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

SAR EVALUATION REPORT

For

Tablet with cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/LTE radio, IEEE 802.11a/b/g/n radio and Bluetooth radio

Model: A1459
FCC ID: BCGA1459

Report Number: 12U14507-8A
Issue Date: 10/19/2012

Prepared for

APPLE INC.
1 INFINITE LOOP
CUPERTINO, CA 95014-2084

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	10/8/2012	Initial Issue	--
A	10/19/2012	Updated RF Output Power Measurement in section 10.2.	Devin Chang

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1. Attestation of Test Results

Applicant	Apple Inc.
DUT description	Tablet with cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/LTE radio, IEEE 802.11a/b/g/n radio and Bluetooth radio
Model	A1459
Test device is	An identical prototype
Device category	Portable
Exposure category	General Population/Uncontrolled Exposure
Highest 1g SAR	Refer to Sec. 7.
Date tested	8/3/2012 - 10/4/2012

Applicable Standards	Test Results
FCC OET Bulletin 65 Supplement C 01-01, IEEE Std 1528-2003 & IEEE 1528a-2005	Pass

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.

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.

Approved & Released For UL CCS By:

Sunny Shih
Engineering Leader
UL CCS

Tested By:

Bobby Bayani
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 KDB Procedures:

- 447498 D01 Mobile Portable RF Exposure v04
- 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)**
- 248227 D01 SAR Meas for 802 11abg v01r02
- 616217 D04 SAR for laptop and tablets v01 **(Daft)**
- KDB Inquiry: Tracking Number 958182 for Proximity Sensor discussion

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.

Vector Signal Generator	R & S	SMU200A	104592	7	27	2014
Vector Signal Generator	R & S	SMU200A	104591	7	26	2014
Power Meter	R & S	NRP2	101663	9	4	2013
Power Meter	R & S	NRP2	101664	9	7	2013
Power Sensor	R & S	NRP - Z81	101298	9	7	2013
Power Sensor	R & S	NRP - Z81	101302	9	4	2013
Amplifier	Amplifier Research	15S1G4M41, 0.7-4.2 GHz	335565	N/A		
Amplifier	Amplifier Research	35S4G8A, 4-8 GHz	336934	N/A		
Directional coupler	KRYTAR	158010	92552	N/A		
Directional coupler	KRYTAR	158010	142253	N/A		
S-Parameter Network Analyzer	Agilent	N5230C	MY49001783	8	31	2013
Base Station Simulator	Agilent	8960	GB42361452	4	4	2013
Base Station Simulator	R & S	CMU200	118706	8	29	2013
Base Station Simulator	R & S	CMU200	108982	5	16	2013
Base Station Simulator	R & S	CMU200	112899	5	16	2013
Base Station Simulator	R & S	CMW500	112266	8	8	2013
Base Station Simulator	R & S	CMW500	112267	8	23	2013
Base Station Simulator	R & S	CMW500	112268	8	27	2013
Base Station Simulator	R & S	CMW500	112269	8	16	2013
Thermometer	Control Company	4353	122102412	2	24	2014
E-Field Probe	SPEAG	EX3DV4	3676	3	23	2013
E-Field Probe	SPEAG	EX3DV4	3720	3	23	2013
E-Field Probe	SPEAG	EX3DV4	3757	3	23	2013
E-Field Probe	SPEAG	EX3DV4	3778	3	23	2013
E-Field Probe	SPEAG	EX3DV4	3751	11	19	2012
Data Acquisition Electronics	SPEAG	DAE4	1261	3	8	2013
Data Acquisition Electronics	SPEAG	DAE4	1263	3	7	2013
Data Acquisition Electronics	SPEAG	DAE4	1264	3	4	2013
Data Acquisition Electronics	SPEAG	DAE4	1278	3	8	2013
System Validation Dipole	SPEAG	D2450V2	826	4	11	2013
System Validation Dipole	SPEAG	D5GHzV2	1072	4	17	2013
System Validation Dipole	SPEAG	D750V3	1025	4	13	2013
System Validation Dipole	SPEAG	D835V2	4d076	4	10	2013
System Validation Dipole	SPEAG	D1750V2	1006	4	11	2013
System Validation Dipole	SPEAG	D1900V2	5d108	4	3	2013

4.2. Measurement Uncertainty

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

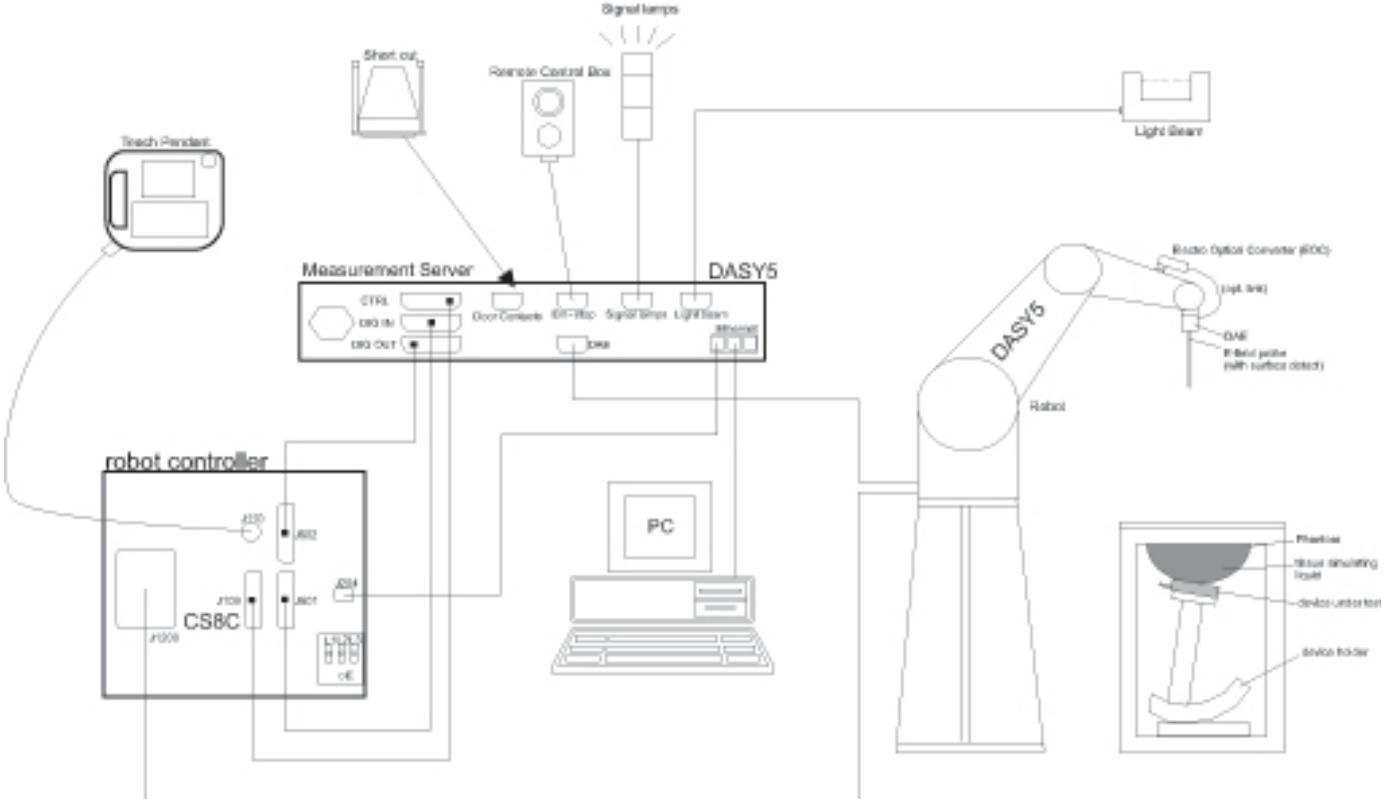
Component	Error, %	Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	**6.00**	Normal	1	1	6.00
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	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	**-4.71**	Normal	1	0.64	-3.01
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement uncertainty	**4.39**	Normal	1	0.6	2.63
				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 3 to 6 GHz averaged over 1 gram

Component	Error, %	Distribution	Divisor	Sensitivity	U (Xi), %
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	**-3.78**	Normal	1	0.64	-2.42
Liquid Permittivity - deviation from target	10.00	Rectangular	1.732	0.6	3.46
Liquid Permittivity - measurement uncertainty	**-3.34**	Normal	1	0.6	-2.00
				Combined Standard Uncertainty Uc(y), %:	10.91
				Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence = 21.39	%
				Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence = 1.68	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.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

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)

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

Step 3: Zoom Scan

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

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

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

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

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

Step 4: Power drift measurement

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

Step 5: Z-Scan (FCC only)

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

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

Results for Highest SAR Values for each Frequency Band

FCC Rule Parts	Freq. Range	Highest 1-g SAR	Limit
22	824-849 MHz	1.16 W/kg (Body Rear w/ 0 mm distance)	1.6 W/kg
24	1850-1910 MHz	1.19 W/kg (Body Rear w/ 0 mm distance)	
27 (LTE Band 2)	1850-1910 MHz	1.19 W/kg (Body Rear w/ 0 mm distance)	
27 (LTE Band 4)	1710–1755 MHz	1.07 W/kg (Rear 41° Tilt @ Edge 1 w/ 0 mm distance)	
27 (LTE Band 5)	824-849 MHz	1.15 W/kg (Body Rear w/ 0 mm distance)	
27 (LTE Band 17)	704–716 MHz	1.19 W/kg (Body Rear w/ 0 mm distance)	
15.247 (WiFi)	2412-2462 MHz	1.10 W/kg (Body Edge 3 w/ 0 mm distance)	
15.247 (BT)	2402-2480 MHz	0.407 W/kg (Body Edge 3 w/ 0 mm distance)	
15.407 (WiFi)	5150-5250 MHz	0.582 W/kg (Body Edge 3 w/ 0 mm distance)	
	5250-5350 MHz	0.891 W/kg (Body Edge 3 w/ 0 mm distance)	
	5500-5700 MHz	1.11 W/kg (Body Edge 3 w/ 0 mm distance)	
15.247 (WiFi)	5725-5850 MHz	0.975 W/kg (Body Edge 3 w/ 0 mm distance)	
Simultaneous transmission condition		1.517 W/kg (refer to Section 15.7) (The highest SAR across exposure conditions)	

Notes:

- Edge 1 = Top Edge
- Edge 2 = Right Edge
- Edge 3 = Bottom Edge
- Edge 4 = Left Edge
- Edge 1 (41° Rear Tilt) = Top Edge/Right Corner Tilt 41°
- Rear (27° Tilt @ Edge 1) = Right Edge Tilt 27°

8. Device Under Test

Model A1459, is a tablet with multimedia functions (music, application support, and video), cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/LTE radio, IEEE 802.11a/b/g/n radio and Bluetooth radio.	
Exposure conditions	Body Exposure with all surfaces and edges. Refer to Section 9 for detailed.

8.1. Band and Air Interfaces

Tx Frequency Bands	• 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
Mode	▪ 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/HT40 (a mode only) • Bluetooth 4.0 LE

8.2. Hotspot (Wireless router) Function

The device is capable of personal hotspot mode. The hotspot mode can be enabled by the users by the following this sequence of soft-keys; Settings > General > Network > Enable Personal Hotspot.

WiFi Hotspot mode permits the device to share its cellular data connection with other 2.4 GHz WiFi-enabled devices (channels 1 - 11). WiFi Hotspot mode is not supported in 5.0 GHz WiFi band.

8.3. Simultaneous Transmission

8.3.1. Body Exposure Condition

A1459 Cellular + Wi-Fi, Cellular+ BT Simultaneous Transmission Configurations

User usage	SAR Test distance	Mode	Mode of Operation	Band	LTE	GPRS/ EGPRS	WCDMA	DC-HSDPA / HSPA+	Wi-Fi 5GHz	Wi-Fi 2.4GHz	BT 2.4GHz
Body SAR	0 cm	Cellular + 2.4GHz WiFi	GPRS/ EGPRS	850	No	Yes	No	No	No	Yes	No
			GPRS/ EGPRS	1900	No	Yes	No	No	No		No
			WCDMA	835	No	No	Yes	No	No		No
			WCDMA	1900	No	No	Yes	No	No		No
			DC-HSDPA	835	No	No	No	Yes	No		No
			DC-HSDPA	1900	No	No	No	Yes	No		No
			HSPA+	835	No	No	No	Yes	No		No
			HSPA+	1900	No	No	No	Yes	No		No
			LTE data	710	Yes	No	No	No	No		No
			LTE data	850	Yes	No	No	No	No		No
			LTE data	1700	Yes	No	No	No	No		No
			LTE data	1900	Yes	No	No	No	No		No
		Cellular + 5GHz Wifi / Cellular + BT / 5GHz WiFi + BT	GPRS/ EGPRS	850	No	Yes	No	No	Yes	No	Yes
			GPRS/ EGPRS	1900	No	Yes	No	No		No	
			WCDMA	835	No	No	Yes	No		No	
			WCDMA	1900	No	No	Yes	No		No	
			DC-HSDPA	835	No	No	No	Yes		No	
			DC-HSDPA	1900	No	No	No	Yes		No	
			HSPA+	835	No	No	No	Yes		No	
			HSPA+	1900	No	No	No	Yes		No	
			LTE data	710	Yes	No	No	No		No	
			LTE data	850	Yes	No	No	No		No	
			LTE data	1700	Yes	No	No	No		No	
			LTE data	1900	Yes	No	No	No		No	

8.3.2. Wireless Router (hotspot) Exposure Condition

A1459 Hotspot simultaneous transmission

User usage	SAR Test distance	Mode	Mode of Operation	Band	LTE	GPRS/ EGPRS	WCDMA	DC-HSDPA / HSPA+	Wi-Fi HOTSPOT 2.4GHz Only)	BT 2.4GHz
Hotspot	0 cm	Cellular + 2.4GHz Wi-Fi	GPRS/ EGPRS	850	No	Yes	No	No	Yes	No
			GPRS/ EGPRS	1900	No	Yes	No	No		No
			WCDMA	850	No	No	Yes	No		
			WCDMA	1900	No	No	Yes	No		
			DC-HSDPA	835	No	No	No	Yes		No
			DC-HSDPA	1900	No	No	No	Yes		No
			HSPA+	835	No	No	No	Yes		No
			HSPA+	1900	No	No	No	Yes		No
			LTE data	710	Yes	No	No	No		No
			LTE data	850	Yes	No	No	No		No
			LTE data	1700	Yes	No	No	No		No
			LTE data	1900	Yes	No	No	No		No

8.4. 941225 D05 SAR for LTE Devices v02 (Draft)

<table>
<tr><th>#</th><th>Description</th><th>Information</th></tr>
<tr><td>A</td><td>List the frequency range and channel bandwidths used in each LTE band; 1.4, 3, 5, 10, 15, 20 MHz, etc.</td><td>
<table>
<tr><td colspan="2">Band 2</td></tr>
<tr><td>Tx: 1850 - 1910 MHz</td><td>Rx: 1930 - 1990 MHz</td></tr>
<tr><td colspan="2">Band 4</td></tr>
<tr><td>Tx: 1710 – 1755 MHz</td><td>Rx: 2100 – 2155 MHz</td></tr>
<tr><td colspan="2">Band 5</td></tr>
<tr><td>Tx: 824 - 849 MHz</td><td>Rx: 869 - 894 MHz</td></tr>
<tr><td colspan="2">Band 17</td></tr>
<tr><td>Tx: 704 – 716 MHz</td><td>Rx: 734 – 746 MHz</td></tr>
<tr><td colspan="2">Channel Bandwidths: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz</td></tr>
</table>
</td></tr>
<tr><td>B</td><td>Identify the high, middle and low (H, M, L) channel numbers and channel frequencies for each LTE bandwidth and frequency band</td><td>
<table>
<tr><td rowspan="2">Band 2</td><td colspan="6">Channel Bandwidth</td></tr>
<tr><td>20 MHz</td><td>15 MHz</td><td>10 MHz</td><td>5 MHz</td><td>3 MHz</td><td>1.4 MHz</td></tr>
<tr><td>Low</td><td>18700 /1860</td><td>18675/ 1857.5</td><td>18650/ 1855</td><td>18625/ 1852.5</td><td>18615/ 1851.5</td><td>18607/ 1850.7</td></tr>
<tr><td>Mid</td><td>18900/ 1880</td><td>18900/ 1880</td><td>18900/ 1880</td><td>18900/ 1880</td><td>18900/ 1880</td><td>18900/ 1880</td></tr>
<tr><td>High</td><td>19100/ 1900</td><td>19125/ 1902.5</td><td>19150/ 1905</td><td>19175/ 1907.5</td><td>19184/ 1908.4</td><td>19192/ 1909.2</td></tr>
<tr><td rowspan="2">Band 4</td><td colspan="6">Channel Bandwidth</td></tr>
<tr><td>20 MHz</td><td>15 MHz</td><td>10 MHz</td><td>5 MHz</td><td>3 MHz</td><td>1.4 MHz</td></tr>
<tr><td>Low</td><td>20050/ 1720</td><td>20025/ 1717.5</td><td>20000/ 1715</td><td>19975/ 1712.5</td><td>19965/ 1711.5</td><td>19957/ 1710.7</td></tr>
<tr><td>Mid</td><td>20175/ 1732.5</td><td>20175/ 1732.5</td><td>20175/ 1732.5</td><td>20175/ 1732.5</td><td>20175/ 1732.5</td><td>20175/ 1732.5</td></tr>
<tr><td>High</td><td>20300/ 1745</td><td>20325/ 1747.5</td><td>20350/ 1750</td><td>20375/ 1752.5</td><td>20384/ 1753.4</td><td>20392/ 1754.2</td></tr>
<tr><td rowspan="2">Band 5</td><td colspan="6">Channel Bandwidth</td></tr>
<tr><td>20 MHz</td><td>15 MHz</td><td>10 MHz</td><td>5 MHz</td><td>3 MHz</td><td>1.4 MHz</td></tr>
<tr><td>Low</td><td></td><td></td><td>20450/ 829</td><td>20425/ 826.5</td><td>20415/ 825.5</td><td>20407/ 824.7</td></tr>
<tr><td>Mid</td><td></td><td></td><td>20525/ 836.5</td><td>20525/ 836.5</td><td>20525/ 836.5</td><td>20525/ 836.5</td></tr>
<tr><td>High</td><td></td><td></td><td>20600/ 844</td><td>20625/ 846.5</td><td>20634/ 847.4</td><td>20642/ 848.2</td></tr>
<tr><td rowspan="2">Band 17</td><td colspan="6">Channel Bandwidth</td></tr>
<tr><td>20 MHz</td><td>15 MHz</td><td>10 MHz</td><td>5 MHz</td><td>3 MHz</td><td>1.4 MHz</td></tr>
<tr><td>Low</td><td></td><td></td><td>23780/ 709</td><td>23755/ 706.5</td><td></td><td></td></tr>
<tr><td>Mid</td><td></td><td></td><td>23790/ 710</td><td>23790/ 710</td><td></td><td></td></tr>
<tr><td>High</td><td></td><td></td><td>23800/ 711</td><td>23825/ 713.5</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>C</td><td>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.</td><td>A single antenna is used for LTE and other wireless modes (GPRS/EGPRS/UMTS) for both Transmit and Receive.
A Secondary antenna is used for LTE and other wireless modes (GPRS/EGPRS/UMTS) for Receive Only. This device does not support DTM.</td></tr>
</table>

941225 D05 SAR for LTE Devices v02 (Continued)

<table>
<tr><th>#</th><th>Description</th><th>Information</th></tr>
<tr><td>D</td><td>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.</td><td>Data Device Only.
Exposure Conditions:
• Body-Rear, Edge 3, Edge 4, Edge 1, Edge 2 of the DUT at a separation distance of 0 mm from the flat phantom.
• With Proximity Sensor Power back-off disabled
○ Rear Surface of the DUT at the separation distance of 12 mm to the flat phantom.
○ Edge 1 of the DUT at the separation distance of 14 mm to the flat phantom
○ Edge 1/Edge 2 Corner of the DUT with separation distance of 0 mm and 27° angle to the flat body phantom.</td></tr>
<tr><td>E</td><td>Identify if Maximum Power Reduction (MPR) is implemented as an optional or permanent feature, i.e., built-in by design:
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.</td><td>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><tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th><th rowspan="2">MPR (dB)</th></tr><tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr><tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr><tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr><tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr></table>
A-MPR is supported by design, but is disabled for SAR testing.
A-MPR is disabled, by using Network Setting value of NS_01.</td></tr>
<tr><td>F</td><td>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.</td><td>Yes. A Proximity sensor for cellular power reduction is implemented in the device to address RF exposure compliance when the cellular antenna is positioned close to the user’s body or other objects.</td></tr>
</table>

941225 D05 SAR for LTE Devices v02 (Continued)

#	Description	Information
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.	Refer to Section 10.
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: 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 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.	N/A

8.5. Power Reduction by Proximity Sensing

A proximity sensor for power reduction is implemented in this device to address RF exposure compliance when the cellular antenna is positioned close to the user's body. The sensor's mechanical structure is designed to fit within the enclosure design used in this device and also extended around the edge and top of the antenna element in order to optimize sensitivity in these orientations. This design combines the antenna and proximity sensor into a single FPC (Flexible Printed Circuit).

8.5.1. Proximity Sensor Detection Area

The proximity sensor is combined with the primary antenna in a single FPC (Flexible Printed Circuit), therefore, the proximity sensor occupies the same area as the primary antenna.

A two-step power back-off mechanism is implemented in this device. For design and testing purposes Top-Edge, Front Surface, and Rear Surface are chosen as the dimensions of interest.

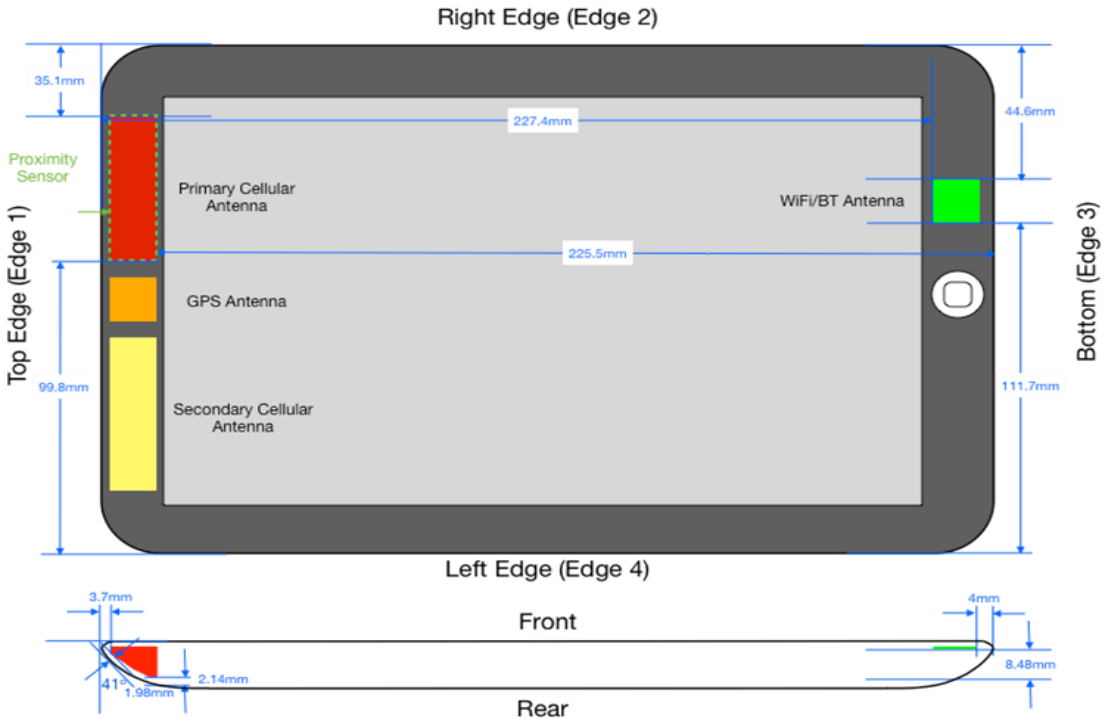
The proximity sensor is triggered at the following conservative distances when:

- the Top-edge of the device is 20 mm for the first-stage trigger, and 14mm for the second-stage trigger, from the phantom.
- the Rear Surface of the device is 20 mm for the first-stage trigger, and 12mm for the second-stage trigger, from the phantom.

The expected capacitance trigger values are programmed in each device for each power back-off stage. Capacitance trigger value for first stage (t1) is C1, and for second stage (t2) is C2. C1 is always smaller than C2.

When a certain object or human body approaches the DUT, if the measured capacitance is lower than C1, proximity sensor is not triggered. If the measured capacitance is higher than C1, but lower than C2, first power back-off (P1) is triggered. If the measured capacitance is higher than C2, second power back-off (P2) is triggered.

SAR evaluation is performed with power back-off disabled (at full power) at the conservative distance of the second stage. Therefore, additional SAR testing for different stages of power back-off will not be performed.



Separation Distances (mm)	Cellular (Primary)	Cellular (Secondary)	Wi-Fi / BT
Cellular (Primary)		18.24	211.0
Cellular (Secondary)			217.2
Wi-Fi / BT			
Top-Edge (Edge 1)	3.7	3.74	227.4
Right-Edge (Edge 2)	35.1	104.14	44.6
Bottom-Edge (Edge 3)	225.5	225.5	4.0
Left-Edge (Edge 4)	99.8	35.14	111.7
Rear Surface	2.14	2.14	8.48

As per the 616217 D04 SAR for laptop and tablets v01, section 6.1, 6.2, following procedure is used to determine the triggering distances.

First, the DUT is moved towards the flat phantom.

Proximity Sensor Status Table when DUT is moving towards the phantom

Distance to the DUT (mm)	Proximity Sensor Status – Rear Surface	Proximity Sensor Status – Top-Edge
30	OFF	OFF
27	OFF	OFF
25	OFF	OFF
24	OFF	OFF
23	OFF	OFF
22	OFF	OFF
21	OFF	OFF
20	ON (C1, t1, P1)	ON (C1, t1, P1)
19	ON (C1, t1, P1)	ON (C1, t1, P1)
18	ON (C1, t1, P1)	ON (C1, t1, P1)
17	ON (C1, t1, P1)	ON (C1, t1, P1)
16	ON (C1, t1, P1)	ON (C1, t1, P1)
15	ON (C1, t1, P1)	ON (C1, t1, P1)
14	ON (C1, t1, P1)	ON (C2, t2, P2)
13	ON (C1, t1, P1)	ON (C2, t2, P2)
12	ON (C2, t2, P2)	ON (C2, t2, P2)
11	ON (C2, t2, P2)	ON (C2, t2, P2)
10	ON (C2, t2, P2)	ON (C2, t2, P2)
9	ON (C2, t2, P2)	ON (C2, t2, P2)
6	ON (C2, t2, P2)	ON (C2, t2, P2)
3	ON (C2, t2, P2)	ON (C2, t2, P2)
0	ON (C2, t2, P2)	ON (C2, t2, P2)

Notes:

C1: Capacitance value triggered First Stage (t1) power back-off
C2: Capacitance value triggered Second Stage (t2) power back-off
t1: 1st Stage triggered
t2: 2nd Stage triggered
P1: Power back-off at 1st Stage
P2: Power back-off at 2nd Stage
The distance at which the proximity sensor triggers is same for all cellular test frequencies.

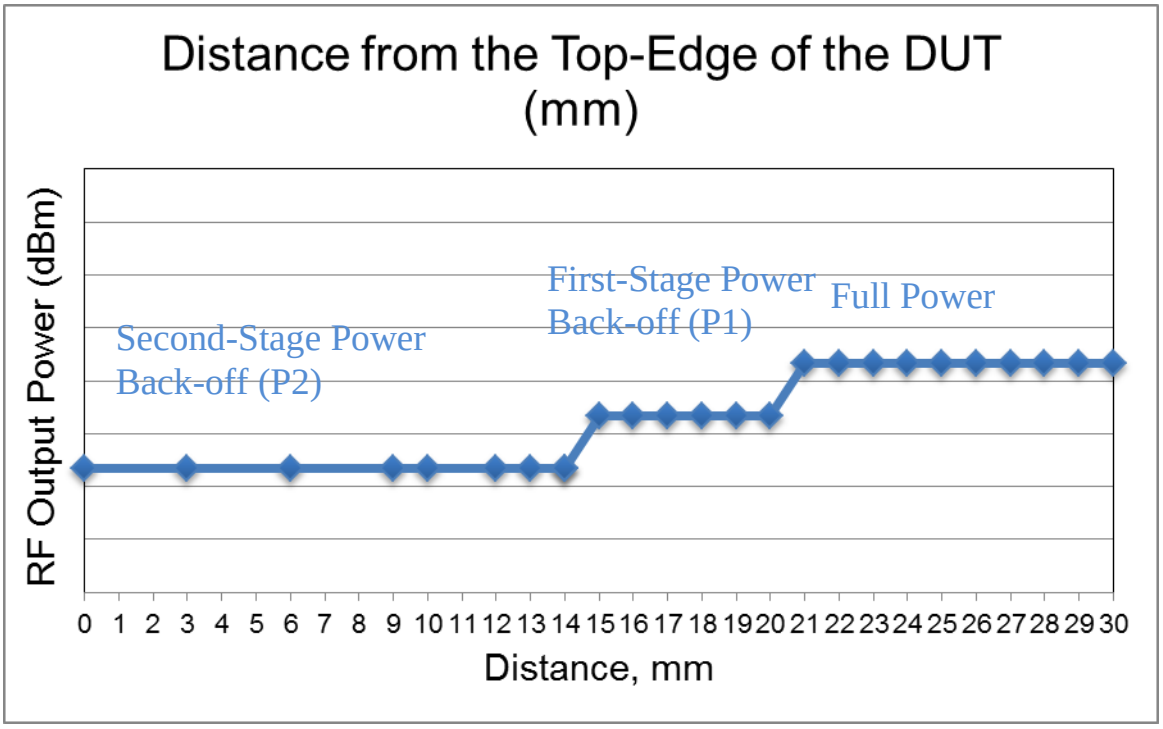
Now, the DUT is moved away from flat phantom

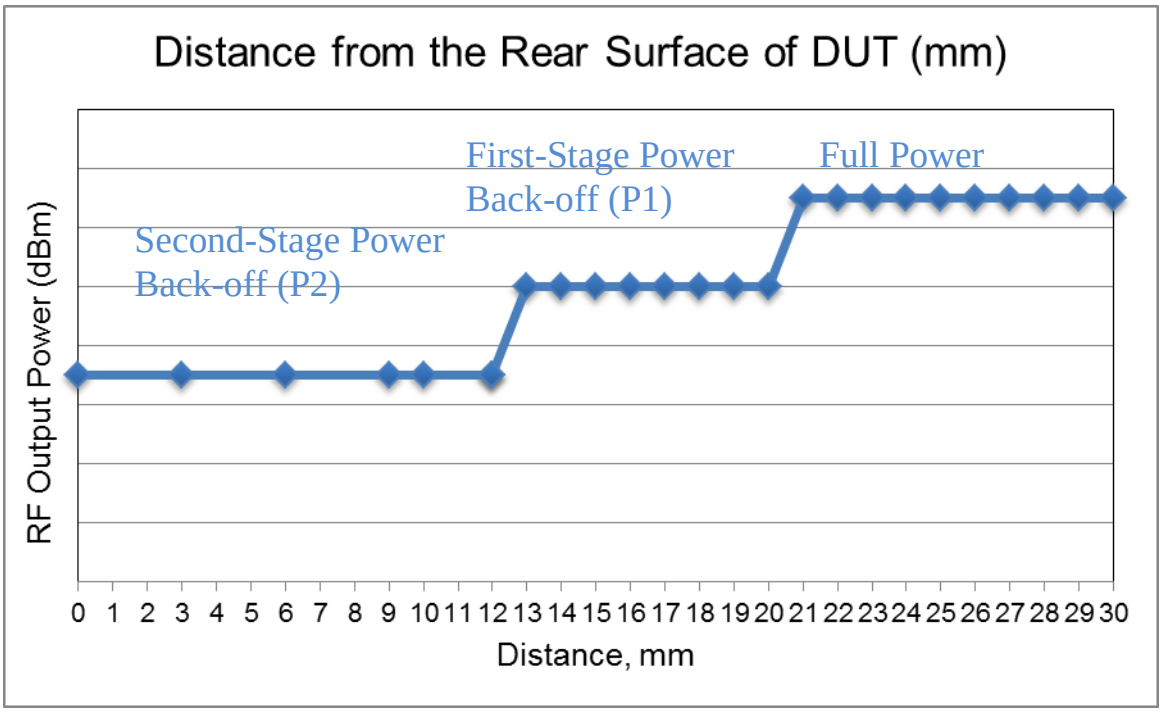
Proximity Sensor Status Table when DUT is moving away from the phantom

Distance to DUT (mm)	Proximity Sensor Status – Rear Surface	Proximity Sensor Status – Top-Edge
0	ON (C2, t2, P2)	ON (C2, t2, P2)
3	ON (C2, t2, P2)	ON (C2, t2, P2)
6	ON (C2, t2, P2)	ON (C2, t2, P2)
9	ON (C2, t2, P2)	ON (C2, t2, P2)
10	ON (C2, t2, P2)	ON (C2, t2, P2)
11	ON (C2, t2, P2)	ON (C2, t2, P2)
12	ON (C2, t2, P2)	ON (C2, t2, P2)
13	ON (C1, t1, P1)	ON (C2, t2, P2)
14	ON (C1, t1, P1)	ON (C2, t2, P2)
15	ON (C1, t1, P1)	ON (C1, t1, P1)
16	ON (C1, t1, P1)	ON (C1, t1, P1)
17	ON (C1, t1, P1)	ON (C1, t1, P1)
18	ON (C1, t1, P1)	ON (C1, t1, P1)
19	ON (C1, t1, P1)	ON (C1, t1, P1)
20	ON (C1, t1, P1)	ON (C1, t1, P1)
21	OFF	OFF
22	OFF	OFF
23	OFF	OFF
24	OFF	OFF
25	OFF	OFF
27	OFF	OFF
30	OFF	OFF

Notes:

C1: Capacitance value triggered First Stage (t1) power back-off
C2: Capacitance value triggered Second Stage (t2) power back-off
t1: 1st Stage triggered
t2: 2nd Stage triggered
P1: Power back-off at 1st Stage
P2: Power back-off at 2nd Stage
The distance at which the proximity sensor triggers is same for all cellular test frequencies.



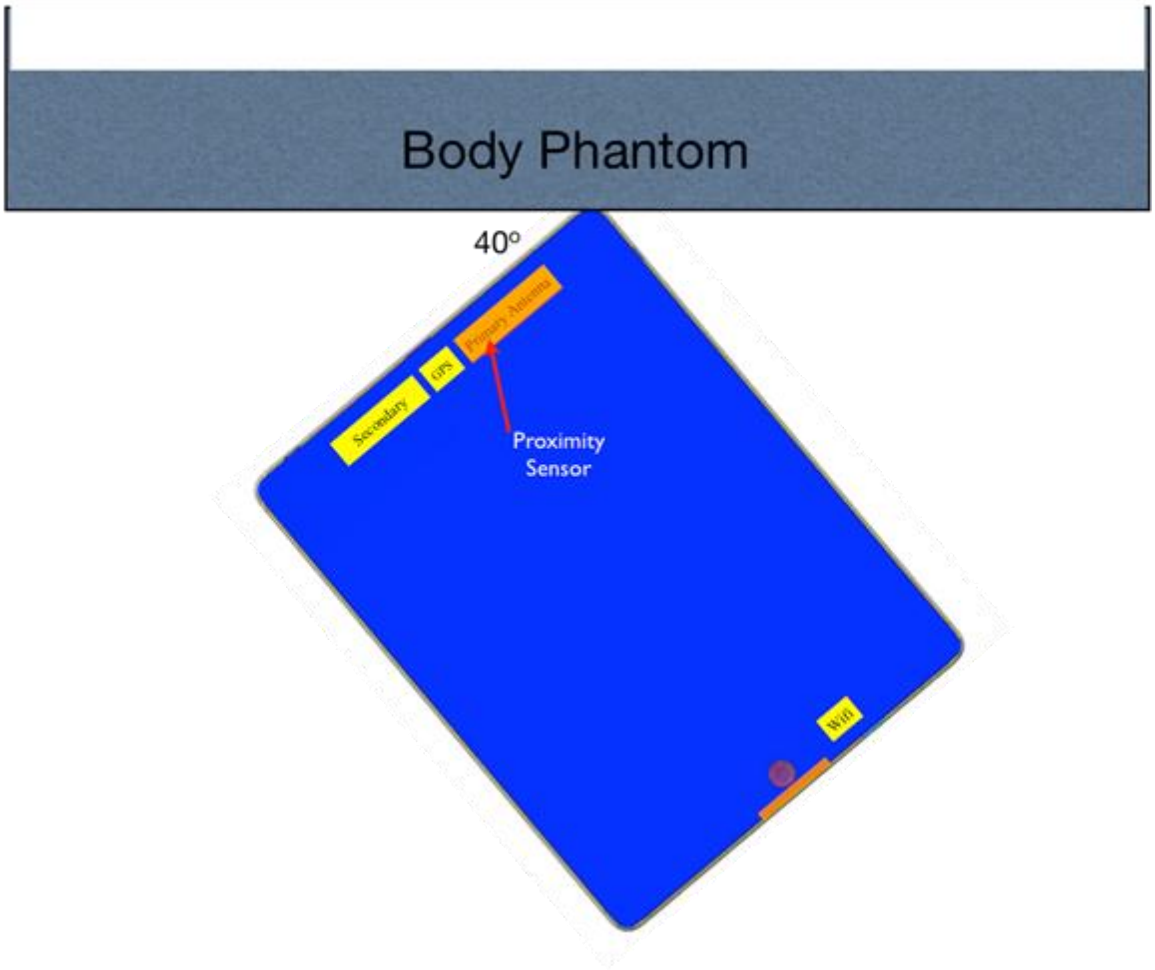


Since, the antenna and proximity sensor are not spatially offset in this implementation, the procedure in KDB 616217, section V.)B.) doesn't apply to device. However, the primary antenna is 35.1 mm from the edge of the device, additional testing is performed to evaluate the coverage of the proximity sensor detection area in the corner of the DUT.

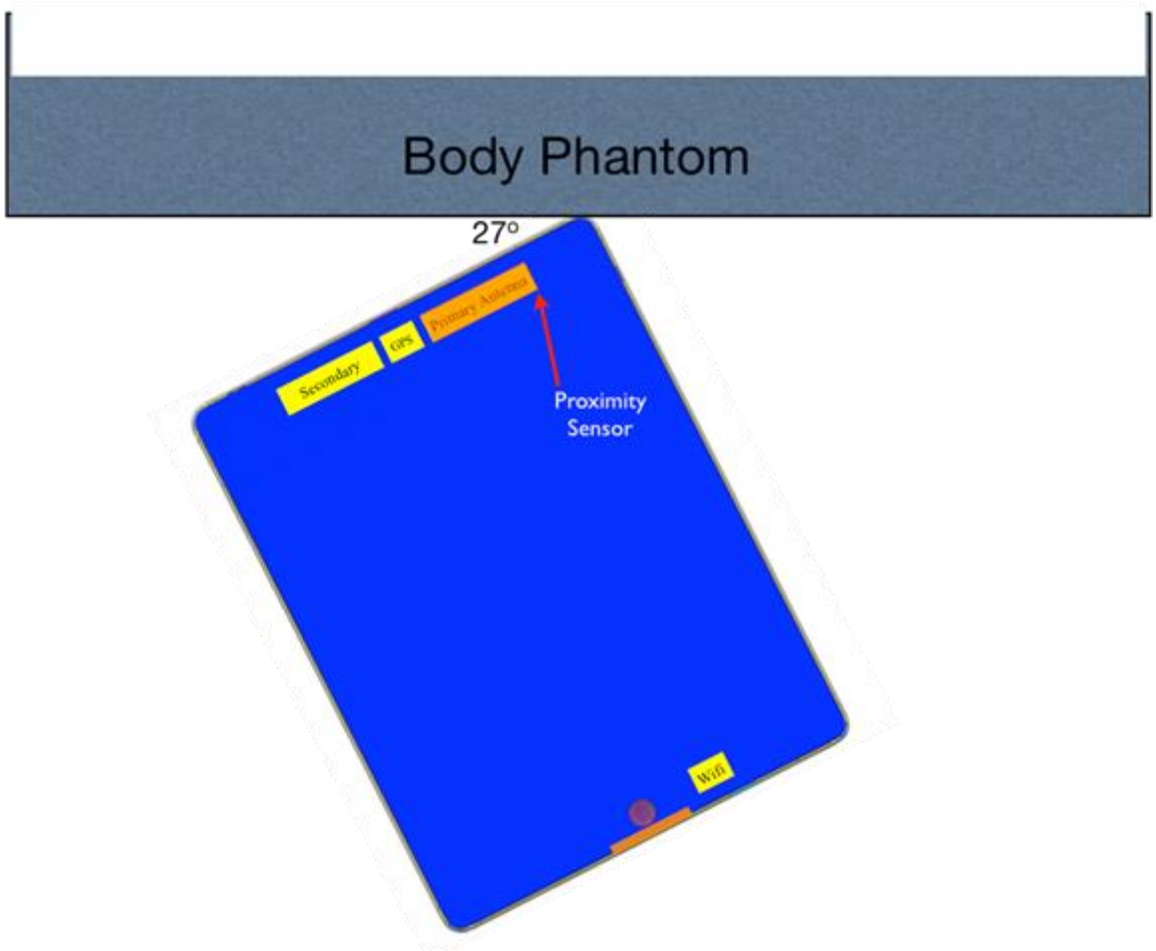
8.5.2. Coverage at the Corner of the DUT

The proximity sensor coverage at the Top-Edge/Right-corner of the device is determined by changing the angle of the device relative to the phantom, and observe the angle at which the proximity sensor is triggered.

In this case, the conservative angles at which the proximity sensor is triggered are: 40° for the first-stage, and 27° for the second-stage, from the phantom.



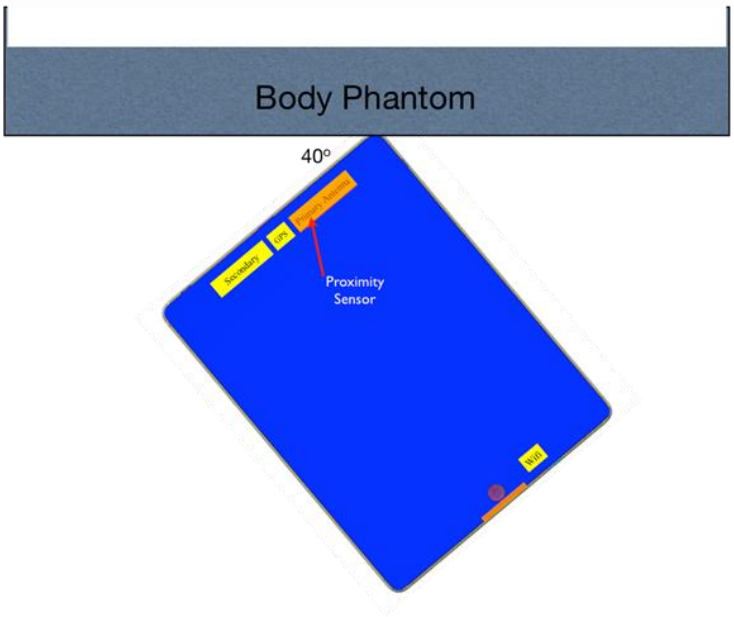
DUT angle at which first–stage is activated



DUT angle at which second–stage is activated

Proximity Sensor Status Table when DUT is moving towards the phantom

Angle to the DUT (Degrees)	Proximity Sensor Status – Top-Edge/Right Corner
90	OFF
85	OFF
80	OFF
75	OFF
70	OFF
65	OFF
60	OFF
55	OFF
50	OFF
45	OFF
44	OFF
43	OFF
42	OFF
41	OFF
40	ON (C1, t1, P1)
39	ON (C1, t1, P1)
38	ON (C1, t1, P1)
35	ON (C1, t1, P1)
30	ON (C1, t1, P1)
29	ON (C1, t1, P1)
28	ON (C1, t1, P1)
27	ON (C2, t2, P2)
26	ON (C2, t2, P2)
25	ON (C2, t2, P2)
20	ON (C2, t2, P2)
15	ON (C2, t2, P2)
10	ON (C2, t2, P2)
5	ON (C2, t2, P2)
0	ON (C2, t2, P2)

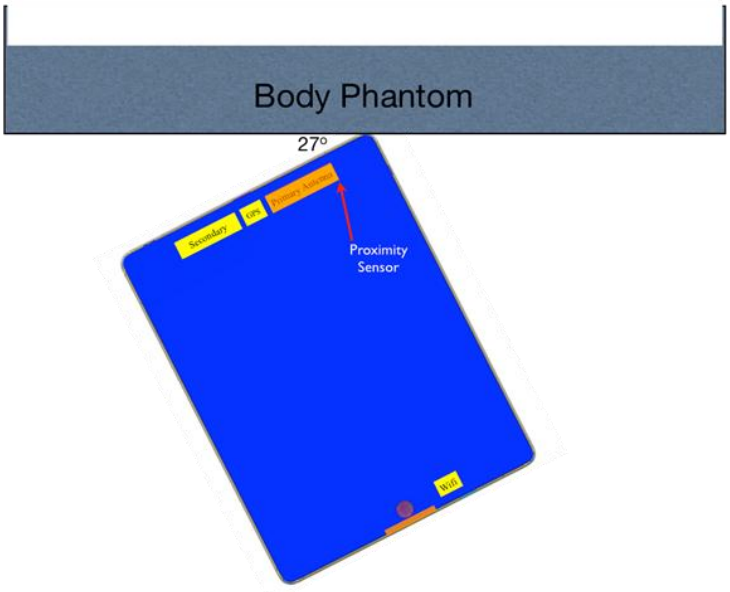


Notes:

C1: Capacitance value triggered First Stage (t1) power back-off
C2: Capacitance value triggered Second Stage (t2) power back-off
t1: 1st Stage triggered
t2: 2nd Stage triggered
P1: Power back-off at 1st Stage
P2: Power back-off at 2nd Stage
The distance at which the proximity sensor triggers is same for all cellular test frequencies.

