accessory & Hotspot Mode Exposure Conditions

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	Rel 99 RMC 12.2kbps	Primary	10	9262	1852.4	22.5	1.000	
				9400	1880.0	22.5	1.090	
				9400	1880.0	22.5	1.140	2
				9538	1907.6	22.5	1.070	
Front	Rel 99 RMC 12.2kbps	Primary	10	9262	1852.4	22.5	0.696	
				9400	1880.0	22.5	0.804	
				9538	1907.6	22.5	0.749	
Edge 2	Rel 99 RMC 12.2kbps	Primary	10	9262	1852.4	22.5		1
				9400	1880.0	22.5	0.638	
				9538	1907.6	22.5		1
Edge 3	Rel 99 RMC 12.2kbps	Primary	10	9262	1852.4	22.5	0.758	
				9400	1880.0	22.5	0.755	
				9538	1907.6	22.5	0.737	
Edge 4	Rel 99 RMC 12.2kbps	Primary	10	9262	1852.4	22.5		1
				9400	1880.0	22.5	0.119	
				9538	1907.6	22.5		1
Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	Rel 99 RMC 12.2kbps	Secondary	10	9262	1852.4	21.3		1
				9400	1880.0	21.5	0.214	
				9538	1907.6	21.4		1
Front	Rel 99 RMC 12.2kbps	Secondary	10	9262	1852.4	21.3		1
				9400	1880.0	21.5	0.285	
				9400	1880.0	21.5	0.275	2
				9538	1907.6	21.4		1
Edge 1	Rel 99 RMC 12.2kbps	Secondary	10	9262	1852.4	21.3		1
				9400	1880.0	21.5	0.193	
				9538	1907.6	21.4		1
Edge 2	Rel 99 RMC 12.2kbps	Secondary	10	9262	1852.4	21.3		1
				9400	1880.0	21.5	0.056	
				9538	1907.6	21.4		1
Edge 4	Rel 99 RMC 12.2kbps	Secondary	10	9262	1852.4	21.3		1
				9400	1880.0	21.5	0.203	
				9538	1907.6	21.4		1

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.
2. With headset attached.

14.5. LTE Band 2 (20 MHz Bandwidth)

14.5.1. Body-worn Accessory & Hotspot Mode Exposure Conditions

Test Position	Antenna	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	Primary	10	QPSK	18700	1860.0	100	0	1	21.6	0.721	
						1	0	0	22.5	1.120	
						1	49	0	22.5	0.844	
						1	99	0	22.5	0.818	
				18900	1880.0	100	0	1	21.7	0.899	
						1	0	0	22.4	0.867	
						1	49	0	22.5	1.170	
						1	99	0	22.5	1.110	2
				19100	1900.0	100	0	1	21.7	0.662	
						1	0	0	22.5	0.840	
						1	49	0	22.5	0.734	
						1	99	0	22.5	1.020	
Front	Primary	10	QPSK	18700	1860.0	100	0	1	21.6	0.616	
						1	0	0	22.5	0.930	
						1	49	0	22.5	0.734	
						1	99	0	22.5	0.698	
				18900	1880.0	100	0	1	21.7	0.714	
						1	0	0	22.4	0.729	
						1	49	0	22.5	0.941	
						1	99	0	22.5	0.764	
				19100	1900.0	100	0	1	21.7	0.554	
						1	0	0	22.5	0.695	
						1	49	0	22.5	0.614	
						1	99	0	22.5	0.811	
Edge 2	Primary	10	QPSK	18700	1860.0	100	0	1	21.6	0.617	
						1	0	0	22.5	0.846	
						1	49	0	22.5	0.846	
						1	99	0	22.5	0.719	
				18900	1880.0	100	0	1	21.7	0.683	
						1	0	0	22.4	0.713	
						1	49	0	22.5	0.906	
						1	99	0	22.5	0.818	
				19100	1900.0	100	0	1	21.7	0.590	
						1	0	0	22.5	0.732	
						1	49	0	22.5	0.800	
						1	99	0	22.5	0.704	
Edge 3	Primary	10	QPSK	18700	1860.0	100	0	1	21.6	0.606	
						1	0	0	22.5	0.949	
						1	49	0	22.5	0.742	
						1	99	0	22.5	0.657	
				18900	1880.0	100	0	1	21.7	0.717	
						1	0	0	22.4	0.654	
						1	49	0	22.5	0.892	
						1	99	0	22.5	0.813	
				19100	1900.0	100	0	1	21.7	0.621	
						1	0	0	22.5	0.880	
						1	49	0	22.5	0.695	
						1	99	0	22.5	1.030	
Edge 4	Primary	10	QPSK	18900	1880.0	100	0	1	21.7	0.094	
						1	0	0	22.4	0.068	
						1	49	0	22.5	0.114	
						1	99	0	22.5	0.093	

Body-worn Accessory & Hotspot Mode Exposure Conditions (continued)

Test Position	Antenna	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	Seconadry	10	QPSK	18900	1880.0	100	0	1	21.9	0.428	
						1	0	0	23.0	0.564	
						1	0	0	23.0	0.560	2
						1	49	0	22.8	0.503	
						1	99	0	22.8	0.517	
Front	Seconadry	10	QPSK	18900	1880.0	100	0	1	21.9	0.224	
						1	0	0	23.0	0.345	
						1	49	0	22.8	0.273	
						1	99	0	22.8	0.262	
Edge 1	Seconadry	10	QPSK	18900	1880.0	100	0	1	21.9	0.183	
						1	0	0	23.0	0.221	
						1	49	0	22.8	0.192	
						1	99	0	22.8	0.240	
Edge 2	Seconadry	10	QPSK	18900	1880.0	100	0	1	21.9	0.083	
						1	0	0	23.0	0.141	
						1	49	0	22.8	0.111	
						1	99	0	22.8	0.128	
Edge 4	Seconadry	10	QPSK	18900	1880.0	100	0	1	21.9	0.185	
						1	0	0	23.0	0.245	
						1	49	0	22.8	0.210	
						1	99	0	22.8	0.216	

Note(s):

- Per KDB 941225 D05 SAR for LTE Devices v02, SAR test reduction are applied using the following criteria:
 - Testing for 50% RB Allocations is not required because the measured SAR for 100% RB allocation is < 1.2 W/Kg and its output power is not more than 0.5 dB higher than that of 100% RB allocation.
 - Testing for 16-QAM modulation is not required because the measured SAR for QPSK is < 1.2 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 measured SAR for the highest channel bandwidth is < 1.2 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.
- With headset attached.

