

**MOTOROLA****Portable Cellular Phone SAR Test Report**

Tests Requested By: Motorola Mobility, LLC
600 N. US Highway 45
Libertyville, IL 60048

Test Report #: 25402-1F
Date of Report: May 22, 2013
Date of Test: Apr 5 – Apr 25, 2013
FCC ID #: IHDT56PB3
IC ID #: N/A
Generic Name: M0DD9

Test Laboratory: Motorola Mobility, LLC - ADR Test Services Laboratory
600 N. US Highway 45
Libertyville, IL 60048

Report Author: Katerina Bruggemann
Engineer

This laboratory is accredited to ISO/IEC 17025-2005 to perform the following tests:

Accreditation:**Tests:**

Electromagnetic Specific Absorption Rate

Procedures:

IEC 62209-1

RSS-102

IEEE 1528 - 2003

FCC OET Bulletin 65 (*including Supplement C*)

Australian Communications Authority Radio

Communications (Electromagnetic Radiation –
Human Exposure) Standard 2003

CENELEC EN 50360

ARIB Std. T-56 (2002)

On the following products or types of products:

Wireless Communications Devices (Examples): Two Way Radios; Portable Phones (including Cellular, Licensed Non-Broadcast and PCS); Low Frequency Readers; and Pagers

**Statement of
Compliance:**

Motorola declares under its sole responsibility that the portable cellular telephone model to which this declaration relates, is in conformity with the appropriate General Population/Uncontrolled RF exposure standards, recommendations and guidelines (FCC 47 CFR §2.1093) as well as with CENELEC en50360:2001 and ANSI / IEEE C95.1. It also declares that the product was tested in accordance with IEEE 1528 / CENELEC EN62209-1 (2006), along with other published guidance indicated in the references at the end of this report, as well as other appropriate measurement standards, guidelines and recommended practices. Any deviations from these standards, guidelines and recommended practices are noted below:

(none)

©Motorola Mobility, LLC 2013

This test report shall not be reproduced except in full, without written approval of the laboratory. The results and statements contained herein relate only to the items tested. The names of individuals involved may be mentioned only in connection with the statements or results from this report. Motorola encourages all feedback, both positive and negative, on this test report.

Table of Contents

1	Introduction.....	3
2	Details of the Device Under Test.....	4
2.1	Sample Information.....	4
2.2	Antenna Description.....	4
2.3	Transmission Band Summary	5
2.4	Device Test Setup, Operating Configurations, and Conducted Power Measurements.....	6
2.4.1	LTE.....	6
2.4.2	CDMA	12
2.4.3	Wi-Fi 802.11.....	13
2.4.4	Bluetooth	18
2.4.5	Near-Field Communications.....	19
2.5	Transmitter power reduction conditions and modes	20
2.6	Accessories for the Device Under Test	21
2.6.1	Body-Worn Carry Accessories	21
3	Test Equipment Used.....	22
3.1	Dosimetric Measurement System.....	22
3.2	Additional Equipment	23
3.3	Test System Validations.....	24
3.4	Test System Verifications (System Performance Checks).....	26
3.5	Simulated Tissue Dielectric Properties	28
4	Test Setup Information, SAR Measurement Results, and Analysis.....	30
4.1	Overview of Test Setup and Results	30
4.2	Head-Adjacent Exposure Results.....	31
4.3	Body-Worn Accessory Exposure Results	33
4.4	Mobile Hotspot Exposure Results.....	34
4.5	Measurement Variability Analysis.....	37
4.6	Description and Evaluation of Simultaneous Transmitters	38
5	References to Test Standards and Guidance	43

Appendix 1: SAR Distribution Plots for Test System Verification

Appendix 2: SAR Distribution Plots for Head-Adjacent Test Results

Appendix 3: SAR Distribution Plots for Body-Worn Accessory Test Results

Appendix 4: SAR Distribution Plots for Mobile Hotspot Test Results

Appendix 5: Measurement Uncertainty Budget

Appendix 6: Probe Calibration Certificates

Appendix 7: Dipole Characterization Certificates

Revision History

Revision Version	Date	Notes
Rev. 0	May-22-2013	Initial report release

1 Introduction

The Motorola Mobility ADR Test Services Laboratory has performed measurements of the maximum potential exposure to the user of the portable cellular phone covered by this test report. The Specific Absorption Rate (SAR) of this product was measured. The portable cellular phone was tested in accordance with [1], [4], [5], [9], and per FCC KDB 941225 D06 for mobile hotspot operation. The SAR values measured for the portable cellular phone are below the maximum recommended levels of 1.6 W/kg in a 1 g average set in [3] and 2.0 W/kg in a 10 g average set in [2].

For ANSI / IEEE C95.1 (1 g), the final stand-alone SAR readings for this phone are given in the table below. These measurements were performed using a DASY52™ system manufactured by Schmid & Partner Engineering AG (SPEAG), of Zurich Switzerland.