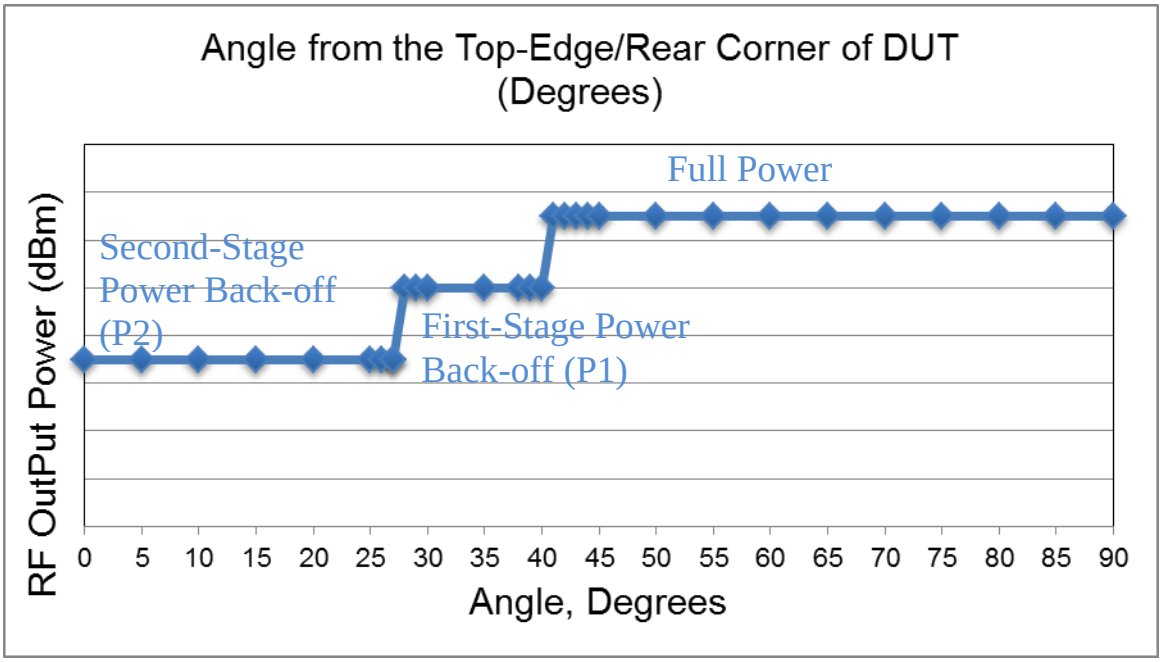
Proximity Sensor Status Table when DUT is moving away from the phantom

Angle to the DUT (Degrees)	Proximity Sensor Status – Top-Edge/Right Corner
0	ON (C2, t2, P2)
5	ON (C2, t2, P2)
10	ON (C2, t2, P2)
15	ON (C2, t2, P2)
20	ON (C2, t2, P2)
25	ON (C2, t2, P2)
26	ON (C2, t2, P2)
27	ON (C2, t2, P2)
28	ON (C1, t1, P1)
29	ON (C1, t1, P1)
30	ON (C1, t1, P1)
35	ON (C1, t1, P1)
38	ON (C1, t1, P1)
39	ON (C1, t1, P1)
40	ON (C1, t1, P1)
41	OFF
42	OFF
43	OFF
44	OFF
45	OFF
50	OFF
55	OFF
60	OFF
65	OFF
70	OFF
75	OFF
80	OFF
85	OFF
90	OFF



Notes:

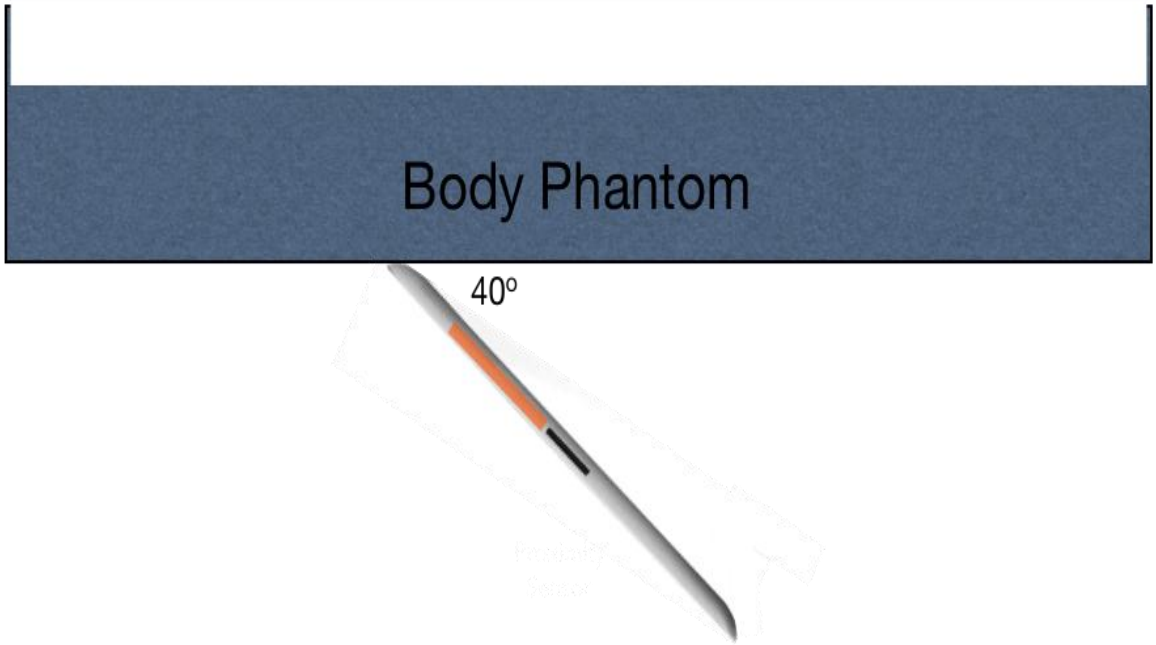
C1: Capacitance value triggered First Stage (t1) power back-off
C2: Capacitance value triggered Second Stage (t2) power back-off
t1: 1st Stage triggered
t2: 2nd Stage triggered
P1: Power back-off at 1st Stage
P2: Power back-off at 2nd Stage
The distance at which the proximity sensor triggers is same for all cellular test frequencies.



The proximity sensor coverage at the Rear Surface/Right-corner of the device is determined by changing the angle of the device relative to the phantom, and observe the angle at which the proximity sensor is triggered.

In this case, the conservative angles at which the proximity sensor is triggered are: 40° for the first-stage, and 25° for the second-stage, from the phantom.

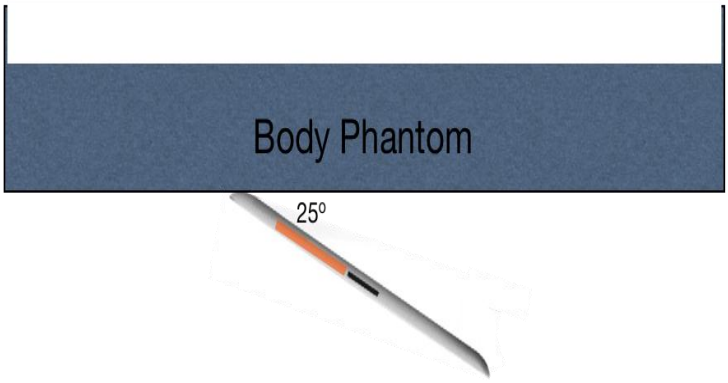
DUT angle at which first-stage is activated



DUT angle at which second-stage is activated

Proximity Sensor Status Table when DUT is moving towards the phantom

Angle to the DUT (Degrees)	Proximity Sensor Status – Rear Surface/Right Corner
90	OFF
85	OFF
80	OFF
75	OFF
70	OFF
65	OFF
60	OFF
55	OFF
50	OFF
45	OFF
43	OFF
42	OFF
41	OFF
40	ON (C1, t1, P1)
39	ON (C1, t1, P1)
38	ON (C1, t1, P1)
35	ON (C1, t1, P1)
30	ON (C1, t1, P1)
28	ON (C1, t1, P1)
27	ON (C1, t1, P1)
26	ON (C1, t1, P1)
25	ON (C2, t2, P2)
24	ON (C2, t2, P2)
23	ON (C2, t2, P2)
20	ON (C2, t2, P2)
15	ON (C2, t2, P2)
10	ON (C2, t2, P2)
5	ON (C2, t2, P2)
0	ON (C2, t2, P2)

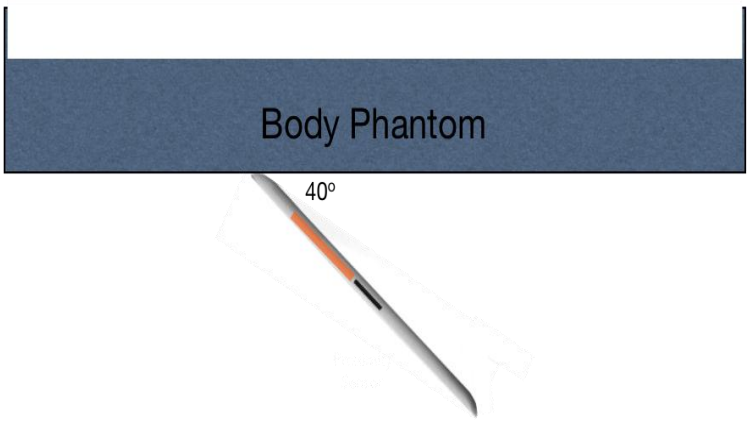


Notes:

C1: Capacitance value triggered First Stage (t1) power back-off
C2: Capacitance value triggered Second Stage (t2) power back-off
t1: 1st Stage triggered
t2: 2nd Stage triggered
P1: Power back-off at 1st Stage
P2: Power back-off at 2nd Stage
The distance at which the proximity sensor triggers is same for all cellular test frequencies.

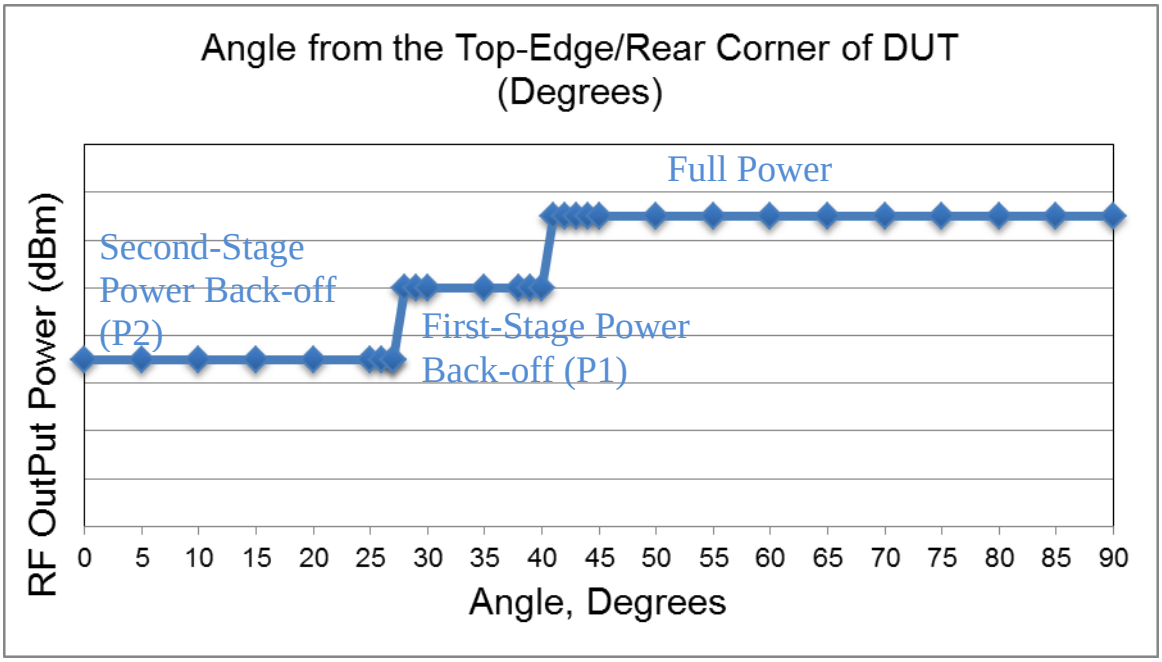
Proximity Sensor Status Table when DUT is moving away from the phantom

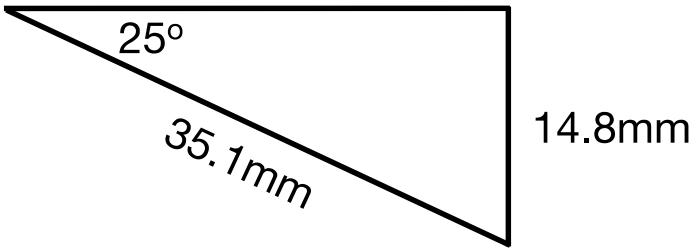
Angle to the DUT (Degrees)	Proximity Sensor Status – Top-Edge
0	ON (C2, t2, P2)
5	ON (C2, t2, P2)
10	ON (C2, t2, P2)
15	ON (C2, t2, P2)
20	ON (C2, t2, P2)
23	ON (C2, t2, P2)
24	ON (C2, t2, P2)
25	ON (C2, t2, P2)
26	ON (C1, t1, P1)
27	ON (C1, t1, P1)
28	ON (C1, t1, P1)
30	ON (C1, t1, P1)
35	ON (C1, t1, P1)
38	ON (C1, t1, P1)
39	ON (C1, t1, P1)
40	ON (C1, t1, P1)
41	OFF
42	OFF
43	OFF
45	OFF
46	OFF
47	OFF
50	OFF
55	OFF
60	OFF
65	OFF
70	OFF
75	OFF
80	OFF
85	OFF
90	OFF



Notes:

C1: Capacitance value triggered First Stage (t1) power back-off
C2: Capacitance value triggered Second Stage (t2) power back-off
t1: 1st Stage triggered
t2: 2nd Stage triggered
P1: Power back-off at 1st Stage
P2: Power back-off at 2nd Stage
The distance at which the proximity sensor triggers is same for all cellular test frequencies.





SAR evaluation for Rear Surface/Right Corner is not performed because, the Antenna-to-flat phantom distance, in this case, is 14.8 mm, which is more the 12 mm for the Rear Surface (at which SAR evaluation will be performed at full power).

With the Top-Edge of the device against the phantom, when the front of the device (LCD side) is tilted toward the phantom, the proximity sensor will remain triggered all the time.

The proximity sensor is not triggered, when approaching from any other corner; therefore, the proximity sensor coverage is only evaluated when approaching from the Top/Right Corner

8.5.3. SAR test configurations

SAR evaluation will be performed with power back-off disabled (at full power) at the conservative distance of the second stage. Therefore, additional SAR testing for different stages of power back-off will not be performed.

For body exposure condition, the DUT is evaluated in the following configurations:

- Rear surface of the DUT with separation distance of 0 mm to the flat phantom. The proximity sensor is active and triggered in this configuration, therefore, the conducted power is backed-off.

- Top-Edge of the DUT with separation distance of 0 mm to the flat phantom. The proximity sensor is active and triggered in this configuration, therefore, the conducted power is backed-off.

- Bottom-Edge of the DUT with separation distance of 0 mm to the flat phantom. The proximity sensor is active, but not triggered in this configuration. Therefore, the conducted power is NOT backed-off.

- Right-Edge of the DUT with separation distance of 0 mm to the flat phantom. The proximity sensor is active, but not triggered in this configuration. Therefore, the conducted power is NOT backed-off.

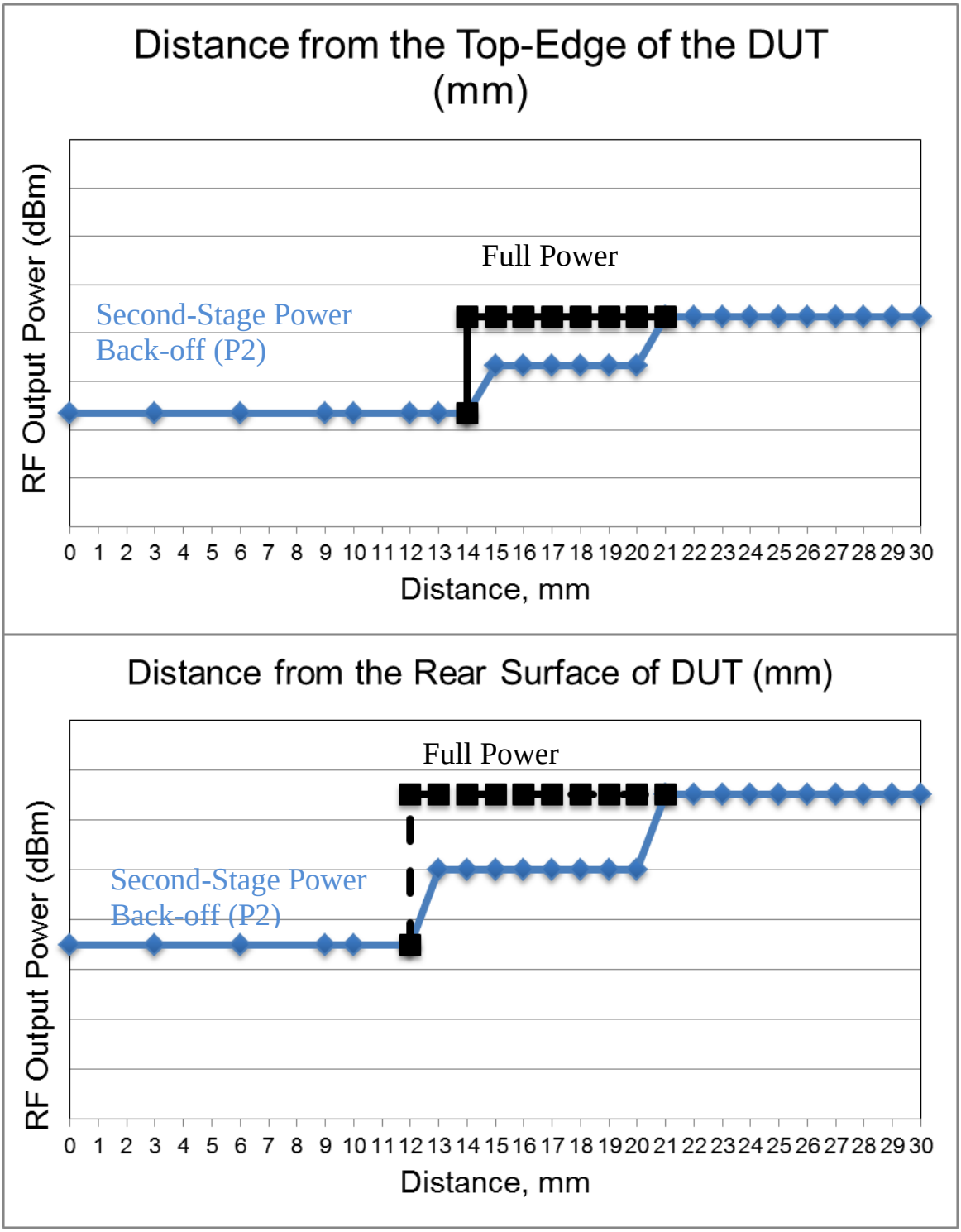
- Rear surface of the DUT with conservative distance of 12 mm to the flat phantom. The proximity sensor is disabled, by special development software, in this configuration. Therefore, the conducted power has NO backed-off.

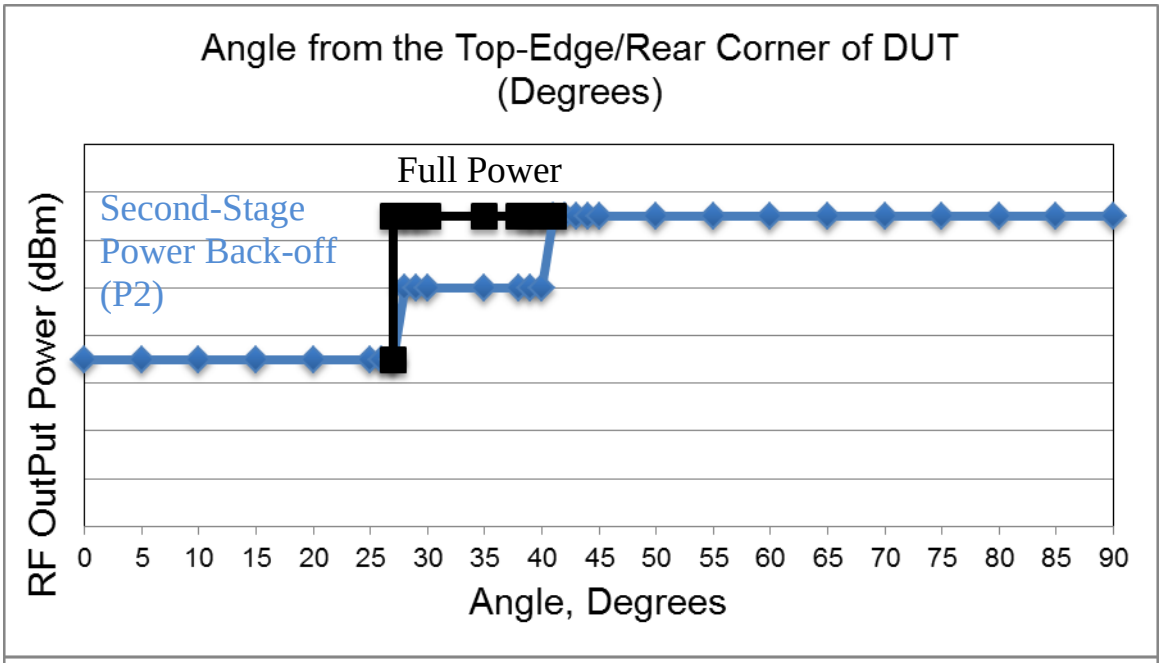
- Top-Edge of the DUT with conservative distance of 14 mm to the flat phantom. The proximity sensor is disabled, by special development software, in this configuration. Therefore, the conducted power has NO backed-off.

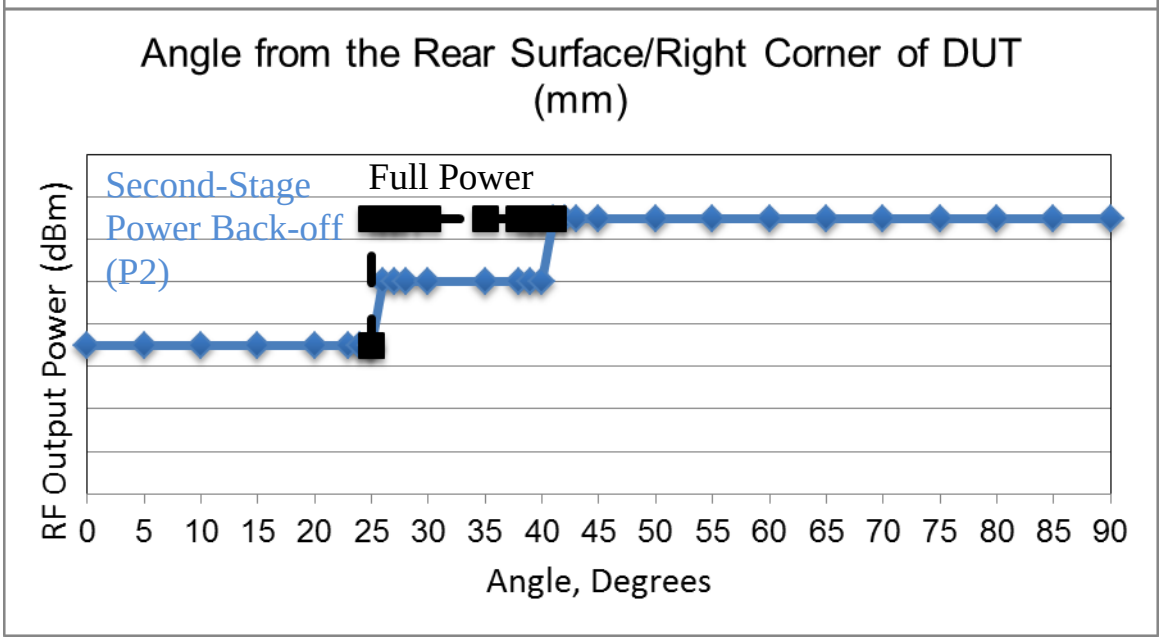
- Top-Edge of the DUT with separation distance of 0 mm and 27° angle to the flat body phantom. The proximity sensor is disabled, by special development software, in this configuration. Therefore, the conducted power has NO backed-off.

SAR evaluation of the DUT on the Front Surface with separation distance of 0 mm to the flat phantom is NOT performed because there is no use case for this configuration.

The graphs below (BLACK LINE) show the distance or angle at which SAR evaluation will be performed.







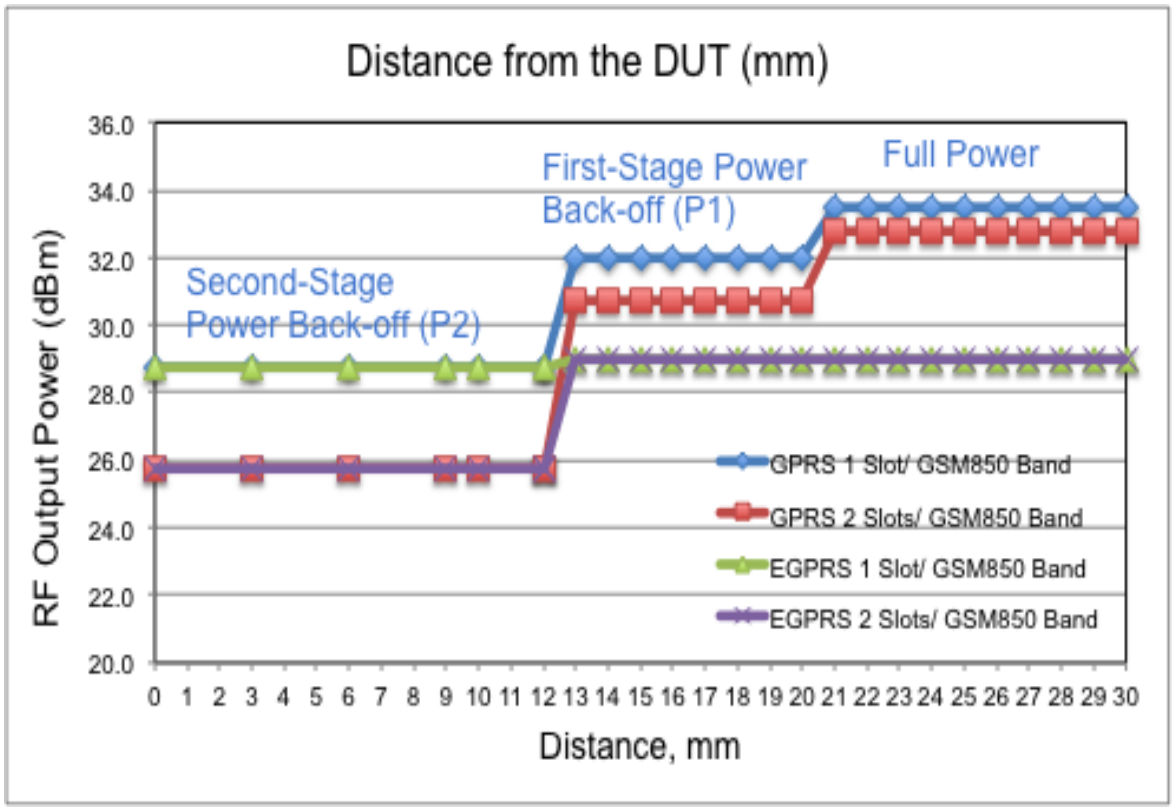
8.5.4. Special Development Software

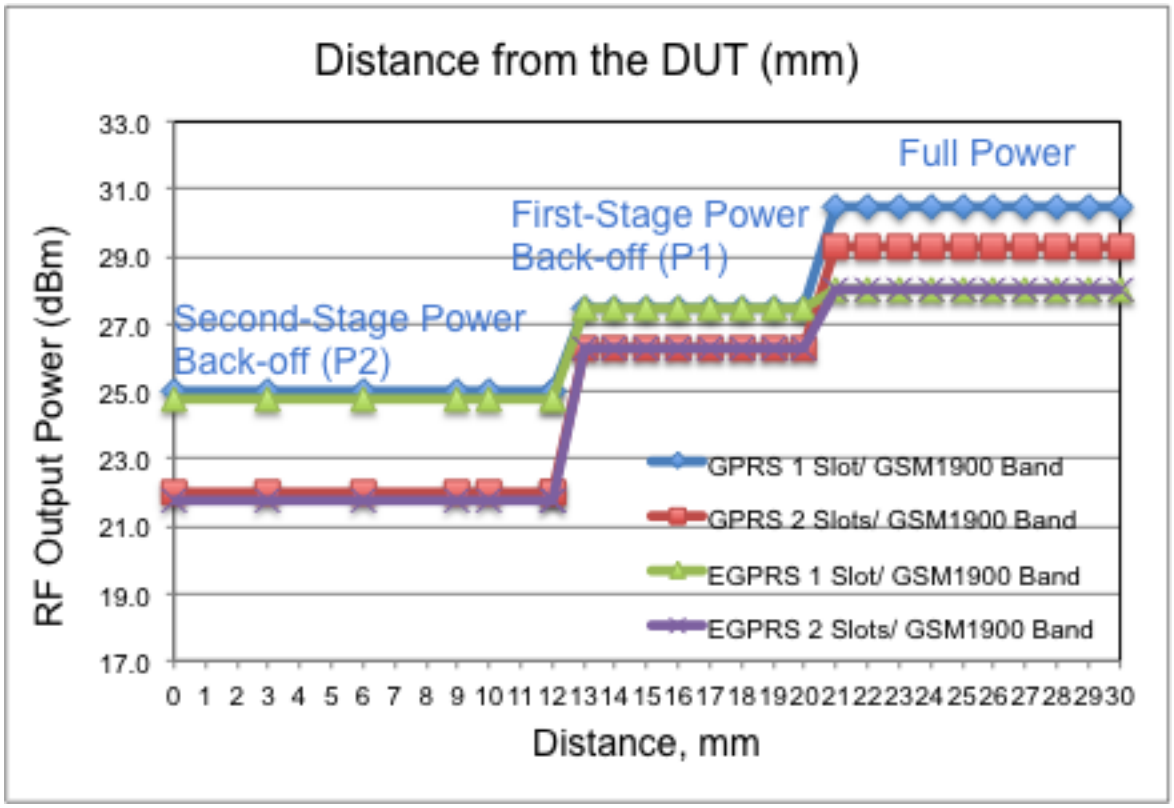
During the Top-Edge (14mm), Rear (12mm), and 27° angle from the Top-Edge/Right Corner (0mm) SAR Evaluation, the power reduction due to proximity sensor was disabled using a series of test commands which are only available in development software. The proximity sensor or the power reduction cannot be intentionally or unintentionally turned-off by the user. The software provided on production units will not allow the proximity sensor or the power cap to be disabled.

8.6. Power Reduction per Air-interface

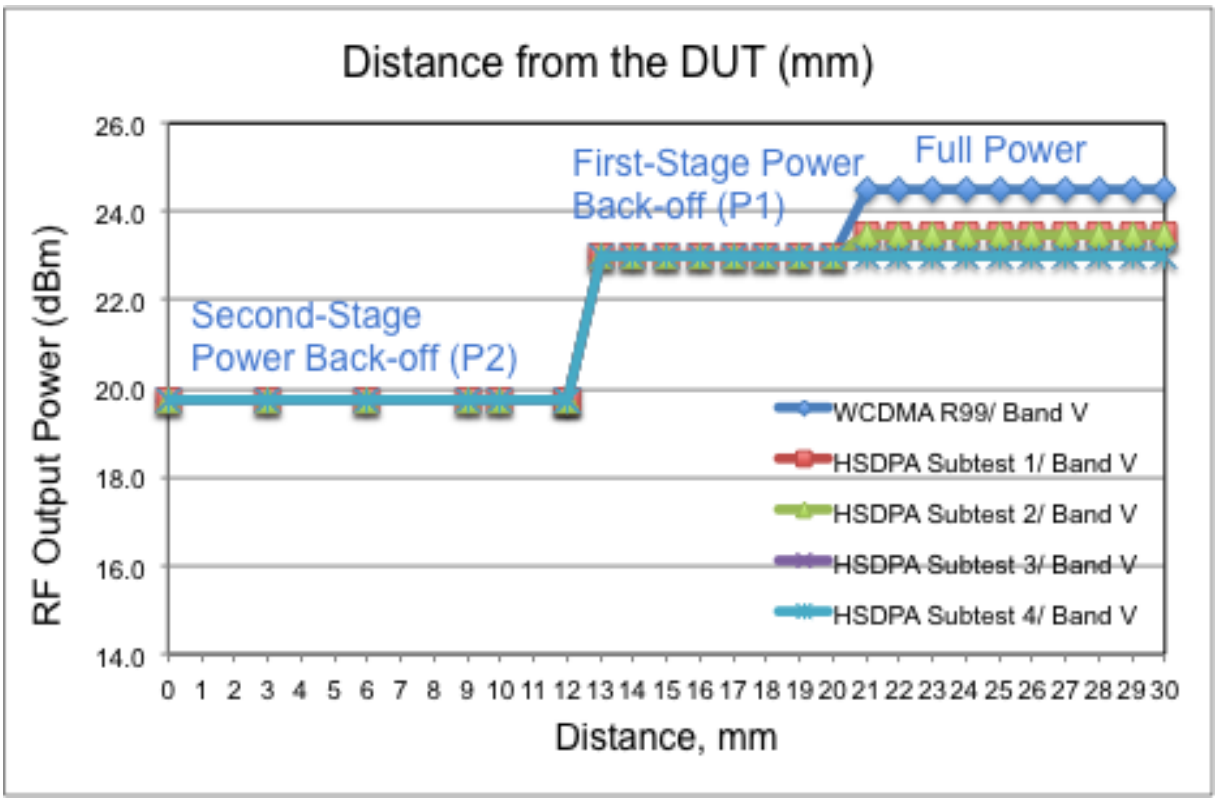
The following graphs show the power level vs the distance from the DUT to the flat phantom for the Rear Surface only.