14.5.2. Additional Test for QPSK with 50%RB Allocation

Test Position	Antenna	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note						
Rear	Primary	10	QPSK	18700	1860.0	50	24	1	21.7	0.812							
				18900	1880.0	50	0	1	21.7	0.852							
				18900	1880.0	50	24	1	21.7	0.965							
				18900	1880.0	50	49	1	21.7	1.020							
Front	Primary	10	QPSK	19100	1900.0	50	0	1	21.7	0.687							
				18700	1860.0	50	24	1	21.7	0.677							
				18900	1880.0	50	0	1	21.7	0.628							
				18900	1880.0	50	24	1	21.7	0.793							
Edge 2	Primary	10	QPSK	18900	1880.0	50	49	1	21.7	0.640							
						50	0	1	21.7	0.670							
						50	24	1	21.7	0.551							
Edge 3	Primary	10	QPSK	18900	1880.0	50	49	1	21.7	0.539							
						50	0	1	21.7	0.725							
						50	24	1	21.7	0.720							
Edge 4	Primary	10	QPSK	18900	1880.0	50	49	1	21.7	0.735							
						50	0	1	21.7	0.103							
						50	24	1	21.7	0.096							
						50	49	1	21.7	0.092							
												50	0	1	21.7	0.370	
												50	24	1	21.9	0.364	
Rear	Secondary	10	QPSK	18900	1880.0							50	49	1	21.8	0.374	
												50	0	1	22.0	0.253	
												50	24	1	21.9	0.272	
Front	Secondary	10	QPSK	18900	1880.0							50	49	1	21.8	0.246	
												50	0	1	22.0	0.204	
												50	24	1	21.9	0.191	
Edge 1	Secondary	10	QPSK	18900	1880.0							50	49	1	21.8	0.196	
												50	0	1	22.0	0.098	
												50	24	1	21.9	0.070	
Edge 2	Secondary	10	QPSK	18900	1880.0							50	49	1	21.8	0.076	
												50	0	1	22.0	0.176	
												50	24	1	21.9	0.161	
Edge 4	Secondary	10	QPSK	18900	1880.0							50	49	1	21.8	0.162	

14.6. LTE Band 4 (20 MHz Bandwidth)

14.6.1. Body-worn Accessory & Hotspot Mode Exposure Conditions

Test Position	Antenna	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	Primary	10	QPSK	20050	1720.0	100	0	1	23.2	0.935	
						1	0	0	23.8	0.906	
						1	49	0	23.9	1.050	
						1	99	0	23.9	0.931	
	Primary	10	QPSK	20175	1732.5	100	0	1	23.1	0.925	
						1	0	0	23.9	1.010	
						1	49	0	23.9	1.180	2
						1	49	0	23.9	1.140	
	Primary	10	QPSK	20300	1745.0	100	0	1	23.2	0.843	
						1	0	0	23.9	1.010	
						1	49	0	23.9	0.992	
						1	99	0	23.8	1.160	
Front	Primary	10	QPSK	20050	1720.0	100	0	1	23.2	0.763	
						1	0	0	23.8	0.760	
						1	49	0	23.9	0.986	
						1	99	0	23.9	1.180	
	Primary	10	QPSK	20175	1732.5	100	0	1	23.1	0.976	
						1	0	0	23.9	1.170	
						1	49	0	23.9	1.060	
						1	99	0	23.9	0.989	
	Primary	10	QPSK	20300	1745.0	100	0	1	23.2	0.776	
						1	0	0	23.9	1.070	
						1	49	0	23.9	0.908	
						1	99	0	23.8	1.020	
Edge 2	Primary	10	QPSK	20050	1720.0	100	0	1	23.2	0.499	
						1	0	0	23.8	0.489	
						1	49	0	23.9	0.610	
						1	99	0	23.9	0.760	
	Primary	10	QPSK	20175	1732.5	100	0	1	23.1	0.565	
						1	0	0	23.9	0.761	
						1	49	0	23.9	0.718	
						1	99	0	23.9	0.592	
	Primary	10	QPSK	20300	1745.0	100	0	1	23.2	0.566	
						1	0	0	23.9	0.683	
						1	49	0	23.9	0.672	
						1	99	0	23.8	0.735	
Edge 3	Primary	10	QPSK	20050	1720.0	100	0	1	23.2	0.604	
						1	0	0	23.8	0.580	
						1	49	0	23.9	0.832	
						1	99	0	23.9	1.100	
	Primary	10	QPSK	20175	1732.5	100	0	1	23.1	0.734	
						1	0	0	23.9	0.908	
						1	49	0	23.9	0.965	
						1	99	0	23.9	0.688	
	Primary	10	QPSK	20300	1745.0	100	0	1	23.2	0.700	
						1	0	0	23.9	0.893	
						1	49	0	23.9	0.776	
						1	99	0	23.8	1.010	
Edge 4	Primary	10	QPSK	20175	1732.5	100	0	1	23.1	0.051	
						1	0	0	23.9	0.058	
						1	49	0	23.9	0.050	
						1	99	0	23.9	0.040	

Body-worn Accessory & Hotspot Mode Exposure Conditions (continued)

Test Position	Antenna	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	Secondary	10	QPSK	20175	1732.5	100	0	1	22.3	0.440	
						1	0	0	23.0	0.495	
						1	49	0	23.0	0.583	
						1	49	0	23.0	0.543	2
						1	99	0	23.0	0.537	
Front	Secondary	10	QPSK	20175	1732.5	100	0	1	22.3	0.250	
						1	0	0	23.0	0.243	
						1	49	0	23.0	0.309	
						1	99	0	23.0	0.310	
Edge 1	Secondary	10	QPSK	20175	1732.5	100	0	1	22.3	0.311	
						1	0	0	23.0	0.367	
						1	49	0	23.0	0.419	
						1	99	0	23.0	0.399	
Edge 2	Secondary	10	QPSK	20175	1732.5	100	0	1	22.3	0.057	
						1	0	0	23.0	0.057	
						1	49	0	23.0	0.070	
						1	99	0	23.0	0.075	
Edge 4	Secondary	10	QPSK	20175	1732.5	100	0	1	22.3	0.213	
						1	0	0	23.0	0.228	
						1	49	0	23.0	0.179	
						1	99	0	23.0	0.180	

Note(s):

- Per KDB 941225 D05 SAR for LTE Devices v02, SAR test reduction are applied using the following criteria:
 - Testing for 16-QAM modulation is not required because the measured SAR for QPSK is < 1.2 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 measured SAR for the highest channel bandwidth is < 1.2 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.
- With headset attached.