Transmit Band	Head SAR (1 g ^W /kg)	Body-Worn Accessory SAR (1 g ^W /kg)	Mobile Hotspot SAR (1 g ^W /kg)
LTE Band 12	0.34	0.15	0.34
LTE Band 5	0.57	0.17	0.50
LTE Band 4	0.32	0.20	0.73
CDMA 800	0.59	0.41	0.69
CDMA 1900	0.79	0.55	0.85
Wi-Fi 2.45 GHz	0.92	0.05	0.24
Wi-Fi 5.2 GHz	0.40	0.19	N/A
Wi-Fi 5.8 GHz	0.21	0.08	0.16
Bluetooth	N/A		
Simultaneous SAR	1.06		

2 Details of the Device Under Test

2.1 Sample Information

Serial Number(s) (Functional Use)	LXWW1K0001 (CDMA conducted power measurements and SAR testing) LXWW1K0003 (LTE Band 12 conducted power measurements and SAR testing) LXWW1K0006 (LTE Band 5 conducted power measurements and SAR testing) LXWW1K0007 (LTE Band 4 conducted power measurements and SAR testing) LXVE110019 (Wi-Fi SAR testing) LXVE110010 (2.4 GHz Wi-Fi conducted power measurements, Bluetooth conducted power measurements) LXAA1W0004 (5 GHz Wi-Fi conducted power measurements)
Production Unit or Identical Prototype (47 CFR §2.908)	Identical Prototype
Device Category	Portable (Mobile Station Class B)
RF Exposure Limits	General Population / Uncontrolled

2.2 Antenna Description

Main (835/1880 MHz) Antenna

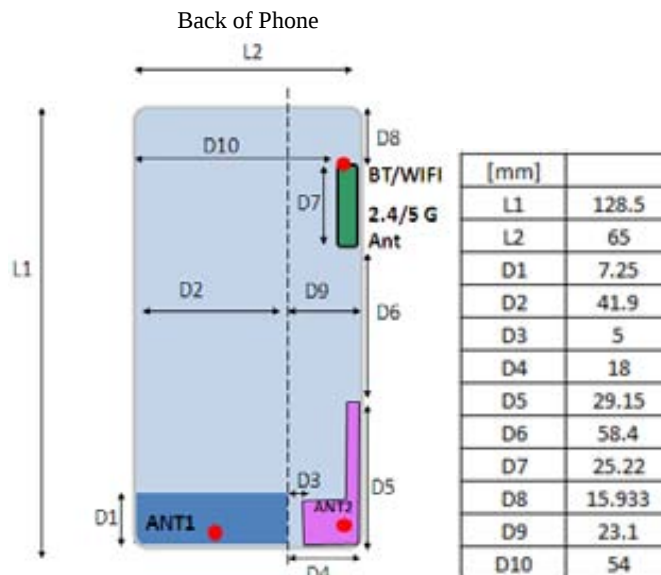
Type	Internal	
Location	Bottom Edge of Transceiver	
Dimensions	Width	7.25 mm
	Length	47 mm

LTE (780/1730 MHz) Antenna

Type	Internal	
Location	Bottom-Left Edge of Transceiver	
Dimensions	Width	13 mm
	Length	29.2 mm

Wi-Fi/Bluetooth Antenna

Type	Internal	
Location	Left Edge of Transceiver	
Dimensions	Width	25.2 mm
	Length	6 mm



2.3 Transmission Band Summary

Mode(s) of Operation	Modulation Mode(s)	Target Output Power Setting	Maximum Output Power Setting	Duty Cycle	Transmitting Frequency Range(s)
LTE Band 12	QPSK, 16QAM	23.0 dBm	24.0 dBm	1:1	699 - 716 MHz
LTE Band 5	QPSK, 16QAM	23.0 dBm	24.0 dBm	1:1	824-849 MHz
LTE Band 4	QPSK, 16QAM	23.0 dBm	24.0 dBm	1:1	1710-1755 MHz
CDMA 800	QPSK	24.0 dBm	25.0 dBm	1:1	824.70 - 848.31 MHz
CDMA 1900	QPSK	24.0 dBm	25.0 dBm	1:1	1851.20 - 1908.75 MHz
Wi-Fi 802.11b/g/n	BPSK	19.18 dBm		1:1	2412.0 - 2462.0 MHz
Wi-Fi 802.11a/n/ac	BPSK	15.60 dBm		1:1	5180.0 - 5240.0 MHz
Wi-Fi 802.11a/n/ac	BPSK	20.13 dBm		1:1	5745.0 - 5825.0 MHz
Bluetooth	GFSK	10.3 dBm		1:1	2402.0 – 2480.0 MHz