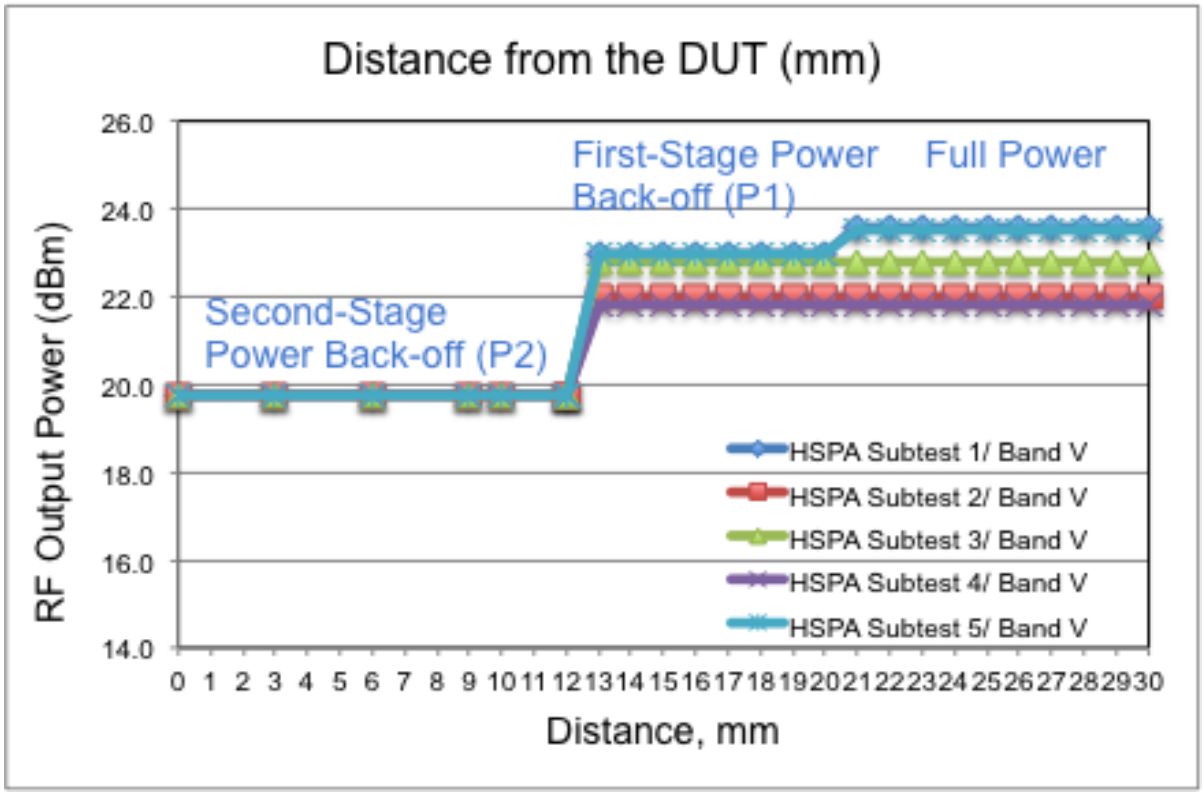
8.6.1. GSM Bands

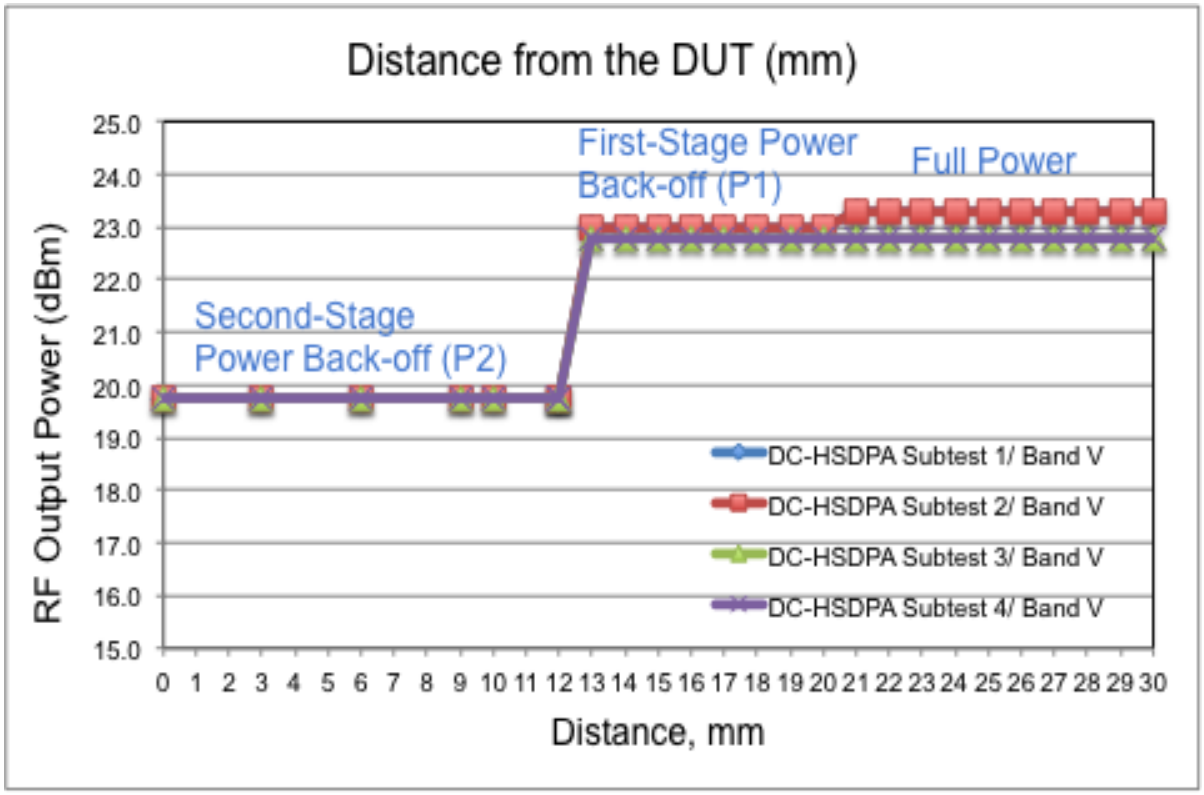


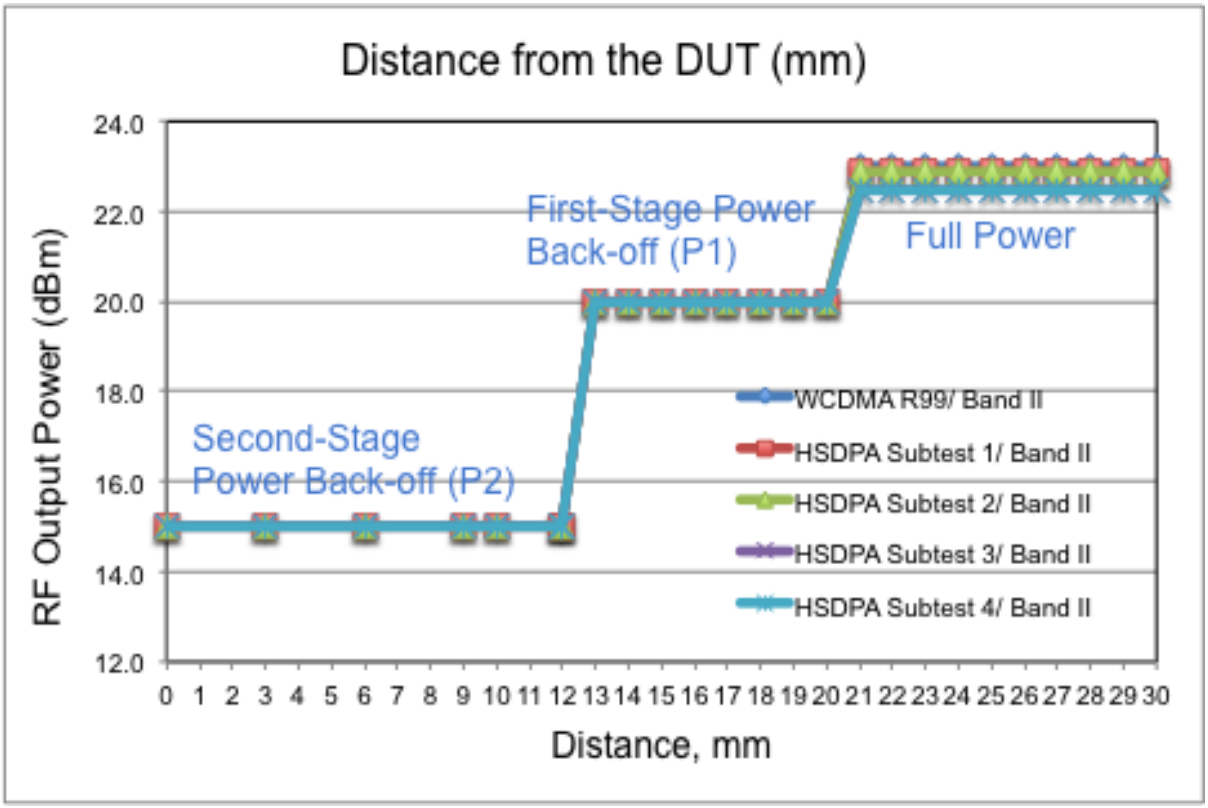


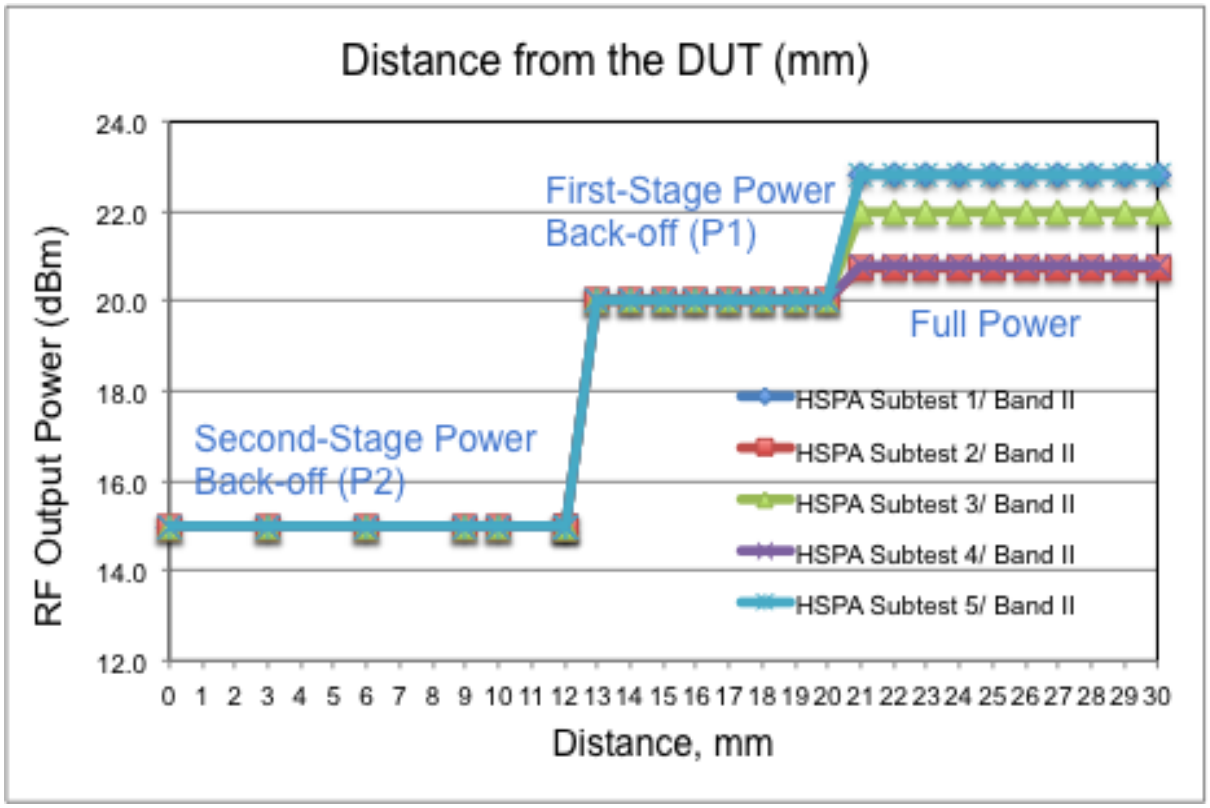
8.6.2. WCDMA Bands

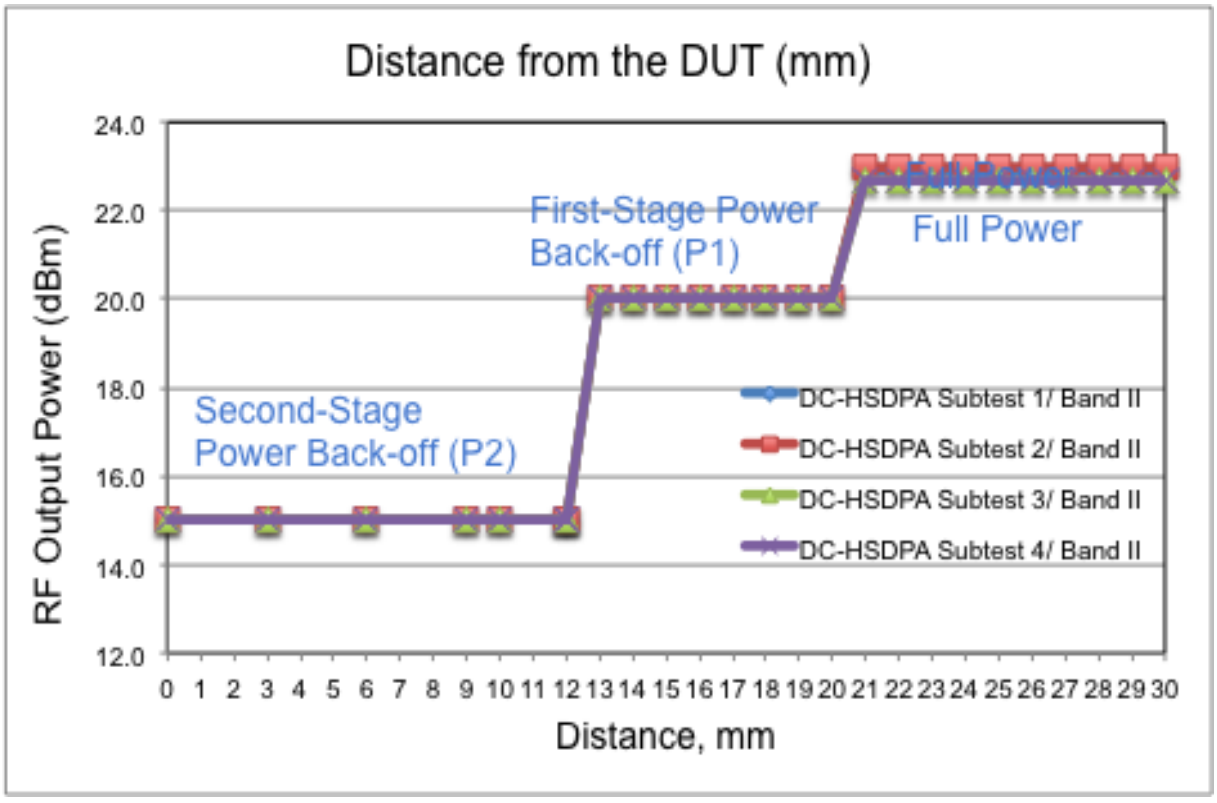




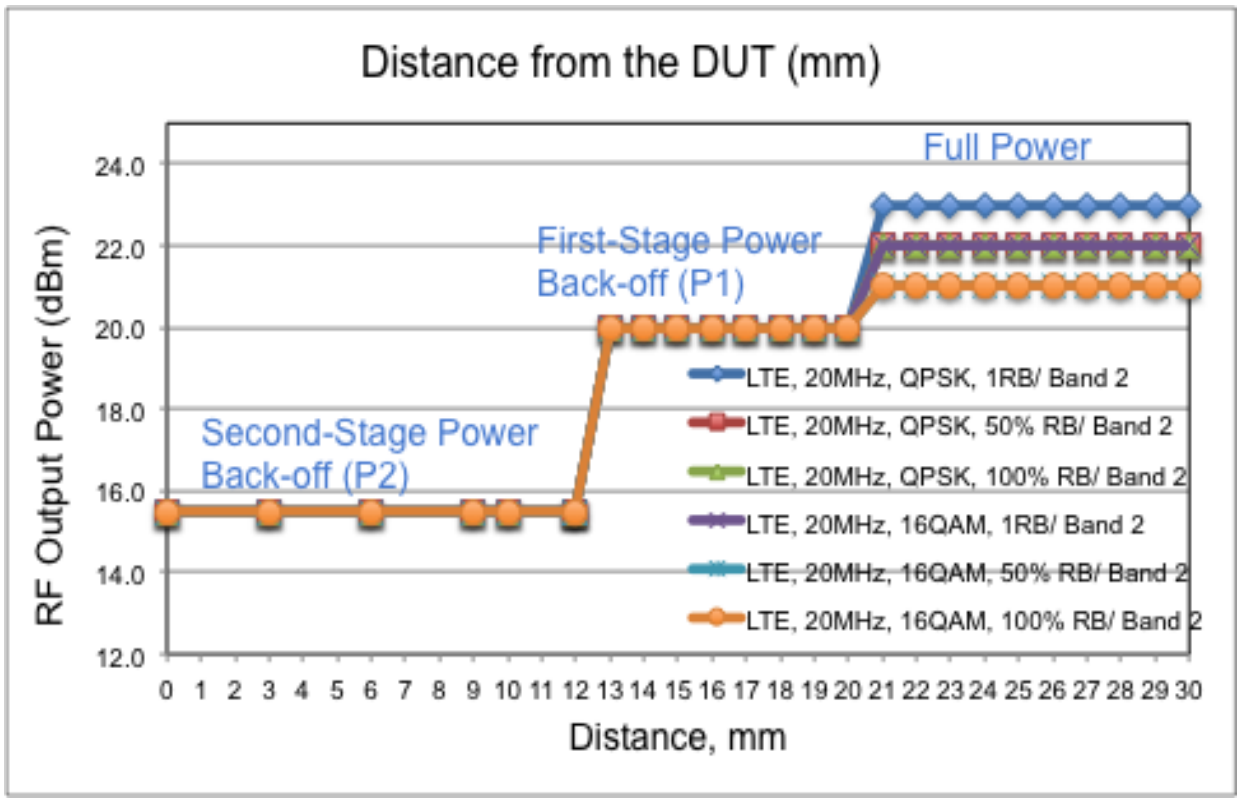


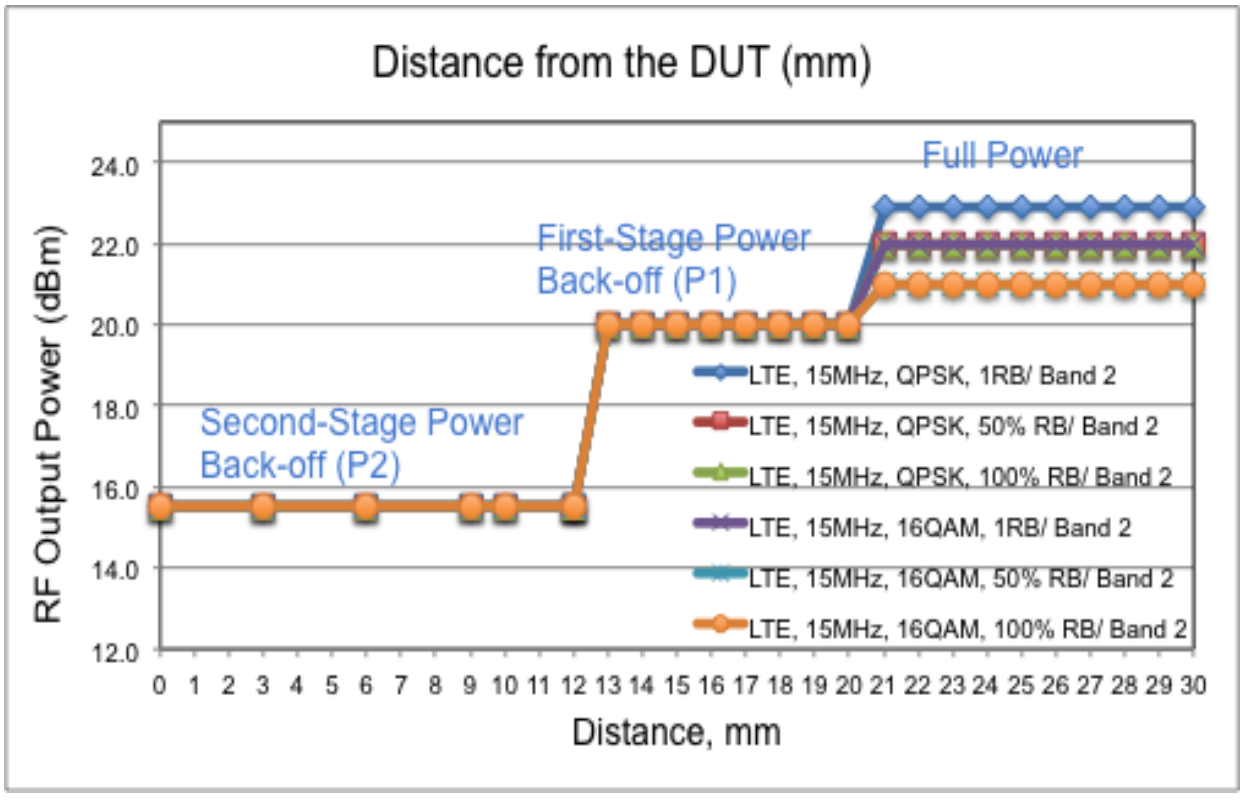


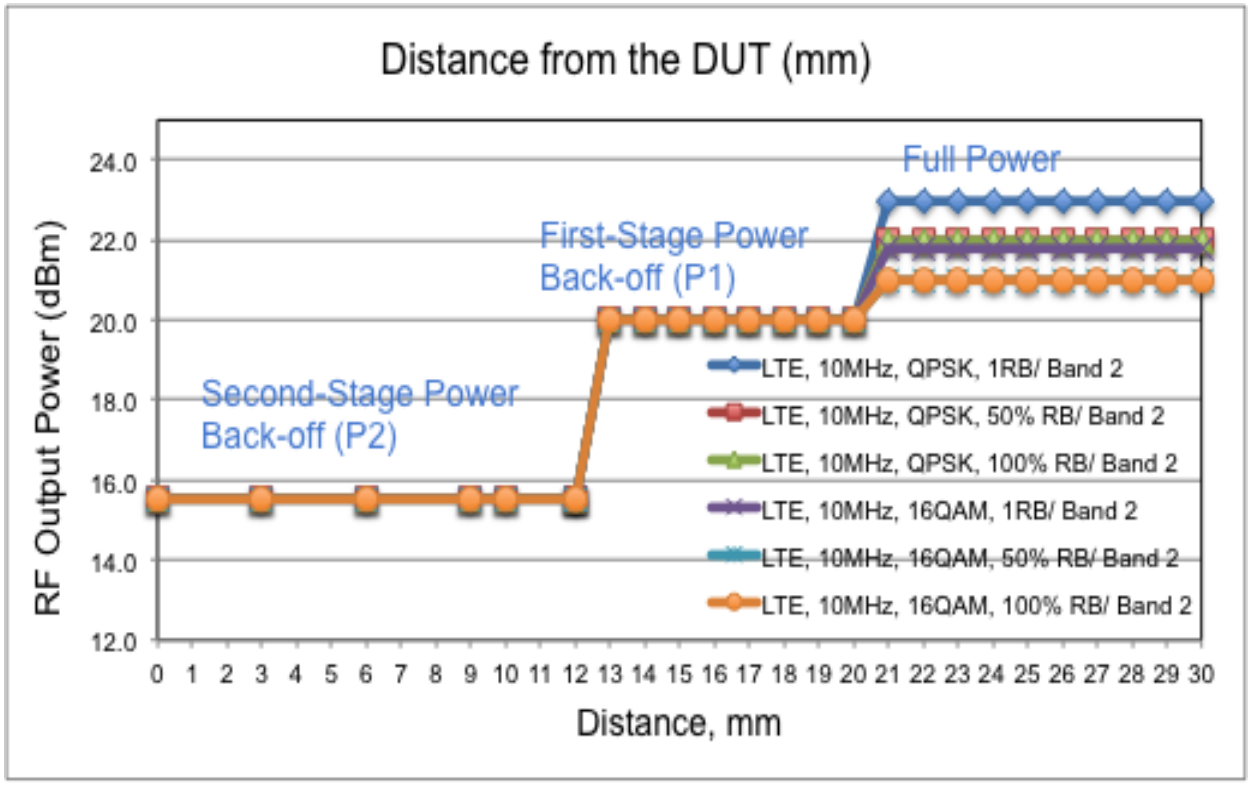


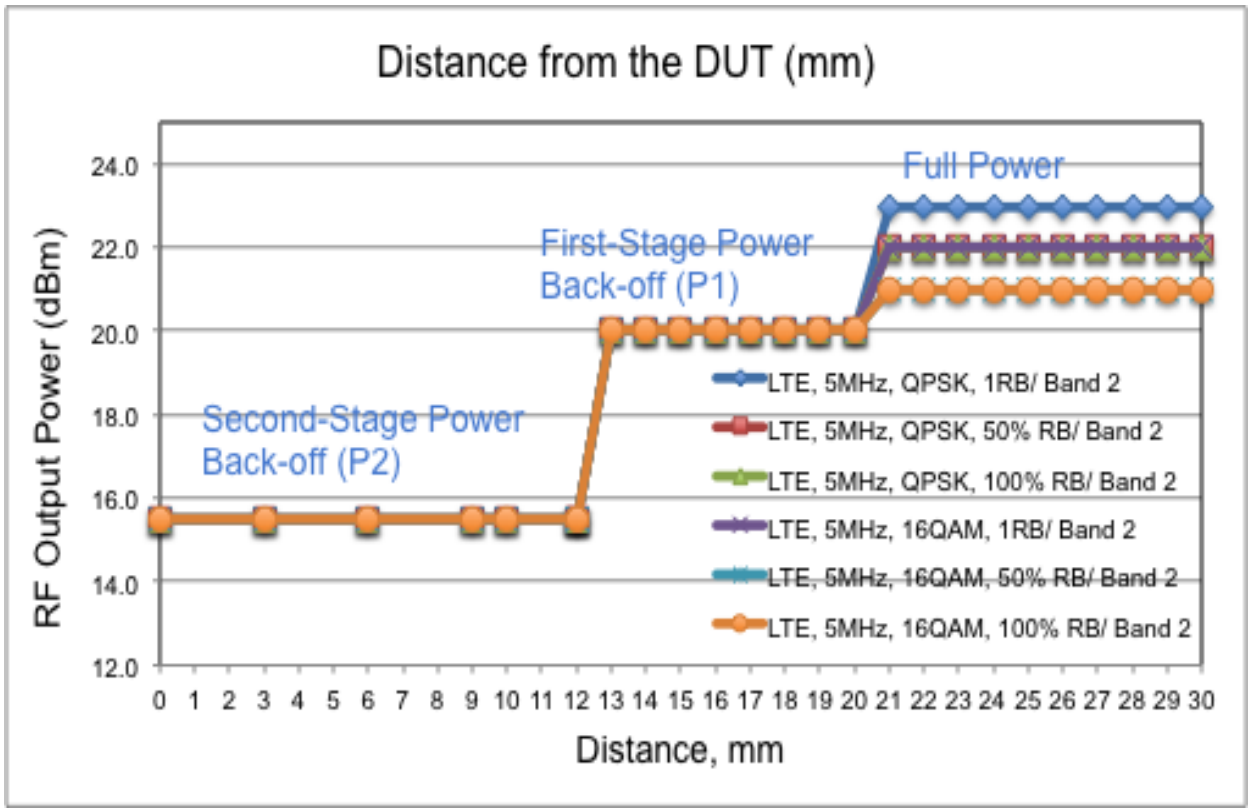


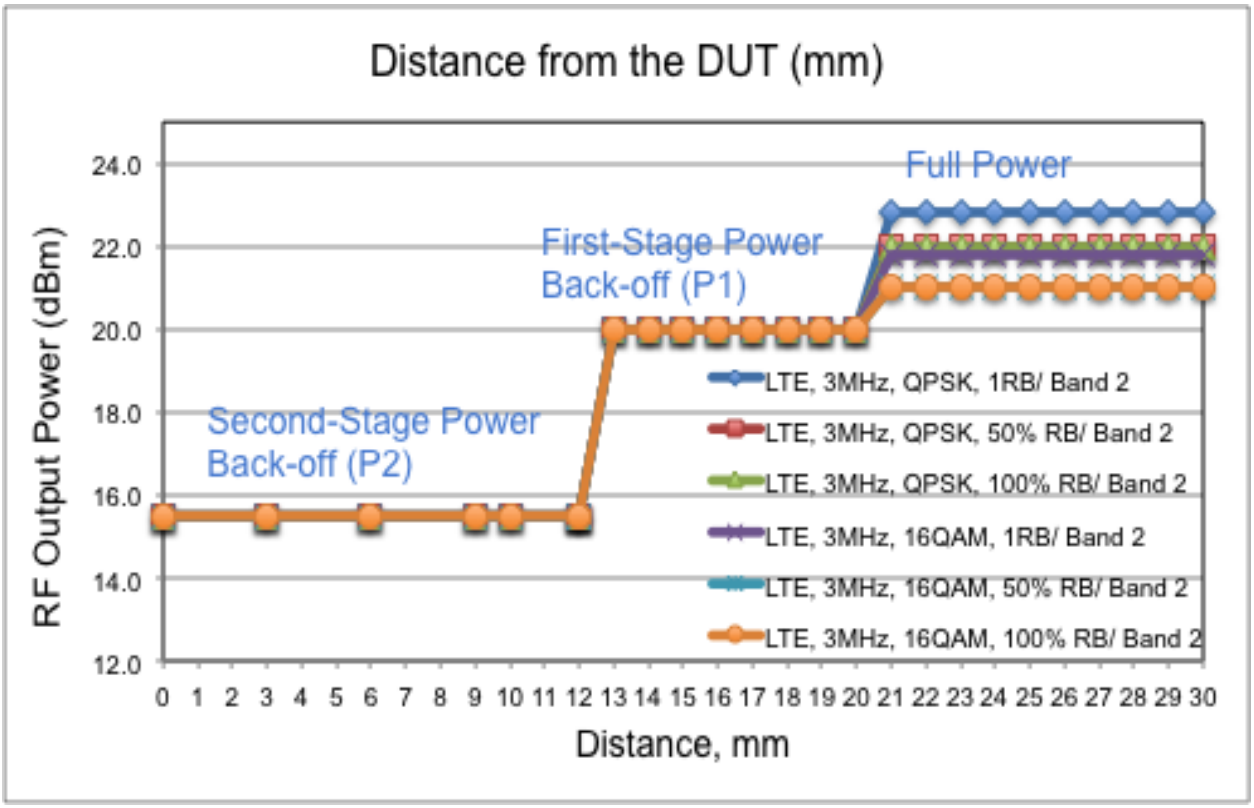
8.6.3. LTE Bands

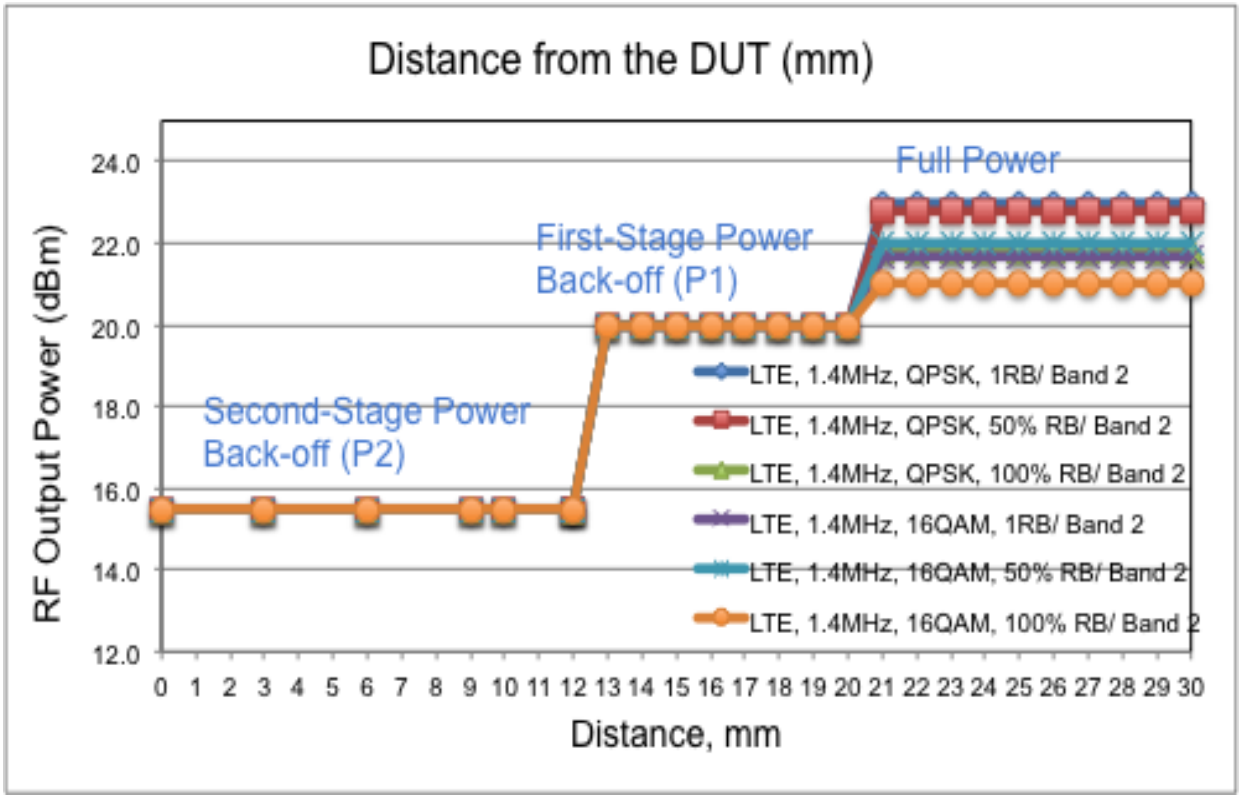


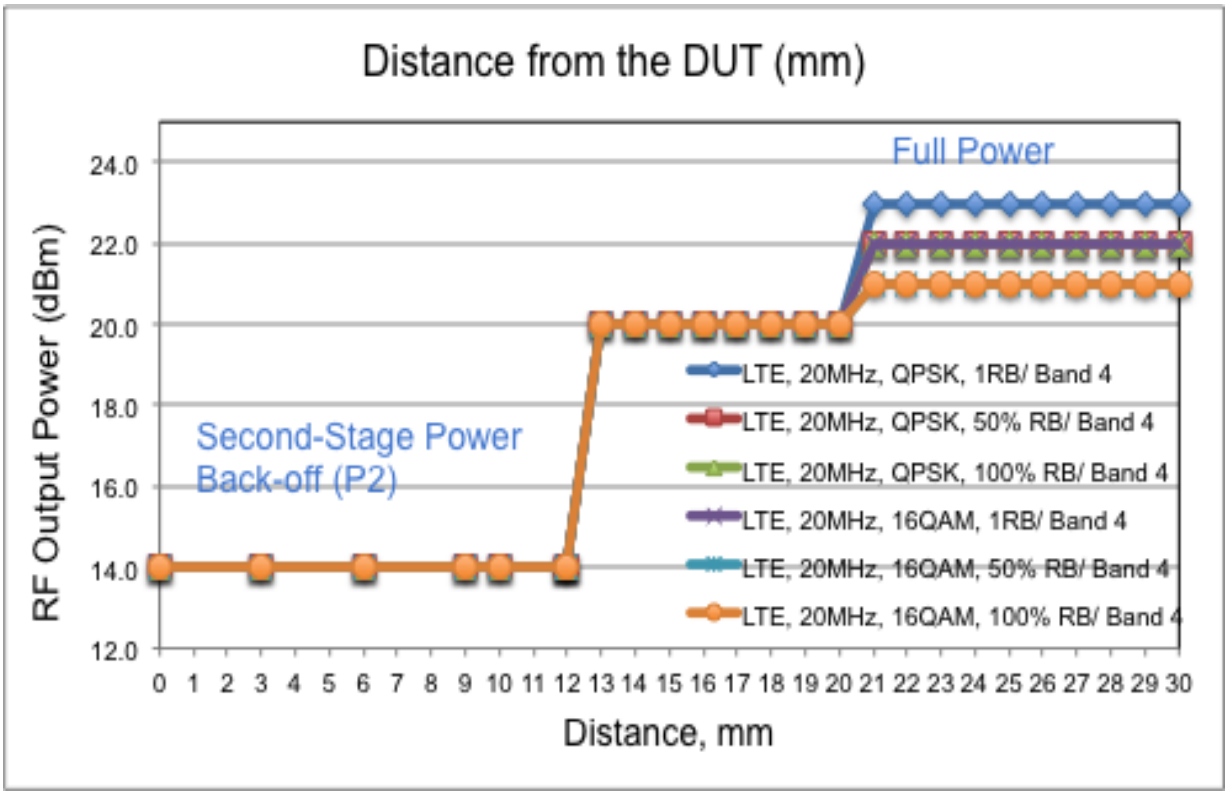


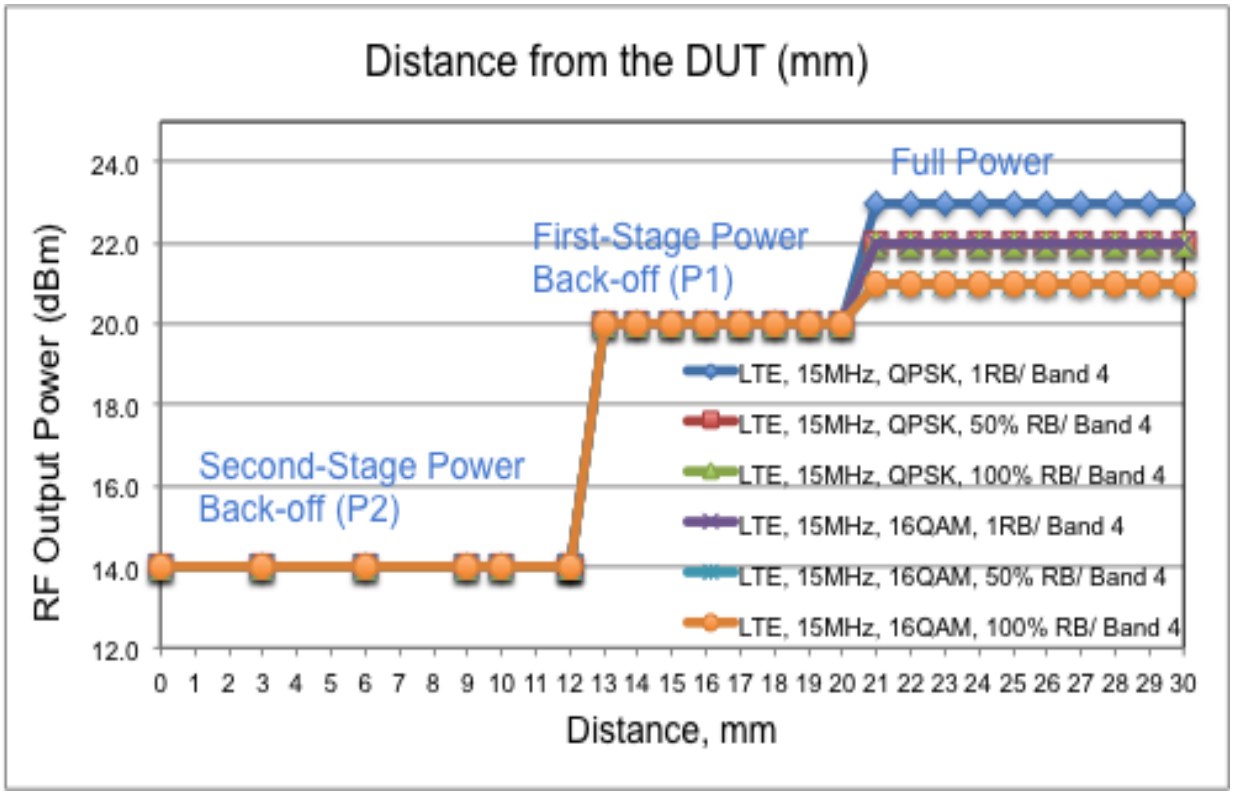


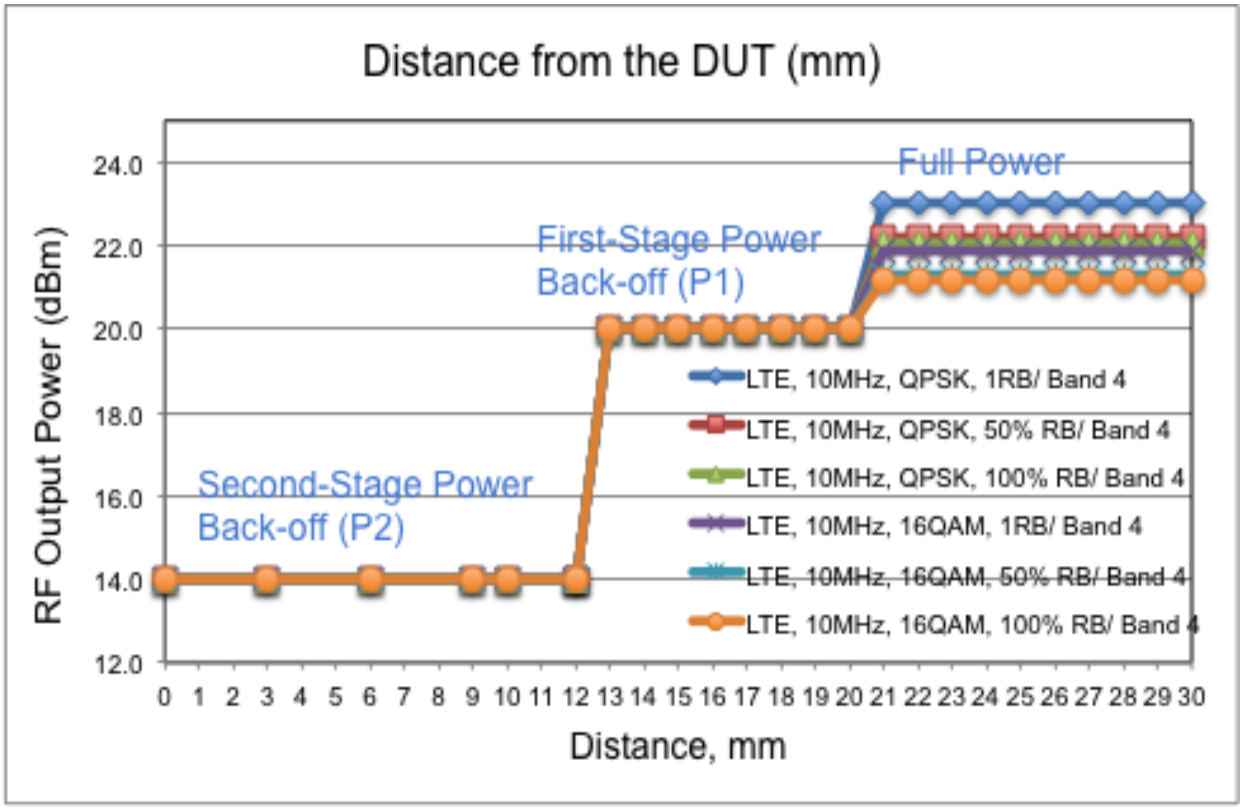


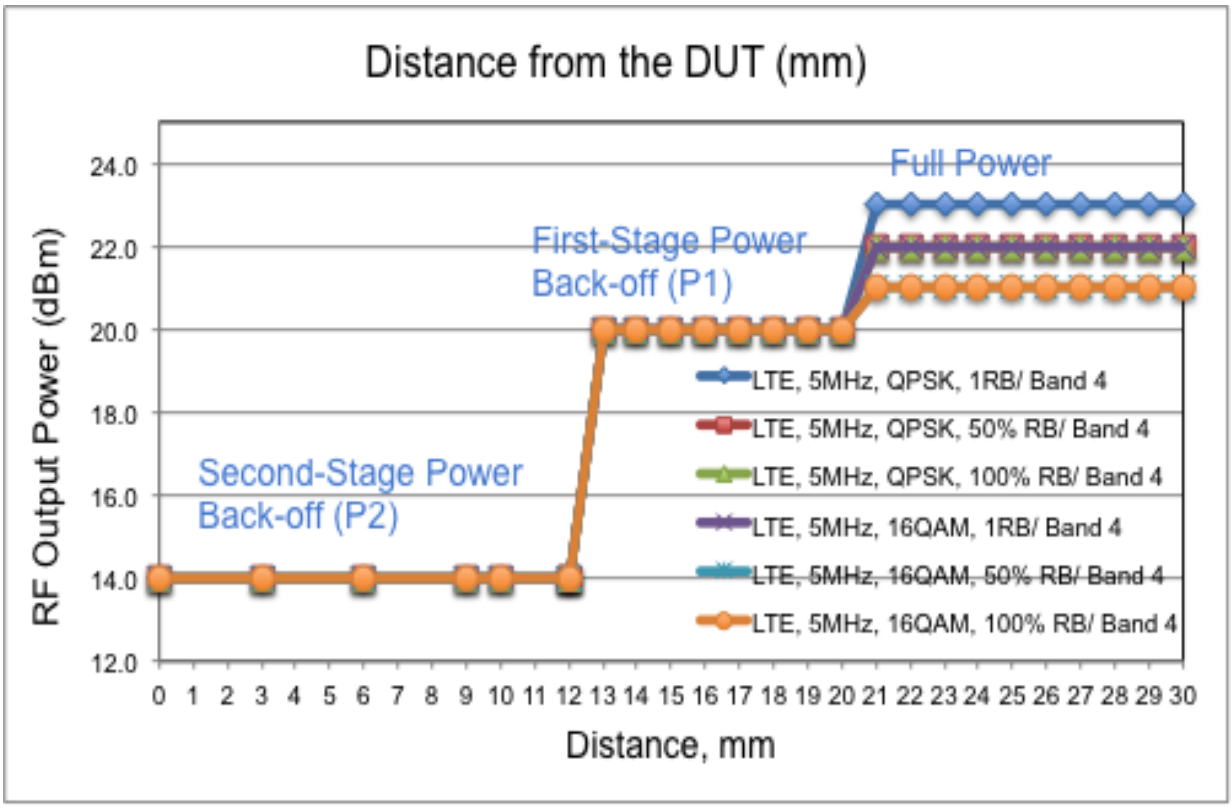


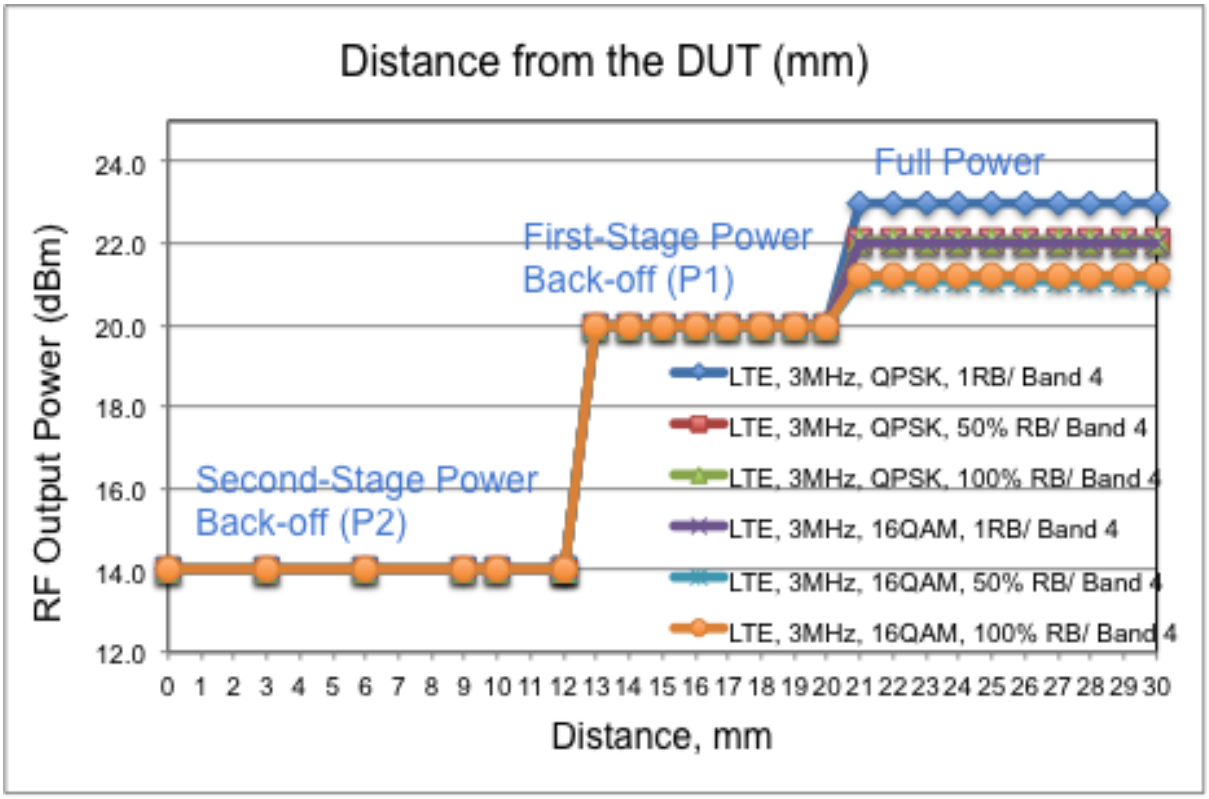


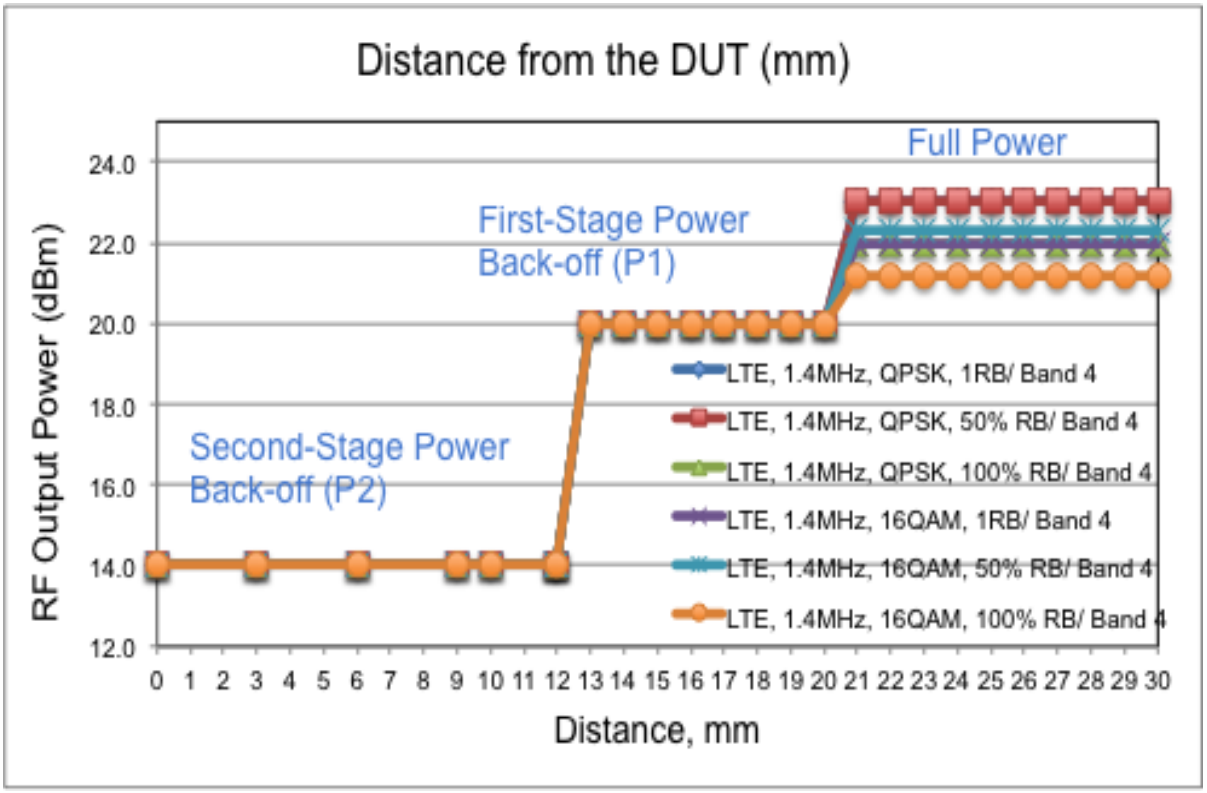


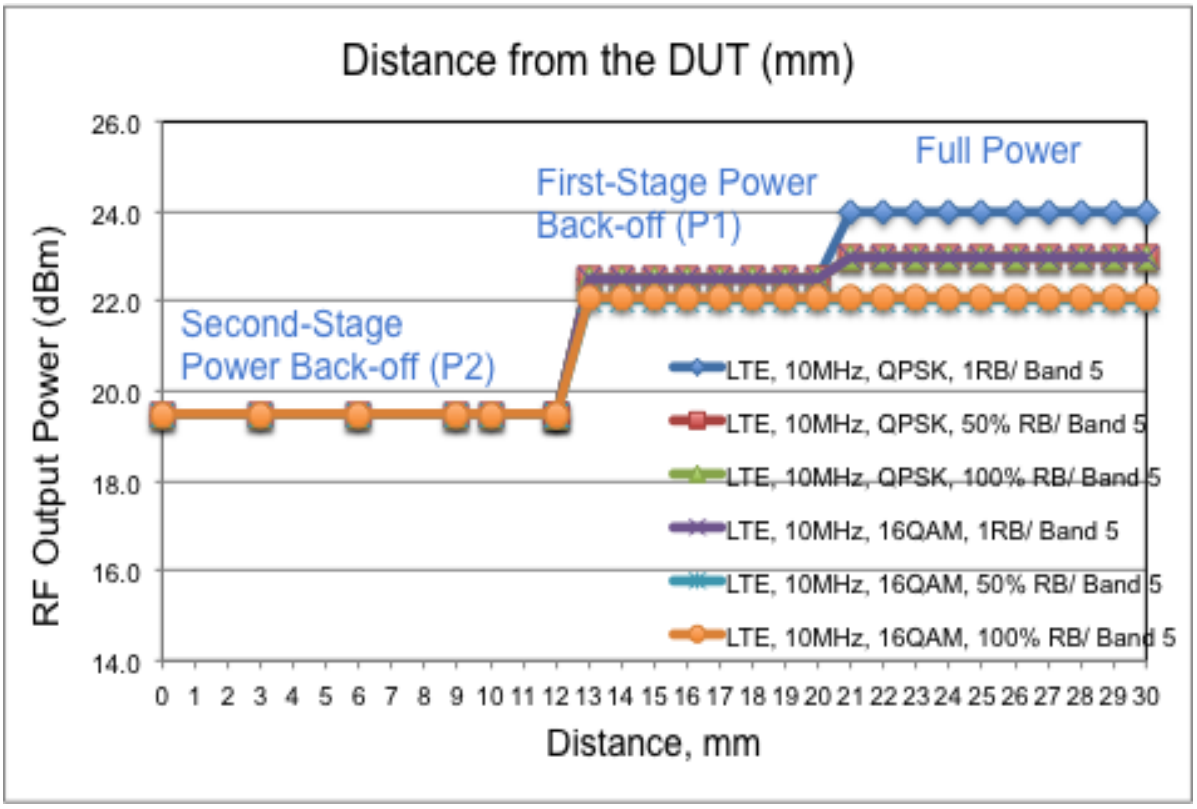


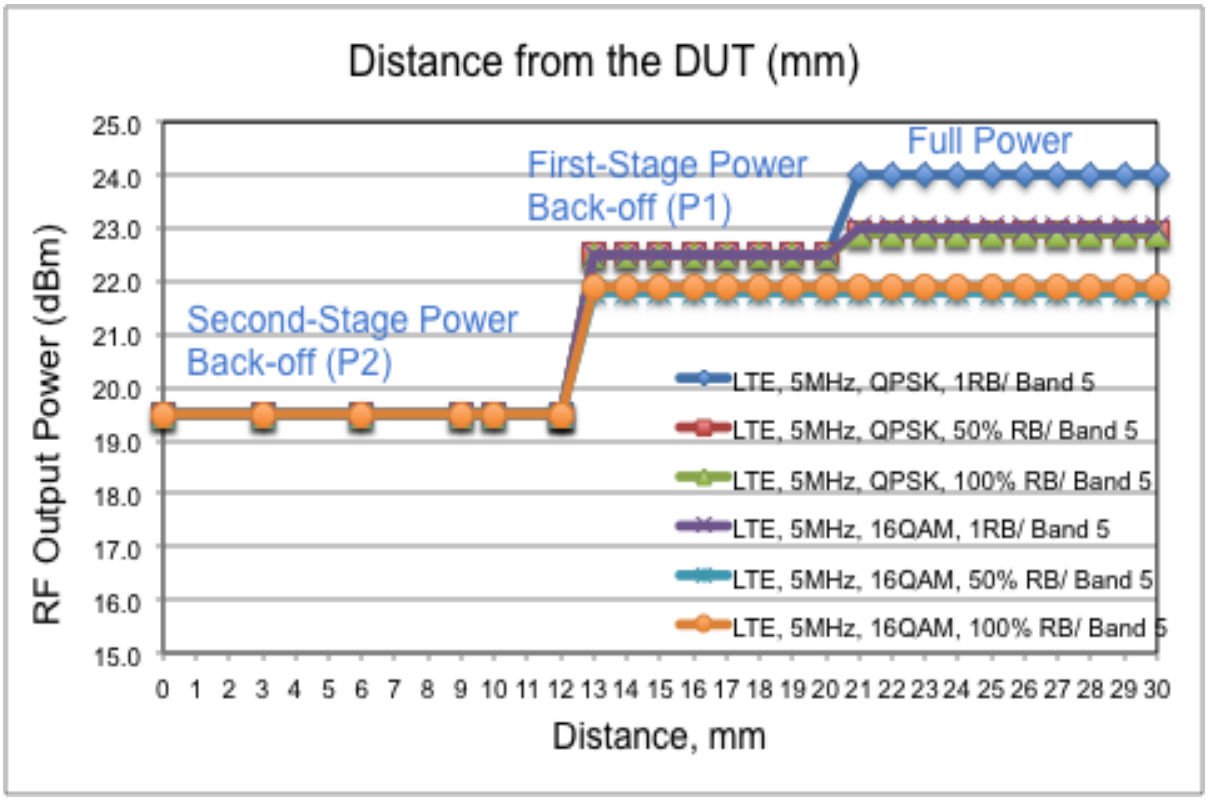


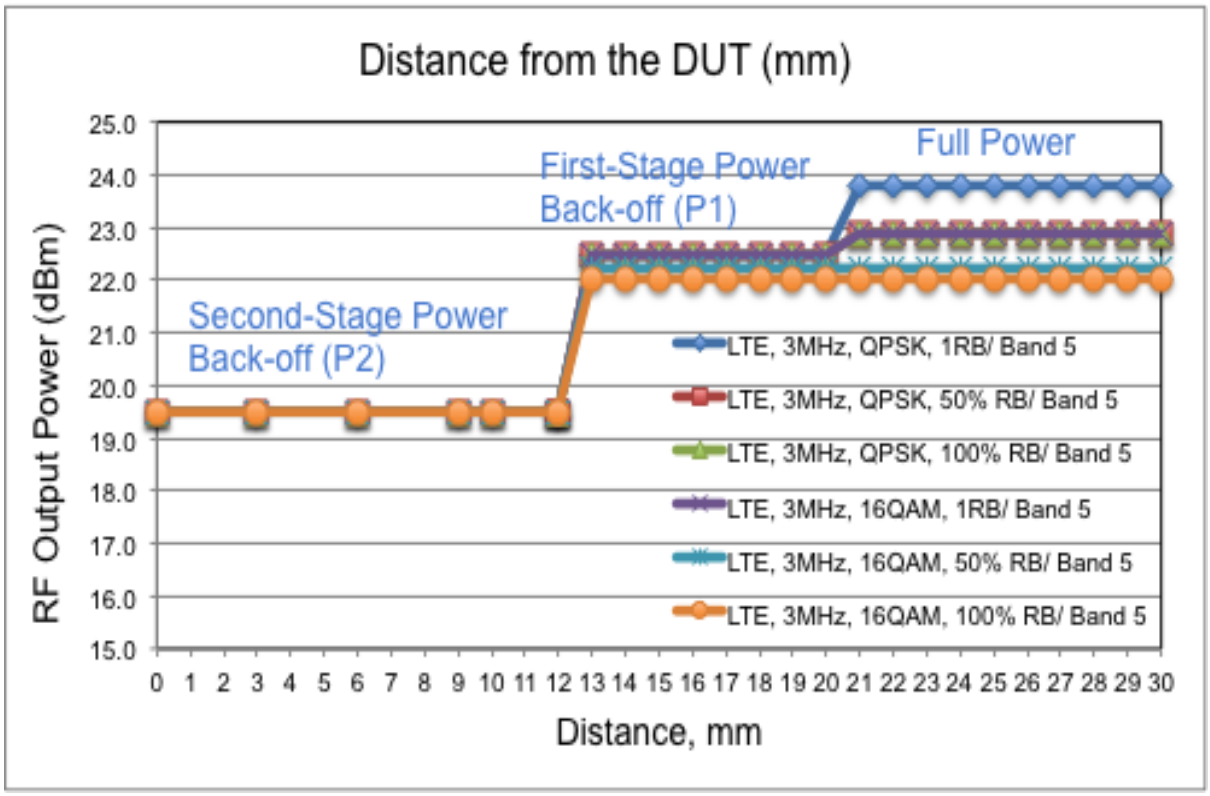


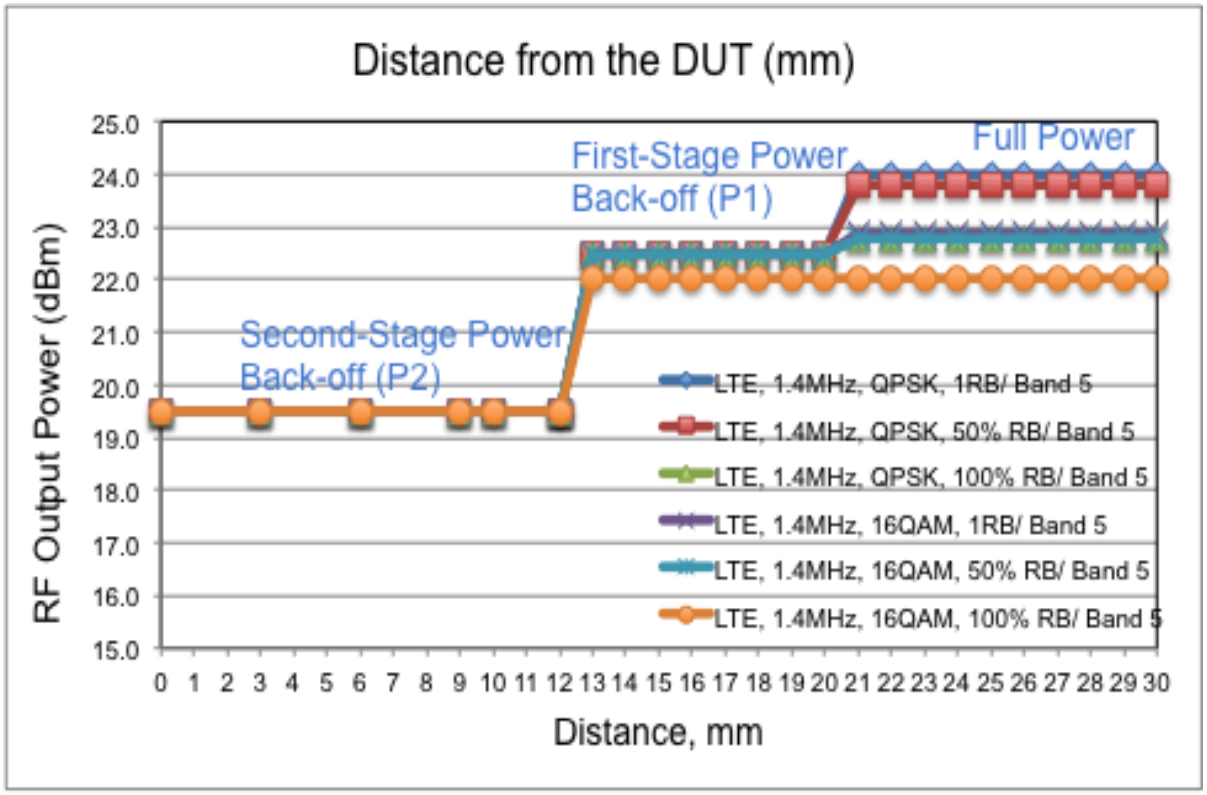


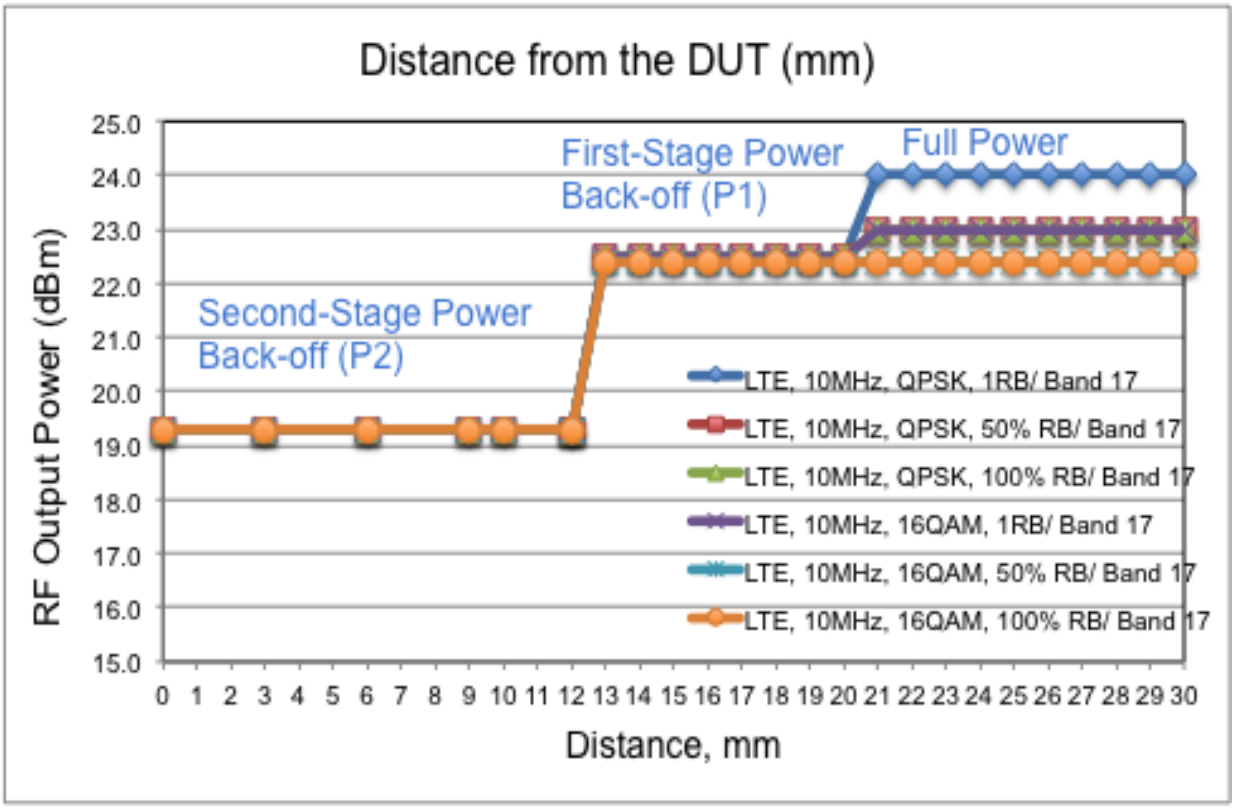


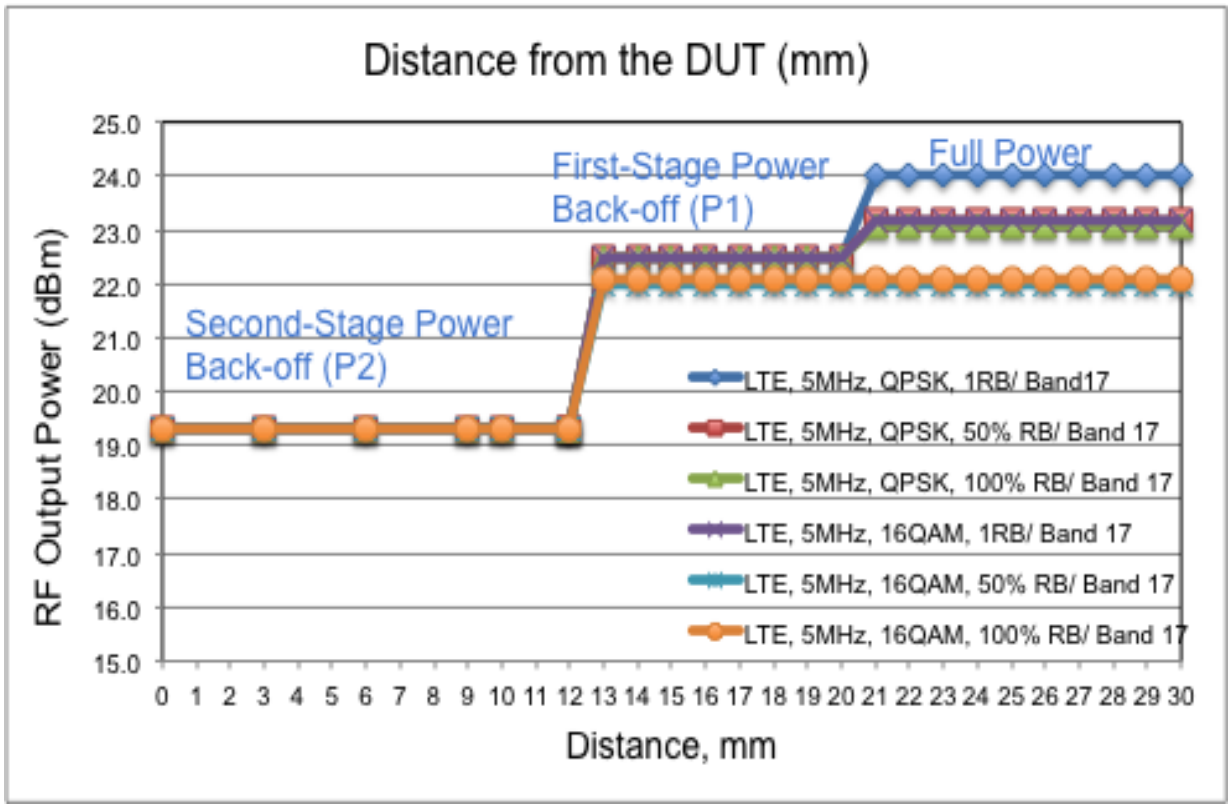












9. Exposure Conditions

Refer to Section 18 “Antenna Location and Separation Distances” for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

9.1. Body

For WiFi

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	8.48mm	Yes	
Edge 1	227.4mm	No	This is not the most conservative antenna-to-user distance at edge mode. According to KDB 447498 4) b) ii) (2)
Edge 2	44.6mm	Yes	
Edge 3	3.75mm	Yes	
Edge 4	111.7mm	No	This is not the most conservative antenna-to-user distance at edge mode. According to KDB 447498 4) b) ii) (2)

For WWAN and LTE

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	2.14mm	Yes	
Edge 1	3.7mm	Yes	
Edge 1 (41° Rear Tilt)	1.98mm	Yes	
Rear (27° Tilt @ Edge 1)	>3.7mm	Yes	
Edge 2	35.1mm	Yes	
Edge 3	99.8mm	No	This is not the most conservative antenna-to-user distance at edge mode. According to KDB 447498 4) b) ii) (2)
Edge 4	225.5mm	No	This is not the most conservative antenna-to-user distance at edge mode. According to KDB 447498 4) b) ii) (2)

Notes:

- Edge 1 = Top Edge
- Edge 2 = Right Edge
- Edge 3 = Bottom Edge
- Edge 4 = Left Edge
- Edge 1 (41° Rear Tilt) = Top Edge/Right Corner Tilt 41°
- Rear (27° Tilt @ Edge 1) = Right Edge Tilt 27°

10. RF Output Power Measurement

10.1. GSM850

Without Power Back-off

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr
850	128	824.2	33.5	24.5	**32.2**	26.2
	190	836.6	33.5	24.5	**32.3**	26.2
	251	848.8	33.5	24.5	**32.2**	26.2

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr
850	128	824.2	28.9	19.9	28.8	22.8
	190	836.6	28.9	19.9	28.9	22.8
	251	848.8	28.9	19.8	28.8	22.8

With Power Back-off

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	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
			Second-stage Power Back-off				First-Stage Power Back-off			
850	128	824.2	28.8	19.8	**25.8**	19.7	32.0	23.0	**30.8**	24.8
	190	836.6	28.8	19.8	**25.8**	19.7	32.0	23.0	**30.8**	24.8
	251	848.8	28.8	19.8	**25.8**	19.7	32.0	23.0	**30.8**	24.8

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	Freq. (MHz)	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
			Second-stage Power Back-off				First-Stage Power Back-off			
850	128	824.2	28.7	19.7	25.7	19.6	29.0	20.0	29.0	23.0
	190	836.6	28.7	19.7	25.7	19.6	29.0	20.0	29.0	23.0
	251	848.8	28.7	19.7	25.7	19.6	29.0	20.0	29.0	23.0

Notes:

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

- 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

Without Power Back-off

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr
1900	512	1850.2	30.5	21.5	**29.3**	23.3
	661	1880.0	30.5	21.5	**29.1**	23.1
	810	1909.8	30.5	21.5	**29.1**	23.1

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr
1900	512	1850.2	27.8	18.7	27.8	21.7
	661	1880.0	27.8	18.8	27.8	21.8
	810	1909.8	27.7	18.7	27.7	21.7

With Power Back-off

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	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
			Second-stage Power Back-off				First-Stage Power Back-off			
1900	512	1850.2	24.9	15.9	**22.0**	16.0	27.5	18.5	**26.3**	20.3
	661	1880.0	24.8	15.8	**21.8**	15.8	27.5	18.4	**26.2**	20.2
	810	1909.8	24.8	15.8	**21.8**	15.8	27.5	18.4	**26.2**	20.2

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	Freq. (MHz)	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
			Second-stage Power Back-off				First-Stage Power Back-off			
1900	512	1850.2	24.7	15.7	21.7	15.7	27.4	18.3	26.1	20.1
	661	1880.0	24.7	15.7	21.7	15.7	27.4	18.3	26.1	20.1
	810	1909.8	24.7	15.7	21.7	15.7	27.4	18.3	26.1	20.1

Notes:

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

- 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
	βc/βd	8/15

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)		
				Without Pwr Back-off	With Pwr Back-off	
					Second-stage	First-Stage
W-CDMA Band V	Rel 99 (RMC, 12.2 kbps)	4132	826.4	24.5	19.7	23.0
		4183	836.6	24.4	19.6	22.9
		4233	846.6	24.5	19.7	23.0

HSDPA

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

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subtest	1	2	3	4
W-CDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	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			
	Ahs =βhs/βc	30/15			

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)		
				Without Pwr Back-off	With Pwr Back-off	
					Second-stage	First-Stage
W-CDMA Band V	Subtest 1	4132	826.4	23.5	19.7	23.0
		4183	836.6	23.5	19.6	22.9
		4233	846.6	23.5	19.7	23.0
	Subtest 2	4132	826.4	23.5	19.7	23.0
		4183	836.6	23.4	19.6	22.9
		4233	846.6	23.6	19.7	23.0
	Subtest 3	4132	826.4	23.0	19.7	23.0
		4183	836.6	22.9	19.6	22.9
		4233	846.6	23.0	19.7	23.0
	Subtest 4	4132	826.4	23.0	19.7	23.0
		4183	836.6	22.9	19.6	22.9
		4233	846.6	23.1	19.7	23.0

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

Note(s):

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

HSPA (HSDPA & HSUPA)

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

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

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)		
				Without Pwr Back-off	With Pwr Back-off	
					Second-stage	First-Stage
W-CDMA Band V	Subtest 1	4132	826.4	23.7	19.7	23.0
		4183	836.6	23.5	19.6	22.9
		4233	846.6	23.4	19.7	23.0
	Subtest 2	4132	826.4	21.8	19.7	21.8
		4183	836.6	21.8	19.6	21.8
		4233	846.6	22.0	19.7	22.0
	Subtest 3	4132	826.4	22.8	19.7	22.8
		4183	836.6	22.7	19.6	22.7
		4233	846.6	22.8	19.7	22.8
	Subtest 4	4132	826.4	21.8	19.7	21.8
		4183	836.6	21.8	19.6	21.8
		4233	846.6	21.8	19.7	21.8
	Subtest 5	4132	826.4	23.5	19.7	23.0
		4183	836.6	23.3	19.6	22.9
		4233	846.6	23.5	19.7	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	Proces ses	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.		

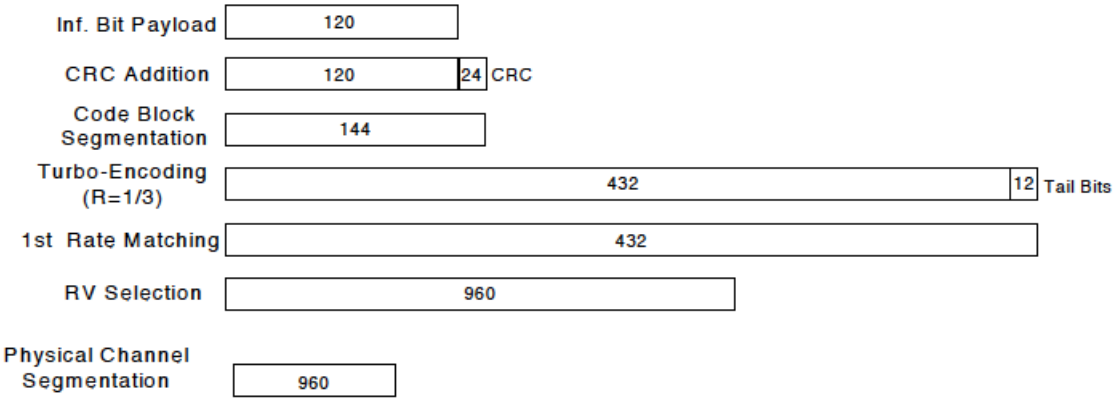


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

The following 5 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			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack Repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs = βhs/ βc	30/15			

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

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)		
				Without Pwr Back-off	With Pwr Back-off	
					Second-stage	First-Stage
W-CDMA Band V	Subtest 1	4132	826.4	23.4	19.7	23.0
		4183	836.6	23.3	19.6	22.9
		4233	846.6	23.3	19.7	23.0
	Subtest 2	4132	826.4	23.3	19.7	23.0
		4183	836.6	23.3	19.6	22.9
		4233	846.6	23.4	19.7	23.0
	Subtest 3	4132	826.4	22.8	19.7	22.8
		4183	836.6	22.8	19.6	22.8
		4233	846.6	22.8	19.7	22.8
	Subtest 4	4132	826.4	22.9	19.7	22.9
		4183	836.6	22.9	19.6	22.9
		4233	846.6	22.8	19.7	22.8

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
	βc/βd	8/15

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)		
				Without Pwr Back-off	With Pwr Back-off	
					Second-stage	First-Stage
W-CDMA (UMTS) Band II	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	23.9	14.9	19.8
		9400	1880.0	23.0	15.0	20.0
		9538	1907.6	22.9	15.0	19.9

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			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	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			
	Ahs =βhs/βc	30/15			

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)		
				Without Pwr Back-off	With Pwr Back-off	
					Second-stage	First-Stage
W-CDMA Band II	Subtest 1	9262	1852.4	22.9	14.9	19.8
		9400	1880.0	22.8	15.0	20.0
		9538	1907.6	22.8	15.0	19.9
	Subtest 2	9262	1852.4	22.8	14.9	19.8
		9400	1880.0	22.9	15.0	20.0
		9538	1907.6	22.8	15.0	19.9
	Subtest 3	9262	1852.4	22.5	14.9	19.8
		9400	1880.0	22.5	15.0	20.0
		9538	1907.6	22.5	15.0	19.9
	Subtest 4	9262	1852.4	22.5	14.9	19.8
		9400	1880.0	22.5	15.0	20.0
		9538	1907.6	22.5	15.0	19.9

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

Note(s):

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

HSPA (HSDPA & HSUPA)

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

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

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)		
				Without Pwr Back-off	With Pwr Back-off	
					Second-stage	First-Stage
W-CDMA Band II	Subtest 1	9262	1852.4	22.8		
		9400	1880.0	22.8		
		9538	1907.6	22.7		
	Subtest 2	9262	1852.4	20.7		
		9400	1880.0	20.8		
		9538	1907.6	20.7		
	Subtest 3	9262	1852.4	22.0		
		9400	1880.0	22.0		
		9538	1907.6	21.9		
	Subtest 4	9262	1852.4	20.7		
		9400	1880.0	20.8		
		9538	1907.6	20.8		
	Subtest 5	9262	1852.4	22.8		
		9400	1880.0	22.7		
		9538	1907.6	22.7		

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	Proces ses	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.		

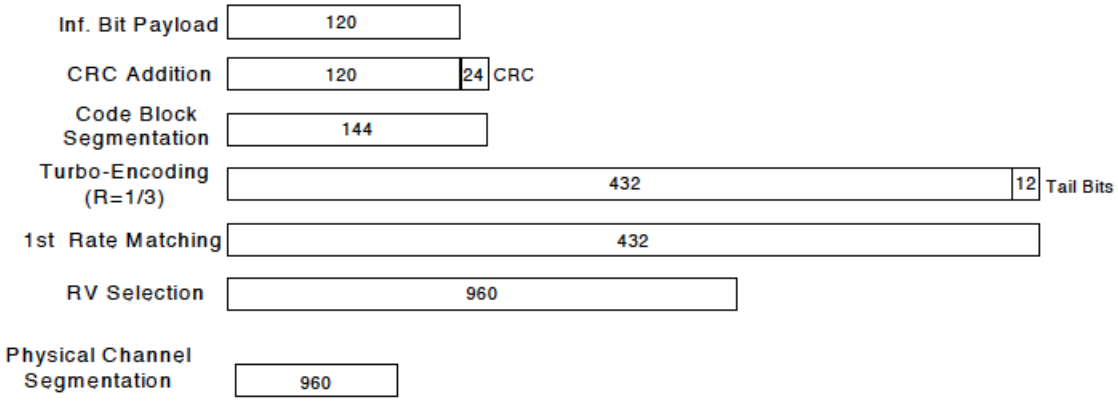


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

The following 5 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			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack Repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs = βhs/ βc	30/15			

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

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)		
				Without Pwr Back-off	With Pwr Back-off	
					Second-stage	First-Stage
W-CDMA Band II	Subtest 1	9262	1852.4	22.9	14.9	19.8
		9400	1880.0	22.9	15.0	20.0
		9538	1907.6	22.9	15.0	19.9
	Subtest 2	9262	1852.4	22.9	14.9	19.8
		9400	1880.0	23.0	15.0	20.0
		9538	1907.6	22.9	15.0	19.9
	Subtest 3	9262	1852.4	22.7	14.9	19.8
		9400	1880.0	22.7	15.0	20.0
		9538	1907.6	22.7	15.0	19.9
	Subtest 4	9262	1852.4	22.6	14.9	19.8
		9400	1880.0	22.7	15.0	20.0
		9538	1907.6	22.6	15.0	19.9

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 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23[1]	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-
Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.					

Results

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
20	18700	1860.0	QPSK	1	0	0	23.0	15.4	19.9
				1	49	0	23.0	15.4	19.8
				1	99	0	23.0	15.4	19.8
				50	0	1	22.2	15.5	20.0
				50	24	1	22.2	15.5	20.0
				50	49	1	22.1	15.4	19.9
				100	0	1	22.1	15.5	20.0
			16QAM	1	0	1	22.0	15.4	19.8
				1	49	1	22.0	15.4	19.8
				1	99	1	22.0	15.4	19.8
				50	0	2	21.0	15.4	19.9
				50	24	2	21.0	15.5	20.0
				50	49	2	21.0	15.4	19.9
				100	0	2	21.1	15.4	20.0
	18900	1880.0	QPSK	1	0	0	23.0	15.5	19.9
				1	49	0	23.0	15.5	20.0
				1	99	0	23.0	15.4	19.9
				50	0	1	22.3	15.5	20.0
				50	24	1	22.3	15.5	20.0
				50	49	1	22.3	15.5	20.0
				100	0	1	22.2	15.6	20.0
			16QAM	1	0	1	22.1	15.4	19.8
				1	49	1	22.0	15.4	19.8
				1	99	1	21.9	15.4	19.8
				50	0	2	21.0	15.4	20.0
				50	24	2	20.9	15.5	20.0
				50	49	2	21.0	15.4	19.9
				100	0	2	21.1	15.4	20.0
	19100	1900.0	QPSK	1	0	0	23.0	15.5	19.9
				1	49	0	22.8	15.4	19.8
				1	99	0	22.9	15.4	19.8
				50	0	1	22.1	15.5	20.0
				50	24	1	22.1	15.4	19.9
				50	49	1	22.1	15.4	19.9
				100	0	1	22.1	15.6	20.0
			16QAM	1	0	1	22.0	15.4	19.8
				1	49	1	22.0	15.4	19.8
				1	99	1	22.0	15.4	19.8
				50	0	2	21.0	15.4	19.9
				50	24	2	21.2	15.5	20.0
				50	49	2	21.0	15.4	19.9
				100	0	2	21.0	15.4	19.9

LTE Band 2 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
15	18675	1857.5	QPSK	1	0	0	22.7	15.4	19.9
				1	37	0	22.8	15.4	19.8
				1	74	0	22.8	15.4	19.8
				38	0	1	22.0	15.4	19.9
				38	18	1	22.1	15.5	20.0
				38	37	1	22.0	15.4	19.9
				75	0	1	21.0	15.5	20.0
			16QAM	1	0	1	21.8	15.4	19.8
				1	37	1	21.8	15.4	19.8
				1	74	1	21.8	15.4	19.8
				38	0	2	22.0	15.4	19.9
				38	18	2	22.0	15.5	19.9
				38	37	2	22.0	15.4	19.9
				75	0	2	21.0	15.4	20.0
	18900	1880.0	QPSK	1	0	0	22.9	15.5	19.9
				1	37	0	22.8	15.4	19.8
				1	74	0	22.7	15.4	19.8
				38	0	1	22.0	15.4	20.0
				38	18	1	22.0	15.5	20.0
				38	37	1	22.0	15.5	19.9
				75	0	1	21.9	15.5	20.0
			16QAM	1	0	1	22.0	15.4	19.8
				1	37	1	21.9	15.4	19.8
				1	74	1	21.8	15.4	19.8
				38	0	2	22.1	15.4	19.9
				38	18	2	22.1	15.5	20.0
				38	37	2	22.1	15.4	19.9
				75	0	2	21.0	15.4	19.9
	19125	1902.5	QPSK	1	0	0	22.9	15.4	19.9
				1	37	0	22.8	15.4	19.8
				1	74	0	22.8	15.4	19.8
				38	0	1	22.1	15.5	19.9
				38	18	1	22.1	15.5	20.0
				38	37	1	22.0	15.4	19.9
				75	0	1	22.1	15.4	19.9
			16QAM	1	0	1	22.1	15.4	19.8
				1	37	1	22.0	15.4	19.8
				1	74	1	21.8	15.4	19.8
				38	0	2	22.1	15.4	19.9
				38	18	2	22.2	15.4	19.9
				38	37	2	22.0	15.4	19.9
				75	0	2	21.1	15.4	20.0

LTE Band 2 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
10	18650	1855.0	QPSK	1	0	0	22.7	15.4	19.9
				1	24	0	22.8	15.4	19.8
				1	49	0	22.8	15.4	19.8
				25	0	1	21.9	15.4	19.9
				25	12	1	22.0	15.4	19.9
				25	24	1	21.9	15.4	19.9
				50	0	1	21.8	15.5	19.9
			16QAM	1	0	1	21.8	15.4	19.8
				1	24	1	21.8	15.4	19.8
				1	49	1	21.8	15.4	19.8
				25	0	2	20.9	15.4	19.9
				25	12	2	20.9	15.5	19.9
				25	24	2	20.9	15.4	19.9
				50	0	2	20.9	15.4	19.9
	18900	1880.0	QPSK	1	0	0	22.9	15.4	19.9
				1	24	0	22.8	15.5	19.9
				1	49	0	22.6	15.4	19.9
				25	0	1	22.0	15.4	19.9
				25	12	1	22.1	15.4	19.9
				25	24	1	22.0	15.4	19.9
				50	0	1	22.0	15.5	19.9
			16QAM	1	0	1	21.8	15.4	19.8
				1	24	1	21.8	15.5	19.9
				1	49	1	21.8	15.4	19.8
				25	0	2	21.0	15.4	19.9
				25	12	2	21.1	15.5	19.9
				25	24	2	21.0	15.4	19.9
				50	0	2	21.0	15.4	19.9
	19150	1905.0	QPSK	1	0	0	23.0	15.4	19.8
				1	24	0	22.9	15.4	19.8
				1	49	0	22.8	15.4	19.8
				25	0	1	22.0	15.4	19.9
				25	12	1	22.1	15.4	19.9
				25	24	1	22.0	15.4	19.9
				50	0	1	21.9	15.4	19.9
			16QAM	1	0	1	21.8	15.4	19.8
				1	24	1	21.8	15.4	19.8
				1	49	1	21.8	15.4	19.8
				25	0	2	21.0	15.4	19.9
				25	12	2	21.0	15.5	19.9
				25	24	2	21.0	15.4	19.9
				50	0	2	21.0	15.4	19.9

LTE Band 2 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
5	18625	1855.0	QPSK	1	0	0	22.7	15.4	19.8
				1	12	0	22.7	15.4	19.8
				1	24	0	22.7	15.4	19.8
				12	0	1	21.7	15.4	19.8
				12	6	1	21.8	15.4	19.9
				12	11	1	21.7	15.4	19.8
				25	0	1	21.8	15.5	19.9
			16QAM	1	0	1	22.0	15.4	19.8
				1	12	1	22.0	15.4	19.8
				1	24	1	21.9	15.4	19.8
				12	0	2	20.8	15.4	19.8
				12	6	2	20.7	15.5	19.8
				12	11	2	20.7	15.4	19.8
				25	0	2	20.8	15.4	19.8
	18900	1880.0	QPSK	1	0	0	23.0	15.4	19.9
				1	12	0	22.8	15.4	19.8
				1	24	0	22.7	15.4	19.8
				12	0	1	21.9	15.4	19.9
				12	6	1	22.0	15.4	19.9
				12	11	1	21.9	15.4	19.9
				25	0	1	22.0	15.5	19.9
			16QAM	1	0	1	22.0	15.4	19.8
				1	12	1	21.9	15.4	19.8
				1	24	1	21.9	15.4	19.8
				12	0	2	20.9	15.4	19.8
				12	6	2	20.9	15.5	19.8
				12	11	2	20.8	15.4	19.8
				25	0	2	21.0	15.4	19.8
	19175	1907.5	QPSK	1	0	0	22.9	15.4	19.9
				1	12	0	22.9	15.4	19.8
				1	24	0	22.9	15.4	19.8
				12	0	1	21.8	15.4	19.9
				12	6	1	21.9	15.4	19.9
				12	11	1	21.8	15.4	19.9