14.6.2. Additional Test for QPSK with 50%RB Allocation

Test Position	Antenna	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	Primary	10	QPSK	20050	1720.0	50	0	1	23.2	0.799	
				20175	1732.5	50	0	1	23.0	0.991	
						50	24	1	23.1	0.874	
				50	49	1	23.1	1.000			
20300	1745.0	50	24	1	23.3	0.739					
Front	Primary	10	QPSK	20050	1720.0	50	0	1	23.2	0.773	
				20175	1732.5	50	0	1	23.0	0.936	
						50	24	1	23.1	0.871	
				50	49	1	23.1	0.779			
20300	1745.0	50	24	1	23.3	0.765					
Edge 2	Primary	10	QPSK	20175	1732.5	50	0	1	23.0	0.604	
						50	24	1	23.1	0.553	
						50	49	1	23.1	0.532	
Edge 3	Primary	10	QPSK	20050	1720.0	50	0	1	23.2	0.598	
				20175	1732.5	50	0	1	23.0	0.836	
						50	24	1	23.1	0.789	
				50	49	1	23.1	0.629			
20300	1745.0	50	24	1	23.3	0.603					
Edge 4	Primary	10	QPSK	20175	1732.5	50	0	1	23.0	0.00658	
						50	24	1	23.1	0.00734	
						50	49	1	23.1	0.00634	
Test Position	Antenna	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	Secondary	10	QPSK	20175	1732.5	50	0	1	22.3	0.372	
						50	24	1	22.4	0.373	
						50	49	1	22.4	0.373	
Front	Secondary	10	QPSK	20175	1732.5	50	0	1	22.3	0.263	
						50	24	1	22.4	0.285	
						50	49	1	22.4	0.269	
Edge 1	Secondary	10	QPSK	20175	1732.5	50	0	1	22.3	0.199	
						50	24	1	22.4	0.206	
						50	49	1	22.4	0.214	
Edge 2	Secondary	10	QPSK	20175	1732.5	50	0	1	22.3	0.041	
						50	24	1	22.4	0.043	
						50	49	1	22.4	0.042	
Edge 4	Secondary	10	QPSK	20175	1732.5	50	0	1	22.3	0.132	
						50	24	1	22.4	0.147	
						50	49	1	22.4	0.142	

14.6.3. Additional Test for Head Exposure Conditions

Test Position	Antenna	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	Primary	QPSK	20175	1732.5	1	0	0	23.9	0.736	
					1	49	0	23.9	0.656	
					1	99	0	23.9	0.522	
					50	0	1	23.0	0.741	
					50	24	1	23.1	0.660	
					50	49	1	23.1	0.597	
					100	0	1	23.1	0.667	
Left Tilt (15°)	Primary	QPSK	20175	1732.5	1	0	0	23.9	0.416	
					1	49	0	23.9	0.336	
					1	99	0	23.9	0.331	
					50	0	1	23.0	0.348	
					50	24	1	23.1	0.306	
					50	49	1	23.1	0.281	
					100	0	1	23.1	0.311	
Right Touch	Primary	QPSK	20050	1720.0	1	0	0	23.8	0.896	
					1	49	0	23.9	1.120	
					1	99	0	23.9	1.240	
					50	0	1	23.2	1.140	
					50	24	1	23.1	1.060	
					50	49	1	23.2	0.920	
					100	0	1	23.2	0.929	
			20175	1732.5	1	0	0	23.9	1.030	
					1	49	0	23.9	1.180	
					1	99	0	23.9	1.190	
					50	0	1	23.0	1.060	
					50	24	1	23.1	1.080	
					50	49	1	23.1	0.848	
					100	0	1	23.1	1.120	
			20300	1745.0	1	0	0	23.9	1.090	
					1	49	0	23.9	0.994	
					1	99	0	23.8	1.240	
					50	0	1	23.2	1.050	
					50	24	1	23.3	1.030	
					50	49	1	23.3	0.849	
					100	0	1	23.2	1.030	
Right Tilt (15°)	Primary	QPSK	20175	1732.5	1	0	0	23.9	0.395	
					1	49	0	23.9	0.361	
					1	99	0	23.9	0.283	
					50	0	1	23.0	0.306	
					50	24	1	23.1	0.263	
					50	49	1	23.1	0.250	
					100	0	1	23.1	0.271	

Additional Test for Head Exposure Conditions (continued)

Test Position	Antenna	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	Secondary	QPSK	20050	1720.0	1	0	0	22.9	0.793	
					1	49	0	22.9	0.782	
					1	99	0	23.0	0.956	
					50	49	1	22.0	0.717	
					100	0	1	22.0	0.666	
			20175	1732.5	1	0	0	23.0	0.994	
					1	49	0	23.0	1.120	
					1	99	0	23.0	1.090	
					50	0	1	22.3	0.915	
					50	24	1	22.4	0.980	
			20300	1745.0	50	49	1	22.4	0.944	
					100	0	1	22.3	0.947	
					1	0	0	23.0	1.050	
					1	49	0	23.0	0.894	
					1	99	0	23.0	0.805	
Left Tilt (15°)	Secondary	QPSK	20050	1720.0	50	24	1	22.5	0.760	
					100	0	1	22.4	0.750	
					1	0	0	22.9	0.823	
					1	49	0	22.9	0.895	
					1	99	0	23.0	1.070	
			20175	1732.5	50	1	1	21.8	0.679	
					50	24	1	21.8	0.723	
					50	49	1	22.0	0.807	
					100	0	1	22.0	0.769	
					1	0	0	23.0	0.936	
			20300	1745.0	1	49	0	23.0	1.100	
					1	99	0	23.0	0.989	
					50	0	1	22.3	0.860	
					50	24	1	22.4	0.912	
					50	49	1	22.4	0.901	
		100	0	1	22.3	0.884				
		1	0	0	23.0	1.100				
		1	49	0	23.0	0.944				
		1	99	0	23.0	0.869				
		50	1	1	22.4	0.913				
		50	24	1	22.5	0.866				
		50	49	1	22.4	0.787				
		100	0	1	22.4	0.852				

Additional Test for Head Exposure Conditions (continued)

Test Position	Antenna	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Right Touch	Secondary	QPSK	20050	1720.0	1	0	0	22.9	1.220	
					1	49	0	22.9	1.120	
					1	99	0	23.0	1.070	
					50	49	1	22.0	0.972	
					100	0	1	22.0	0.948	
					1	0	0	23.0	0.887	
			20175	1732.5	1	49	0	23.0	1.140	
					1	99	0	23.0	1.150	
					50	0	1	22.3	0.852	
					50	24	1	22.4	0.985	
					50	49	1	22.4	1.010	
					100	0	1	22.3	0.974	
			20300	1745.0	1	0	0	23.0	1.150	
					1	49	0	23.0	1.250	
					1	99	0	23.0	1.180	
					50	0	1	22.4	1.000	
					50	24	1	22.5	1.050	
					50	49	1	22.4	1.000	
Right Tilt (15°)	Secondary	QPSK	20050	1720.0	1	0	0	22.9	0.934	
					1	49	0	22.9	0.918	
					1	99	0	23.0	1.050	
					50	0	1	21.8	0.676	
					50	24	1	21.8	0.684	
					50	49	1	22.0	0.773	
			20175	1732.5	100	0	1	22.0	0.869	
					1	0	0	23.0	0.898	
					1	49	0	23.0	1.080	
					1	99	0	23.0	0.967	
					50	0	1	22.3	0.833	
					50	24	1	22.4	0.902	
			20300	1745.0	50	49	1	22.4	0.871	
					100	0	1	22.3	0.848	
					1	0	0	23.0	1.190	
					1	49	0	23.0	1.040	
					1	99	0	23.0	1.020	
					50	0	1	22.4	0.938	
50	24	1	22.5	0.873						
50	49	1	22.4	0.791						
100	0	1	22.4	0.941						

14.7. LTE Band 5 (10 MHz Bandwidth)

14.7.1. Body-worn Accessory & Hotspot Mode Exposure Conditions

Test Position	Antenna	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	Primary	10	QPSK	20525	836.5	50	0	1	23.1	0.530	
						1	0	0	24.0	0.600	
						1	24	0	24.0	0.617	
						1	49	0	24.0	0.627	
Front	Primary	10	QPSK	20525	836.5	50	0	1	23.1	0.601	
						1	0	0	24.0	0.693	
						1	24	0	24.0	0.724	
						1	24	0	24.0	0.344	2
Edge 2	Primary	10	QPSK	20525	836.5	50	0	1	23.1	0.274	
						1	0	0	24.0	0.404	
						1	24	0	24.0	0.425	
						1	49	0	24.0	0.414	
Edge 3	Primary	10	QPSK	20525	836.5	50	0	1	23.1	0.089	
						1	0	0	24.0	0.096	
						1	24	0	24.0	0.109	
						1	49	0	24.0	0.111	
Edge 4	Primary	10	QPSK	20525	836.5	50	0	1	23.1	0.350	
						1	0	0	24.0	0.385	
						1	24	0	24.0	0.426	
						1	49	0	24.0	0.425	
Test Position	Antenna	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	Secondary	10	QPSK	20525	836.5	50	0	1	22.7	0.153	
						1	0	0	23.4	0.171	
						1	24	0	23.4	0.186	
						1	24	0	23.4	0.172	2
						1	49	0	23.5	0.130	
Front	Secondary	10	QPSK	20525	836.5	50	0	1	22.7	0.130	
						1	0	0	23.4	0.145	
						1	24	0	23.4	0.167	
						1	49	0	23.5	0.118	
Edge 1	Secondary	10	QPSK	20525	836.5	50	0	1	22.7	0.088	
						1	0	0	23.4	0.094	
						1	24	0	23.4	0.113	
						1	49	0	23.5	0.078	
Edge 2	Secondary	10	QPSK	20525	836.5	50	0	1	22.7	0.138	
						1	0	0	23.4	0.153	
						1	24	0	23.4	0.168	
						1	49	0	23.5	0.115	
Edge 4	Secondary	10	QPSK	20525	836.5	50	0	1	22.7	0.044	
						1	0	0	23.4	0.048	
						1	24	0	23.4	0.054	
						1	49	0	23.5	0.036	

Note(s):

1. Per KDB 941225 D05 SAR for LTE Devices v02, SAR test reduction are applied using the following criteria:
 - Testing for 16-QAM modulation is not required because the measured SAR for QPSK is < 1.2 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 measured SAR for the highest channel bandwidth is < 1.2 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.
2. With headset attached. (The difference between the SAR values of the primary antenna without the headset and with the headset is dramatic, but this has been verified to be true through repeated testing)

14.7.2. Additional Test for QPSK with 50%RB Allocation

Test Position	Antenna	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	Primary	10	QPSK	20525	836.5	25	0	1	23.1	0.519	
						25	12	1	23.1	0.526	
						25	24	1	23.1	0.523	
Front	Primary	10	QPSK	20525	836.5	25	0	1	23.1	0.511	
						25	12	1	23.1	0.512	
						25	24	1	23.1	0.512	
Edge 2	Primary	10	QPSK	20525	836.5	25	0	1	23.1	0.287	
						25	12	1	23.1	0.285	
						25	24	1	23.1	0.285	
Edge 3	Primary	10	QPSK	20525	836.5	25	0	1	23.1	0.069	
						25	12	1	23.1	0.078	
						25	24	1	23.1	0.074	
Edge 4	Primary	10	QPSK	20525	836.5	25	0	1	23.1	0.330	
						25	12	1	23.1	0.290	
						25	24	1	23.1	0.345	
Test Position	Antenna	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	Secondary	10	QPSK	20525	836.5	25	0	1	22.7	0.169	
						25	12	1	22.7	0.155	
						25	24	1	22.8	0.165	
Front	Secondary	10	QPSK	20525	836.5	25	0	1	22.7	0.139	
						25	12	1	22.7	0.132	
						25	24	1	22.8	0.135	
Edge 1	Secondary	10	QPSK	20525	836.5	25	0	1	22.7	0.099	
						25	12	1	22.7	0.116	
						25	24	1	22.8	0.128	
Edge 2	Secondary	10	QPSK	20525	836.5	25	0	1	22.7	0.131	
						25	12	1	22.7	0.155	
						25	24	1	22.8	0.134	
Edge 4	Secondary	10	QPSK	20525	836.5	25	0	1	22.7	0.056	
						25	12	1	22.7	0.058	
						25	24	1	22.8	0.055	