				25	0	1	21.7	15.5	19.9
			16QAM	1	0	1	22.0	15.4	19.8
				1	12	1	22.0	15.4	19.8
				1	24	1	22.0	15.4	19.8
				12	0	2	20.7	15.4	19.8
				12	6	2	20.7	15.5	19.8
				12	11	2	20.8	15.4	19.8
				25	0	2	20.9	15.4	19.8

LTE Band 2 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
3	18615	1851.5	QPSK	1	0	0	22.6	15.4	19.8
				1	7	0	22.7	15.4	19.8
				1	14	0	22.7	15.4	19.8
				8	0	1	21.7	15.4	19.8
				8	4	1	21.8	15.4	19.9
				8	7	1	21.7	15.4	19.8
				15	0	1	21.8	15.4	19.8
			16QAM	1	0	1	21.5	15.3	19.7
				1	7	1	22.6	15.4	19.8
				1	14	1	21.5	15.4	19.8
				8	0	2	21.0	15.4	19.8
				8	4	2	21.1	15.5	19.8
				8	7	2	21.0	15.4	19.8
				15	0	2	20.9	15.4	19.8
	18900	1880.0	QPSK	1	0	0	22.8	15.3	19.7
				1	7	0	22.7	15.4	19.8
				1	14	0	22.7	15.4	19.8
				8	0	1	21.8	15.4	19.8
				8	4	1	22.0	15.4	19.9
				8	7	1	21.9	15.4	19.8
				15	0	1	22.0	15.4	19.9
			16QAM	1	0	1	21.5	15.3	19.7
				1	7	1	21.6	15.4	19.8
				1	14	1	21.6	15.4	19.8
				8	0	2	22.1	15.4	19.8
				8	4	2	21.3	15.4	19.8
				8	7	2	21.1	15.3	19.8
				15	0	2	21.1	15.4	19.8
	19184	1908.4	QPSK	1	0	0	22.6	15.4	19.8
				1	7	0	22.6	15.4	19.8
				1	14	0	22.7	15.3	19.7
				8	0	1	21.7	15.4	19.8
				8	4	1	21.8	15.4	19.9
				8	7	1	21.7	15.4	19.8
				15	0	1	21.8	15.5	19.9
			16QAM	1	0	1	21.8	15.4	19.8
				1	7	1	21.8	15.4	19.8
				1	14	1	21.5	15.4	19.8
				8	0	2	21.0	15.4	19.8
				8	4	2	21.2	15.5	19.8
				8	7	2	21.0	15.4	19.8
				15	0	2	21.0	15.4	19.8

LTE Band 2 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
1.4	18607	1850.7	QPSK	1	0	0	22.7	15.3	19.7
				1	2	0	22.6	15.4	19.8
				1	5	0	22.7	15.4	19.8
				3	0	1	22.2	15.3	19.8
				3	1	1	22.2	15.4	19.9
				3	2	1	22.5	15.4	19.8
				6	0	1	21.7	15.4	19.8
			16QAM	1	0	1	21.5	15.3	19.7
				1	2	1	21.7	15.4	19.8
				1	5	1	21.5	15.4	19.8
				3	0	1	22.8	15.3	19.7
				3	1	1	21.8	15.4	19.8
				3	2	1	22.1	15.4	19.8
				6	0	2	20.8	15.4	19.8
	18900	1880.0	QPSK	1	0	0	23.0	15.3	19.7
				1	2	0	22.9	15.4	19.8
				1	5	0	22.9	15.4	19.8
				3	0	1	22.8	15.3	19.7
				3	1	1	22.8	15.4	19.9
				3	2	1	22.9	15.4	19.8
				6	0	1	21.9	15.4	19.9
			16QAM	1	0	1	21.7	15.3	19.7
				1	2	1	21.7	15.4	19.8
				1	5	1	21.6	15.4	19.8
				3	0	1	22.0	15.4	19.8
				3	1	1	22.0	15.4	19.8
				3	2	1	22.2	15.3	19.8
				6	0	2	21.1	15.4	19.8
	19192	1909.2	QPSK	1	0	0	23.0	15.3	19.7
				1	2	0	22.9	15.4	19.8
				1	5	0	22.9	15.3	19.7
				3	0	1	22.8	15.4	19.8
				3	1	1	22.8	15.4	19.9
				3	2	1	22.7	15.4	19.8
				6	0	1	21.8	15.5	19.9
			16QAM	1	0	1	21.6	15.3	19.8
				1	2	1	21.7	15.4	19.8
				1	5	1	21.6	15.3	19.7
				3	0	1	21.8	15.4	19.8
				3	1	1	21.8	15.5	19.8
				3	2	1	22.0	15.4	19.8
				6	0	2	21.0	15.4	19.8

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 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23[1]	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-
Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.					

Results

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
20	20050	1720.0	QPSK	1	0	0	23.0	14.1	20.0
				1	49	0	22.9	14.0	19.9
				1	99	0	22.9	14.0	19.9
				50	0	1	22.1	14.1	20.0
				50	24	1	22.0	14.1	20.0
				50	49	1	22.0	14.1	20.0
				100	0	1	22.0	14.1	20.0
			16QAM	1	0	1	22.1	14.0	20.0
				1	49	1	22.0	14.0	19.9
				1	99	1	22.0	14.0	19.9
				50	0	2	21.0	14.0	20.0
				50	24	2	21.0	14.0	19.9
				50	49	2	21.0	14.0	20.0
				100	0	2	21.2	14.0	19.9
	20175	1732.5	QPSK	1	0	0	23.0	14.1	20.0
				1	49	0	22.9	13.9	19.8
				1	99	0	23.0	14.0	19.9
				50	0	1	22.0	14.0	19.9
				50	24	1	22.0	14.0	19.9
				50	49	1	21.9	14.0	19.9
				100	0	1	22.1	14.1	20.0
			16QAM	1	0	1	22.0	14.0	20.0
				1	49	1	22.0	14.0	19.9
				1	99	1	22.0	14.0	19.9
				50	0	2	21.0	14.0	20.0
				50	24	2	21.1	14.0	19.9
				50	49	2	21.0	14.0	20.0
				100	0	2	21.2	14.0	19.9
	20300	1745.0	QPSK	1	0	0	22.9	13.9	19.8
				1	49	0	22.9	13.9	19.8
				1	99	0	23.0	14.0	19.9
				50	0	1	21.9	14.0	19.9
				50	24	1	22.0	14.1	20.0
				50	49	1	22.0	14.1	20.0
				100	0	1	22.1	14.1	20.0
			16QAM	1	0	1	22.2	14.0	20.0
				1	49	1	22.1	14.0	19.9
				1	99	1	22.2	14.0	19.9
				50	0	2	21.0	14.0	20.0
				50	24	2	21.1	14.0	19.9
				50	49	2	21.0	14.0	20.0
				100	0	2	21.2	14.0	19.9

LTE Band 4 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
15	20025	1717.5	QPSK	1	0	0	23.0	14.0	20.0
				1	37	0	23.0	14.0	19.9
				1	74	0	22.9	14.0	19.9
				38	0	1	22.0	14.1	20.0
				38	18	1	22.0	14.1	20.0
				38	37	1	22.0	14.1	20.0
				75	0	1	22.1	14.0	20.0
			16QAM	1	0	1	22.0	14.0	20.0
				1	37	1	22.0	14.0	19.9
				1	74	1	22.0	14.0	19.9
				38	0	2	21.0	14.0	20.0
				38	18	2	21.0	14.0	19.9
				38	37	2	20.9	14.0	20.0
				75	0	2	21.0	14.0	19.9
	20175	1732.5	QPSK	1	0	0	23.0	14.0	20.0
				1	37	0	23.0	13.9	19.8
				1	74	0	23.0	14.0	19.9
				38	0	1	22.0	14.0	19.9
				38	18	1	21.9	14.0	19.9
				38	37	1	22.0	14.0	19.9
				75	0	1	22.1	14.0	20.0
			16QAM	1	0	1	22.2	14.0	20.0
				1	37	1	22.1	14.0	19.9
				1	74	1	22.1	14.0	19.9
				38	0	2	21.0	14.0	20.0
				38	18	2	21.1	14.0	19.9
				38	37	2	21.0	14.0	20.0
				75	0	2	21.2	14.0	19.9
	20325	1747.5	QPSK	1	0	0	23.0	13.9	19.8
				1	37	0	23.0	13.9	19.8
				1	74	0	23.0	14.0	19.9
				38	0	1	22.1	14.0	19.9
				38	18	1	22.2	14.0	20.0
				38	37	1	22.1	14.0	20.0
				75	0	1	22.3	14.0	20.0
			16QAM	1	0	1	22.0	14.0	20.0
				1	37	1	22.0	14.0	19.9
				1	74	1	22.0	14.0	19.9
				38	0	2	21.0	14.0	20.0
				38	18	2	21.1	14.0	19.9
				38	37	2	21.0	14.0	20.0
				75	0	2	21.2	14.0	19.9

LTE Band 4 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
10	20000	1715.0	QPSK	1	0	0	23.0	14.0	20.0
				1	24	0	22.9	14.0	19.9
				1	49	0	23.0	14.0	19.9
				25	0	1	22.0	14.0	20.0
				25	12	1	22.1	14.0	20.0
				25	24	1	22.0	14.0	20.0
				50	0	1	22.1	14.0	20.0
			16QAM	1	0	1	21.9	14.0	19.9
				1	24	1	21.9	14.0	19.9
				1	49	1	22.0	14.0	19.9
				25	0	2	21.1	14.0	19.9
				25	12	2	21.3	13.9	19.9
				25	24	2	21.1	14.0	20.0
				50	0	2	21.1	14.0	19.9
	20175	1732.5	QPSK	1	0	0	23.0	14.0	20.0
				1	24	0	22.9	13.9	19.8
				1	49	0	23.0	14.0	19.9
				25	0	1	22.0	14.0	19.9
				25	12	1	22.2	14.0	19.9
				25	24	1	22.0	14.0	19.9
				50	0	1	22.1	14.0	20.0
			16QAM	1	0	1	21.7	14.0	20.0
				1	24	1	21.8	14.0	19.9
				1	49	1	21.8	14.0	19.9
				25	0	2	21.0	14.0	19.9
				25	12	2	21.1	13.9	19.9
				25	24	2	21.0	14.0	19.9
				50	0	2	21.2	14.0	19.9
	20350	1750.0	QPSK	1	0	0	23.0	13.9	19.8
				1	24	0	22.9	13.9	19.8
				1	49	0	22.9	14.0	19.9
				25	0	1	22.1	14.0	19.9
				25	12	1	22.3	14.0	20.0
				25	24	1	22.1	14.0	20.0
				50	0	1	22.1	14.0	20.0
			16QAM	1	0	1	21.8	14.0	20.0
				1	24	1	21.8	14.0	19.9
				1	49	1	21.9	14.0	19.9
				25	0	2	21.1	14.0	20.0
				25	12	2	21.3	13.9	19.9
				25	24	2	21.1	14.0	19.9
				50	0	2	21.2	14.0	19.9

LTE Band 4 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
5	19975	1712.5	QPSK	1	0	0	23.0	14.0	19.9
				1	12	0	22.9	14.0	19.9
				1	24	0	23.0	14.0	19.9
				12	0	1	22.0	14.0	19.9
				12	6	1	22.2	14.0	20.0
				12	11	1	22.0	14.0	19.9
				25	0	1	22.0	14.0	19.9
			16QAM	1	0	1	22.0	13.9	19.9
				1	12	1	21.9	14.0	19.9
				1	24	1	22.0	14.0	19.9
				12	0	2	21.0	14.0	19.9
				12	6	2	21.0	13.9	19.9
				12	11	2	20.9	14.0	19.9
				25	0	2	21.0	14.0	19.9
	20175	1732.5	QPSK	1	0	0	23.0	14.0	19.9
				1	12	0	22.9	13.9	19.8
				1	24	0	23.0	14.0	19.9
				12	0	1	21.9	14.0	19.9
				12	6	1	22.0	14.0	19.9
				12	11	1	21.9	14.0	19.9
				25	0	1	21.9	14.0	20.0
			16QAM	1	0	1	22.1	14.0	19.9
				1	12	1	22.0	14.0	19.9
				1	24	1	22.7	14.0	19.9
				12	0	2	20.8	14.0	19.9
				12	6	2	20.7	13.9	19.9
				12	11	2	20.8	14.0	19.9
				25	0	2	20.9	13.9	19.9
	20375	1752.5	QPSK	1	0	0	23.0	13.9	19.8
				1	12	0	22.9	13.9	19.8
				1	24	0	23.0	14.0	19.9
				12	0	1	22.1	14.0	19.9
				12	6	1	22.2	14.0	19.9
				12	11	1	22.1	14.0	20.0
				25	0	1	22.2	14.0	19.9
			16QAM	1	0	1	22.0	13.9	19.9
				1	12	1	22.0	14.0	19.9
				1	24	1	22.1	14.0	19.9
				12	0	2	20.9	14.0	19.9
				12	6	2	21.0	13.9	19.9
				12	11	2	20.9	14.0	19.9
				25	0	2	21.1	14.0	19.9

LTE Band 4 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
3	19965	1711.5	QPSK	1	0	0	23.0	14.0	19.9
				1	7	0	22.9	14.0	19.9
				1	14	0	23.0	14.0	19.9
				8	0	1	22.0	14.0	19.9
				8	4	1	22.2	14.0	19.9
				8	7	1	22.0	14.0	19.9
				15	0	1	22.2	14.0	19.9
			16QAM	1	0	1	22.0	13.9	19.8
				1	7	1	21.9	14.0	19.9
				1	14	1	21.9	14.0	19.9
				8	0	2	21.0	14.0	19.9
				8	4	2	21.1	13.9	19.9
				8	7	2	21.0	14.0	19.9
				15	0	2	21.3	14.0	19.9
	20175	1732.5	QPSK	1	0	0	22.9	14.0	19.9
				1	7	0	22.9	13.9	19.8
				1	14	0	22.9	14.0	19.9
				8	0	1	22.0	14.0	19.9
				8	4	1	22.1	14.0	19.9
				8	7	1	22.0	14.0	19.9
				15	0	1	22.1	14.0	19.9
			16QAM	1	0	1	21.8	14.0	19.8
				1	7	1	21.8	14.0	19.9
				1	14	1	21.8	14.0	19.9
				8	0	2	21.0	14.0	19.9
				8	4	2	21.1	13.9	19.9
				8	7	2	21.0	14.0	19.9
				15	0	2	21.0	13.9	19.9
	20385	1753.4	QPSK	1	0	0	23.0	13.9	19.8
				1	7	0	22.9	13.9	19.8
				1	14	0	22.9	14.0	19.9
				8	0	1	22.0	14.0	19.9
				8	4	1	22.2	14.0	19.9
				8	7	1	22.0	14.0	19.9
				15	0	1	22.2	14.0	19.9
			16QAM	1	0	1	21.9	13.9	19.9
				1	7	1	21.9	14.0	19.9
				1	14	1	22.0	14.0	19.9
				8	0	2	21.0	14.0	19.9
				8	4	2	21.1	13.9	19.9
				8	7	2	21.0	14.0	19.9
				15	0	2	21.2	14.0	19.8

LTE Band 4 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
1.4	19957	1710.7	QPSK	1	0	0	23.0	14.0	19.8
				1	2	0	22.9	14.0	19.9
				1	5	0	23.0	14.0	19.9
				3	0	1	22.8	14.0	19.8
				3	1	1	22.9	14.0	19.9
				3	2	1	23.0	14.0	19.9
				6	0	1	21.8	14.0	19.9
			16QAM	1	0	1	21.9	13.9	19.8
				1	2	1	21.9	14.0	19.9
				1	5	1	21.9	13.9	19.9
				3	0	1	21.9	14.0	19.9
				3	1	1	22.0	13.9	19.9
				3	2	1	22.3	14.0	19.9
				6	0	2	21.3	14.0	19.9
	20175	1732.5	QPSK	1	0	0	22.9	14.0	19.9
				1	2	0	22.9	13.9	19.8
				1	5	0	22.9	14.0	19.9
				3	0	1	22.8	14.0	19.9
				3	1	1	22.8	14.0	19.9
				3	2	1	22.8	14.0	19.9
				6	0	1	21.7	13.9	19.9
			16QAM	1	0	1	21.7	14.0	19.8
				1	2	1	21.7	14.0	19.9
				1	5	1	21.7	14.0	19.8
				3	0	1	22.0	14.0	19.9
				3	1	1	22.0	13.9	19.9
				3	2	1	22.1	14.0	19.9
				6	0	2	21.0	13.9	19.8
	20392	1754.2	QPSK	1	0	0	23.0	13.9	19.8
				1	2	0	22.9	13.9	19.8
				1	5	0	23.0	14.0	19.9
				3	0	1	22.9	14.0	19.9
				3	1	1	22.9	14.0	19.9
				3	2	1	22.9	14.0	19.9
				6	0	1	22.0	14.0	19.9
			16QAM	1	0	1	21.9	13.9	19.8
				1	2	1	21.8	14.0	19.9
				1	5	1	21.9	13.9	19.9
				3	0	1	21.9	14.0	19.9
				3	1	1	21.9	13.9	19.8
				3	2	1	22.3	14.0	19.9
				6	0	2	21.2	13.9	19.8

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 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23[1]	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-

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

Results

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
10	20450	829.0	QPSK	1	0	0	23.9	19.4	22.5
				1	24	0	24.0	19.4	22.5
				1	49	0	23.8	19.5	22.4
				25	0	1	22.9	19.5	22.5
				25	12	1	23.0	19.5	22.5
				25	24	1	22.8	19.5	22.4
				50	0	1	22.9	19.5	22.5
			16QAM	1	0	1	22.8	19.4	22.4
				1	24	1	22.8	19.4	22.5
				1	49	1	22.7	19.4	22.4
				25	0	2	22.0	19.5	22.4
				25	12	2	22.0	19.5	22.5
				25	24	2	22.0	19.5	22.4
				50	0	2	22.0	19.5	22.5
	20525	836.5	QPSK	1	0	0	23.9	19.5	22.5
				1	24	0	23.8	19.5	22.4
				1	49	0	23.9	19.5	22.5
				25	0	1	22.8	19.5	22.5
				25	12	1	22.8	19.5	22.4
				25	24	1	22.8	19.5	22.4
				50	0	1	22.8	19.5	22.5
			16QAM	1	0	1	23.0	19.4	22.5
				1	24	1	22.9	19.5	22.4
				1	49	1	22.7	19.4	22.5
				25	0	2	22.0	19.5	22.4
				25	12	2	21.9	19.5	22.5
				25	24	2	22.0	19.5	22.4
				50	0	2	22.1	19.5	22.5
	20600	844.0	QPSK	1	0	0	23.9	19.5	22.3
				1	24	0	23.8	19.4	22.3
				1	49	0	23.7	19.4	22.3
				25	0	1	22.8	19.5	22.4
				25	12	1	22.9	19.5	22.5
				25	24	1	22.8	19.5	22.4
				50	0	1	22.7	19.5	22.4
			16QAM	1	0	1	23.0	19.4	22.4
				1	24	1	22.8	19.4	22.5
				1	49	1	22.7	19.4	22.4
				25	0	2	22.0	19.5	22.4
				25	12	2	22.0	19.5	22.5
				25	24	2	22.0	19.5	22.4
				50	0	2	22.0	19.5	22.5

LTE Band 5 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
5	20425	826.5	QPSK	1	0	0	24.0	19.4	22.4
				1	12	0	23.9	19.4	22.5
				1	24	0	23.9	19.5	22.4
				12	0	1	22.9	19.5	22.5
				12	6	1	22.9	19.5	22.5
				12	11	1	22.8	19.5	22.4
				25	0	1	22.9	19.4	22.4
			16QAM	1	0	1	22.9	19.4	22.4
				1	12	1	22.9	19.4	22.5
				1	24	1	22.9	19.4	22.4
				12	0	2	21.8	19.4	22.4
				12	6	2	21.7	19.4	22.5
				12	11	2	21.8	19.4	22.4
				25	0	2	21.9	19.4	22.4
	20525	836.5	QPSK	1	0	0	24.0	19.5	22.5
				1	12	0	23.9	19.5	22.4
				1	24	0	24.0	19.5	22.5
				12	0	1	22.8	19.5	22.5
				12	6	1	22.9	19.5	22.4
				12	11	1	22.8	19.5	22.4
				25	0	1	22.9	19.5	22.5
			16QAM	1	0	1	23.0	19.4	22.5
				1	12	1	22.9	19.4	22.4
				1	24	1	22.9	19.4	22.5
				12	0	2	21.8	19.5	22.4
				12	6	2	21.8	19.5	22.5
				12	11	2	21.8	19.5	22.4
				25	0	2	21.8	19.4	22.5
	20625	846.5	QPSK	1	0	0	24.0	19.5	22.4
				1	12	0	23.9	19.4	22.3
				1	24	0	23.9	19.4	22.3
				12	0	1	22.9	19.5	22.4
				12	6	1	22.9	19.5	22.5
				12	11	1	22.9	19.5	22.4
				25	0	1	22.9	19.5	22.4
			16QAM	1	0	1	23.0	19.4	22.4
				1	12	1	22.9	19.4	22.5
				1	24	1	22.9	19.4	22.4
				12	0	2	21.8	19.4	22.4
				12	6	2	21.8	19.4	22.4
				12	11	2	21.8	19.5	22.4
				25	0	2	21.8	19.4	22.4

LTE Band 5 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
3	20415	825.5	QPSK	1	0	0	23.8	19.4	22.4
				1	7	0	23.8	19.4	22.4
				1	14	0	23.8	19.4	22.4
				8	0	1	22.8	19.4	22.5
				8	4	1	22.9	19.5	22.5
				8	7	1	22.8	19.4	22.4
				15	0	1	22.9	19.4	22.4
			16QAM	1	0	1	22.9	19.3	22.3
				1	7	1	22.8	19.4	22.4
				1	14	1	22.6	19.4	22.3
				8	0	2	22.1	19.4	22.4
				8	4	2	22.3	19.4	22.4
				8	7	2	22.1	19.4	22.4
				15	0	2	22.0	19.4	22.3
	20525	836.5	QPSK	1	0	0	23.8	19.4	22.4
				1	7	0	23.8	19.5	22.4
				1	14	0	23.8	19.4	22.4
				8	0	1	22.8	19.4	22.4
				8	4	1	22.8	19.5	22.4
				8	7	1	22.8	19.4	22.4
				15	0	1	22.8	19.4	22.4
			16QAM	1	0	1	22.8	19.3	22.4
				1	7	1	22.7	19.4	22.4
				1	14	1	22.6	19.4	22.4
				8	0	2	22.1	19.4	22.3
				8	4	2	22.2	19.4	22.4
				8	7	2	22.1	19.4	22.3
				15	0	2	22.0	19.4	22.4
	20634	847.4	QPSK	1	0	0	23.8	19.5	22.4
				1	7	0	23.8	19.4	22.3
				1	14	0	23.8	19.4	22.3
				8	0	1	22.8	19.5	22.4
				8	4	1	22.9	19.5	22.4
				8	7	1	22.8	19.5	22.4
				15	0	1	22.9	19.5	22.4
			16QAM	1	0	1	22.8	19.3	22.3
				1	7	1	22.7	19.4	22.3
				1	14	1	22.7	19.4	22.3
				8	0	2	22.1	19.4	22.3
				8	4	2	22.2	19.4	22.4
				8	7	2	22.1	19.4	22.4
				15	0	2	22.2	19.4	22.4

LTE Band 5 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
1.4	20407	824.7	QPSK	1	0	0	24.0	19.4	22.4
				1	2	0	23.9	19.4	22.4
				1	5	0	24.0	19.4	22.4
				3	0	1	23.7	19.3	22.4
				3	1	1	23.8	19.4	22.4
				3	2	1	23.8	19.3	22.4
				6	0	1	22.7	19.4	22.3
			16QAM	1	0	1	22.9	19.3	22.3
				1	2	1	22.8	19.3	22.4
				1	5	1	22.7	19.3	22.3
				3	0	1	22.8	19.4	22.4
				3	1	1	22.7	19.4	22.4
				3	2	1	22.7	19.4	22.4
				6	0	2	22.0	19.4	22.3
	20525	836.5	QPSK	1	0	0	23.9	19.3	22.3
				1	2	0	23.8	19.4	22.4
				1	5	0	23.9	19.4	22.4
				3	0	1	23.8	19.4	22.4
				3	1	1	23.7	19.4	22.4
				3	2	1	23.8	19.4	22.4
				6	0	1	22.8	19.4	22.4
			16QAM	1	0	1	22.6	19.3	22.3
				1	2	1	22.7	19.4	22.4
				1	5	1	22.7	19.3	22.4
				3	0	1	22.7	19.4	22.3
				3	1	1	22.8	19.4	22.4
				3	2	1	22.8	19.4	22.3
				6	0	2	22.0	19.3	22.4
	20642	848.2	QPSK	1	0	0	23.9	19.4	22.4
				1	2	0	23.9	19.4	22.3
				1	5	0	23.9	19.4	22.3
				3	0	1	23.7	19.4	22.4
				3	1	1	23.8	19.4	22.4
				3	2	1	23.7	19.4	22.4
				6	0	1	22.7	19.3	22.4
			16QAM	1	0	1	22.8	19.3	22.3
				1	2	1	22.7	19.4	22.3
				1	5	1	22.5	19.4	22.3
				3	0	1	22.7	19.3	22.3
				3	1	1	22.7	19.4	22.4
				3	2	1	22.8	19.4	22.4
				6	0	2	22.0	19.3	22.4

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 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23[1]	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-
Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.					