14.8. LTE Band 17 (10 MHz Bandwidth)

14.8.1. Body-worn Accessory & Hotspot Mode Exposure Conditions

Test Position	Antenna	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	Primary	10	QPSK	23790	710.0	50	0	1	23.0	0.455	
						1	0	0	24.0	0.536	
						1	24	0	24.0	0.527	
						1	49	0	24.0	0.538	
Front	Primary	10	QPSK	23790	710.0	50	0	1	23.0	0.466	
						1	0	0	24.0	0.546	
						1	24	0	24.0	0.547	
						1	24	0	24.0	0.358	2
Edge 2	Primary	10	QPSK	23790	710.0	50	0	1	23.0	0.250	
						1	0	0	24.0	0.293	
						1	24	0	24.0	0.294	
						1	49	0	24.0	0.321	
Edge 3	Primary	10	QPSK	23790	710.0	50	0	1	23.0	0.078	
						1	0	0	24.0	0.099	
						1	24	0	24.0	0.090	
						1	49	0	24.0	0.092	
Edge 4	Primary	10	QPSK	23790	710.0	50	0	1	23.0	0.258	
						1	0	0	24.0	0.289	
						1	24	0	24.0	0.314	
						1	49	0	24.0	0.317	
Test Position	Antenna	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	Secondary	10	QPSK	23790	710.0	50	0	1	22.6	0.131	
						1	0	0	23.4	0.152	
						1	24	0	23.4	0.143	
						1	49	0	23.5	0.233	
Front	Secondary	10	QPSK	23790	710.0	50	0	1	22.6	0.121	
						1	0	0	23.4	0.136	
						1	24	0	23.4	0.130	
						1	49	0	23.5	0.203	
Edge 1	Secondary	10	QPSK	23790	710.0	50	0	1	22.6	0.071	
						1	0	0	23.4	0.084	
						1	24	0	23.4	0.070	
						1	49	0	23.5	0.110	
Edge 2	Secondary	10	QPSK	23790	710.0	50	0	1	22.6	0.072	
						1	0	0	23.4	0.088	
						1	24	0	23.4	0.076	
						1	49	0	23.5	0.112	
Edge 4	Secondary	10	QPSK	23790	710.0	50	0	1	22.6	0.042	
						1	0	0	23.4	0.054	
						1	24	0	23.4	0.050	
						1	49	0	23.5	0.082	

Note(s):

1. Per KDB 941225 D05 SAR for LTE Devices v02, SAR test reduction are applied using the following criteria:
 - Testing for 16-QAM modulation is not required because the measured SAR for QPSK is < 1.2 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 measured SAR for the highest channel bandwidth is < 1.2 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.
2. With headset attached.

14.8.2. Additional Test for QPSK with 50%RB Allocation

Test Position	Antenna	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	Primary	10	QPSK	23790	710.0	25	0	1	23.0	0.438	
						25	12	1	23.0	0.446	
						25	24	1	23.0	0.447	
Front	Primary	10	QPSK	23790	710.0	25	0	1	23.0	0.436	
						25	12	1	23.0	0.441	
						25	24	1	23.0	0.428	
Edge 2	Primary	10	QPSK	23790	710.0	25	0	1	23.0	0.226	
						25	12	1	23.0	0.230	
						25	24	1	23.0	0.237	
Edge 3	Primary	10	QPSK	23790	710.0	25	0	1	23.0	0.064	
						25	12	1	23.0	0.064	
						25	24	1	23.0	0.061	
Edge 4	Primary	10	QPSK	23790	710.0	25	0	1	23.0	0.257	
						25	12	1	23.0	0.256	
						25	24	1	23.0	0.249	
Test Position	Antenna	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	Secondary	10	QPSK	23790	710.0	25	0	1	22.5	0.120	
						25	12	1	22.6	0.126	
						25	24	1	22.7	0.138	
Front	Secondary	10	QPSK	23790	710.0	25	0	1	22.5	0.092	
						25	12	1	22.6	0.097	
						25	24	1	22.7	0.114	
Edge 1	Secondary	10	QPSK	23790	710.0	25	0	1	22.5	0.047	
						25	12	1	22.6	0.043	
						25	24	1	22.7	0.055	
Edge 2	Secondary	10	QPSK	23790	710.0	25	0	1	22.5	0.058	
						25	12	1	22.6	0.060	
						25	24	1	22.7	0.065	
Edge 4	Secondary	10	QPSK	23790	710.0	25	0	1	22.5	0.042	
						25	12	1	22.6	0.040	
						25	24	1	22.7	0.052	

14.9. Wi-Fi (2.4 GHz Band)

14.9.1. Head Exposure Conditions (WiFi BOM #1)

Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	802.11b	1	2412	16.0		1
		6	2437	16.0	0.205	
		11	2462	16.0		1
Left Tilt (15°)	802.11b	1	2412	16.0		1
		6	2437	16.0	0.131	
		11	2462	16.0		1
Right Touch	802.11b	1	2412	16.0		1
		6	2437	16.0	0.572	
		11	2462	16.0		1
Right Tilt (15°)	802.11b	1	2412	16.0		1
		6	2437	16.0	0.326	
		11	2462	16.0		1