Results

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
10	23780	709.0	QPSK	1	0	0	24.0	19.3	22.5
				1	24	0	24.0	19.3	22.5
				1	49	0	24.0	19.3	22.5
				25	0	1	23.0	19.3	22.5
				25	12	1	23.0	19.3	22.5
				25	24	1	23.0	19.3	22.5
				50	0	1	23.0	19.3	22.5
			16QAM	1	0	1	23.0	19.2	22.4
				1	24	1	23.0	19.2	22.5
				1	49	1	23.0	19.2	22.4
				25	0	2	22.3	19.2	22.4
				25	12	2	22.4	19.2	22.5
				25	24	2	22.3	19.2	22.4
				50	0	2	22.4	19.2	22.4
	23790	710.0	QPSK	1	0	0	24.0	19.3	22.5
				1	24	0	24.0	19.3	22.5
				1	49	0	24.0	19.3	22.5
				25	0	1	23.0	19.3	22.5
				25	12	1	23.0	19.3	22.6
				25	24	1	23.0	19.3	22.5
				50	0	1	23.0	19.3	22.5
			16QAM	1	0	1	22.9	19.2	22.4
				1	24	1	22.9	19.2	22.5
				1	49	1	22.8	19.2	22.4
				25	0	2	22.3	19.2	22.4
				25	12	2	22.4	19.2	22.5
				25	24	2	22.3	19.2	22.4
				50	0	2	22.2	19.2	22.4
	23800	711.0	QPSK	1	0	0	24.0	19.3	22.4
				1	24	0	24.0	19.3	22.5
				1	49	0	24.0	19.3	22.4
				25	0	1	23.0	19.3	22.4
				25	12	1	23.0	19.3	22.5
				25	24	1	23.0	19.3	22.5
				50	0	1	23.0	19.3	22.4
			16QAM	1	0	1	23.0	19.2	22.4
				1	24	1	23.0	19.2	22.5
				1	49	1	23.0	19.2	22.4
				25	0	2	22.3	19.2	22.4
				25	12	2	22.4	19.2	22.5
				25	24	2	22.3	19.2	22.4
				50	0	2	22.4	19.2	22.4

LTE Band 17 Results (continued)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Avg Pwr (dBm)		
							Without Pwr Back-off	With Pwr Back-off	
								Second-stage	First-Stage
5	23755	706.5	QPSK	1	0	0	24.0	19.3	22.5
				1	12	0	23.9	19.3	22.5
				1	24	0	24.0	19.3	22.5
				12	0	1	23.1	19.3	22.5
				12	6	1	23.2	19.3	22.5
				12	11	1	23.1	19.3	22.5
				25	0	1	23.0	19.3	22.5
			16QAM	1	0	1	22.9	19.2	22.4
				1	12	1	22.9	19.2	22.5
				1	24	1	22.9	19.2	22.4
				12	0	2	22.0	19.2	22.4
				12	6	2	22.0	19.2	22.5
				12	11	2	22.0	19.2	22.4
				25	0	2	22.1	19.2	22.4
	23790	710.0	QPSK	1	0	0	24.0	19.3	22.5
				1	12	0	23.9	19.2	22.4
				1	24	0	24.0	19.3	22.5
				12	0	1	23.1	19.3	22.5
				12	6	1	23.2	19.3	22.6
				12	11	1	23.1	19.3	22.5
				25	0	1	23.1	19.3	22.5
			16QAM	1	0	1	23.2	19.2	22.4
				1	12	1	23.0	19.2	22.5
				1	24	1	23.0	19.2	22.4
				12	0	2	21.9	19.2	22.4
				12	6	2	22.0	19.2	22.5
				12	11	2	21.9	19.2	22.4
				25	0	2	22.1	19.2	22.4
	23825	713.5	QPSK	1	0	0	24.0	19.3	22.4
				1	12	0	23.9	19.3	22.4
				1	24	0	24.0	19.3	22.4
				12	0	1	23.0	19.3	22.4
				12	6	1	23.1	19.3	22.4
				12	11	1	23.0	19.3	22.5
				25	0	1	23.1	19.3	22.4
			16QAM	1	0	1	23.0	19.2	22.4
				1	12	1	23.0	19.2	22.5
				1	24	1	23.0	19.2	22.4
				12	0	2	22.0	19.2	22.4
				12	6	2	22.0	19.2	22.5
				12	11	2	22.0	19.2	22.4
				25	0	2	22.1	19.2	22.4

10.9. WiFi (2.4 GHz Band)

There are two Bill of Material variations of the Wi-Fi/Bluetooth Radio to support the production volumes of the device. The two BOM variants are:

- BOM # 1
- BOM # 2

The Model A1459 share the same Wi-Fi/Bluetooth chipset, have the same mechanical outline (e.g., the same dimension package and pin-out layout), use the same on-board antenna matching circuit, have an identical antenna structure, and are built and tested to conform the same specifications and to operate within the same tolerances.

Complete SAR evaluation is performed on the BOM # 1 that has the highest SAR, and then, the test is repeated for the other BOM variant at the highest peak SAR value.

Required Test Channels per KDB 248227 D01

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

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

Band (MHz)	Mode	Ch #	Freq. (MHz)	Avg Pwr (dBm)	Note
2.4	802.11b	1	2412	16.5	
		6	2437	16.5	
		11	2462	16.5	
	802.11g	1	2412	16.0	
		6	2437	16.5	
		11	2462	15.5	
	802.11n (HT20)	1	2412	15.5	
		6	2437	16.5	
		11	2462	15.0	

Note(s):
Per KDB 248227, 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.

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		*
			5.660	132		*
			5.680	136	√	
			5.700	140		*
	DTS (15.247)	5.8 GHz	5.745	149	√	
			5.765	153		*
			5.785	157	√	
			5.805	161		*
			5.825	165	√	

√ = "default test channels"

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

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

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	14.0	
		48	5240	14.0	
	802.11n (HT40)	38	5190	12.0	
		46	5230	15.5	
5.3	802.11a	52	5260	17.5	
		56	5280	17.5	
		60	5300	17.5	
		64	5320	16.0	
	802.11n (HT20)	52	5260	17.5	
		60	5300	17.5	
		64	5320	16.0	
	802.11n (HT40)	54	5270	17.5	
		62	5310	14.0	
5.5	802.11a	100	5500	15.5	
		104	5520	18.0	
		108	5540	18.0	
		112	5560	18.0	
		116	5580	18.0	
		120	5600	18.0	
		124	5620	18.0	
		128	5640	18.0	
		132	5660	18.0	
		136	5680	18.0	
		140	5700	15.0	
	802.11n (HT20)	100	5500	15.0	
		120	5600	18.0	
		140	5700	15.0	
	802.11n (HT40)	102	5510	13.0	
		110	5550	18.0	
		134	5670	16.0	
5.8	802.11a	149	5745	18.5	
		153	5765	18.5	
		157	5785	18.5	
		161	5805	18.5	
		165	5825	18.5	
	802.11n (HT20)	149	5745	18.5	
		157	5785	18.5	
		161	5805	18.5	
	802.11n (HT40)	151	5755	18.5	
		159	5795	18.5	

Note(s):

Per KDB 248227, 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.

10.11. Bluetooth

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
V2.1 + EDR, GFSK	0	2402	13.00	19.95
	39	2441	13.00	19.95
	78	2480	13.00	19.95
V2.1 + EDR, π/4 DQPSK	0	2402	10.50	11.22
	39	2441	10.50	11.22
	78	2480	10.50	11.22
V2.1 + EDR, 8-DPSK	0	2402	10.50	11.22
	39	2441	10.50	11.22
	78	2480	10.50	11.22
V4.0 LE, GFSK	0	2402	10.00	10.00
	19	2440	10.00	10.00
	39	2480	10.00	10.00

11. 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

11.1. 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^2O	Water, 35 – 58%
Sucrese	Sugar, white, refined, 40-60%
NaCl	Sodium Chloride, 0-6%
Hydroxyethel-cellulsoe	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-methyyl-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^2O	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

11.2. 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 ±(%)
7/31/2012	Body 2450	e'	50.7519	Relative Permittivity (ϵ_r):	50.75	52.70	-3.70	5
		e''	14.1589	Conductivity (σ):	1.93	1.95	-1.09	5
	Body 2410	e'	50.9167	Relative Permittivity (ϵ_r):	50.92	52.76	-3.49	5
		e''	14.0246	Conductivity (σ):	1.88	1.91	-1.47	5
	Body 2435	e'	50.8177	Relative Permittivity (ϵ_r):	50.82	52.73	-3.62	5
		e''	14.1008	Conductivity (σ):	1.91	1.93	-1.14	5
	Body 2475	e'	50.6491	Relative Permittivity (ϵ_r):	50.65	52.67	-3.83	5
		e''	14.2555	Conductivity (σ):	1.96	1.99	-1.18	5
8/1/2012	Body 2450	e'	50.7236	Relative Permittivity (ϵ_r):	50.72	52.70	-3.75	5
		e''	14.0709	Conductivity (σ):	1.92	1.95	-1.70	5
	Body 2410	e'	50.8538	Relative Permittivity (ϵ_r):	50.85	52.76	-3.61	5
		e''	13.8638	Conductivity (σ):	1.86	1.91	-2.60	5
	Body 2435	e'	50.7868	Relative Permittivity (ϵ_r):	50.79	52.73	-3.68	5
		e''	13.9938	Conductivity (σ):	1.89	1.93	-1.89	5
	Body 2475	e'	50.6027	Relative Permittivity (ϵ_r):	50.60	52.67	-3.92	5
		e''	14.2020	Conductivity (σ):	1.95	1.99	-1.55	5
8/2/2012	Body 5180	e'	48.9762	Relative Permittivity (ϵ_r):	48.98	49.05	-0.14	10
		e''	18.0626	Conductivity (σ):	5.20	5.27	-1.31	5
	Body 5200	e'	48.9212	Relative Permittivity (ϵ_r):	48.92	49.02	-0.20	10
		e''	18.0499	Conductivity (σ):	5.22	5.29	-1.43	5
	Body 5500	e'	48.4659	Relative Permittivity (ϵ_r):	48.47	48.61	-0.30	10
		e''	18.3323	Conductivity (σ):	5.61	5.64	-0.68	5
	Body 5800	e'	48.1495	Relative Permittivity (ϵ_r):	48.15	48.20	-0.10	10
		e''	18.7079	Conductivity (σ):	6.03	6.00	0.55	5
	Body 5825	e'	48.1383	Relative Permittivity (ϵ_r):	48.14	48.20	-0.13	10
		e''	18.7200	Conductivity (σ):	6.06	6.00	1.05	5
8/3/2012	Body 5180	e'	48.1546	Relative Permittivity (ϵ_r):	48.15	49.05	-1.82	10
		e''	17.7978	Conductivity (σ):	5.13	5.27	-2.75	5
	Body 5200	e'	48.1147	Relative Permittivity (ϵ_r):	48.11	49.02	-1.85	10
		e''	17.8025	Conductivity (σ):	5.15	5.29	-2.78	5
	Body 5500	e'	47.6584	Relative Permittivity (ϵ_r):	47.66	48.61	-1.96	10
		e''	18.0100	Conductivity (σ):	5.51	5.64	-2.42	5
	Body 5800	e'	47.2684	Relative Permittivity (ϵ_r):	47.27	48.20	-1.93	10
		e''	18.2788	Conductivity (σ):	5.89	6.00	-1.75	5
	Body 5825	e'	47.2401	Relative Permittivity (ϵ_r):	47.24	48.20	-1.99	10
		e''	18.2900	Conductivity (σ):	5.92	6.00	-1.27	5
8/3/2012	Body 2450	e'	50.6311	Relative Permittivity (ϵ_r):	50.63	52.70	-3.93	5
		e''	14.2874	Conductivity (σ):	1.95	1.95	-0.19	5
	Body 2410	e'	50.8186	Relative Permittivity (ϵ_r):	50.82	52.76	-3.68	5
		e''	14.1037	Conductivity (σ):	1.89	1.91	-0.92	5
	Body 2435	e'	50.7039	Relative Permittivity (ϵ_r):	50.70	52.73	-3.84	5
		e''	14.2138	Conductivity (σ):	1.92	1.93	-0.34	5
	Body 2475	e'	50.5183	Relative Permittivity (ϵ_r):	50.52	52.67	-4.08	5
		e''	14.3998	Conductivity (σ):	1.98	1.99	-0.17	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
8/7/2012	Body 5180	e'	48.7255	Relative Permittivity (ϵ_r):	48.73	49.05	-0.65	10
		e''	18.1064	Conductivity (σ):	5.22	5.27	-1.07	5
	Body 5200	e'	48.6845	Relative Permittivity (ϵ_r):	48.68	49.02	-0.68	10
		e''	18.1261	Conductivity (σ):	5.24	5.29	-1.02	5
	Body 5500	e'	48.2284	Relative Permittivity (ϵ_r):	48.23	48.61	-0.79	10
		e''	18.3599	Conductivity (σ):	5.61	5.64	-0.53	5
	Body 5800	e'	47.7690	Relative Permittivity (ϵ_r):	47.77	48.20	-0.89	10
		e''	18.6553	Conductivity (σ):	6.02	6.00	0.27	5
	Body 5825	e'	47.7355	Relative Permittivity (ϵ_r):	47.74	48.20	-0.96	10
		e''	18.6849	Conductivity (σ):	6.05	6.00	0.86	5
8/7/2012	Body 2450	e'	50.4124	Relative Permittivity (ϵ_r):	50.41	52.70	-4.34	5
		e''	14.0214	Conductivity (σ):	1.91	1.95	-2.05	5
	Body 2410	e'	50.5845	Relative Permittivity (ϵ_r):	50.58	52.76	-4.12	5
		e''	13.8206	Conductivity (σ):	1.85	1.91	-2.91	5
	Body 2435	e'	50.4785	Relative Permittivity (ϵ_r):	50.48	52.73	-4.26	5
		e''	13.9291	Conductivity (σ):	1.89	1.93	-2.34	5
	Body 2475	e'	50.3070	Relative Permittivity (ϵ_r):	50.31	52.67	-4.48	5
		e''	14.1434	Conductivity (σ):	1.95	1.99	-1.95	5
8/8/2012	Body 5180	e'	48.7255	Relative Permittivity (ϵ_r):	48.73	49.05	-0.65	10
		e''	18.1064	Conductivity (σ):	5.22	5.27	-1.07	5
	Body 5200	e'	48.6845	Relative Permittivity (ϵ_r):	48.68	49.02	-0.68	10
		e''	18.1261	Conductivity (σ):	5.24	5.29	-1.02	5
	Body 5500	e'	48.2284	Relative Permittivity (ϵ_r):	48.23	48.61	-0.79	10
		e''	18.3599	Conductivity (σ):	5.61	5.64	-0.53	5
	Body 5800	e'	47.4574	Relative Permittivity (ϵ_r):	47.46	48.20	-1.54	10
		e''	18.1514	Conductivity (σ):	5.85	6.00	-2.44	5
	Body 5825	e'	47.4028	Relative Permittivity (ϵ_r):	47.40	48.20	-1.65	10
		e''	18.1668	Conductivity (σ):	5.88	6.00	-1.93	5
8/9/2012	Body 5180	e'	48.5476	Relative Permittivity (ϵ_r):	48.55	49.05	-1.02	10
		e''	17.7943	Conductivity (σ):	5.13	5.27	-2.77	5
	Body 5200	e'	48.5254	Relative Permittivity (ϵ_r):	48.53	49.02	-1.01	10
		e''	17.7991	Conductivity (σ):	5.15	5.29	-2.80	5
	Body 5500	e'	48.0577	Relative Permittivity (ϵ_r):	48.06	48.61	-1.14	10
		e''	18.0177	Conductivity (σ):	5.51	5.64	-2.38	5
	Body 5800	e'	47.6435	Relative Permittivity (ϵ_r):	47.64	48.20	-1.15	10
		e''	18.2966	Conductivity (σ):	5.90	6.00	-1.66	5
	Body 5825	e'	47.5995	Relative Permittivity (ϵ_r):	47.60	48.20	-1.25	10
		e''	18.3121	Conductivity (σ):	5.93	6.00	-1.15	5
8/9/2012	Body 5180	e'	47.5532	Relative Permittivity (ϵ_r):	47.55	49.05	-3.05	10
		e''	17.8564	Conductivity (σ):	5.14	5.27	-2.43	5
	Body 5200	e'	47.5353	Relative Permittivity (ϵ_r):	47.54	49.02	-3.03	10
		e''	17.8587	Conductivity (σ):	5.16	5.29	-2.48	5
	Body 5500	e'	47.0531	Relative Permittivity (ϵ_r):	47.05	48.61	-3.21	10
		e''	18.0550	Conductivity (σ):	5.52	5.64	-2.18	5
	Body 5800	e'	46.6394	Relative Permittivity (ϵ_r):	46.64	48.20	-3.24	10
		e''	18.3188	Conductivity (σ):	5.91	6.00	-1.54	5
	Body 5825	e'	46.5918	Relative Permittivity (ϵ_r):	46.59	48.20	-3.34	10
		e''	18.3318	Conductivity (σ):	5.94	6.00	-1.04	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
8/10/2012	Body 5180	e'	48.4203	Relative Permittivity (ϵ_r):	48.42	49.05	-1.28	10
		e''	17.6641	Conductivity (σ):	5.09	5.27	-3.48	5
	Body 5200	e'	48.3895	Relative Permittivity (ϵ_r):	48.39	49.02	-1.29	10
		e''	17.6799	Conductivity (σ):	5.11	5.29	-3.45	5
	Body 5500	e'	47.9529	Relative Permittivity (ϵ_r):	47.95	48.61	-1.36	10
		e''	17.8811	Conductivity (σ):	5.47	5.64	-3.12	5
	Body 5800	e'	47.5367	Relative Permittivity (ϵ_r):	47.54	48.20	-1.38	10
		e''	18.1423	Conductivity (σ):	5.85	6.00	-2.49	5
	Body 5825	e'	47.4986	Relative Permittivity (ϵ_r):	47.50	48.20	-1.46	10
		e''	18.1656	Conductivity (σ):	5.88	6.00	-1.94	5
8/10/2012	Body 5180	e'	47.6472	Relative Permittivity (ϵ_r):	47.65	49.05	-2.85	10
		e''	17.6116	Conductivity (σ):	5.07	5.27	-3.77	5
	Body 5200	e'	47.6267	Relative Permittivity (ϵ_r):	47.63	49.02	-2.84	10
		e''	17.6192	Conductivity (σ):	5.09	5.29	-3.78	5
	Body 5500	e'	47.1681	Relative Permittivity (ϵ_r):	47.17	48.61	-2.97	10
		e''	17.7950	Conductivity (σ):	5.44	5.64	-3.59	5
	Body 5800	e'	46.7702	Relative Permittivity (ϵ_r):	46.77	48.20	-2.97	10
		e''	18.0332	Conductivity (σ):	5.82	6.00	-3.07	5
	Body 5825	e'	46.7252	Relative Permittivity (ϵ_r):	46.73	48.20	-3.06	10
		e''	18.0537	Conductivity (σ):	5.85	6.00	-2.54	5
8/13/2012	Body 5180	e'	48.3891	Relative Permittivity (ϵ_r):	48.39	49.05	-1.34	10
		e''	18.0384	Conductivity (σ):	5.20	5.27	-1.44	5
	Body 5200	e'	48.3547	Relative Permittivity (ϵ_r):	48.35	49.02	-1.36	10
		e''	18.0544	Conductivity (σ):	5.22	5.29	-1.41	5
	Body 5500	e'	47.8910	Relative Permittivity (ϵ_r):	47.89	48.61	-1.49	10
		e''	18.2725	Conductivity (σ):	5.59	5.64	-1.00	5
	Body 5800	e'	47.4431	Relative Permittivity (ϵ_r):	47.44	48.20	-1.57	10
		e''	18.5463	Conductivity (σ):	5.98	6.00	-0.31	5
	Body 5825	e'	47.4060	Relative Permittivity (ϵ_r):	47.41	48.20	-1.65	10
		e''	18.5701	Conductivity (σ):	6.01	6.00	0.24	5
8/15/2012	Body 5180	e'	48.2354	Relative Permittivity (ϵ_r):	48.24	49.05	-1.65	10
		e''	18.4456	Conductivity (σ):	5.31	5.27	0.79	5
	Body 5200	e'	48.2057	Relative Permittivity (ϵ_r):	48.21	49.02	-1.66	10
		e''	18.4660	Conductivity (σ):	5.34	5.29	0.84	5
	Body 5500	e'	47.7139	Relative Permittivity (ϵ_r):	47.71	48.61	-1.85	10
		e''	18.6741	Conductivity (σ):	5.71	5.64	1.18	5
	Body 5800	e'	47.2511	Relative Permittivity (ϵ_r):	47.25	48.20	-1.97	10
		e''	18.9609	Conductivity (σ):	6.11	6.00	1.91	5
	Body 5825	e'	47.2144	Relative Permittivity (ϵ_r):	47.21	48.20	-2.04	10
		e''	18.9790	Conductivity (σ):	6.15	6.00	2.45	5
8/17/2012	Body 5180	e'	48.1888	Relative Permittivity (ϵ_r):	48.19	49.05	-1.75	10
		e''	18.0487	Conductivity (σ):	5.20	5.27	-1.38	5
	Body 5200	e'	48.1525	Relative Permittivity (ϵ_r):	48.15	49.02	-1.77	10
		e''	18.0695	Conductivity (σ):	5.22	5.29	-1.33	5
	Body 5500	e'	47.6815	Relative Permittivity (ϵ_r):	47.68	48.61	-1.92	10
		e''	18.3062	Conductivity (σ):	5.60	5.64	-0.82	5
	Body 5800	e'	47.2365	Relative Permittivity (ϵ_r):	47.24	48.20	-2.00	10
		e''	18.6056	Conductivity (σ):	6.00	6.00	0.00	5
	Body 5825	e'	47.1999	Relative Permittivity (ϵ_r):	47.20	48.20	-2.07	10
		e''	18.6277	Conductivity (σ):	6.03	6.00	0.55	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
8/28/2012	Body 1900	e'	51.7278	Relative Permittivity (ϵ_r):	51.73	53.30	-2.95	5
		e''	14.7308	Conductivity (σ):	1.56	1.52	2.38	5
	Body 1850	e'	51.9007	Relative Permittivity (ϵ_r):	51.90	53.30	-2.63	5
		e''	14.4699	Conductivity (σ):	1.49	1.52	-2.08	5
	Body 1880	e'	51.8206	Relative Permittivity (ϵ_r):	51.82	53.30	-2.78	5
		e''	14.6406	Conductivity (σ):	1.53	1.52	0.69	5
	Body 1910	e'	51.6773	Relative Permittivity (ϵ_r):	51.68	53.30	-3.04	5
8/29/2012	Body 1900	e'	51.8966	Relative Permittivity (ϵ_r):	51.90	53.30	-2.63	5
		e''	14.5722	Conductivity (σ):	1.54	1.52	1.28	5
	Body 1850	e'	51.9953	Relative Permittivity (ϵ_r):	52.00	53.30	-2.45	5
		e''	14.3106	Conductivity (σ):	1.47	1.52	-3.15	5
	Body 1880	e'	51.9574	Relative Permittivity (ϵ_r):	51.96	53.30	-2.52	5
		e''	14.4590	Conductivity (σ):	1.51	1.52	-0.56	5
	Body 1910	e'	51.8558	Relative Permittivity (ϵ_r):	51.86	53.30	-2.71	5
		e''	14.6261	Conductivity (σ):	1.55	1.52	2.19	5
8/30/2012	Body 1900	e'	51.5974	Relative Permittivity (ϵ_r):	51.60	53.30	-3.19	5
		e''	14.5089	Conductivity (σ):	1.53	1.52	0.84	5
	Body 1850	e'	51.7518	Relative Permittivity (ϵ_r):	51.75	53.30	-2.90	5
		e''	14.2809	Conductivity (σ):	1.47	1.52	-3.35	5
	Body 1880	e'	51.6928	Relative Permittivity (ϵ_r):	51.69	53.30	-3.02	5
		e''	14.4376	Conductivity (σ):	1.51	1.52	-0.71	5
	Body 1910	e'	51.5417	Relative Permittivity (ϵ_r):	51.54	53.30	-3.30	5
		e''	14.5448	Conductivity (σ):	1.54	1.52	1.62	5
8/31/2012	Body 1900	e'	51.5370	Relative Permittivity (ϵ_r):	51.54	53.30	-3.31	5
		e''	14.4077	Conductivity (σ):	1.52	1.52	0.14	5
	Body 1850	e'	51.6640	Relative Permittivity (ϵ_r):	51.66	53.30	-3.07	5
		e''	14.1837	Conductivity (σ):	1.46	1.52	-4.01	5
	Body 1880	e'	51.6033	Relative Permittivity (ϵ_r):	51.60	53.30	-3.18	5
		e''	14.3142	Conductivity (σ):	1.50	1.52	-1.56	5
	Body 1910	e'	51.5014	Relative Permittivity (ϵ_r):	51.50	53.30	-3.37	5
		e''	14.4520	Conductivity (σ):	1.53	1.52	0.98	5
9/11/2012	Body 1900	e'	51.5752	Relative Permittivity (ϵ_r):	51.58	53.30	-3.24	5
		e''	14.4860	Conductivity (σ):	1.53	1.52	0.68	5
	Body 1850	e'	51.6759	Relative Permittivity (ϵ_r):	51.68	53.30	-3.05	5
		e''	14.2854	Conductivity (σ):	1.47	1.52	-3.32	5
	Body 1880	e'	51.6375	Relative Permittivity (ϵ_r):	51.64	53.30	-3.12	5
		e''	14.4081	Conductivity (σ):	1.51	1.52	-0.91	5
	Body 1910	e'	51.5312	Relative Permittivity (ϵ_r):	51.53	53.30	-3.32	5
		e''	14.5273	Conductivity (σ):	1.54	1.52	1.50	5
9/12/2012	Body 1900	e'	51.5698	Relative Permittivity (ϵ_r):	51.57	53.30	-3.25	5
		e''	14.5471	Conductivity (σ):	1.54	1.52	1.11	5
	Body 1850	e'	51.6939	Relative Permittivity (ϵ_r):	51.69	53.30	-3.01	5
		e''	14.3646	Conductivity (σ):	1.48	1.52	-2.79	5
	Body 1880	e'	51.6392	Relative Permittivity (ϵ_r):	51.64	53.30	-3.12	5
		e''	14.4698	Conductivity (σ):	1.51	1.52	-0.49	5
	Body 1910	e'	51.5262	Relative Permittivity (ϵ_r):	51.53	53.30	-3.33	5
		e''	14.5887	Conductivity (σ):	1.55	1.52	1.93	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ? %)
9/13/2012	Body 5180	e'	49.0229	Relative Permittivity (ϵ_r):	49.02	49.05	-0.05	10
		e''	18.3655	Conductivity (σ):	5.29	5.27	0.35	5
	Body 5200	e'	48.9950	Relative Permittivity (ϵ_r):	49.00	49.02	-0.05	10
		e''	18.3815	Conductivity (σ):	5.31	5.29	0.38	5
	Body 5500	e'	48.4902	Relative Permittivity (ϵ_r):	48.49	48.61	-0.25	10
		e''	18.6164	Conductivity (σ):	5.69	5.64	0.86	5
	Body 5800	e'	48.0470	Relative Permittivity (ϵ_r):	48.05	48.20	-0.32	10
		e''	18.9143	Conductivity (σ):	6.10	6.00	1.66	5
	Body 5825	e'	48.0006	Relative Permittivity (ϵ_r):	48.00	48.20	-0.41	10
		e''	18.9404	Conductivity (σ):	6.13	6.00	2.24	5
9/13/2012	Body 5180	e'	49.0982	Relative Permittivity (ϵ_r):	49.10	49.05	0.10	10
		e''	18.3566	Conductivity (σ):	5.29	5.27	0.30	5
	Body 5200	e'	49.0635	Relative Permittivity (ϵ_r):	49.06	49.02	0.09	10
		e''	18.3781	Conductivity (σ):	5.31	5.29	0.36	5
	Body 5500	e'	48.5836	Relative Permittivity (ϵ_r):	48.58	48.61	-0.06	10
		e''	18.6206	Conductivity (σ):	5.69	5.64	0.89	5
	Body 5800	e'	48.1190	Relative Permittivity (ϵ_r):	48.12	48.20	-0.17	10
		e''	18.9293	Conductivity (σ):	6.10	6.00	1.74	5
	Body 5825	e'	48.0824	Relative Permittivity (ϵ_r):	48.08	48.20	-0.24	10
		e''	18.9590	Conductivity (σ):	6.14	6.00	2.34	5
9/13/2012	Body 1900	e'	52.0214	Relative Permittivity (ϵ_r):	52.02	53.30	-2.40	5
		e''	14.6406	Conductivity (σ):	1.55	1.52	1.76	5
	Body 1850	e'	52.1087	Relative Permittivity (ϵ_r):	52.11	53.30	-2.24	5
		e''	14.4628	Conductivity (σ):	1.49	1.52	-2.12	5
	Body 1880	e'	52.0763	Relative Permittivity (ϵ_r):	52.08	53.30	-2.30	5
		e''	14.5629	Conductivity (σ):	1.52	1.52	0.15	5
	Body 1910	e'	51.9863	Relative Permittivity (ϵ_r):	51.99	53.30	-2.46	5
		e''	14.6875	Conductivity (σ):	1.56	1.52	2.62	5
9/14/2012	Body 5180	e'	48.9517	Relative Permittivity (ϵ_r):	48.95	49.05	-0.19	10
		e''	18.4148	Conductivity (σ):	5.30	5.27	0.62	5
	Body 5200	e'	48.8933	Relative Permittivity (ϵ_r):	48.89	49.02	-0.26	10
		e''	18.3945	Conductivity (σ):	5.32	5.29	0.45	5
	Body 5500	e'	48.3475	Relative Permittivity (ϵ_r):	48.35	48.61	-0.55	10
		e''	18.6822	Conductivity (σ):	5.71	5.64	1.22	5
	Body 5800	e'	47.9896	Relative Permittivity (ϵ_r):	47.99	48.20	-0.44	10
		e''	19.0179	Conductivity (σ):	6.13	6.00	2.22	5
	Body 5825	e'	47.9771	Relative Permittivity (ϵ_r):	47.98	48.20	-0.46	10
		e''	19.0333	Conductivity (σ):	6.16	6.00	2.74	5
9/17/2012	Body 750	e'	53.3775	Relative Permittivity (ϵ_r):	53.38	55.55	-3.90	5
		e''	23.2811	Conductivity (σ):	0.97	0.96	0.81	5
	Body 700	e'	53.7980	Relative Permittivity (ϵ_r):	53.80	55.74	-3.48	5
		e''	23.7261	Conductivity (σ):	0.92	0.96	-3.73	5
	Body 710	e'	53.6758	Relative Permittivity (ϵ_r):	53.68	55.70	-3.63	5
		e''	23.6457	Conductivity (σ):	0.93	0.96	-2.76	5
9/18/2012	Body 1900	e'	52.2590	Relative Permittivity (ϵ_r):	52.26	53.30	-1.95	5
		e''	14.4842	Conductivity (σ):	1.53	1.52	0.67	5
	Body 1850	e'	52.3704	Relative Permittivity (ϵ_r):	52.37	53.30	-1.74	5
		e''	14.2689	Conductivity (σ):	1.47	1.52	-3.44	5
	Body 1880	e'	52.3104	Relative Permittivity (ϵ_r):	52.31	53.30	-1.86	5
		e''	14.3900	Conductivity (σ):	1.50	1.52	-1.04	5
	Body 1910	e'	52.2292	Relative Permittivity (ϵ_r):	52.23	53.30	-2.01	5
		e''	14.5315	Conductivity (σ):	1.54	1.52	1.53	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
9/18/2012	Body 750	e'	53.2153	Relative Permittivity (ϵ_r):	53.22	55.55	-4.20	5
		e''	23.2219	Conductivity (σ):	0.97	0.96	0.55	5
	Body 700	e'	53.6475	Relative Permittivity (ϵ_r):	53.65	55.74	-3.75	5
		e''	23.6651	Conductivity (σ):	0.92	0.96	-3.98	5
	Body 710	e'	53.5270	Relative Permittivity (ϵ_r):	53.53	55.70	-3.90	5
		e''	23.5746	Conductivity (σ):	0.93	0.96	-3.05	5
9/18/2012	Body 835	e'	52.7118	Relative Permittivity (ϵ_r):	52.71	55.20	-4.51	5
		e''	21.8097	Conductivity (σ):	1.01	0.97	4.39	5
	Body 820	e'	52.8905	Relative Permittivity (ϵ_r):	52.89	55.28	-4.32	5
		e''	21.8805	Conductivity (σ):	1.00	0.97	3.01	5
	Body 850	e'	52.5614	Relative Permittivity (ϵ_r):	52.56	55.16	-4.71	5
		e''	21.7430	Conductivity (σ):	1.03	0.99	4.10	5
9/18/2012	Body 1720	e'	52.0867	Relative Permittivity (ϵ_r):	52.09	53.52	-2.67	5
		e''	15.3084	Conductivity (σ):	1.46	1.47	-0.25	5
	Body 1735	e'	52.0357	Relative Permittivity (ϵ_r):	52.04	53.48	-2.70	5
		e''	15.3152	Conductivity (σ):	1.48	1.48	0.04	5
	Body 1750	e'	51.9848	Relative Permittivity (ϵ_r):	51.98	53.44	-2.72	5
		e''	15.3159	Conductivity (σ):	1.49	1.49	0.28	5
9/19/2012	Body 1900	e'	52.5213	Relative Permittivity (ϵ_r):	52.52	53.30	-1.46	5
		e''	14.8532	Conductivity (σ):	1.57	1.52	3.24	5
	Body 1850	e'	52.6964	Relative Permittivity (ϵ_r):	52.70	53.30	-1.13	5
		e''	14.6008	Conductivity (σ):	1.50	1.52	-1.19	5
	Body 1880	e'	52.6107	Relative Permittivity (ϵ_r):	52.61	53.30	-1.29	5
		e''	14.7643	Conductivity (σ):	1.54	1.52	1.54	5
	Body 1910	e'	52.4720	Relative Permittivity (ϵ_r):	52.47	53.30	-1.55	5
		e''	14.8918	Conductivity (σ):	1.58	1.52	4.05	5
9/19/2012	Body 750	e'	54.0482	Relative Permittivity (ϵ_r):	54.05	55.55	-2.70	5
		e''	23.1811	Conductivity (σ):	0.97	0.96	0.38	5
	Body 700	e'	54.5696	Relative Permittivity (ϵ_r):	54.57	55.74	-2.10	5
		e''	23.5668	Conductivity (σ):	0.92	0.96	-4.37	5
	Body 710	e'	54.4530	Relative Permittivity (ϵ_r):	54.45	55.70	-2.24	5
		e''	23.4792	Conductivity (σ):	0.93	0.96	-3.45	5
9/19/2012	Body 835	e'	52.9460	Relative Permittivity (ϵ_r):	52.95	55.20	-4.08	5
		e''	21.6933	Conductivity (σ):	1.01	0.97	3.83	5
	Body 820	e'	53.1126	Relative Permittivity (ϵ_r):	53.11	55.28	-3.92	5
		e''	21.7588	Conductivity (σ):	0.99	0.97	2.44	5
	Body 850	e'	52.7908	Relative Permittivity (ϵ_r):	52.79	55.16	-4.29	5
		e''	21.6258	Conductivity (σ):	1.02	0.99	3.54	5
9/19/2012	Body 1720	e'	53.1727	Relative Permittivity (ϵ_r):	53.17	53.52	-0.65	5
		e''	15.3453	Conductivity (σ):	1.47	1.47	-0.01	5
	Body 1735	e'	53.1167	Relative Permittivity (ϵ_r):	53.12	53.48	-0.68	5
		e''	15.3591	Conductivity (σ):	1.48	1.48	0.32	5
	Body 1750	e'	53.0605	Relative Permittivity (ϵ_r):	53.06	53.44	-0.71	5
		e''	15.3684	Conductivity (σ):	1.50	1.49	0.62	5
9/20/2012	Body 1900	e'	52.2552	Relative Permittivity (ϵ_r):	52.26	53.30	-1.96	5
		e''	14.5612	Conductivity (σ):	1.54	1.52	1.21	5
	Body 1850	e'	52.3476	Relative Permittivity (ϵ_r):	52.35	53.30	-1.79	5
		e''	14.3237	Conductivity (σ):	1.47	1.52	-3.06	5
	Body 1880	e'	52.3167	Relative Permittivity (ϵ_r):	52.32	53.30	-1.84	5
		e''	14.1607	Conductivity (σ):	1.48	1.52	-2.61	5
	Body 1910	e'	52.2120	Relative Permittivity (ϵ_r):	52.21	53.30	-2.04	5
		e''	14.6148	Conductivity (σ):	1.55	1.52	2.11	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
9/20/2012	Body 750	e'	54.1573	Relative Permittivity (ϵ_r):	54.16	55.55	-2.50	5
		e''	23.1435	Conductivity (σ):	0.97	0.96	0.21	5
	Body 700	e'	54.6553	Relative Permittivity (ϵ_r):	54.66	55.74	-1.94	5
		e''	23.5764	Conductivity (σ):	0.92	0.96	-4.34	5
	Body 710	e'	54.5415	Relative Permittivity (ϵ_r):	54.54	55.70	-2.08	5
		e''	23.4835	Conductivity (σ):	0.93	0.96	-3.43	5
9/20/2012	Body 835	e'	53.1554	Relative Permittivity (ϵ_r):	53.16	55.20	-3.70	5
		e''	21.6222	Conductivity (σ):	1.00	0.97	3.49	5
	Body 820	e'	53.3117	Relative Permittivity (ϵ_r):	53.31	55.28	-3.56	5
		e''	21.6916	Conductivity (σ):	0.99	0.97	2.12	5
	Body 850	e'	53.0089	Relative Permittivity (ϵ_r):	53.01	55.16	-3.89	5
		e''	21.5561	Conductivity (σ):	1.02	0.99	3.21	5
9/20/2012	Body 1720	e'	52.9186	Relative Permittivity (ϵ_r):	52.92	53.52	-1.12	5
		e''	15.1053	Conductivity (σ):	1.44	1.47	-1.57	5
	Body 1735	e'	52.8560	Relative Permittivity (ϵ_r):	52.86	53.48	-1.17	5
		e''	15.1264	Conductivity (σ):	1.46	1.48	-1.20	5
	Body 1750	e'	52.7893	Relative Permittivity (ϵ_r):	52.79	53.44	-1.22	5
		e''	15.1437	Conductivity (σ):	1.47	1.49	-0.85	5
9/21/2012	Body 1900	e'	51.9270	Relative Permittivity (ϵ_r):	51.93	53.30	-2.58	5
		e''	14.6658	Conductivity (σ):	1.55	1.52	1.93	5
	Body 1850	e'	52.0633	Relative Permittivity (ϵ_r):	52.06	53.30	-2.32	5
		e''	14.4471	Conductivity (σ):	1.49	1.52	-2.23	5
	Body 1880	e'	51.9940	Relative Permittivity (ϵ_r):	51.99	53.30	-2.45	5
		e''	14.5786	Conductivity (σ):	1.52	1.52	0.26	5
	Body 1910	e'	51.8892	Relative Permittivity (ϵ_r):	51.89	53.30	-2.65	5
		e''	14.7120	Conductivity (σ):	1.56	1.52	2.79	5
9/21/2012	Body 835	e'	52.9657	Relative Permittivity (ϵ_r):	52.97	55.20	-4.05	5
		e''	21.8061	Conductivity (σ):	1.01	0.97	4.37	5
	Body 820	e'	53.1394	Relative Permittivity (ϵ_r):	53.14	55.28	-3.87	5
		e''	21.8670	Conductivity (σ):	1.00	0.97	2.95	5
	Body 850	e'	52.8021	Relative Permittivity (ϵ_r):	52.80	55.16	-4.27	5
		e''	21.7438	Conductivity (σ):	1.03	0.99	4.11	5
9/24/2012	Body 835	e'	52.8992	Relative Permittivity (ϵ_r):	52.90	55.20	-4.17	5
		e''	21.6852	Conductivity (σ):	1.01	0.97	3.80	5
	Body 820	e'	53.0588	Relative Permittivity (ϵ_r):	53.06	55.28	-4.01	5
		e''	21.7587	Conductivity (σ):	0.99	0.97	2.44	5
	Body 850	e'	52.7450	Relative Permittivity (ϵ_r):	52.75	55.16	-4.37	5
		e''	21.6151	Conductivity (σ):	1.02	0.99	3.49	5
9/25/2012	Body 835	e'	53.3671	Relative Permittivity (ϵ_r):	53.37	55.20	-3.32	5
		e''	21.7788	Conductivity (σ):	1.01	0.97	4.24	5
	Body 820	e'	53.5342	Relative Permittivity (ϵ_r):	53.53	55.28	-3.15	5
		e''	21.8467	Conductivity (σ):	1.00	0.97	2.85	5
	Body 850	e'	53.2145	Relative Permittivity (ϵ_r):	53.21	55.16	-3.52	5
		e''	21.7086	Conductivity (σ):	1.03	0.99	3.94	5
9/26/2012	Body 835	e'	53.0289	Relative Permittivity (ϵ_r):	53.03	55.20	-3.93	5
		e''	21.5017	Conductivity (σ):	1.00	0.97	2.92	5
	Body 820	e'	53.1888	Relative Permittivity (ϵ_r):	53.19	55.28	-3.78	5
		e''	21.5689	Conductivity (σ):	0.98	0.97	1.55	5
	Body 850	e'	52.8784	Relative Permittivity (ϵ_r):	52.88	55.16	-4.13	5
		e''	21.4366	Conductivity (σ):	1.01	0.99	2.63	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ? %)
9/26/2012	Body 2450	e'	52.3157	Relative Permittivity (ϵ_r):	52.32	52.70	-0.73	5
		e''	14.3029	Conductivity (σ):	1.95	1.95	-0.08	5
	Body 2410	e'	52.4615	Relative Permittivity (ϵ_r):	52.46	52.76	-0.56	5
		e''	14.1250	Conductivity (σ):	1.89	1.91	-0.77	5
	Body 2435	e'	52.3699	Relative Permittivity (ϵ_r):	52.37	52.73	-0.68	5
		e''	14.2395	Conductivity (σ):	1.93	1.93	-0.16	5
	Body 2475	e'	52.2246	Relative Permittivity (ϵ_r):	52.22	52.67	-0.84	5
		e''	14.4146	Conductivity (σ):	1.98	1.99	-0.07	5
9/26/2012	Body 2450	e'	52.5971	Relative Permittivity (ϵ_r):	52.60	52.70	-0.20	5
		e''	14.4298	Conductivity (σ):	1.97	1.95	0.81	5
	Body 2410	e'	52.7465	Relative Permittivity (ϵ_r):	52.75	52.76	-0.02	5
		e''	14.2473	Conductivity (σ):	1.91	1.91	0.09	5
	Body 2435	e'	52.6546	Relative Permittivity (ϵ_r):	52.65	52.73	-0.14	5
		e''	14.3623	Conductivity (σ):	1.94	1.93	0.70	5
	Body 2475	e'	52.5055	Relative Permittivity (ϵ_r):	52.51	52.67	-0.31	5
		e''	14.5402	Conductivity (σ):	2.00	1.99	0.80	5
9/27/2012	Body 1900	e'	51.9536	Relative Permittivity (ϵ_r):	51.95	53.30	-2.53	5
		e''	14.6042	Conductivity (σ):	1.54	1.52	1.50	5
	Body 1850	e'	52.0489	Relative Permittivity (ϵ_r):	52.05	53.30	-2.35	5
		e''	14.4110	Conductivity (σ):	1.48	1.52	-2.47	5
	Body 1880	e'	52.0152	Relative Permittivity (ϵ_r):	52.02	53.30	-2.41	5
		e''	14.5248	Conductivity (σ):	1.52	1.52	-0.11	5
	Body 1910	e'	51.9132	Relative Permittivity (ϵ_r):	51.91	53.30	-2.60	5
		e''	14.6479	Conductivity (σ):	1.56	1.52	2.34	5
10/4/2012	Body 750	e'	53.9857	Relative Permittivity (εr):	53.99	55.55	-2.81	5
		e''	23.2071	Conductivity (σ):	0.97	0.96	0.49	5
	Body 700	e'	54.4608	Relative Permittivity (εr):	54.46	55.74	-2.29	5
		e''	23.6378	Conductivity (σ):	0.92	0.96	-4.09	5
	Body 710	e'	54.3506	Relative Permittivity (εr):	54.35	55.70	-2.42	5
		e''	23.5465	Conductivity (σ):	0.93	0.96	-3.17	5

12. 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 ±10%.

12.1. 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.

12.2. 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	1029	4/13/12	750	1g	8.44	8.76
				10g	5.53	5.80
D835V2	4d076	4/10/12	835	1g	9.40	9.49
				10g	6.16	6.28
D1750V2	1006	4/11/12	1750	1g	36.4	37.3
				10g	19.3	20.1
D1900V2	5d108	4/3/12	1900	1g	39.9	40.6
				10g	21.0	21.5
D2450V2	826	4/11/12	2450	1g	52.4	50.6
				10g	24.5	23.7
D5GHzV2	1072	4/18/12	5200	1g	80.3	73.8
				10g	23.0	20.7
			5500	1g	85.0	78.7
				10g	24.3	21.9
			5800	1g	79.6	72.8
				10g	22.6	20.2

12.3. System Performance Check Results

Date Tested	System Dipole		T.S.	SAR Measured		Target	Delta (%)	Tolerance
	Type	Serial No.	Liquid	(Normalized to 1 W)		(Ref. Value)		(%)
7/31/2012	D2450V2	826	Body	1g	53.1	50.6	4.94	±10
				10g	24.8	23.7	4.64	
8/1/2012	D2450V2	826	Body	1g	50.1	50.6	-0.99	±10
				10g	23.0	23.7	-2.95	
8/2/2012	D5GHzV2 (5.8GHz)	1072	Body	1g	70.0	72.8	-3.85	±10
				10g	19.7	20.2	-2.48	
8/3/2012	D5GHzV2 (5.8GHz)	1072	Body	1g	67.8	72.8	-6.87	±10
				10g	19.1	20.2	-5.45	
8/3/2012	D2450V2	826	Body	1g	54.7	50.6	8.10	±10
				10g	25.5	23.7	7.59	
8/7/2012	D5GHzV2 (5.2GHz)	1072	Body	1g	71.8	73.8	-2.71	±10
				10g	20.3	20.7	-1.93	
8/7/2012	D2450V2	826	Body	1g	53.8	50.6	6.32	±10
				10g	25.3	23.7	6.75	
8/8/2012	D5GHzV2 (5.2GHz)	1072	Body	1g	69.3	73.8	-6.10	±10
				10g	19.5	20.7	-5.80	
8/9/2012	D5GHzV2 (5.2GHz)	1072	Body	1g	69.8	73.8	-5.42	±10
				10g	19.7	20.7	-4.83	
8/9/2012	D5GHzV2 (5.2GHz)	1072	Body	1g	69.7	73.8	-5.56	±10
				10g	19.6	20.7	-5.31	
8/9/2012	D2450V2	826	Body	1g	53.2	50.6	5.14	±10
				10g	25.0	23.7	5.49	
8/10/2012	D5GHzV2 (5.5GHz)	1072	Body	1g	73.3	78.7	-6.86	±10
				10g	20.4	21.9	-6.85	
8/10/2012	D5GHzV2 (5.6GHz)	1072	Body	1g	75.9	78.7	-3.56	±10
				10g	21.3	21.9	-2.74	
8/10/2012	D5GHzV2 (5.2GHz)	1072	Body	1g	70.8	73.8	-4.07	±10
				10g	19.9	20.7	-3.86	
8/13/2012	D5GHzV2 (5.5GHz)	1072	Body	1g	76.7	78.7	-2.54	±10
				10g	21.5	21.9	-1.83	
8/13/2012	D5GHzV2 (5.6GHz)	1072	Body	1g	78.9	78.7	0.25	±10
				10g	22.3	21.9	1.83	
8/15/2012	D5GHzV2 (5.2GHz)	1072	Body	1g	73.4	73.8	-0.54	±10
				10g	20.7	20.7	0.00	
8/15/2012	D5GHzV2 (5.5GHz)	1072	Body	1g	77.0	78.7	-2.16	±10
				10g	21.4	21.9	-2.28	
8/15/2012	D5GHzV2 (5.6GHz)	1072	Body	1g	80.9	78.7	2.80	±10
				10g	22.7	21.9	3.65	
8/15/2012	D5GHzV2 (5.8GHz)	1072	Body	1g	68.7	72.8	-5.63	±10
				10g	19.3	20.2	-4.46	
8/17/2012	D5GHzV2 (5.5GHz)	1072	Body	1g	74.9	78.7	-4.83	±10
				10g	20.9	21.9	-4.57	
8/17/2012	D5GHzV2 (5.6GHz)	1072	Body	1g	80.5	78.7	2.29	±10
				10g	22.5	21.9	2.74	
8/28/2012	D1900V2	5d108	Body	1g	41.8	40.6	2.96	±10
				10g	21.9	21.5	1.86	

System Performance Check Results (continued)

Date Tested	System Dipole		T.S. Liquid	SAR Measured (Normalized to 1 W)		Target (Ref. Value)	Delta (%)	Tolerance (%)
	Type	Serial No.						
8/29/2012	D1900V2	5d108	Body	1g	42.6	40.6	3.69	±10
				10g	22.2	21.5	1.86	
8/30/2012	D1900V2	5d108	Body	1g	41.4	40.6	1.97	±10
				10g	21.7	21.5	0.93	
8/31/2012	D1900V2	5d108	Body	1g	41.5	40.6	2.22	±10
				10g	21.6	21.5	0.47	
9/11/2012	D1900V2	5d108	Body	1g	41.1	40.6	1.23	±10
				10g	21.5	21.5	0.00	
9/12/2012	D1900V2	5d108	Body	1g	40.9	40.6	0.74	±10
				10g	21.3	21.5	-0.93	
9/13/2012	D5GHzV2 (5.2GHz)	1072	Body	1g	68.8	73.8	-6.78	±10
				10g	19.3	20.7	-6.76	
9/13/2012	D5GHzV2 (5.2GHz)	1072	Body	1g	71.8	73.8	-2.71	±10
				10g	20.1	20.7	-2.90	
9/13/2012	D1900V2	5d108	Body	1g	41.0	40.6	0.99	±10
				10g	21.4	21.5	-0.47	
9/14/2012	D5GHzV2 (5.2GHz)	1072	Body	1g	73.3	73.8	-0.68	±10
				10g	20.7	20.7	0.00	
9/17/2012	D750V3	1025	Body	1g	8.56	8.76	-2.28	±10
				10g	5.68	5.80	-2.07	
9/18/2012	D1900V2	5d108	Body	1g	40.3	40.6	-0.74	±10
				10g	21.1	21.5	-1.86	
9/18/2012	D750V3	1025	Body	1g	8.09	8.76	-7.65	±10
				10g	5.36	5.80	-7.59	
9/18/2012	D835V2	4d076	Body	1g	9.25	9.49	-2.53	±10
				10g	6.09	6.28	-3.03	
9/18/2012	D1750V2	1006	Body	1g	39.0	37.30	4.56	±10
				10g	20.8	20.10	3.48	
9/19/2012	D1900V2	5d108	Body	1g	40.4	40.6	-0.49	±10
				10g	21.1	21.5	-1.86	
9/19/2012	D750V3	1025	Body	1g	8.55	8.76	-2.40	±10
				10g	5.67	5.80	-2.24	
9/19/2012	D835V2	4d076	Body	1g	9.15	9.49	-3.58	±10
				10g	6.01	6.28	-4.30	
9/19/2012	D1750V2	1006	Body	1g	37.7	37.30	1.07	±10
				10g	20.1	20.10	0.00	
9/20/2012	D1900V2	5d108	Body	1g	40.6	40.6	0.00	±10
				10g	21.4	21.5	-0.47	
9/20/2012	D750V3	1025	Body	1g	8.27	8.76	-5.59	±10
				10g	5.47	5.80	-5.69	
9/20/2012	D835V2	4d076	Body	1g	9.14	9.49	-3.69	±10
				10g	6.02	6.28	-4.14	
9/20/2012	D1750V2	1006	Body	1g	37.6	37.30	0.80	±10
				10g	20.1	20.10	0.00	
9/21/2012	D1900V2	5d108	Body	1g	39.6	40.6	-2.46	±10
				10g	20.8	21.5	-3.26	
9/21/2012	D835V2	4d076	Body	1g	9.98	9.49	5.16	±10
				10g	6.57	6.28	4.62	

System Performance Check Results (continued)

Date Tested	System Dipole		T.S. Liquid	SAR Measured (Normalized to 1 W)		Target (Ref. Value)	Delta (%)	Tolerance (%)
	Type	Serial No.						
9/24/2012	D835V2	4d076	Body	1g	9.65	9.49	1.69	±10
				10g	6.36	6.28	1.27	
9/25/2012	D835V2	4d076	Body	1g	10.1	9.49	6.43	±10
				10g	6.66	6.28	6.05	
9/26/2012	D835V2	4d076	Body	1g	10.0	9.49	5.37	±10
				10g	6.61	6.28	5.25	
9/26/2012	D2450V2	826	Body	1g	51.5	50.6	1.78	±10
				10g	24.2	23.7	2.11	
9/26/2012	D2450V2	826	Body	1g	53.6	50.6	5.93	±10
				10g	24.9	23.7	5.06	
9/27/2012	D1900V2	5d108	Body	1g	39.8	40.6	-1.97	±10
				10g	20.8	21.5	-3.26	
10/4/2012	D750V3	1025	Body	1g	8.94	8.76	2.05	±10
				10g	5.93	5.80	2.24	

13. SAR Test Results

13.1. GSM850

Test Position	Power back-off	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	on (Second-stage)	0	GPRS 2 slots	128	824.2	25.8	1.140	
				190	836.6	25.8	**1.160**	
				251	848.8	25.8	1.120	
Edge 1	on (Second-stage)	0	GPRS 2 slots	128	824.2	25.8		1
				190	836.6	25.8	0.758	
				251	848.8	25.8		1
Edge 1 (41° Rear Tilt)	on (Second-stage)	0	GPRS 2 slots	128	824.2	25.8	1.130	
				190	836.6	25.8	1.100	
				251	848.8	25.8	1.070	
Rear	off	12	GPRS 2 slots	128	824.2	32.2		1
				190	836.6	32.3	0.728	2
				251	848.8	32.2		1
Edge 1	off	14	GPRS 2 slots	128	824.2	32.2		1
				190	836.6	32.3	0.492	2
				251	848.8	32.2		1
Rear (27° Tilt @ Edge 1)	off	0	GPRS 2 slots	128	824.2	32.2		1
				190	836.6	32.3	0.417	
				251	848.8	32.2		1
Edge 2	off	0	GPRS 2 slots	128	824.2	32.2		1
				190	836.6	32.3	0.371	
				251	848.8	32.2		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. SAR evaluation is performed with power back-off disabled (at full power) at the conservative distance of the second stage trigger. Therefore, additional SAR testing for different stages of power back-off is not performed.

13.2. GSM1900

Test Position	Power back-off	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	on (Second-stage)	0	GPRS 2 slots	512	1850.2	22.0	1.130	
				661	1880.0	21.8	**1.190**	
				810	1909.8	21.8	1.160	
Edge 1	on (Second-stage)	0	GPRS 2 slots	512	1850.2	22.0		1
				661	1880.0	21.8	0.628	
				810	1909.8	21.8		1
Edge 1 (41° Rear Tilt)	on (Second-stage)	0	GPRS 2 slots	512	1850.2	22.0	0.829	
				661	1880.0	21.8	0.801	
				810	1909.8	21.8	0.787	
Rear	off	12	GPRS 2 slots	512	1850.2	29.3	0.781	2
				661	1880.0	29.1	0.800	2
				810	1909.8	29.1	0.809	2
Edge 1	off	14	GPRS 2 slots	512	1850.2	29.3	0.897	2
				661	1880.0	29.1	0.901	2
				810	1909.8	29.1	0.937	2
Rear (27° Tilt @ Edge 1)	off	0	GPRS 2 slots	512	1850.2	29.3		1
				661	1880.0	29.1	0.778	
				810	1909.8	29.1		1
Edge 2	off	0	GPRS 2 slots	512	1850.2	29.3		1
				661	1880.0	29.1	0.600	
				810	1909.8	29.1		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. SAR evaluation is performed with power back-off disabled (at full power) at the conservative distance of the second stage trigger. Therefore, additional SAR testing for different stages of power back-off is not performed.

13.3. 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

Test Position	Power back-off	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	on (Second-stage)	0	Rel 99 RMC 12.2kbps	4132	826.4	19.7	1.080	
				4183	836.6	19.6	**1.130**	
				4233	846.6	19.7	1.030	
Edge 1	on (Second-stage)	0	Rel 99 RMC 12.2kbps	4132	826.4	19.7	0.812	
				4183	836.6	19.6	0.783	
				4233	846.6	19.7	0.652	
Edge 1 (41 deg Tilt)	on (Second-stage)	0	Rel 99 RMC 12.2kbps	4132	826.4	19.7	0.990	
				4183	836.6	19.6	1.090	
				4233	846.6	19.7	0.977	
Rear	off	12	Rel 99 RMC 12.2kbps	4132	826.4	24.5		1
				4183	836.6	24.4	0.639	2
				4233	846.6	24.5		1
Edge 1	off	14	Rel 99 RMC 12.2kbps	4132	826.4	24.5		1
				4183	836.6	24.4	0.493	2
				4233	846.6	24.5		1
Rear (27 deg Tilt @ Edge 1)	off	0	Rel 99 RMC 12.2kbps	4132	826.4	24.5		1
				4183	836.6	24.4	0.377	
				4233	846.6	24.5		1
Edge 2	off	0	Rel 99 RMC 12.2kbps	4132	826.4	24.5		1
				4183	836.6	24.4	0.340	
				4233	846.6	24.5		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. SAR evaluation is performed with power back-off disabled (at full power) at the conservative distance of the second stage trigger. Therefore, additional SAR testing for different stages of power back-off is not performed.

13.4. 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

Test Position	Power back-off	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	on (Second-stage)	0	Rel 99 RMC 12.2kbps	9262	1852.4	14.9	0.943	
				9400	1880.0	15.0	0.939	
				9538	1907.6	15.0	**1.050**	
Edge 1	on (Second-stage)	0	Rel 99 RMC 12.2kbps	9262	1852.4	14.9		1
				9400	1880.0	15.0	0.502	
				9538	1907.6	15.0		1
Edge 1 (41° Rear Tilt)	on (Second-stage)	0	Rel 99 RMC 12.2kbps	9262	1852.4	14.9		1
				9400	1880.0	15.0	0.680	
				9538	1907.6	15.0		1
Rear	off	12	Rel 99 RMC 12.2kbps	9262	1852.4	22.9	0.694	2
				9400	1880.0	23.0	0.872	2
				9538	1907.6	22.9	0.936	2
Edge 1	off	14	Rel 99 RMC 12.2kbps	9262	1852.4	22.9	0.698	2
				9400	1880.0	23.0	0.958	2
				9538	1907.6	22.9	1.000	2
Rear (27° Tilt @ Edge 1)	off	0	Rel 99 RMC 12.2kbps	9262	1852.4	22.9	0.495	
				9400	1880.0	23.0	0.832	
				9538	1907.6	22.9	0.975	
Edge 2	off	0	Rel 99 RMC 12.2kbps	9262	1852.4	22.9		1
				9400	1880.0	23.0	0.608	
				9538	1907.6	22.9		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. SAR evaluation is performed with power back-off disabled (at full power) at the conservative distance of the second stage trigger. Therefore, additional SAR testing for different stages of power back-off is not performed.

13.5. LTE Band 2 (20MHz Bandwidth)

Test Position	Power back-off	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	on (Second-stage)	0	QPSK	18700	1860.0	1	49	0	15.4	0.974	
						50	24	1	15.5	0.955	
				18900	1880.0	1	0	0	15.5	1.170	
						1	49	0	15.5	1.150	
						1	99	0	15.4	0.955	
						50	0	1	15.5	**1.190**	
						50	24	1	15.5	1.120	
						50	49	1	15.5	1.050	
						100	0	1	15.6	1.170	
				19100	1900.0	1	0	0	15.5	0.993	
						50	0	1	15.5	1.040	
Edge 1	on (Second-stage)	0	QPSK	18700	1860.0	1	49	0	15.4	0.560	
						50	24	1	15.5	0.599	
				18900	1880.0	1	0	0	15.5	0.774	
						1	49	0	15.5	0.816	
						1	99	0	15.4	0.572	
						50	0	1	15.5	0.811	
						50	24	1	15.5	0.798	
						50	49	1	15.5	0.718	
						100	0	1	15.6	0.792	
				19100	1900.0	1	0	0	15.5	0.532	
						50	0	1	15.5	0.547	
Rear 41° Tilt @ Edge 1	on (Second-stage)	0	QPSK	18700	1860.0	1	49	0	15.4	0.779	
						50	24	1	15.5	0.780	
				18900	1880.0	1	0	0	15.5	1.010	
						1	49	0	15.5	1.110	
						1	99	0	15.4	0.780	
						50	0	1	15.5	1.080	
						50	24	1	15.5	1.050	
						50	49	1	15.5	0.961	
						100	0	1	15.6	1.070	
				19100	1900.0	1	0	0	15.5	0.740	
						50	0	1	15.5	0.725	

LTE Band 2 (20MHz Bandwidth) continued

Test Position	Power back-off	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	off	12	QPSK	18700	1860.0	1	49	0	23.0	0.627	2
						50	24	1	22.2	0.668	2
				18900	1880.0	1	0	0	23.0	0.972	2
						1	49	0	23.0	0.895	2
						1	99	0	23.0	0.754	2
						50	0	1	22.3	0.788	2
						50	24	1	22.3	0.730	2
						50	49	1	22.3	0.698	2
						100	0	1	22.2	0.720	2
				19100	1900.0	1	0	0	22.8	0.908	2
						50	0	1	22.1	0.768	2
Edge 1	off	14	QPSK	18700	1860.0	1	49	0	23.0	0.905	2
						50	24	1	22.2	0.750	2
				18900	1880.0	1	0	0	23.0	1.170	2
						1	49	0	23.0	1.080	2
						1	99	0	23.0	0.876	2
						50	0	1	22.3	0.942	2
						50	24	1	22.3	0.843	2
						50	49	1	22.3	0.771	2
						100	0	1	22.2	0.885	2
				19100	1900.0	1	0	0	22.8	0.883	2
						50	0	1	22.1	0.923	2
Rear (27° Tilt @ Edge 1)	off	0	QPSK	18700	1860.0	1	49	0	23.0	0.665	
						50	24	1	22.2	0.571	
				18900	1880.0	1	0	0	23.0	0.911	
						1	49	0	23.0	0.834	
						1	99	0	23.0	0.688	
						50	0	1	22.3	0.716	
						50	24	1	22.3	0.720	
						50	49	1	22.3	0.663	
						100	0	1	22.2	0.672	
				19100	1900.0	1	0	0	22.8	0.905	
						50	0	1	22.1	0.775	
Edge 2	off	0	QPSK	18900	1880.0	1	0	0	23.0	0.644	
						1	49	0	23.0	0.621	
						1	99	0	23.0	0.552	
						50	0	1	22.3	0.524	
						50	24	1	22.3	0.473	
						50	49	1	22.3	0.455	
						100	0	1	22.2	0.497	

Note(s):

1. Per KDB 941225 D05 SAR for LTE Devices v02, SAR test reduction are applied using the following criteria:
   - Testing for Low and High Channel is performed at the highest output power level for 1RB, and 50% RB configuration for that channel
   - Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel
   - Testing for 16-QAM modulation is not required because the measured SAR for QPSK is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of QPSK.
   - Testing for the other channel bandwidths is not required because the measured SAR for the highest channel bandwidth is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.
2. SAR evaluation is performed with power back-off disabled (at full power) at the conservative distance of the second stage trigger. Therefore, additional SAR testing for different stages of power back-off is not performed.

13.6. LTE Band 4 (20MHz Bandwidth)

Test Position	Pwr Back-off	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	on (Second-stage)	0	QPSK	20175	1732.5	1	0	0	14.1	0.554	
						1	49	0	13.9	0.525	
						1	99	0	14.0	0.785	
						50	0	1	14.0	0.518	
						50	24	1	14.0	0.569	
						50	49	1	14.0	0.647	
						100	0	1	14.1	0.591	
Edge 1	on (Second-stage)	0	QPSK	20175	1732.5	1	0	0	14.1	0.580	
						1	49	0	13.9	0.484	
						1	99	0	14.0	0.693	
						50	0	1	14.0	0.510	
						50	24	1	14.0	0.516	
						50	49	1	14.0	0.586	
						100	0	1	14.1	0.565	
Rear 41° Tilt @ Edge 1	on (Second-stage)	0	QPSK	20050	1720.0	1	0	0	14.1	**1.070**	
						50	24	1	14.1	0.957	
				20175	1732.5	1	0	0	14.1	0.788	
						1	49	0	13.9	0.646	
						1	99	0	14.0	0.831	
						50	0	1	14.0	0.702	
						50	24	1	14.0	0.695	
						50	49	1	14.0	0.748	
						100	0	1	14.1	0.741	
				20300	1745.0	1	99	0	14.0	0.931	
						50	24	1	14.1	1.030	

Test Position	Pwr Back-off	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	off	12	QPSK	20175	1732.5	1	0	0	23.0	0.410	2
						1	49	0	22.9	0.419	2
						1	99	0	23.0	0.701	2
						50	0	1	22.0	0.324	2
						50	24	1	22.0	0.355	2
						50	49	1	21.9	0.445	2
						100	0	1	22.1	0.390	2
Edge 1	off	14	QPSK	20050	1720.0	1	0	0	23.0	0.984	2
						50	0	1	22.1	0.633	2
				20175	1732.5	1	0	0	23.0	0.500	2
						1	49	0	22.9	0.531	2
						1	99	0	23.0	0.897	2
						50	0	1	22.0	0.400	2
						50	24	1	22.0	0.445	2
						50	49	1	21.9	0.549	2
						100	0	1	22.1	0.483	2
				20300	1745.0	1	99	0	23.0	0.658	2
						50	24	1	22.0	0.774	2
Rear (27° Tilt @ Edge 1)	off	0	QPSK	20175	1732.5	1	0	0	23.0	0.346	
						1	49	0	22.9	0.361	
						1	99	0	23.0	0.621	
						50	0	1	22.0	0.276	
						50	24	1	22.0	0.305	
						50	49	1	21.9	0.378	
						100	0	1	22.1	0.336	
Edge 2	off	0	QPSK	20175	1732.5	1	0	0	23.0	0.337	
						1	49	0	22.9	0.412	
						1	99	0	23.0	0.673	
						50	0	1	22.0	0.298	
						50	24	1	22.0	0.338	
						50	49	1	21.9	0.421	
						100	0	1	22.1	0.368	

Note(s):

1. Per KDB 941225 D05 SAR for LTE Devices v02, SAR test reduction are applied using the following criteria:
   - Testing for Low and High Channel is performed at the highest output power level for 1RB, and 50% RB configuration for that channel
   - Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel
   - Testing for 16-QAM modulation is not required because the measured SAR for QPSK is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of QPSK.
   - Testing for the other channel bandwidths is not required because the measured SAR for the highest channel bandwidth is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.
2. SAR evaluation is performed with power back-off disabled (at full power) at the conservative distance of the second stage trigger. Therefore, additional SAR testing for different stages of power back-off is not performed.

13.7. LTE Band 5 (10MHz Bandwidth)

Test Position	Power back-off	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	on (Second-stage)	0	QPSK	20450	829.0	1	49	0	19.5	1.010	
						25	12	1	19.5	1.060	
				20525	836.5	1	0	0	19.5	1.020	
						1	24	0	19.5	1.100	
						1	49	0	19.5	1.130	
						25	0	1	19.5	1.120	
						25	12	1	19.5	**1.150**	
						25	24	1	19.5	1.100	
						50	0	1	19.5	1.060	
				20600	844.0	1	0	0	19.5	1.150	
						25	12	1	19.5	1.100	
Edge 1	on (Second-stage)	0	QPSK	20525	836.5	1	0	0	19.5	0.631	
						1	24	0	19.5	0.677	
						1	49	0	19.5	0.683	
						25	0	1	19.5	0.693	
						25	12	1	19.5	0.701	
						25	24	1	19.5	0.712	
						50	0	1	19.5	0.718	
Edge 1 (41° Tilt)	on (Second-stage)	0	QPSK	20450	829.0	1	49	0	19.5	0.920	
						25	12	1	19.5	0.939	
				20525	836.5	1	0	0	19.5	0.886	
						1	24	0	19.5	1.010	
						1	49	0	19.5	0.988	
						25	0	1	19.5	1.030	
						25	12	1	19.5	1.040	
						25	24	1	19.5	1.070	
						50	0	1	19.5	1.060	
				20600	844.0	1	0	0	19.5	1.040	
						25	12	1	19.5	0.979	

LTE Band 5 (10MHz Bandwidth) continued

Test Position	Power back-off	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	off	12	QPSK	20525	836.5	1	0	0	23.9	0.596	2
						1	24	0	23.8	0.635	2
						1	49	0	23.9	0.664	2
						25	0	1	22.8	0.504	2
						25	12	1	22.8	0.522	2
						25	24	1	22.8	0.545	2
						50	0	1	22.8	0.526	2
Edge 1	off	14	QPSK	20525	836.5	1	0	0	23.9	0.359	2
						1	24	0	23.8	0.379	2
						1	49	0	23.9	0.404	2
						25	0	1	22.8	0.307	2
						25	12	1	22.8	0.316	2
						25	24	1	22.8	0.325	2
						50	0	1	22.8	0.321	2
Rear (27° Tilt @ Edge 1)	off	0	QPSK	20525	836.5	1	0	0	23.9	0.336	
						1	24	0	23.8	0.342	
						1	49	0	23.9	0.371	
						25	0	1	22.8	0.279	
						25	12	1	22.8	0.286	
						25	24	1	22.8	0.302	
						50	0	1	22.8	0.294	
Edge 2	off	0	QPSK	20525	836.5	1	0	0	23.9	0.247	
						1	24	0	23.8	0.275	
						1	49	0	23.9	0.302	
						25	0	1	22.8	0.218	
						25	12	1	22.8	0.230	
						25	24	1	22.8	0.239	
						50	0	1	22.8	0.228	

Note(s):

1. Per KDB 941225 D05 SAR for LTE Devices v02, SAR test reduction are applied using the following criteria:
   - Testing for Low and High Channel is performed at the highest output power level for 1RB, and 50% RB configuration for that channel
   - Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel
   - Testing for 16-QAM modulation is not required because the measured SAR for QPSK is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of QPSK.
   - Testing for the other channel bandwidths is not required because the measured SAR for the highest channel bandwidth is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.
2. SAR evaluation is performed with power back-off disabled (at full power) at the conservative distance of the second stage trigger. Therefore, additional SAR testing for different stages of power back-off is not performed

13.8. LTE Band 17 (10MHz Bandwidth)

Test Position	Pwr Back-off	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	on (Second-stage)	0	QPSK	23780	709.0	1	24	0	19.3	1.060	
						25	12	1	19.4	1.120	
				23790	710.0	1	0	0	19.3	0.970	
						1	24	0	19.2	1.070	
						1	49	0	19.3	1.040	
						25	0	1	19.3	1.080	
						25	12	1	19.3	1.150	
						25	24	1	19.3	1.120	
						50	0	1	19.3	1.130	
				23800	711.0	1	24	0	19.3	1.160	
						25	12	1	19.4	**1.190**	
Edge 1	on (Second-stage)	0	QPSK	23790	710.0	1	0	0	19.3	0.657	
						1	24	0	19.2	0.718	
						1	49	0	19.3	0.698	
						25	0	1	19.3	0.694	
						25	12	1	19.3	0.731	
						25	24	1	19.3	0.720	
						50	0	1	19.3	0.750	
Rear 41° Tilt @ Edge 1	on (Second-stage)	0	QPSK	23780	709.0	1	24	0	19.3	1.010	
						25	12	1	19.4	1.070	
				23790	710.0	1	0	0	19.3	1.000	
						1	24	0	19.2	0.950	
						1	49	0	19.3	0.890	
						25	0	1	19.3	1.050	
						25	12	1	19.3	1.020	
						25	24	1	19.3	0.951	
						50	0	1	19.3	1.000	
				23800	711.0	1	24	0	19.3	0.929	
						25	12	1	19.4	0.983	

Test Position	Power back-off	Dist. (mm)	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Start	MPR	Power (dBm)	1g SAR (W/kg)	Note
Rear	off	12	QPSK	23790	710.0	1	0	0	24.0	0.294	2
						1	24	0	24.0	0.328	2
						1	49	0	24.0	0.434	2
						25	0	1	23.0	0.249	2
						25	12	1	23.0	0.285	2
						25	24	1	23.0	0.323	2
						50	0	1	23.0	0.286	2
Edge 1	off	14	QPSK	23790	710.0	1	0	0	24.0	0.160	2
						1	24	0	24.0	0.160	2
						1	49	0	24.0	0.207	2
						25	0	1	23.0	0.129	2
						25	12	1	23.0	0.138	2
						25	24	1	23.0	0.158	2
						50	0	1	23.0	0.146	2
Rear (27° Tilt @ Edge 1)	off	0	QPSK	23790	710.0	1	0	0	24.0	0.224	
						1	24	0	24.0	0.238	
						1	49	0	24.0	0.337	
						25	0	1	23.0	0.185	
						25	12	1	23.0	0.199	
						25	24	1	23.0	0.234	
						50	0	1	23.0	0.208	
Edge 2	off	0	QPSK	23790	710.0	1	0	0	24.0	0.165	
						1	24	0	24.0	0.203	
						1	49	0	24.0	0.267	
						25	0	1	23.0	0.149	
						25	12	1	23.0	0.172	
						25	24	1	23.0	0.201	
						50	0	1	23.0	0.175	

Note(s):

1. Per KDB 941225 D05 SAR for LTE Devices v02, SAR test reduction are applied using the following criteria:
   - Testing for Low and High Channel is performed at the highest output power level for 1RB, and 50% RB configuration for that channel
   - Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel
   - Testing for 16-QAM modulation is not required because the measured SAR for QPSK is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of QPSK.
   - Testing for the other channel bandwidths is not required because the measured SAR for the highest channel bandwidth is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.
2. SAR evaluation is performed with power back-off disabled (at full power) at the conservative distance of the second stage trigger. Therefore, additional SAR testing for different stages of power back-off is not performed

13.9. Wi-Fi (2.4 GHz Band)

(BOM #1)

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	802.11b	0	1	2412	16.5		1
			6	2437	16.5	0.080	
			11	2462	16.5		1
Edge 2	802.11b	0	1	2412	16.5		1
			6	2437	16.5	0.051	
			11	2462	16.5		1
Edge 3	802.11b	0	1	2412	16.5	1.040	
			6	2437	16.5	**1.100**	
			11	2462	16.5	1.040	

Highest SAR Configuration (BOM #2)

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Edge 3	802.11b	0	6	2437	16.5	1.060	

Note(s):

1. 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)
   ≤ 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

13.10. Wi-Fi (5 GHz Bands)

(BOM #1)

Band (GHz)	Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
5.2	Rear	0	802.11a	36	5180	14.0	0.024	
				48	5240	14.0	0.029	
			802.11n HT40	46	5230	15.5	0.039	
	Edge 2	0	802.11a	36	5180	14.0	< .001	
				48	5240	14.0	< .001	
			802.11n HT40	46	5230	15.5	< .001	
	Edge 3	0	802.11a	36	5180	14.0	0.393	
				48	5240	14.0	0.413	
			802.11n HT40	46	5230	15.5	**0.582**	
5.3	Rear	0	802.11a	52	5260	17.5	0.039	
				60	5320	17.5	0.037	
	Edge 2	0	802.11a	52	5260	17.5	0.0079	
				60	5320	17.5	< .001	
	Edge 3	0	802.11a	52	5260	17.5	**0.891**	
				60	5320	17.5	0.854	
5.5	Rear	0	802.11a	104	5520	18.0	0.051	
				116	5580	18.0	0.049	
				124	5620	18.0	0.056	
				136	5680	18.0	0.069	
	Edge 2	0	802.11a	104	5520	18.0	0.0015	
				116	5580	18.0	0.00597	
				124	5620	18.0	0.018	
				136	5680	18.0	0.0210	
	Edge 3	0	802.11a	104	5520	18.0	0.928	
				116	5580	18.0	1.060	
				124	5620	18.0	1.110	
				136	5680	18.0	**1.110**	
5.8	Rear	0	802.11a	149	5745	18.5	0.057	
				157	5785	18.5	0.064	
				165	5825	18.5	0.061	
	Edge 2	0	802.11a	149	5745	18.5	0.022	
				157	5785	18.5	0.028	
				165	5825	18.5	0.023	
	Edge 3	0	802.11a	149	5745	18.5	**0.975**	
				157	5785	18.5	0.914	
				165	5825	18.5	0.882	

Highest SAR Configuration (BOM #2)

Band (GHz)	Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
5.2	Edge 3	10	802.11n HT40	46	5230	15.5	0.569	
5.3	Edge 3	10	802.11a	52	5260	17.5	0.856	
5.5	Edge 3	10	802.11a	136	5680	18.0	1.070	
5.8	Edge 3	10	802.11a	149	5745	18.5	0.975	

13.11. Bluetooth

(BOM #1)

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Rear	V2.1 + EDR, GFSK	0	0	2402	13.0		1
			39	2441	13.0	0.028	
			78	2480	13.0		1
Edge 2	V2.1 + EDR, GFSK	0	0	2402	13.0		1
			39	2441	13.0	0.014	
			78	2480	13.0		1
Edge 3	V2.1 + EDR, GFSK	0	0	2402	13.0		1
			39	2441	13.0	**0.407**	
			78	2480	13.0		1

Highest SAR Configuration (BOM #2)

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)	Note
Edge 3	V2.1 + EDR, GFSK	0	39	2441	13.0	0.284	

Note(s):

1. 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)
   ≤ 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

14. Summary of Highest SAR Values

Results for highest SAR values for each frequency band and mode

Technology/Band	Test configuration			Mode	Highest 1g SAR (W/kg)
	Exposure	Position	Pwr Back-off		
GSM850	Body	Rear	on (Second-stage)	GPRS 2 slots	1.160
GSM1900	Body	Rear	on (Second-stage)	GPRS 2 slots	1.190
W-CDMA Band V	Body	Rear	on (Second-stage)	Rel 99 RMC 12.2kbps	1.130
W-CDMA Band II	Body	Rear	on (Second-stage)	Rel 99 RMC 12.2kbps	1.050
LTE Band 2	Body	Rear	on (Second-stage)	20 MHz (QPSK) RB 50/0	1.190
LTE Band 4	Body	Rear 41° Tilt @ Edge 1	on (Second-stage)	20 MHz (QPSK) RB 1/0	1.070
LTE Band 5	Body	Rear	on (Second-stage)	10 MHz (QPSK) RB 25/12	1.150
LTE Band 17	Body	Rear	on (Second-stage	10 MHz (QPSK) RB 25/12	1.190
WiFi 2.4 GHz	Body	Edge 3		802.11b 1Mbps	1.100
Bluetooth	Body	Edge 3		GFSK	0.407
WiFi 5.2 GHz	Body	Edge 3		802.11n HT40 MCS0	0.582
WiFi 5.3 GHz	Body	Edge 3		802.11a 6Mbps	0.891
WiFi 5.5 GHz	Body	Edge 3		802.11a 6Mbps	1.110
WiFi 5.8 GHz	Body	Edge 3		802.11a 6Mbps	0.975

14.1. Scaled SAR Values to the Maximum Target Output Power

The highest measured SAR results were scaled, in cases where measured output power is lower than the maximum Target output power level, in each frequency band.

Technology/Band	Test Configuration	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		SAR (W/kg)	
						Tune-up limit	Measured	Measured	Scaled
GSM850	Rear	GPRS 2 Slots	0	190	836.6	25.8	25.8	1.160	*
LTE Band 2	Rear	20 MHz (QPSK) RB 50/0	0	18900	1880.0	15.5	15.5	1.190	*
LTE Band 4	Rear 41° Tilt @ Edge 1	20 MHz (QPSK) RB 1/0	0	20050	1720.0	14.1	14.1	1.070	*
LTE Band 17	Rear	10 MHz (QPSK) RB 25/12	0	23800	711.0	19.4	19.4	1.190	*
WiFi 2.4 GHz	Edge 3	802.11b 1Mbps	0	6	2437	16.5	16.5	1.100	*
WiFi 5.2 GHz	Edge 3	802.11n HT40 MCS0	0	46	5230	15.5	15.5	0.582	*
WiFi 5.3 GHz	Edge 3	802.11a 6Mbps	0	52	5260	17.5	17.5	0.891	*
WiFi 5.5 GHz	Edge 3	802.11a 6Mbps	0	136	5680	18.0	18.0	1.110	*
WiFi 5.8 GHz	Edge 3	802.11a 6Mbps	0	149	5785	18.5	18.5	0.975	*

Note(s):

*: SAR Scaling was not applied when the measured output power is equal or greater than the maximum target output power.

14.2. SAR Plots (from Summary of Highest SAR Values)

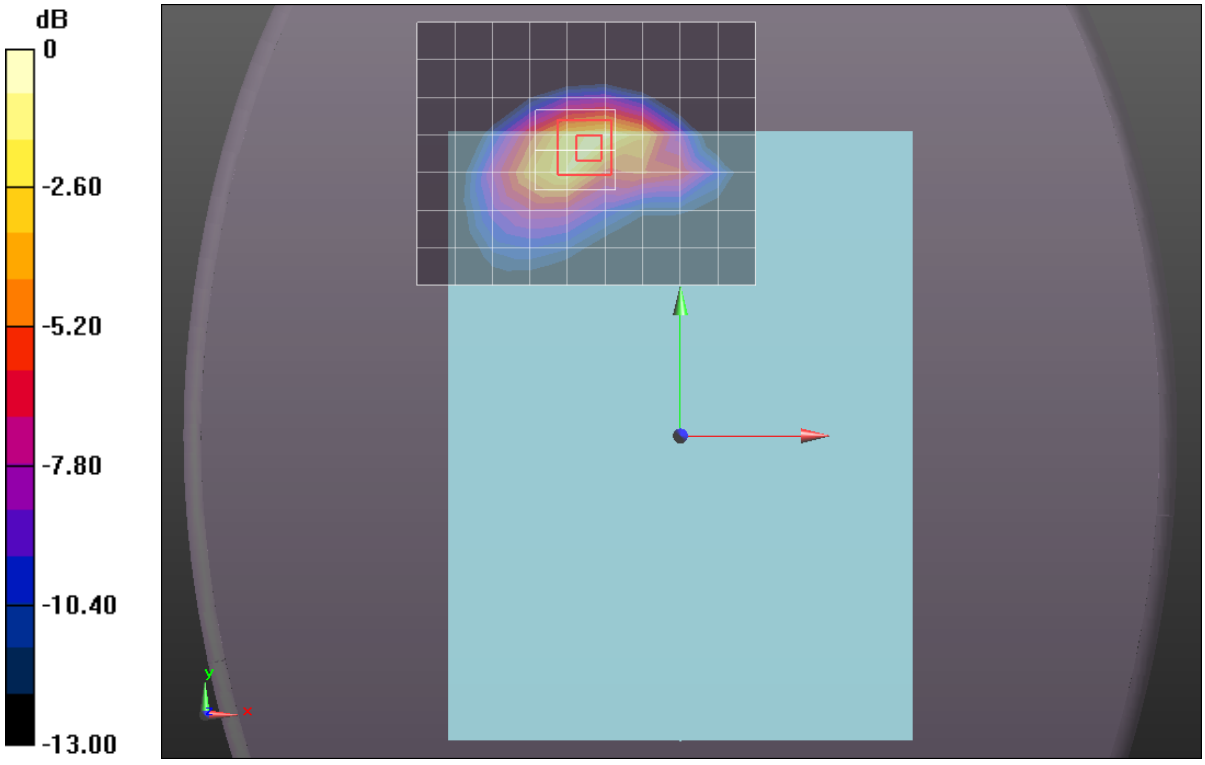
Test Laboratory: Lab C Date: 9/19/2012

GPRS850

Frequency: 836.6 MHz; Duty Cycle: 1:4; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 836.6 MHz; σ = 1.009 mho/m; ε_r = 52.929; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1261; Calibrated: 3/9/2012
- Probe: EX3DV4 - SN3757; ConvF(9, 9, 9); Calibrated: 3/24/2012
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Phantom: Back ELI v5.0; Type: QDOVA002AA; Serial: 1136

Rear/GPRS 2 Slots_ch 190/Area Scan (10x8x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.328 mW/g

Rear/GPRS 2 Slots_ch 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 40.529 V/m; Power Drift = -0.53 dB
Peak SAR (extrapolated) = 2.2540
SAR(1 g) = 1.16 mW/g; SAR(10 g) = 0.616 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.768 mW/g



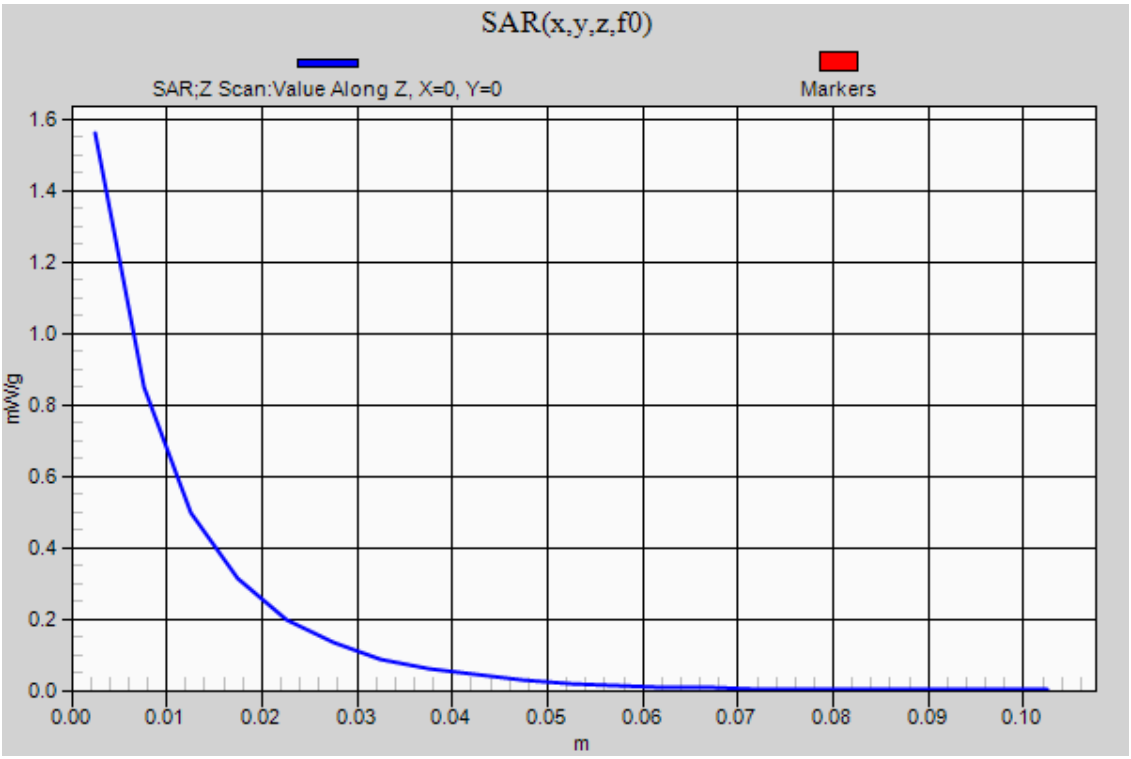
0 dB = 1.770mW/g = 4.96 dB mW/g

Test Laboratory: Lab C Date: 9/19/2012

GPRS850

Frequency: 836.6 MHz; Duty Cycle: 1:4.00037

Rear/GPRS 2 Slots_ch 190/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.559 mW/g



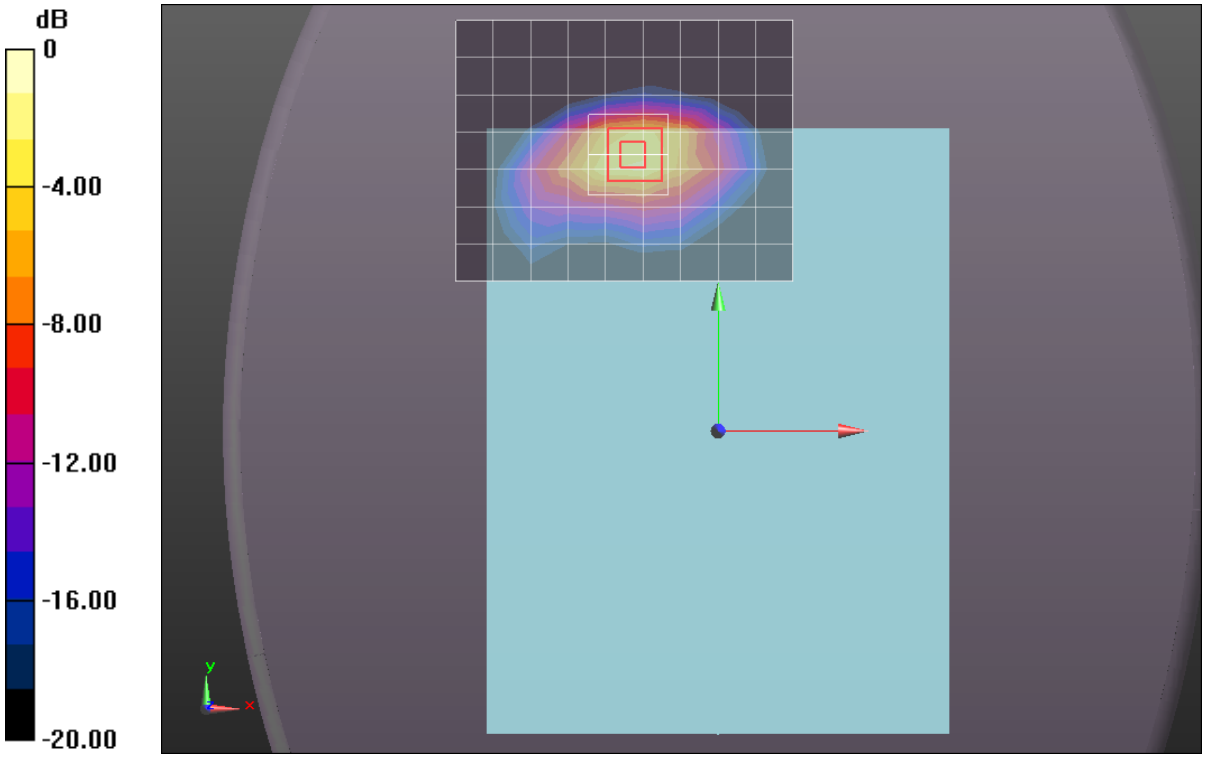
Test Laboratory: Lab A Date: 9/19/2012

GSM1900

Frequency: 1880 MHz; Duty Cycle: 1:4; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: f = 1880 MHz; σ = 1.544 mho/m; ε_r = 52.611; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1263; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3778; ConvF(6.89, 6.89, 6.89); Calibrated: 3/24/2012
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Phantom: Back ELI v5.0; Type: QDOVA002AA; Serial: 1134