14.9.2. Body-worn Accessory & Hotspot Mode Exposure Conditions (WiFi BOM #1)

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	802.11b	10	1	2412	16.0		1
			6	2437	16.0	0.190	
			6	2437	16.0	0.198	2
			11	2462	16.0		1
Front	802.11b	10	1	2412	16.0		1
			6	2437	16.0	0.083	
			11	2462	16.0		1
Edge 1	802.11b	10	1	2412	16.0		1
			6	2437	16.0	0.084	
			11	2462	16.0		1
Edge 2	802.11b	10	1	2412	16.0		1
			6	2437	16.0	0.022	
			11	2462	16.0		1
Edge 4	802.11b	10	1	2412	16.0		1
			6	2437	16.0	0.170	
			11	2462	16.0		1

Note(s):

- When the 1-g SAR for the mid-band channel or the channel with the highest output power satisfy the following conditions, testing of the other channels in the band is not required. (Per KDB 447498 D01 General RF Exposure Guidance v05)
 ≤ 0.8 W/kg and transmission band ≤ 100 MHz
 ≤ 0.6 W/kg and, 100 MHz < transmission bandwidth ≤ 200 MHz
 ≤ 0.4 W/kg and transmission band > 200 MHz
- With headset attached.

Worst Case Spot Check (WiFi BOM #2)

Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Right Touch	802.11b	1	2412	16.0		1
		6	2437	16.0	0.567	
		11	2462	16.0		1

Worst Case Spot Check (WiFi BOM #3)

Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Right Touch	802.11b	1	2412	16.0		1
		6	2437	16.0	0.527	
		11	2462	16.0		1

Note(s):

- When the 1-g SAR for the mid-band channel or the channel with the highest output power satisfy the following conditions, testing of the other channels in the band is not required. (Per KDB 447498 D01 General RF Exposure Guidance v05)
 ≤ 0.8 W/kg and transmission band ≤ 100 MHz
 ≤ 0.6 W/kg and, 100 MHz < transmission bandwidth ≤ 200 MHz
 ≤ 0.4 W/kg and transmission band > 200 MHz
- With headset attached.

14.10. Wi-Fi (5 GHz Bands)

14.10.1. Head Exposure Conditions (WiFi BOM #1)

Band (GHz)	Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
5.2	Left Touch	802.11a	36	5180	14.0	0.385	
			48	5240	14.0	0.440	
	Left Tilt (15°)	802.11a	36	5180	14.0	0.471	
			48	5240	14.0	0.456	
	Right Touch	802.11a	36	5180	14.0	0.465	
			48	5240	14.0	0.594	
Right Tilt (15°)	802.11a	36	5180	14.0	0.461		
		48	5240	14.0	0.566		
5.3	Left Touch	802.11a	52	5260	13.5	0.384	
			64	5320	13.5	0.373	
	Left Tilt (15°)	802.11a	52	5260	13.5	0.350	
			64	5320	13.5	0.323	
	Right Touch	802.11a	52	5260	13.5	0.538	
			64	5320	13.5	0.516	
Right Tilt (15°)	802.11a	52	5260	13.5	0.474		
		64	5320	13.5	0.412		
5.5	Left Touch	802.11a	104	5520	12.0	0.457	
			116	5580	12.0	0.472	
			124	5620	12.0	0.492	
			136	5680	12.0	0.460	
	Left Tilt (15°)	802.11a	104	5520	12.0	0.419	
			116	5580	12.0	0.516	
			124	5620	12.0	0.498	
			136	5680	12.0	0.530	
	Right Touch	802.11a	104	5520	12.0	0.537	
			116	5580	12.0	0.574	
			124	5620	12.0	0.554	
			136	5680	12.0	0.593	
Right Tilt (15°)	802.11a	104	5520	12.0	0.472		
		116	5580	12.0	0.547		
		124	5620	12.0	0.579		
		136	5680	12.0	0.559		
5.8	Left Touch	802.11a	149	5745	13.0	0.496	
			157	5785	13.0	0.559	
			165	5825	13.0	0.457	
	Left Tilt (15°)	802.11a	149	5745	13.0	0.439	
			157	5785	13.0	0.543	
			165	5825	13.0	0.546	
	Right Touch	802.11a	149	5745	13.0	0.543	
			157	5785	13.0	0.580	
			165	5825	13.0	0.508	
	Right Tilt (15°)	802.11a	149	5745	13.0	0.577	
			157	5785	13.0	0.572	
			165	5825	13.0	0.461	

14.10.2. Body-worn Accessory Exposure Conditions (WiFi BOM #1)

Band (GHz)	Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
5.2	Rear	10	802.11a	36	5180	14.0	0.050	
				48	5240	14.0	0.038	
	Front	10	802.11a	36	5180	14.0	0.059	
				48	5240	14.0	0.065	
				48	5240	14.0	0.065	1
5.3	Rear	10	802.11a	52	5260	13.5	0.056	
				64	5320	13.5	0.068	
	Front	10	802.11a	52	5260	13.5	0.048	
				64	5320	13.5	0.071	
				64	5320	13.5	0.053	1
5.5	Rear	10	802.11a	104	5520	12.0	0.076	
				116	5580	12.0	0.060	
				124	5620	12.0	0.047	
				136	5680	12.0	0.049	
	Front	10	802.11a	104	5520	12.0	0.070	
				116	5580	12.0	0.067	
				124	5620	12.0	0.085	
				124	5620	12.0	0.084	1
5.8	Rear	10	802.11a	149	5745	13.0	0.051	
				157	5785	13.0	0.042	
				165	5825	13.0	0.038	
	Front	10	802.11a	149	5745	13.0	0.067	
				149	5745	13.0	0.062	1
				157	5785	13.0	0.059	
				165	5825	13.0	0.056	

Note(s):

1. With headset attached.

Worst Case Spot Check (WiFi BOM #2)

Band (GHz)	Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
5.2	Left Touch	802.11a	48	5240	14.0	0.582	
5.3	Right Touch	802.11a	52	5260	13.5	0.491	
5.5	Right Touch	802.11a	136	5680	12.0	0.572	
5.8	Right Touch	802.11a	157	5785	13.0	0.452	

Worst Case Spot Check (WiFi BOM #3)

Band (GHz)	Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
5.2	Left Touch	802.11a	48	5240	14.0	0.585	
5.3	Right Touch	802.11a	52	5260	13.5	0.510	
5.5	Right Touch	802.11a	136	5680	12.0	0.536	
5.8	Right Touch	802.11a	157	5785	13.0	0.477	