Rear/GPRS 2 Slots_ch 661/Area Scan (10x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.007 mW/g

Rear/GPRS 2 Slots_ch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.004 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 2.1820
SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.585 mW/g
Maximum value of SAR (measured) = 1.745 mW/g



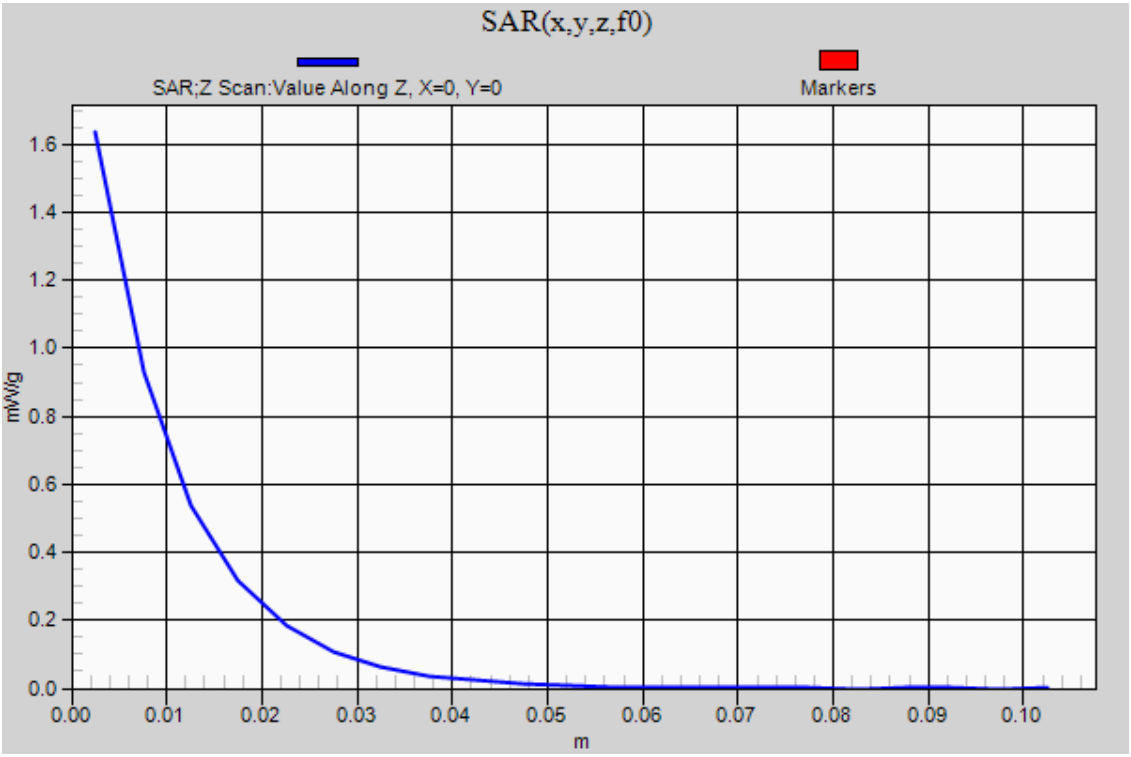
0 dB = 1.750mW/g = 4.86 dB mW/g

Test Laboratory: Lab A Date: 9/19/2012

GSM1900

Frequency: 1880 MHz; Duty Cycle: 1:4

Rear/GPRS 2 Slots_ch 661/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.636 mW/g



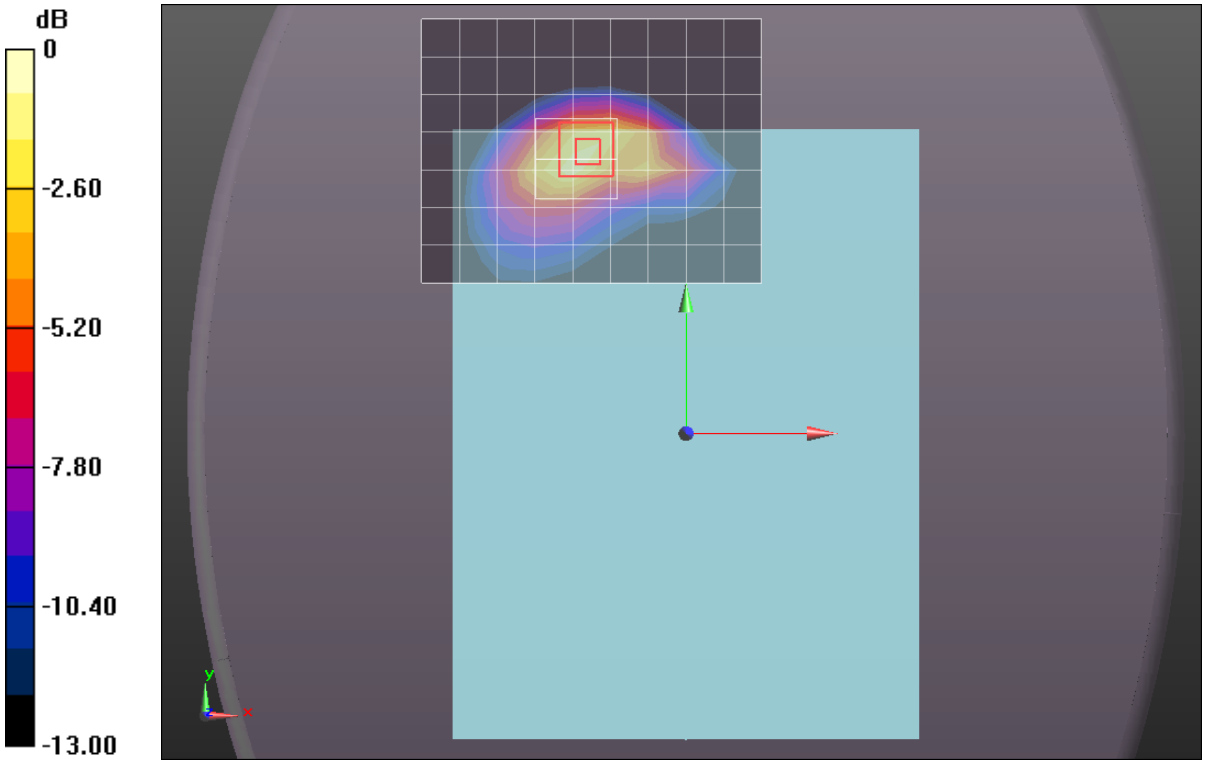
Test Laboratory: Lab C Date: 9/18/2012

W-CDMA Band V

Frequency: 836.6 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 836.6 MHz; σ = 1.015 mho/m; ε_r = 52.696; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1261; Calibrated: 3/9/2012
- Probe: EX3DV4 - SN3757; ConvF(9, 9, 9); Calibrated: 3/24/2012
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Phantom: Back ELI v5.0; Type: QDOVA002AA; Serial: 1136

Rear/Rel.99_RMC 12.2kbps_Ch 4183/Area Scan (10x8x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.275 mW/g

Rear/Rel.99_RMC 12.2kbps_Ch 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 38.885 V/m; Power Drift = 0.0066 dB
Peak SAR (extrapolated) = 2.2260
SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.591 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.610 mW/g



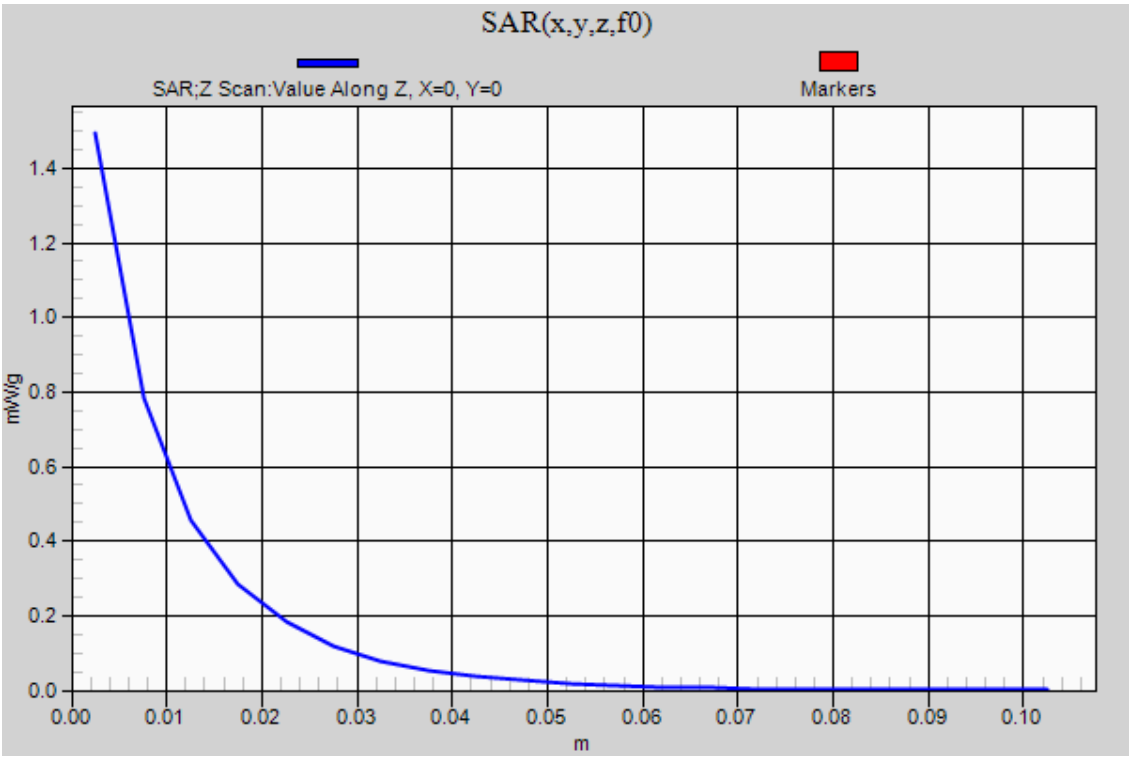
0 dB = 1.610mW/g = 4.14 dB mW/g

Test Laboratory: Lab C Date: 9/18/2012

W-CDMA Band V

Frequency: 836.6 MHz; Duty Cycle: 1:1

Rear/Rel.99_RMC 12.2kbps_Ch 4183/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.494 mW/g



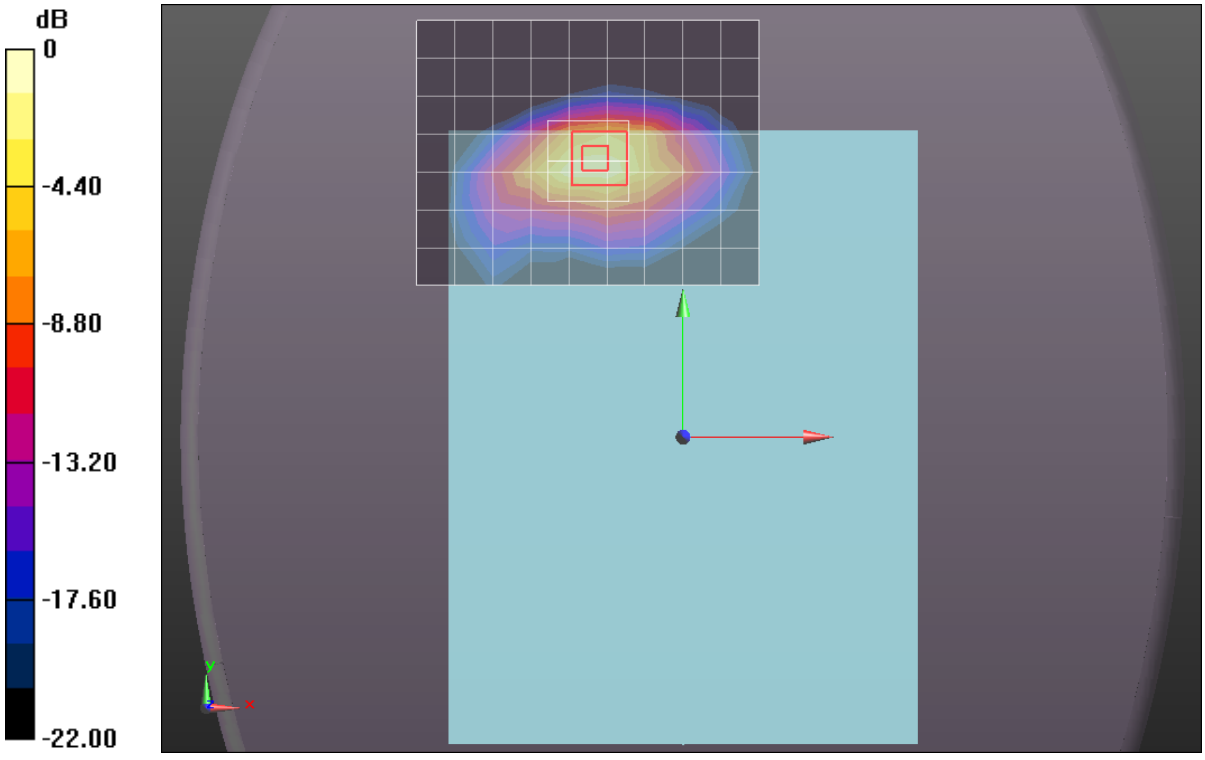
Test Laboratory: Lab A Date: 9/20/2012

W-CDMA Band II

Frequency: 1907.6 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 1907.6 MHz; σ = 1.524 mho/m; ε_r = 52.452; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1263; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3778; ConvF(6.89, 6.89, 6.89); Calibrated: 3/24/2012
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Phantom: Back ELI v5.0; Type: QDOVA002AA; Serial: 1134

Rear/Rel. 99 RMC 12.2kbps_Ch 9538/Area Scan (10x8x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.054 mW/g

Rear/Rel. 99 RMC 12.2kbps_Ch 9538/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.992 V/m; Power Drift = -0.0024 dB
Peak SAR (extrapolated) = 1.9470
SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.514 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.526 mW/g



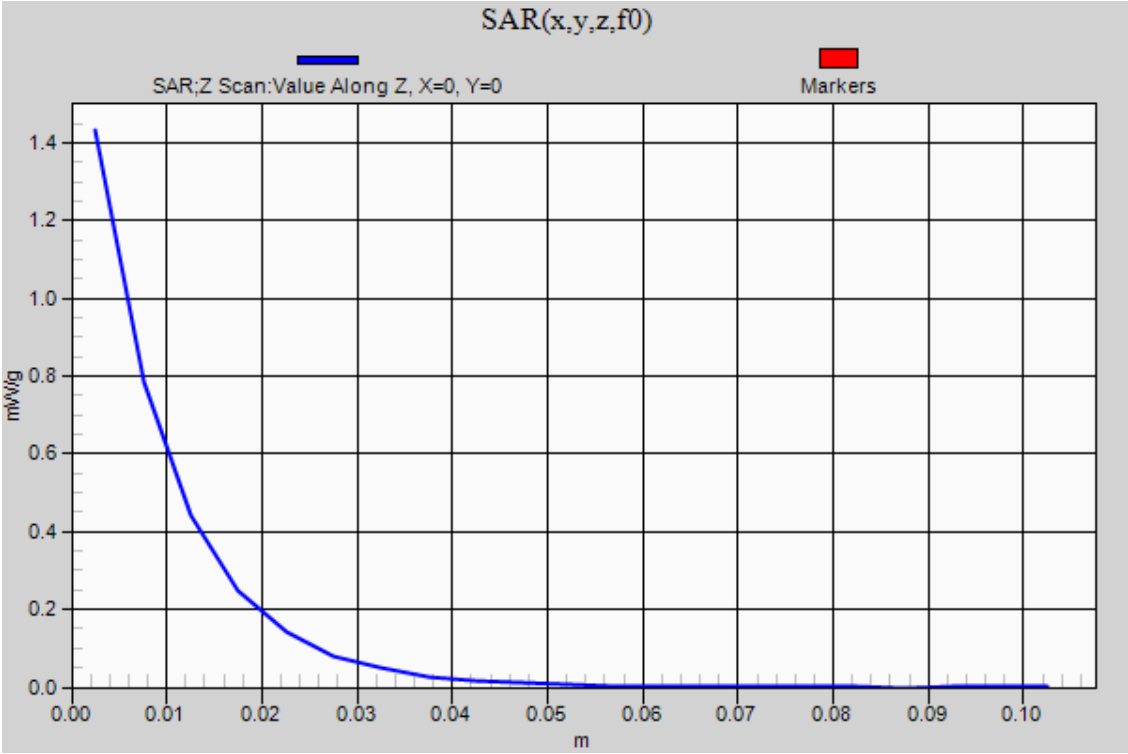
0 dB = 1.530mW/g = 3.69 dB mW/g

Test Laboratory: Lab A Date: 9/20/2012

W-CDMA Band II

Frequency: 1907.6 MHz; Duty Cycle: 1:1

Rear/Rel. 99 RMC 12.2kbps_Ch 9538/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.433 mW/g



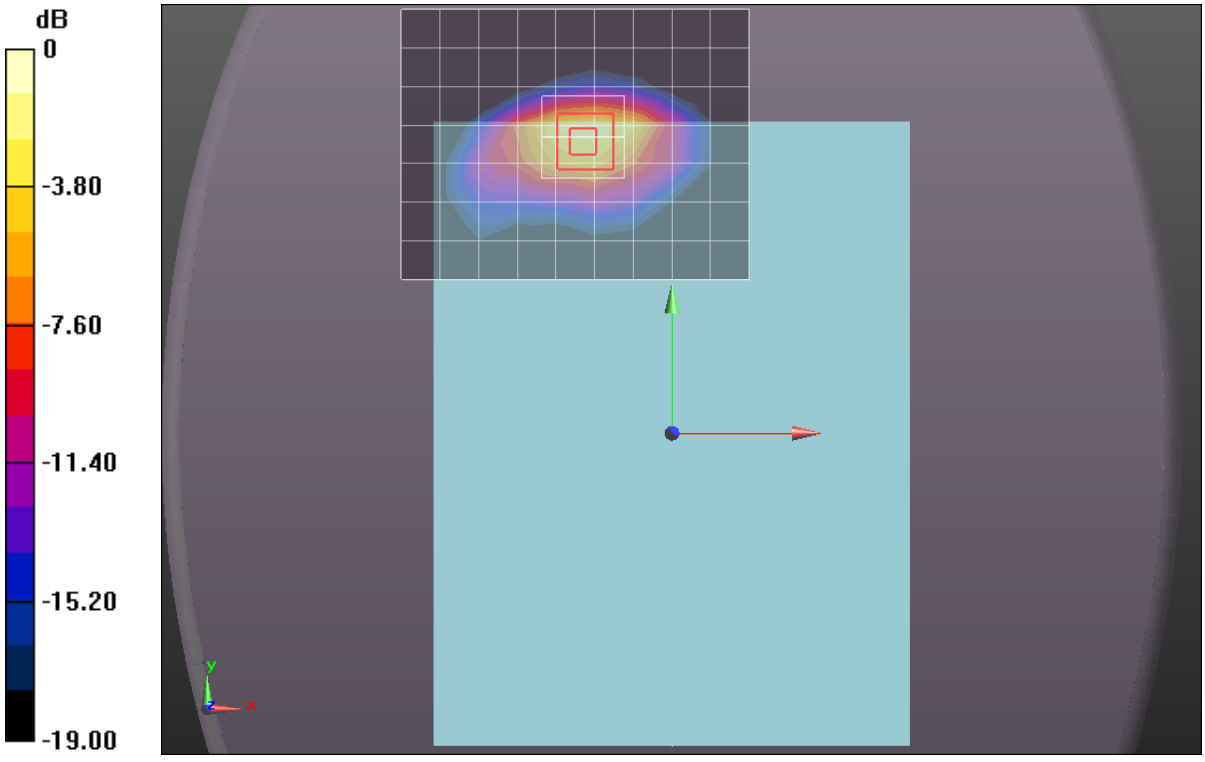
Test Laboratory: Lab D Date: 9/11/2012

LTE Band 2

Frequency: 1880 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: f = 1880 MHz; σ = 1.507 mho/m; ε_r = 51.638; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1278; Calibrated: 3/9/2012
- Probe: EX3DV4 - SN3676; ConvF(7.45, 7.45, 7.45); Calibrated: 3/24/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Phantom: Back ELI v5.0; Type: QDOVA002AA; Serial: 1135

Rear/QPSK_RB#50,0_Ch 18900/Area Scan (10x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.240 mW/g

Rear/QPSK_RB#50,0_Ch 18900/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.850 V/m; Power Drift = -0.49 dB
Peak SAR (extrapolated) = 2.2050
SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.588 mW/g
Maximum value of SAR (measured) = 1.646 mW/g



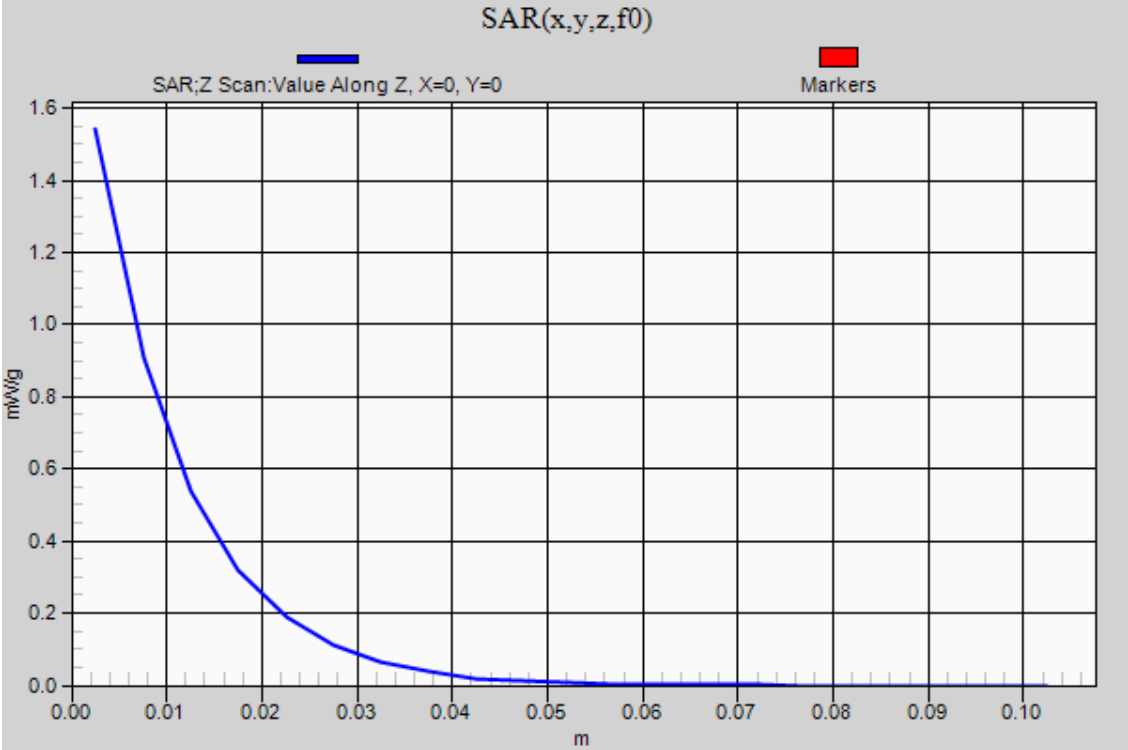
0 dB = 1.650mW/g = 4.35 dB mW/g

Test Laboratory: Lab D Date: 9/11/2012

LTE Band 2

Frequency: 1880 MHz; Duty Cycle: 1:1

Rear/QPSK_RB#50,0_Ch 18900/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.543 mW/g



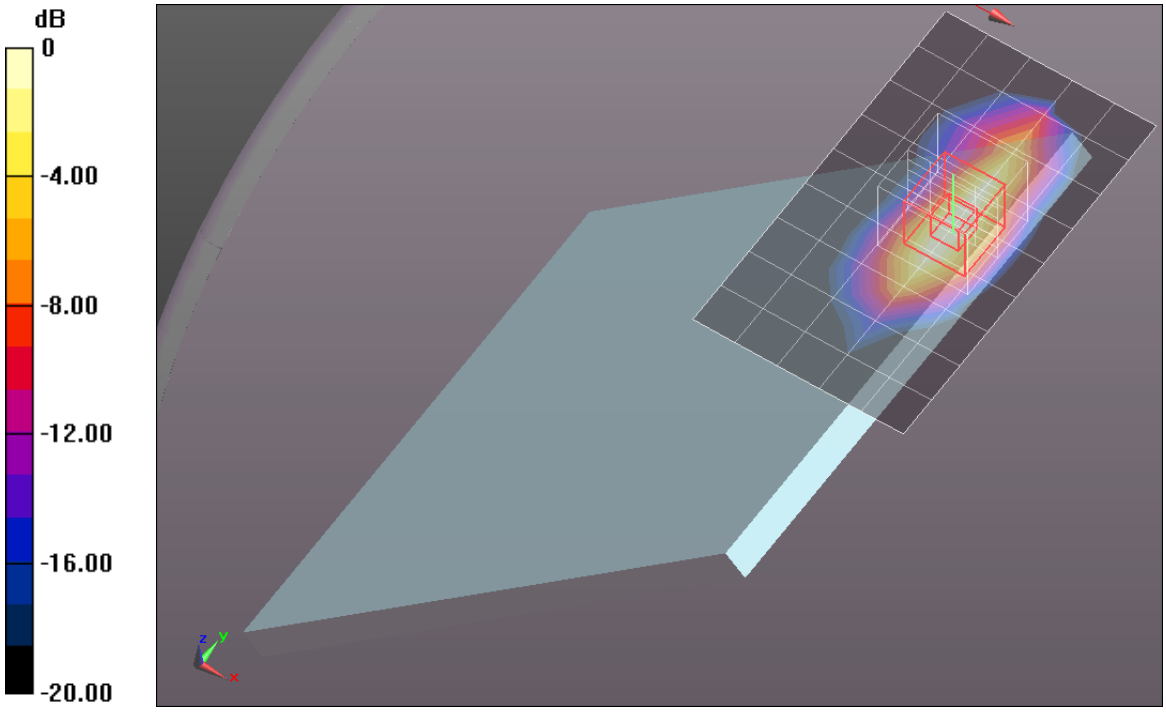
Test Laboratory: Lab D Date: 9/18/2012

LTE Band 4

Frequency: 1720 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: f = 1720 MHz; σ = 1.465 mho/m; ε_r = 52.087; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1278; Calibrated: 3/9/2012
- Probe: EX3DV4 - SN3676; ConvF(7.8, 7.8, 7.8); Calibrated: 3/24/2012
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Phantom: Back ELI v5.0; Type: QDOVA002AA; Serial: 1135

41 deg Tilt @ Edge 1/QPSK_RB#1,0_Ch 20050/Area Scan (6x10x1): Measurement grid:
dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.235 mW/g

41 deg Tilt @ Edge 1/QPSK_RB#1,0_Ch 20050/Zoom Scan (5x5x7)/Cube 0: Measurement grid:
dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.880 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 2.0560
SAR(1 g) = 1.07 mW/g; SAR(10 g) = 0.509 mW/g
Maximum value of SAR (measured) = 1.629 mW/g



0 dB = 1.630mW/g = 4.24 dB mW/g

Test Laboratory: Lab B Date: 9/21/2012

LTE Band 5

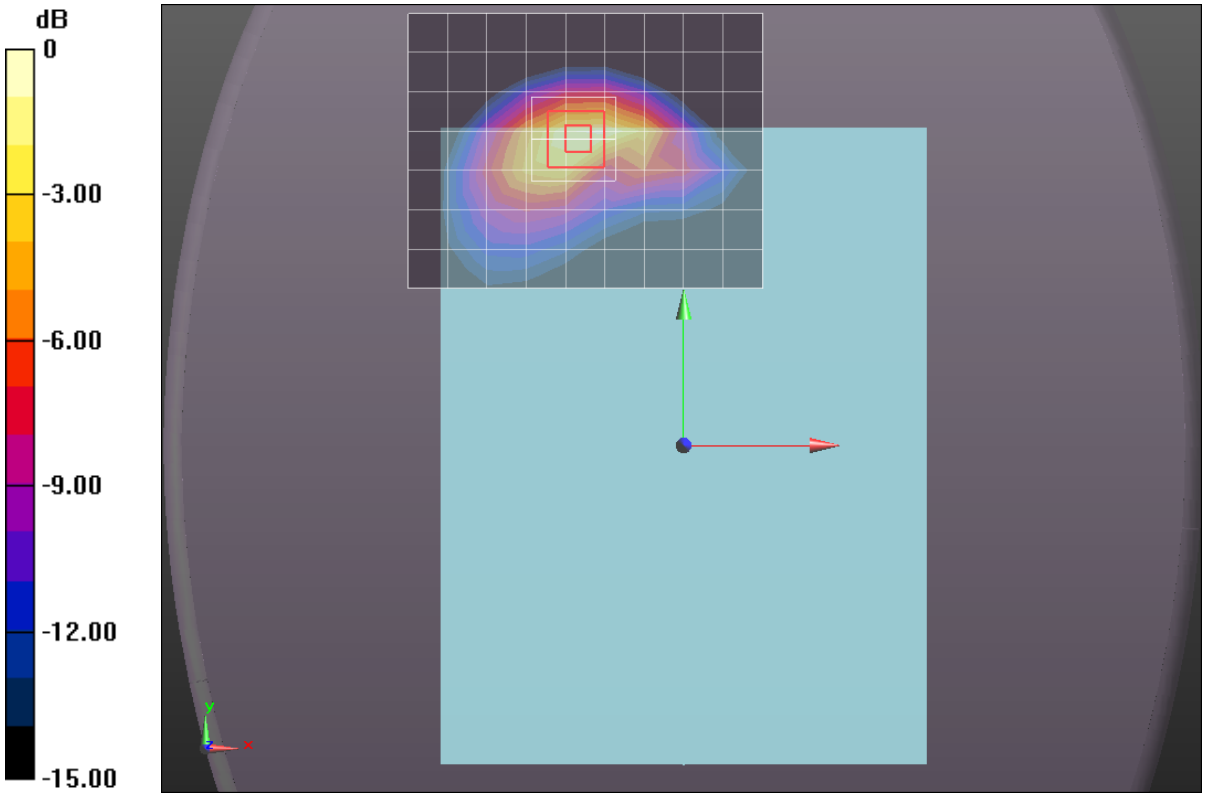
Frequency: 836.5 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 836.5 MHz; σ = 1.014 mho/m; ε_r = 52.949; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1264; Calibrated: 3/5/2012
- Probe: EX3DV4 - SN3720; ConvF(8.45, 8.45, 8.45); Calibrated: 3/24/2012
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Phantom: Back ELI v5.0; Type: QDOVA002AA; Serial: 1137

Rear/QPSK_RB#25,12_Ch 20525/Area Scan (10x8x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.415 mW/g

Rear/QPSK_RB#25,12_Ch 20525/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 40.229 V/m; Power Drift = -0.00059 dB
Peak SAR (extrapolated) = 2.2480
SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.600 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.712 mW/g



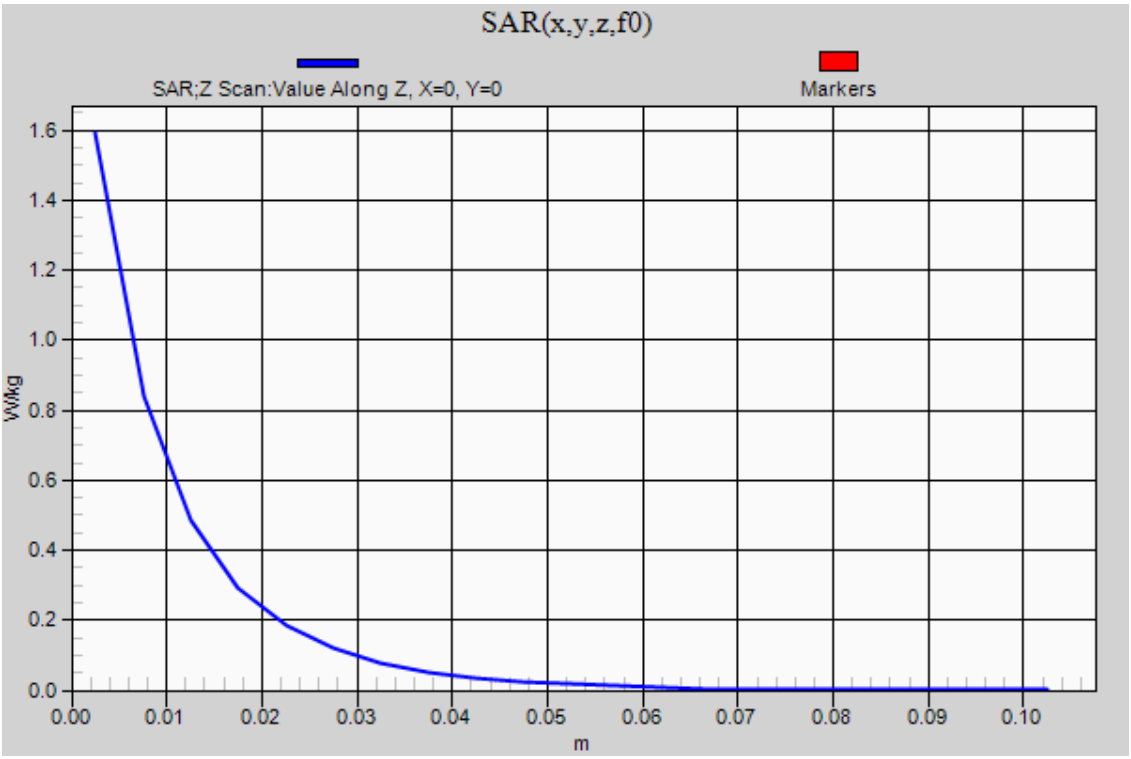
0 dB = 1.710mW/g = 4.66 dB mW/g

Test Laboratory: Lab B Date: 9/21/2012

LTE Band 5

Frequency: 836.5 MHz; Duty Cycle: 1:1

Rear/QPSK_RB#25,12_Ch 20525/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.59 W/kg



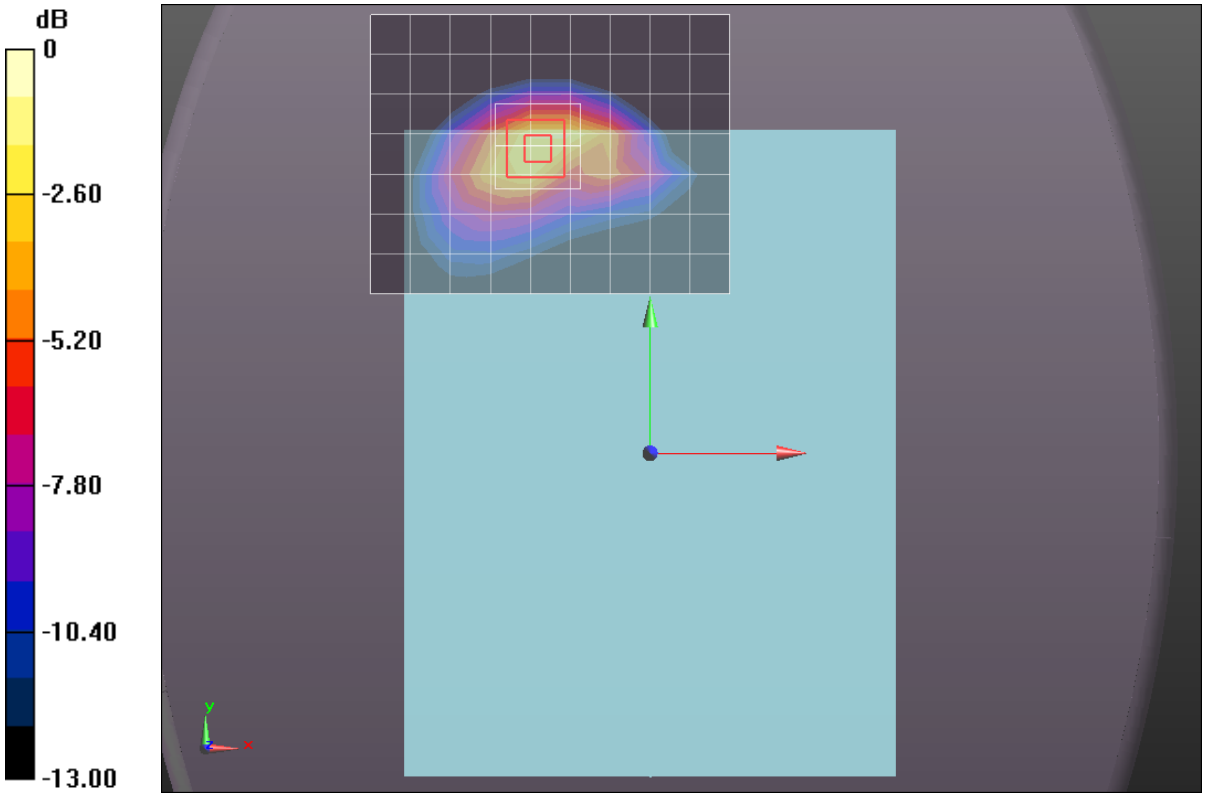
Test Laboratory: Lab B Date: 9/18/2012

LTE Band 17

Frequency: 711 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 711 MHz; σ = 0.932 mho/m; ε_r = 53.515; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1264; Calibrated: 3/5/2012
- Probe: EX3DV4 - SN3720; ConvF(8.64, 8.64, 8.64); Calibrated: 3/24/2012
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Phantom: Back ELI v5.0; Type: QDOVA002AA; Serial: 1137

Rear/QPSK_RB#25,12_Ch 23800/Area Scan (10x8x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.252 mW/g

Rear/QPSK_RB#25,12_Ch 23800/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 43.042 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 2.5160
SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.620 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.842 mW/g



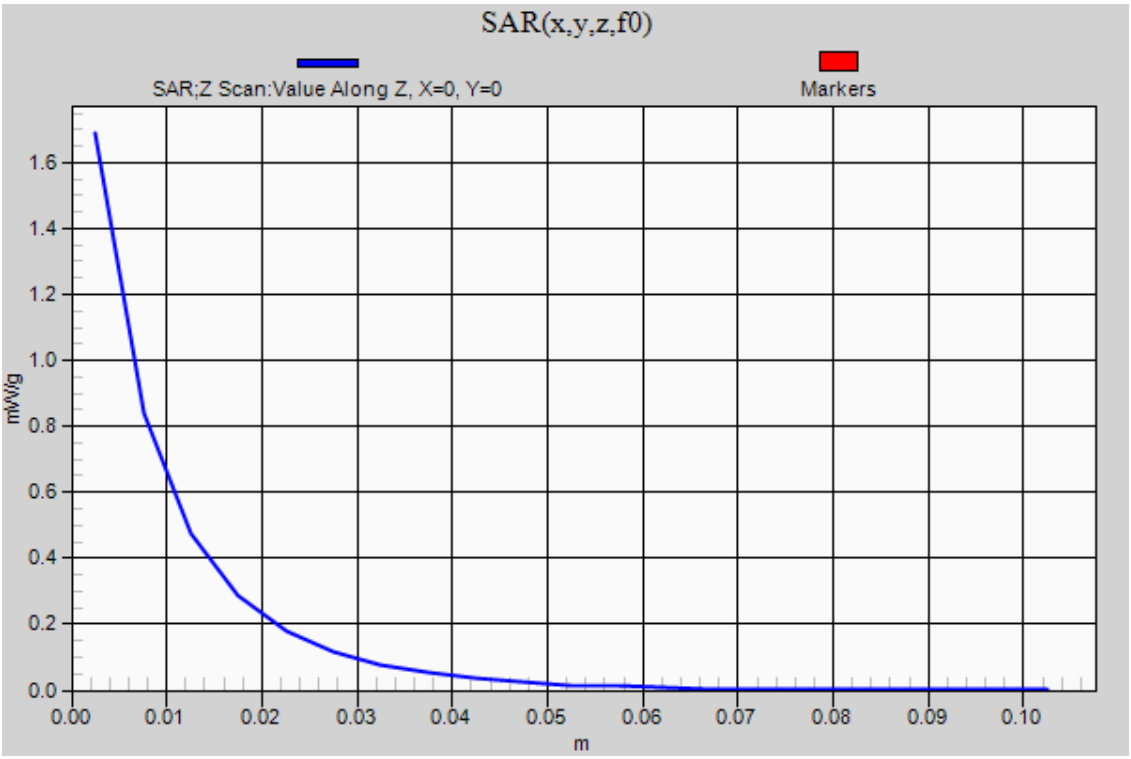
0 dB = 1.840mW/g = 5.30 dB mW/g

Test Laboratory: Lab B Date: 9/18/2012

LTE Band 17

Frequency: 711 MHz; Duty Cycle: 1:1

Rear/QPSK_RB#25,12_Ch 23800/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.689 mW/g



Test Laboratory: Lab C Date: 7/31/2012

WiFi 2.4 GHz

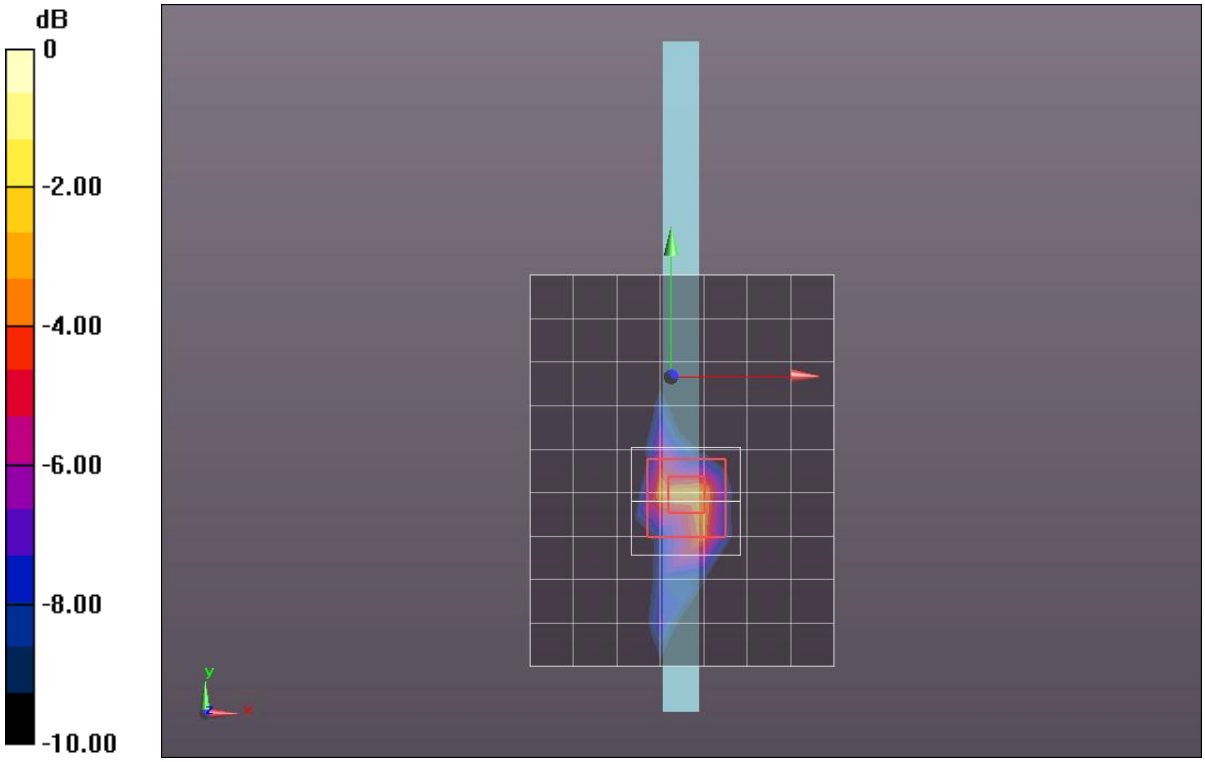
Frequency: 2437 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.913 mho/m; ε_r = 50.809; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1261; Calibrated: 3/9/2012
- Probe: EX3DV4 - SN3757; ConvF(6.85, 6.85, 6.85); Calibrated: 3/24/2012
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Phantom: Back ELI v5.0; Type: QDOVA002AA; Serial: 1136

Edge 3/802.11b_ch 6/Area Scan (8x10x1): Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.199 mW/g

Edge 3/802.11b_ch 6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 31.114 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.2550
SAR(1 g) = 1.1 mW/g; SAR(10 g) = 0.383 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.041 mW/g



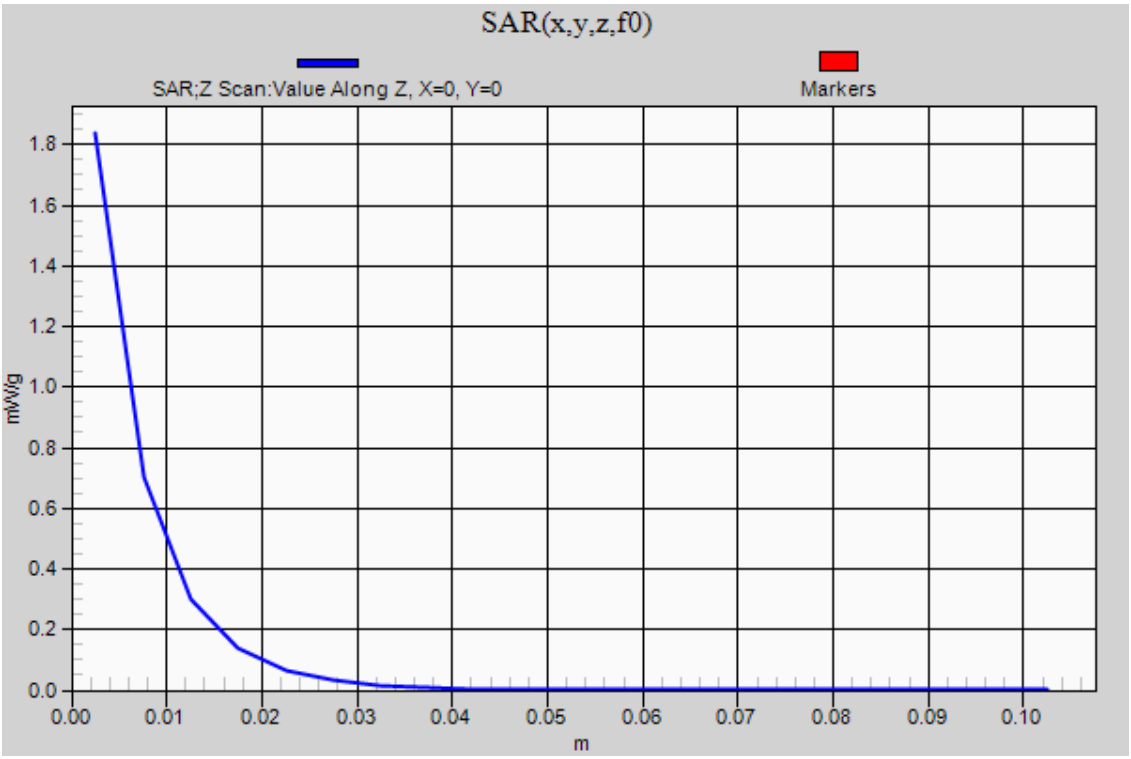
0 dB = 2.040mW/g = 6.19 dB mW/g

Test Laboratory: Lab C Date: 7/31/2012

WiFi 2.4 GHz

Frequency: 2437 MHz; Duty Cycle: 1:1

Edge 3/802.11b_ch 6/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.837 mW/g