14.11. Bluetooth

14.11.1. Body-worn Accessory Exposure Conditions

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	GFSK	10	0	2402	13.2		1
			39	2441	13.4	0.109	
			78	2480	13.4		1
Front	GFSK	10	0	2402	13.2		1
			39	2441	13.4	0.045	
			78	2480	13.4		1

Note(s):

- When the 1-g SAR for the mid-band channel or the channel with the highest output power satisfy the following conditions, testing of the other channels in the band is not required. (Per KDB 447498 D01 General RF Exposure Guidance v05)
 - ≤ 0.8 W/kg and transmission band ≤ 100 MHz
 - ≤ 0.6 W/kg and, 100 MHz < transmission bandwidth ≤ 200 MHz
 - ≤ 0.4 W/kg and transmission band > 200 MHz

15. SAR Test Results (Model A1429)

15.1. GSM850

15.1.1. Head Exposure Conditions

Test Position	Mode	Antenna	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	Voice	Primary	128	824.20	33.5		1
			190	836.60	33.5	0.737	
			251	848.80	33.5		1
Left Tilt (15°)	Voice	Primary	128	824.20	33.5		1
			190	836.60	33.5	0.370	
			251	848.80	33.5		1
Right Touch	Voice	Primary	128	824.20	33.5		1
			190	836.60	33.5	0.702	
			251	848.80	33.5		1
Right Tilt (15°)	Voice	Primary	128	824.20	33.5		1
			190	836.60	33.5	0.402	
			251	848.80	33.5		1
Test Position	Mode	Antenna	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	Voice	Secondary	128	824.20	33.0		1
			190	836.60	33.0	0.675	
			251	848.80	33.0		1
Left Tilt (15°)	Voice	Secondary	128	824.20	33.0		1
			190	836.60	33.0	0.619	
			251	848.80	33.0		1
Right Touch	Voice	Secondary	128	824.20	33.0		1
			190	836.60	33.0	0.433	
			251	848.80	33.0		1
Right Tilt (15°)	Voice	Secondary	128	824.20	33.0		1
			190	836.60	33.0	0.397	
			251	848.80	33.0		1

Note(s):

- SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel is optional.

15.1.2. Body-worn Accessory Exposure Conditions

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	Voice	Primary	10	128	824.20	33.5	0.702	
				190	836.60	33.5	0.821	
				251	848.80	33.5	0.866	
				251	848.80	33.5	0.425	2
Front	Voice	Primary	10	128	824.20	33.5		1
				190	836.60	33.5	0.739	
				251	848.80	33.5		1
Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	Voice	Secondary	10	128	824.20	33.0		1
				190	836.60	33.0	0.236	
				190	836.60	33.0	0.235	2
				251	848.80	33.0		1
Front	Voice	Secondary	10	128	824.20	33.0		1
				190	836.60	33.0	0.184	
				251	848.80	33.0		1

Note(s):

1. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel is optional.
2. With headset attached. (The difference between the SAR values of the primary antenna without the headset and with the headset is dramatic, but this has been verified to be true through repeated testing)

15.1.3. Hotspot Mode Exposure Conditions

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	GPRS 2 slots	Primary	10	128	824.20	31.5	0.867	
				190	836.60	31.5	0.940	
				251	848.80	31.4	1.040	
Front	GPRS 2 slots	Primary	10	128	824.20	31.5	0.822	
				190	836.60	31.5	0.844	
				251	848.80	31.4	0.950	
Edge 2	GPRS 2 slots	Primary	10	128	824.20	31.5		1
				190	836.60	31.5	0.553	
				251	848.80	31.4		1
Edge 3	GPRS 2 slots	Primary	10	128	824.20	31.5		1
				190	836.60	31.5	0.133	
				251	848.80	31.4		1
Edge 4	GPRS 2 slots	Primary	10	128	824.20	31.5		1
				190	836.60	31.5	0.676	
				251	848.80	31.4		1
Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	GPRS 2 slots	Secondary	10	128	824.20	32.4		1
				190	836.60	32.5	0.442	
				251	848.80	32.4		1
Front	GPRS 2 slots	Secondary	10	128	824.20	32.4		1
				190	836.60	32.5	0.353	
				251	848.80	32.4		1
Edge 1	GPRS 2 slots	Secondary	10	128	824.20	32.4		1
				190	836.60	32.5	0.227	
				251	848.80	32.4		1
Edge 2	GPRS 2 slots	Secondary	10	128	824.20	32.4		1
				190	836.60	32.5	0.350	
				251	848.80	32.4		1
Edge 4	GPRS 2 slots	Secondary	10	128	824.20	32.4		1
				190	836.60	32.5	0.121	
				251	848.80	32.4		1

Note(s):

- SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel is optional.

15.2. GSM1900

15.2.1. Head Exposure Conditions

Test Position	Mode	Antenna	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	Voice	Primary	512	1850.2	31.0		1
			661	1880.0	31.0	0.452	
			810	1909.8	31.0		1
Left Tilt (15°)	Voice	Primary	512	1850.2	31.0		1
			661	1880.0	31.0	0.254	
			810	1909.8	31.0		1
Right Touch	Voice	Primary	512	1850.2	31.0	0.759	
			661	1880.0	31.0	0.815	
			810	1909.8	31.0	0.895	
Right Tilt (15°)	Voice	Primary	512	1850.2	31.0		1
			661	1880.0	31.0	0.247	
			810	1909.8	31.0		1
Test Position	Mode	Antenna	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	Voice	Secondary	512	1850.2	30.5		1
			661	1880.0	30.5	0.551	
			810	1909.8	30.5		1
Left Tilt (15°)	Voice	Secondary	512	1850.2	30.5		1
			661	1880.0	30.5	0.584	
			810	1909.8	30.5		1
Right Touch	Voice	Secondary	512	1850.2	30.5	0.777	
			661	1880.0	30.5	0.908	
			810	1909.8	30.5	0.956	
Right Tilt (15°)	Voice	Secondary	512	1850.2	30.5	0.760	
			661	1880.0	30.5	0.878	
			810	1909.8	30.5	0.929	

Note(s):

- SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel is optional.

15.2.2. Body-worn Accessory Exposure Conditions

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	Voice	Primary	10	512	1850.2	31.0	0.817	
				661	1880.0	31.0	0.823	
				810	1909.8	31.0	0.829	
				810	1909.8	31.0	0.864	2
Front	Voice	Primary	10	512	1850.2	31.0		1
				661	1880.0	31.0	0.648	
				810	1909.8	31.0		1
Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	Voice	Secondary	10	512	1850.2	30.5		1
				661	1880.0	30.5	0.464	
				661	1880.0	30.5	0.463	2
				810	1909.8	30.5		1
Front	Voice	Secondary	10	512	1850.2	30.5		1
				661	1880.0	30.5	0.327	
				810	1909.8	30.5		1

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.
2. With headset attached.

15.2.3. Hotspot Exposure Conditions

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	GPRS 2 slots	Primary	10	512	1850.2	29.9	1.130	
				661	1880.0	29.9	1.120	
				810	1909.8	29.8	1.080	
Front	GPRS 2 slots	Primary	10	512	1850.2	29.9	1.030	
				661	1880.0	29.9	0.907	
				810	1909.8	29.8	0.879	
Edge 2	GPRS 2 slots	Primary	10	512	1850.2	29.9		1
				661	1880.0	29.9	0.700	
				810	1909.8	29.8		1
Edge 3	GPRS 2 slots	Primary	10	512	1850.2	29.9	1.000	
				661	1880.0	29.9	0.946	
				810	1909.8	29.8	1.020	
Edge 4	GPRS 2 slots	Primary	10	512	1850.2	29.9		1
				661	1880.0	29.9	0.102	
				810	1909.8	29.8		1
Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	GPRS 2 slots	Secondary	10	512	1850.2	30.5		1
				661	1880.0	30.5	0.700	
				810	1909.8	30.5		1
Front	GPRS 2 slots	Secondary	10	512	1850.2	30.5		1
				661	1880.0	30.5	0.501	
				810	1909.8	30.5		1
Edge 1	GPRS 2 slots	Secondary	10	512	1850.2	30.5		1
				661	1880.0	30.5	0.402	
				810	1909.8	30.5		1
Edge 2	GPRS 2 slots	Secondary	10	512	1850.2	30.5		1
				661	1880.0	30.5	0.148	
				810	1909.8	30.5		1
Edge 4	GPRS 2 slots	Secondary	10	512	1850.2	30.5		1
				661	1880.0	30.5	0.423	
				810	1909.8	30.5		1

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.

15.3. W-CDMA Band V

Test reduction considerations

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 as per KDB 941225 D01

15.3.1. Head Exposure Conditions

Test Position	Mode	Antenna	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	Rel 99 RMC 12.2kbps	Primary	4132	826.4	24.5		1
			4183	836.6	24.5	0.689	
			4233	846.6	24.5		1
Left Tilt (15°)	Rel 99 RMC 12.2kbps	Primary	4132	826.4	24.5		1
			4183	836.6	24.5	0.352	
			4233	846.6	24.5		1
Right Touch	Rel 99 RMC 12.2kbps	Primary	4132	826.4	24.5		1
			4183	836.6	24.5	0.588	
			4233	846.6	24.5		1
Right Tilt (15°)	Rel 99 RMC 12.2kbps	Primary	4132	826.4	24.5		1
			4183	836.6	24.5	0.397	
			4233	846.6	24.5		1
Test Position	Mode	Antenna	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Left Touch	Rel 99 RMC 12.2kbps	Secondary	4132	826.4	24.0	0.796	
			4183	836.6	24.0	0.782	
			4233	846.6	23.9	0.768	
Left Tilt (15°)	Rel 99 RMC 12.2kbps	Secondary	4132	826.4	24.0		1
			4183	836.6	24.0	0.690	
			4233	846.6	23.9		1
Right Touch	Rel 99 RMC 12.2kbps	Secondary	4132	826.4	24.0		1
			4183	836.6	24.0	0.469	
			4233	846.6	23.9		1
Right Tilt (15°)	Rel 99 RMC 12.2kbps	Secondary	4132	826.4	24.0		1
			4183	836.6	24.0	0.430	
			4233	846.6	23.9		1

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.

15.3.2. Body-worn Accessory & Hotspot Mode Exposure Conditions

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	Rel 99 RMC 12.2kbps	Primary	10	4132	826.4	24.5	0.800	
				4183	836.6	24.5	0.802	
				4233	846.6	24.5	0.837	
				4233	846.6	24.5	0.461	2
Front	Rel 99 RMC 12.2kbps	Primary	10	4132	826.4	24.5		1
				4183	836.6	24.5	0.676	
				4233	846.6	24.5		1
Edge 2	Rel 99 RMC 12.2kbps	Primary	10	4132	826.4	24.5		1
				4183	836.6	24.5	0.496	
				4233	846.6	24.5		1
Edge 3	Rel 99 RMC 12.2kbps	Primary	10	4132	826.4	24.5		1
				4183	836.6	24.5	0.113	
				4233	846.6	24.5		1
Edge 4	Rel 99 RMC 12.2kbps	Primary	10	4132	826.4	24.5		1
				4183	836.6	24.5	0.587	
				4233	846.6	24.5		1
Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	Rel 99 RMC 12.2kbps	Secondary	10	4132	826.4	24.0		1
				4183	836.6	24.0	0.332	
				4183	836.6	24.0	0.272	2
				4233	846.6	23.9		1
Front	Rel 99 RMC 12.2kbps	Secondary	10	4132	826.4	24.0		1
				4183	836.6	24.0	0.283	
				4233	846.6	23.9		1
Edge 1	Rel 99 RMC 12.2kbps	Secondary	10	4132	826.4	24.0		1
				4183	836.6	24.0	0.166	
				4233	846.6	23.9		1
Edge 2	Rel 99 RMC 12.2kbps	Secondary	10	4132	826.4	24.0		1
				4183	836.6	24.0	0.305	
				4233	846.6	23.9		1
Edge 4	Rel 99 RMC 12.2kbps	Secondary	10	4132	826.4	24.0		1
				4183	836.6	24.0	0.139	
				4233	846.6	23.9		1

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.
2. With headset attached. (The difference between the SAR values of the primary antenna without the headset and with the headset is dramatic, but this has been verified to be true through repeated testing)