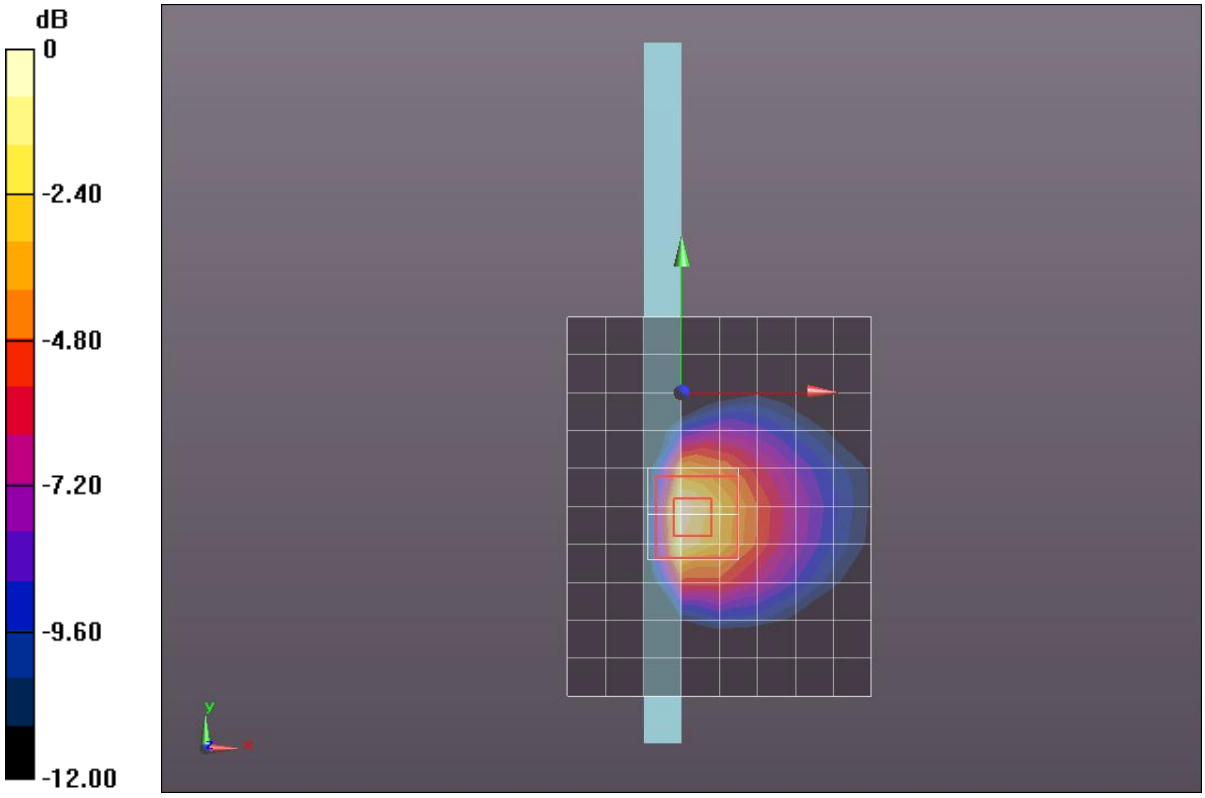
Test Laboratory: Lab B Date: 9/13/2012

WiFi 5.2 GHz

Frequency: 5230 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: f = 5230 MHz; σ = 5.354 mho/m; ε_r = 49.013; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1264; Calibrated: 3/5/2012
- Probe: EX3DV4 - SN3720; ConvF(4.09, 4.09, 4.09); Calibrated: 3/24/2012
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Phantom: Back ELI v5.0; Type: QDOVA002AA; Serial: 1137

Edge 3/802.11n HT40_Ch 46/Area Scan (9x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.077 mW/g

Edge 3/802.11n HT40_Ch 46/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 14.327 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 2.1580
SAR(1 g) = 0.582 mW/g; SAR(10 g) = 0.199 mW/g
Maximum value of SAR (measured) = 1.109 mW/g



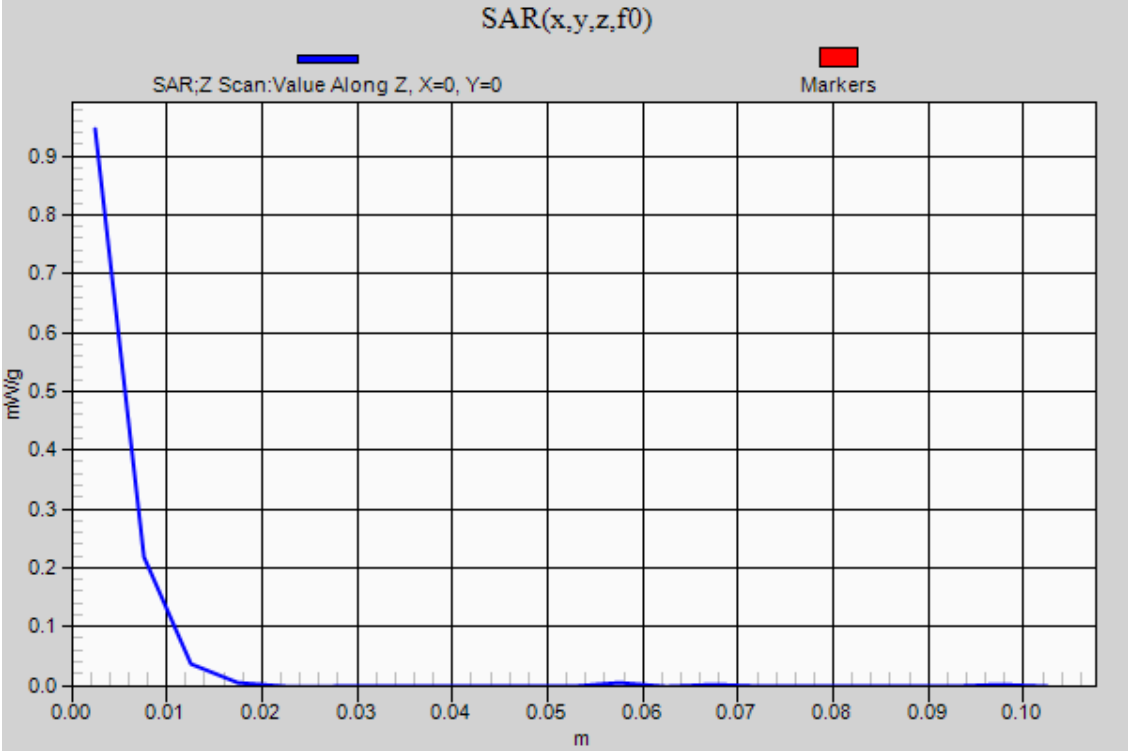
0 dB = 1.110mW/g = 0.91 dB mW/g

Test Laboratory: Lab B Date: 9/13/2012

WiFi 5.2 GHz

Frequency: 5230 MHz; Duty Cycle: 1:1

Edge 3/802.11n HT40_Ch 46/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.946 mW/g



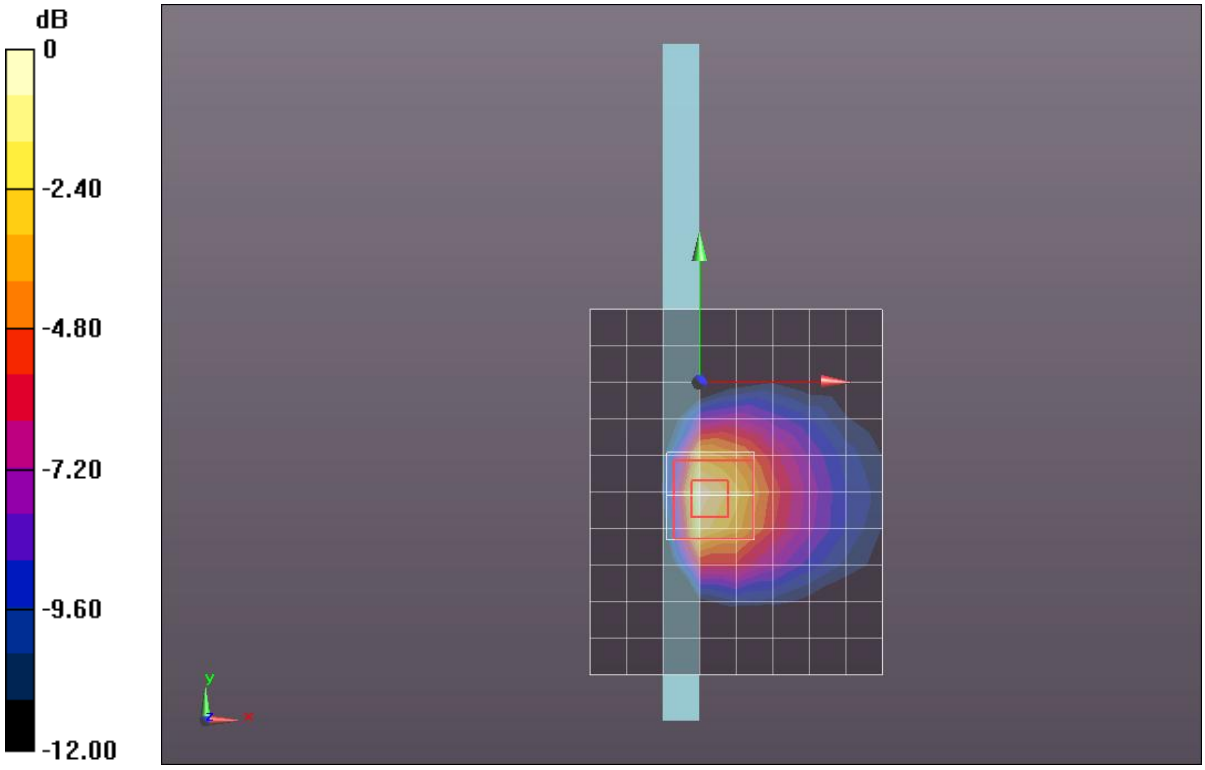
Test Laboratory: Lab B Date: 8/10/2012

WiFi 5.3 GHz

Frequency: 5260 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: f = 5260 MHz; σ = 5.186 mho/m; ε_r = 48.299; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1264; Calibrated: 3/5/2012
- Probe: EX3DV4 - SN3751; ConvF(3.86, 3.86, 3.86); Calibrated: 12/19/2011
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Phantom: Back ELI v5.0; Type: QDOVA002AA; Serial: 1137

Edge 3/802.11a_Ch 52/Area Scan (9x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.578 mW/g

Edge 3/802.11a_Ch 52/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 17.835 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 3.2560
SAR(1 g) = 0.891 mW/g; SAR(10 g) = 0.307 mW/g
Maximum value of SAR (measured) = 1.664 mW/g



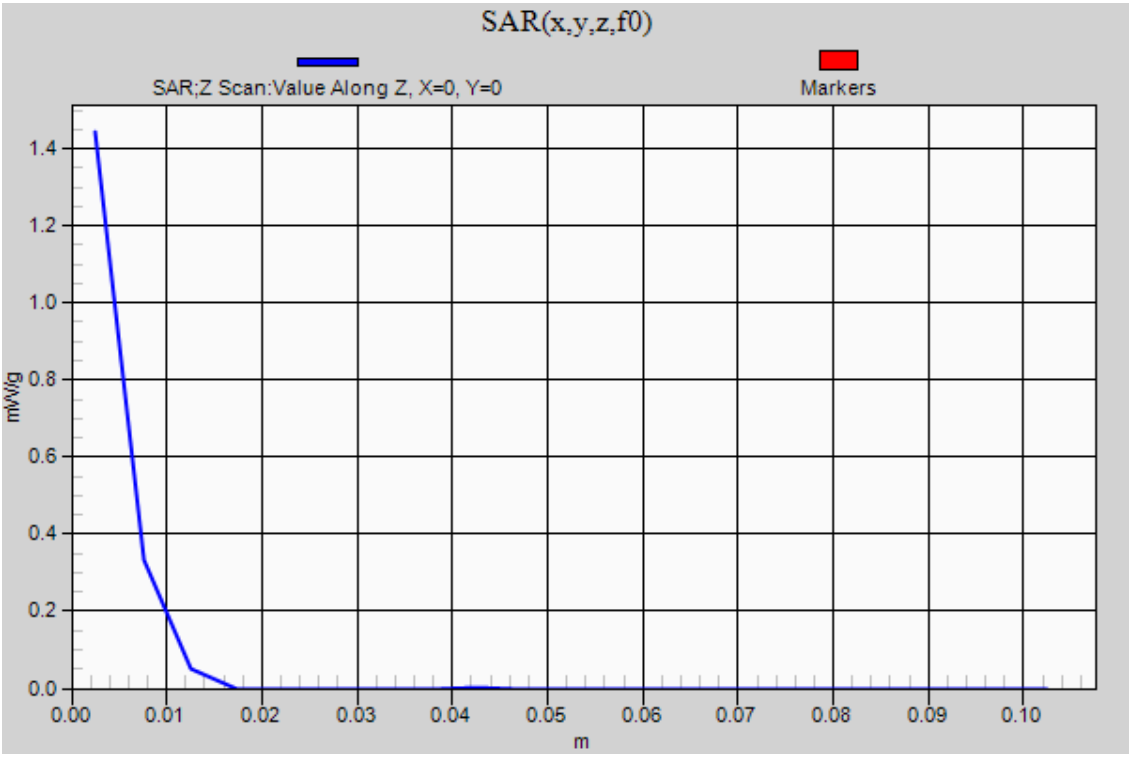
0 dB = 1.660mW/g = 4.40 dB mW/g

Test Laboratory: Lab B Date: 8/10/2012

WiFi 5.3 GHz

Frequency: 5260 MHz; Duty Cycle: 1:1

Edge 3/802.11a_Ch 52/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.443 mW/g



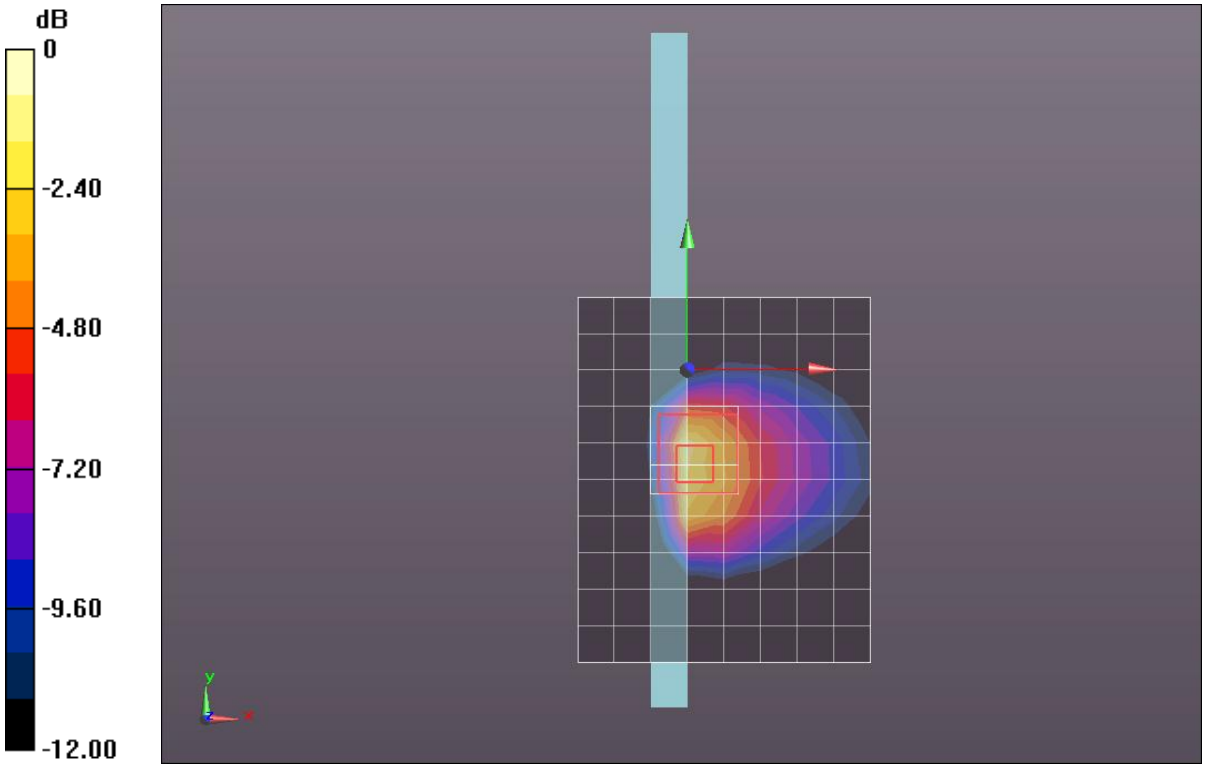
Test Laboratory: Lab B Date: 8/13/2012

WiFi 5.5 GHz

Frequency: 5680 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: f = 5680 MHz; σ = 5.826 mho/m; ε_r = 47.614; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1264; Calibrated: 3/5/2012
- Probe: EX3DV4 - SN3751; ConvF(3.29, 3.29, 3.29); Calibrated: 12/19/2011
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Phantom: Back ELI v5.0; Type: QDOVA002AA; Serial: 1137

Edge 3/802.11a_Ch 136/Area Scan (9x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.617 mW/g

Edge 3/802.11a_Ch 136/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 18.862 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 4.2590
SAR(1 g) = 1.11 mW/g; SAR(10 g) = 0.382 mW/g
Maximum value of SAR (measured) = 2.128 mW/g



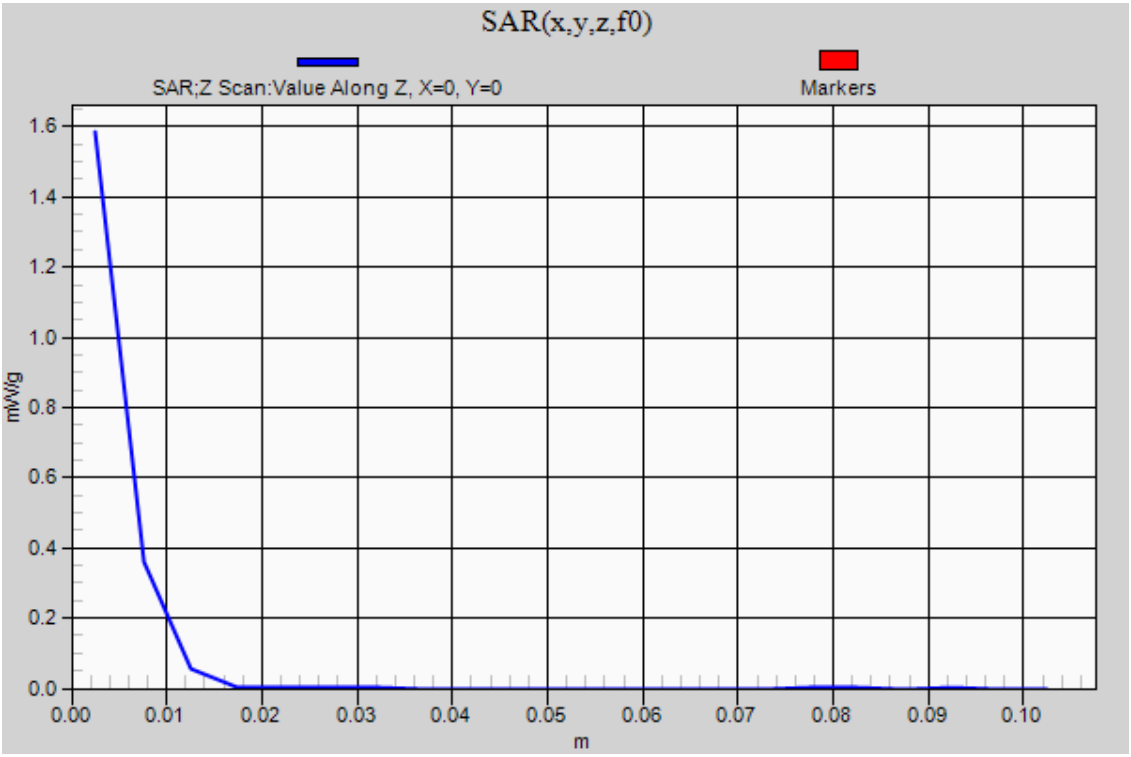
0 dB = 2.130mW/g = 6.57 dB mW/g

Test Laboratory: Lab B Date: 8/13/2012

WiFi 5.5 GHz

Frequency: 5680 MHz; Duty Cycle: 1:1

Edge 3/802.11a_Ch 136/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.584 mW/g



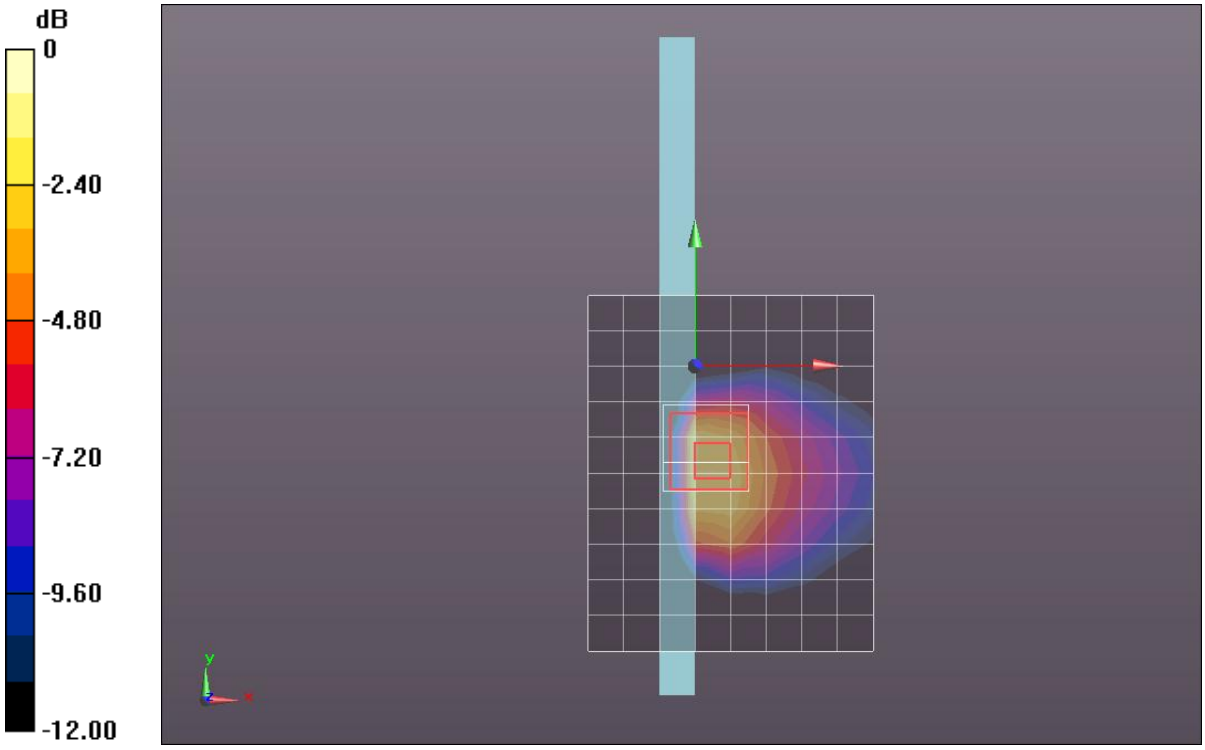
Test Laboratory: Lab A Date: 8/2/2012

WiFi 5.8 GHz

Frequency: 5745 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: f = 5745 MHz; σ = 5.942 mho/m; ε_r = 48.157; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1263; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3778; ConvF(3.71, 3.71, 3.71); Calibrated: 3/24/2012
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Phantom: Back ELI v5.0; Type: QDOVA002AA; Serial: 1134

Edge 3/802.11a_Ch 149/Area Scan (9x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.398 mW/g

Edge 3/802.11a_Ch 149/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 18.031 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 3.7250
SAR(1 g) = 0.975 mW/g; SAR(10 g) = 0.304 mW/g
Maximum value of SAR (measured) = 1.956 mW/g



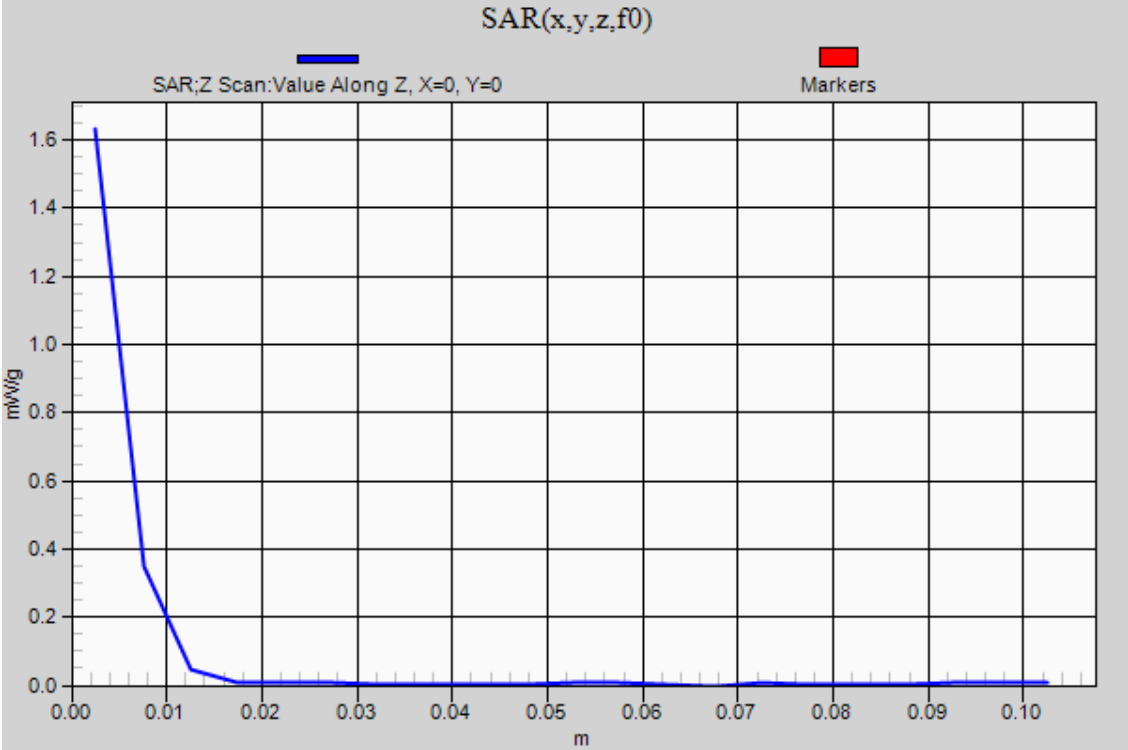
0 dB = 1.960mW/g = 5.85 dB mW/g

Test Laboratory: Lab A Date: 8/2/2012

WiFi 5.8 GHz

Frequency: 5745 MHz; Duty Cycle: 1:1

Edge 3/802.11a_Ch 149/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.632 mW/g



Test Laboratory: Lab C Date: 9/26/2012

Bluetooth

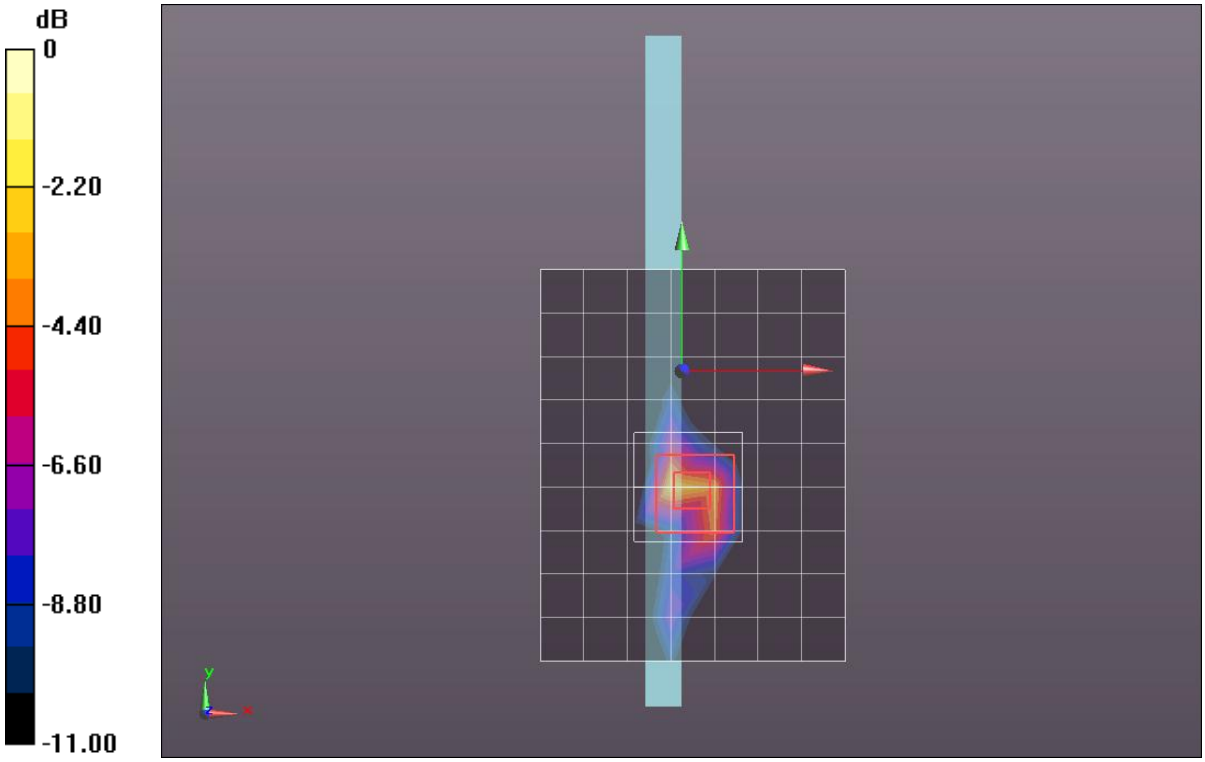
Frequency: 2441 MHz; Duty Cycle: 1:1.24165; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 2441 MHz; σ = 1.937 mho/m; ε_r = 52.348; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1261; Calibrated: 3/9/2012
- Probe: EX3DV4 - SN3757; ConvF(6.85, 6.85, 6.85); Calibrated: 3/24/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: Back ELI v5.0; Type: QDOVA002AA; Serial: 1136

Edge 3/802.11b_ch 39/Area Scan (8x10x1): Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.449 mW/g

Edge 3/802.11b_ch 39/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.151 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.2200
SAR(1 g) = 0.407 mW/g; SAR(10 g) = 0.140 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.706 mW/g



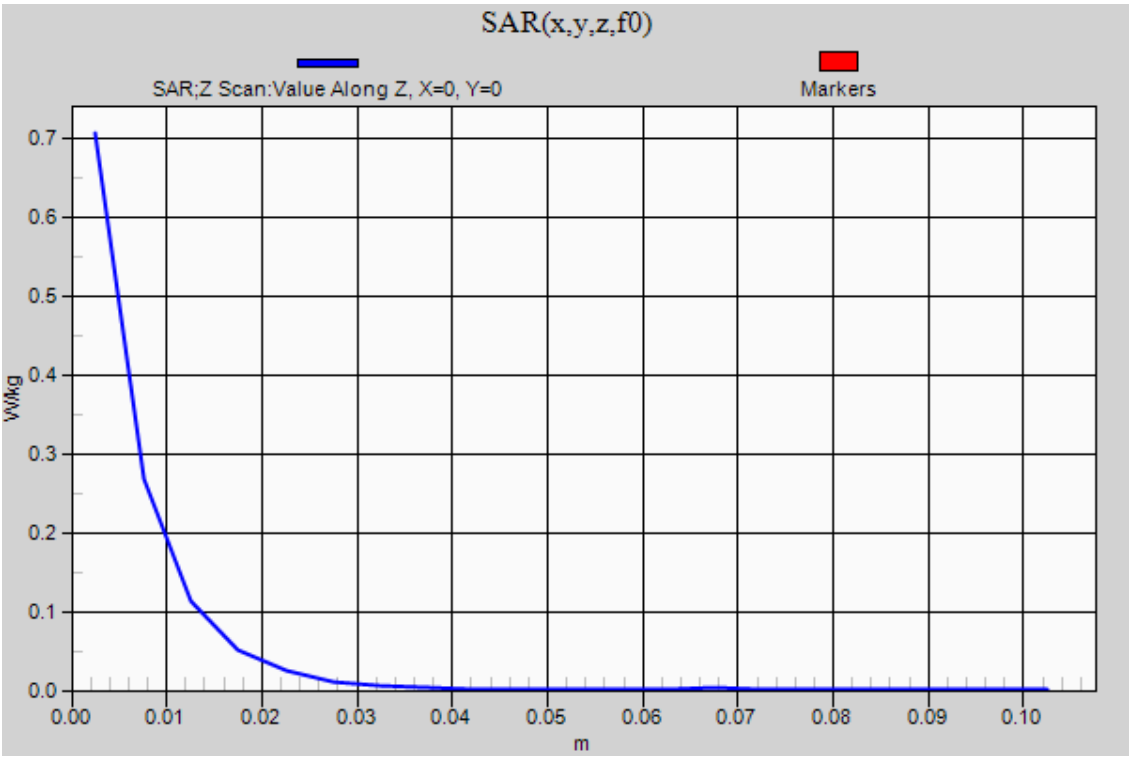
0 dB = 0.710mW/g = -2.97 dB mW/g

Test Laboratory: Lab C Date: 9/26/2012

Bluetooth

Frequency: 2441 MHz; Duty Cycle: 1:1.24165

Edge 3/802.11b_ch 39/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.707 W/kg



15. Simultaneous Transmission SAR Analysis

15.1. Sum of the SAR for GSM, W-CDMA, LTE and WiFi 2.4 GHz

Sum of the SAR with Measured Values

Test Position	Data									Σ 1-g SAR (mW/g)
	GSM 850	GSM 1900	W-CDMA Band V	W-CDMA Band II	LTE Band 2	LTE Band 4	LTE Band 5	LTE Band 17	WiFi 2.4 GHz	
Rear	1.160								0.080	1.240
		1.190							0.080	1.270
			1.130						0.080	1.210
				1.050					0.080	1.130
					1.190				0.080	1.270
						0.785			0.080	0.865
							1.150		0.080	1.230
								1.190	0.080	1.270
Edge 1	0.758								0	0.758
		0.628							0	0.628
			0.812						0	0.812
				0.502					0	0.502
					0.816				0	0.816
						0.693			0	0.693
							0.718		0	0.718
								0.731	0	0.731
Edge 2	0.371								0.051	0.422
		0.600							0.051	0.651
			0.340						0.051	0.391
				0.608					0.051	0.659
					0.644				0.051	0.695
						0.673			0.051	0.724
							0.302		0.051	0.353
								0.267	0.051	0.318
Edge 3	0								1.100	1.100
		0							1.100	1.100
			0						1.100	1.100
				0					1.100	1.100
					0				1.100	1.100
						0			1.100	1.100
							0		1.100	1.100
								0	1.100	1.100
Edge 4	0								0	0
		0							0	0
			0						0	0
				0					0	0
					0				0	0
						0			0	0
							0		0	0
								0	0	0

Sum of the SAR with Scaled Values for the Worst-case Configuration

As the SAR for these configurations were measured at the maximum of tune-up tolerance limit, SAR scaling does not need to be applied.

SAR to Peak Location Separation Ratio (SPLSR)

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

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the either sum of the 1-g SAR is < 1.6 W/kg or the SPLSR is < 0.3 for all circumstances that require SPLSR calculation.

15.2. Sum of the SAR for GSM, W-CDMA, LTE and Bluetooth

Sum of the SAR with Measured Values

Test Position	Data									∑ 1-g SAR (mW/g)
	GSM 850	GSM 1900	W-CDMA Band V	W-CDMA Band II	LTE Band 2	LTE Band 4	LTE Band 5	LTE Band 17	Bluetooth	
Rear	1.160								0.028	1.188
		1.190							0.028	1.218
			1.130						0.028	1.158
				1.050					0.028	1.078
					1.190				0.028	1.218
						0.785			0.028	0.813
							1.150		0.028	1.178
								1.190	0.028	1.218
Edge 1	0.758								0	0.758
		0.628							0	0.628
			0.812						0	0.812
				0.502					0	0.502
					0.816				0	0.816
						0.693			0	0.693
							0.718		0	0.718
								0.731	0	0.731
Edge 2	0.371								0.014	0.385
		0.600							0.014	0.614
			0.340						0.014	0.354
				0.608					0.014	0.622
					0.644				0.014	0.658
						0.673			0.014	0.687
							0.302		0.014	0.316
								0.267	0.014	0.281
Edge 3	0								0.407	0.407
		0							0.407	0.407
			0						0.407	0.407
				0					0.407	0.407
					0				0.407	0.407
						0			0.407	0.407
							0		0.407	0.407
								0	0.407	0.407
Edge 4	0								0	0
		0							0	0
			0						0	0
				0					0	0
					0				0	0
						0			0	0
							0		0	0
								0	0	0

Sum of the SAR with Scaled Values for the Worst-case Configuration

As the SAR for these configurations were measured at the maximum of tune-up tolerance limit, SAR scaling does not need to be applied.

SAR to Peak Location Separation Ratio (SPLSR)

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

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the either sum of the 1-g SAR is < 1.6 W/kg or the SPLSR is < 0.3 for all circumstances that require SPLSR calculation.

15.3. Sum of the SAR for GSM, W-CDMA, LTE, WiFi 5.2 GHz

Sum of the SAR with Measured Values

Test Position	Data									∑ 1-g SAR (mW/g)
	GSM 850	GSM 1900	W-CDMA Band V	W-CDMA Band II	LTE Band 2	LTE Band 4	LTE Band 5	LTE Band 17	WiFi 5.2 GHz	
Rear	1.160								0.039	1.199
		1.190							0.039	1.229
			1.130						0.039	1.169
				1.050					0.039	1.089
					1.190				0.039	1.229
						0.785			0.039	0.824
							1.150		0.039	1.189
								1.190	0.039	1.229
Edge 1	0.758								0	0.758
		0.628							0	0.628
			0.812						0	0.812
				0.502					0	0.502
					0.816				0	0.816
						0.693			0	0.693
							0.718		0	0.718
								0.731	0	0.731
Edge 2	0.371								0	0.371
		0.600							0	0.600
			0.340						0	0.340
				0.608					0	0.608
					0.644				0	0.644
						0.673			0	0.673
							0.302		0	0.302
								0.267	0	0.267
Edge 3	0								0.582	0.582
		0							0.582	0.582
			0						0.582	0.582
				0					0.582	0.582
					0				0.582	0.582
						0			0.582	0.582
							0		0.582	0.582
								0	0.582	0.582
Edge 4	0								0	0
		0							0	0
			0						0	0
				0					0	0
					0				0	0
						0			0	0
							0		0	0
								0	0	0

Sum of the SAR with Scaled Values for the Worst-case Configuration

As the SAR for these configurations were measured at the maximum of tune-up tolerance limit, SAR scaling does not need to be applied.

SAR to Peak Location Separation Ratio (SPLSR)

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

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the either sum of the 1-g SAR is < 1.6 W/kg or the SPLSR is < 0.3 for all circumstances that require SPLSR calculation.

15.4. Sum of the SAR for GSM, W-CDMA, LTE, WiFi 5.3 GHz

Sum of the SAR with Measured Values

Test Position	Data									∑ 1-g SAR (mW/g)
	GSM 850	GSM 1900	W-CDMA Band V	W-CDMA Band II	LTE Band 2	LTE Band 4	LTE Band 5	LTE Band 17	WiFi 5.3 GHz	
Rear	1.160								0.039	1.199
		1.190							0.039	1.229
			1.130						0.039	1.169
				1.050					0.039	1.089
					1.190				0.039	1.229
						0.785			0.039	0.824
							1.150		0.039	1.189
								1.190	0.039	1.229
Edge 1	0.758								0	0.758
		0.628							0	0.628
			0.812						0	0.812
				0.502					0	0.502
					0.816				0	0.816
						0.693			0	0.693
							0.718		0	0.718
								0.731	0	0.731
Edge 2	0.371								0.0079	0.379
		0.600							0.0079	0.608
			0.340						0.0079	0.348
				0.608					0.0079	0.616
					0.644				0.0079	0.652
						0.673			0.0079	0.681
							0.302		0.0079	0.310
								0.267	0.0079	0.275
Edge 3	0								0.891	0.891
		0							0.891	0.891
			0						0.891	0.891
				0					0.891	0.891
					0				0.891	0.891
						0			0.891	0.891
							0		0.891	0.891
								0	0.891	0.891
Edge 4	0								0	0
		0							0	0
			0						0	0
				0					0	0
					0				0	0
						0			0	0
							0		0	0
								0	0	0

Sum of the SAR with Scaled Values for the Worst-case Configuration

As the SAR for these configurations were measured at the maximum of tune-up tolerance limit, SAR scaling does not need to be applied.

SAR to Peak Location Separation Ratio (SPLSR)

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

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the either sum of the 1-g SAR is < 1.6 W/kg or the SPLSR is < 0.3 for all circumstances that require SPLSR calculation.

15.5. Sum of the SAR for GSM, W-CDMA, LTE, WiFi 5.5 GHz

Sum of the SAR with Measured Values

Test Position	Data									∑ 1-g SAR (mW/g)
	GSM 850	GSM 1900	W-CDMA Band V	W-CDMA Band II	LTE Band 2	LTE Band 4	LTE Band 5	LTE Band 17	WiFi 5.5 GHz	
Rear	1.160								0.069	1.229
		1.190							0.069	1.259
			1.130						0.069	1.199
				1.050					0.069	1.119
					1.190				0.069	1.259
						0.785			0.069	0.854
							1.150		0.069	1.219
								1.190	0.069	1.259
Edge 1	0.758								0	0.758
		0.628							0	0.628
			0.812						0	0.812
				0.502					0	0.502
					0.816				0	0.816
						0.693			0	0.693
							0.718		0	0.718
								0.731	0	0.731
Edge 2	0.371								0.00597	0.377
		0.600							0.00597	0.606
			0.340						0.00597	0.346
				0.608					0.00597	0.614
					0.644				0.00597	0.650
						0.673			0.00597	0.679
							0.302		0.00597	0.308
								0.267	0.00597	0.273
Edge 3	0								1.110	1.110
		0							1.110	1.110
			0						1.110	1.110
				0					1.110	1.110
					0				1.110	1.110
						0			1.110	1.110
							0		1.110	1.110
								0	1.110	1.110
Edge 4	0								0	0
		0							0	0
			0						0	0
				0					0	0
					0				0	0
						0			0	0
							0		0	0
								0	0	0

Sum of the SAR with Scaled Values for the Worst-case Configuration

As the SAR for these configurations were measured at the maximum of tune-up tolerance limit, SAR scaling does not need to be applied.

SAR to Peak Location Separation Ratio (SPLSR)

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

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the either sum of the 1-g SAR is < 1.6 W/kg or the SPLSR is < 0.3 for all circumstances that require SPLSR calculation.

15.6. Sum of the SAR for GSM, W-CDMA, LTE, WiFi 5.8 GHz

Sum of the SAR with Measured Values

Test Position	Data									∑ 1-g SAR (mW/g)
	GSM 850	GSM 1900	W-CDMA Band V	W-CDMA Band II	LTE Band 2	LTE Band 4	LTE Band 5	LTE Band 17	WiFi 5.8 GHz	
Rear	1.160								0.064	1.224
		1.190							0.064	1.254
			1.130						0.064	1.194
				1.050					0.064	1.114
					1.190				0.064	1.254
						0.785			0.064	0.849
							1.150		0.064	1.214
								1.190	0.064	1.254
Edge 1	0.758								0	0.758
		0.628							0	0.628
			0.812						0	0.812
				0.502					0	0.502
					0.816				0	0.816
						0.693			0	0.693
							0.718		0	0.718
								0.731	0	0.731
Edge 2	0.371								0.028	0.399
		0.600							0.028	0.628
			0.340						0.028	0.368
				0.608					0.028	0.636
					0.644				0.028	0.672
						0.673			0.028	0.701
							0.302		0.028	0.330
								0.267	0.028	0.295
Edge 3	0								0.975	0.975
		0							0.975	0.975
			0						0.975	0.975
				0					0.975	0.975
					0				0.975	0.975
						0			0.975	0.975
							0		0.975	0.975
								0	0.975	0.975
Edge 4	0								0	0
		0							0	0
			0						0	0
				0					0	0
					0				0	0
						0			0	0
							0		0	0
								0	0	0

Sum of the SAR with Scaled Values for the Worst-case Configuration

As the SAR for these configurations were measured at the maximum of tune-up tolerance limit, SAR scaling does not need to be applied.

SAR to Peak Location Separation Ratio (SPLSR)

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

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the either sum of the 1-g SAR is < 1.6 W/kg or the SPLSR is < 0.3 for all circumstances that require SPLSR calculation.

15.7. Sum of the SAR for WiFi 5 GHz and Bluetooth

Sum of the SAR with Measured Values

Test Position	Data					∑ 1-g SAR (mW/g)
	WiFi 5.2 GHz	WiFi 5.3 GHz	WiFi 5.5 GHz	WiFi 5.8 GHz	Bluetooth	
Rear	0.030				0.028	0.058
		0.039			0.028	0.067
			0.069		0.028	0.097
				0.064	0.028	0.092
Edge 1	0				0	0
		0			0	0
			0		0	0
				0	0	0
Edge 2	0				0.014	0.014
		0.0079			0.014	0.022
			0.00597		0.014	0.020
				0.028	0.014	0.042
Edge 3	0.582				0.407	0.989
		0.891			0.407	1.298
			1.110		0.407	**1.517**
				0.975	0.407	1.382
Edge 4	0				0	0
		0			0	0
			0		0	0
				0	0	0

Sum of the SAR with Scaled Values for the Worst-case Configuration

As the SAR for these configurations were measured at the maximum of tune-up tolerance limit, SAR scaling does not need to be applied.

SAR to Peak Location Separation Ratio (SPLSR)

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

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the either sum of the 1-g SAR is < 1.6 W/kg or the SPLSR is < 0.3 for all circumstances that require SPLSR calculation.

16. Appendixes

Refer to separated files for the following appendixes.

16.1. System Performance Check Plots

16.2. SAR Test Plots for GSM850

16.3. SAR Test Plots for GSM1900

16.4. SAR Test Plots for W-CDMA Band V

16.5. SAR Test Plots for W-CDMA Band II

16.6. SAR Test Plots for LTE Band 2

16.7. SAR Test Plots for LTE Band 4

16.8. SAR Test Plots for LTE Band 5

16.9. SAR Test Plots for LTE Band 17

16.10. SAR Test Plots for WiFi 2.4 GHz Band

16.11. SAR Test Plots for WiFi 5 GHz Bands

16.12. SAR Test Plots for Bluetooth

16.13. Calibration Certificate for E-Field Probe EX3DV4 - SN 3676

16.14. Calibration Certificate for E-Field Probe EX3DV4 - SN 3720

16.15. Calibration Certificate for E-Field Probe EX3DV4 - SN 3757

16.16. Calibration Certificate for E-Field Probe EX3DV4 - SN 3778

16.17. Calibration Certificate for E-Field Probe EX3DV4 - SN 3751

16.18. Calibration Certificate for D750V3 - SN 1025

16.19. Calibration Certificate for D835V2 - SN 4d076

16.20. Calibration Certificate for D1750V2 - SN 1006

16.21. Calibration Certificate for D1900V2 - SN 5d108

16.22. Calibration Certificate for D2450V2 - SN 826

16.23. Calibration Certificate for D5GHzV2 - SN 1072