2.4 Device Test Setup, Operating Configurations, and Conducted Power Measurements

2.4.1 LTE

Technical Description

LTE Summary Information

FCC ID	IHDT56PB3
Form Factor	Portable Handset
Frequency Range(s)	Band 12: 699 - 716 MHz Band 5: 824-849 MHz Band 4: 1710-1755 MHz
Channel Bandwidth(s)	Band 12: 20, 15, 10, 5, 3, 1.4 MHz Band 5: 10, 5, 3, 1.4 MHz Band 4: 10, 5, 3, 1.4 MHz
UE Category	3
Modulations Supported	QPSK, 16QAM
Description of LTE Tx and Antenna Implementation	Band 12: 1 TX/RX Antenna, 1 RX Antenna Band 5: 1 TX/RX Antenna, 1 RX Antenna Band 4: 1 TX/RX Antenna, 1 RX Antenna
LTE Voice Available?	Yes (VOIP clients Only)
Hotspot with LTE + Wi-Fi?	Yes
Hotspot with LTE + Wi-Fi active with Voice sessions?	Yes
LTE MPR Permanently Implemented per 3GPP TS 36.101?	Yes
A-MPR disabled for SAR Testing?	Yes
Conducted power table providing measurements across 1 RB, 50% RB and 100% RB allocations?	Yes
Table provided specifying other US wireless operating modes?	Yes
Table provided specifying maximum average conducted power for these other wireless modes?	Yes
Table provided identifying simultaneous transmission conditions?	Yes
Power Reduction used for SAR compliance?	Yes
Power Reduction used for GSM/WCDMA?	N/A
Power Reduction used for LTE?	Yes
Power Reduction used for SVLTE?	N/A
Test Equipment used	CMW500 SW version 2.1.26.3

LTE Maximum Power Reduction (MPR) conditions are defined in 3GPP 36-521, section 6.2.3.3:

6.2.3.3 Minimum conformance requirements

For UE Power Class 3, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2.3-1 due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3.3-1.

Table 6.2.3.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth configuration [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

For the UE maximum output power modified by MPR, the power limits specified in subclause 6.2.5.3 apply. The normative reference for this requirement is TS 36.101 clause 6.2.3.

The table applies for any RB start value. RBs are assigned contiguously. Thus, given the maximum power limits stated in 2.2 and the MPR described above, the maximum power for the SAR test cases is as follows:

Test Case	Band 12 / Band 5 / Band 4
	Max Power (dBm)
QPSK, 1 RB Allocation	24.0
QPSK, 50% RB Allocation	23.0
QPSK, 100% RB Allocation	23.0
16QAM, 1 RB Allocation	23.0
16QAM, 50% RB Allocation	22.0
16QAM, 100% RB Allocation	22.0

Exposure Conditions and Test Exclusions

Mode	Type	Head-Adjacent	Body-Worn Accessory	Mobile Hotspot
All Modes, QPSK modulation	Data	Tested (1)	Tested (1)	Tested
All Modes, 16QAM modulation	Data	Excluded (2)	Excluded (2)	Excluded (2)

Notes:

- (1) QPSK modulation, as a data-only mode, was tested against the Head and in Body-Worn Accessory exposure conditions to support evaluation for VOIP applications potentially installed and used by the end-user.
- (2) 16QAM modulation was excluded from testing per FCC KDB 941225 D05, as the maximum output power in this mode is not more than ½ dB higher than each comparable mode in QPSK and the reported SAR results for QPSK mode testing were less than 1.45 W/kg .

Device Test Setup

For LTE modes, the test sample was operated using transmission to a base station simulator. The base station simulator was configured per the guidance provided in FCC KDB 941225 D05, with closed-loop power control enforced to ensure the phone transmits at maximum output power.

Conducted Power Measurements

LTE Band 4																
Modulation Start RB RB Allocation			QPSK 0 1	QPSK 50 1	QPSK 99 1	QPSK 0 50	QPSK 25 50	QPSK 50 50	QPSK 0 100	16-QAM 0 1	16-QAM 50 1	16-QAM 99 1	16-QAM 0 50	16-QAM 25 50	16-QAM 50 50	16-QAM 0 100
Max Limit (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
MPR Target (dB)			0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
Max Limit with MPR (dBm)			24.0	24.0	24.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.0	22.0	22.0	22.0
Channel BW (MHz)	Frequency (MHz)	Channel														
20	1720	20050	23.48	23.69	23.84	22.50	22.49	22.55	22.51	22.56	22.68	22.94	21.45	21.50	21.55	21.52
20	1732.5	20175	23.62	23.68	24.10	22.61	22.63	22.66	22.67	22.19	22.31	22.36	21.65	21.72	21.82	21.63
20	1745	20300	23.63	23.69	23.64	22.51	22.56	22.50	22.53	22.46	22.46	22.44	21.59	21.60	21.62	21.53

LTE Band 4																
Modulation Start RB RB Allocation			QPSK 0 1	QPSK3 7 1	QPSK 74 1	QPSK 0 36	QPSK 19 36	QPS 39 36	QPSK 0 75	16-QAM 0 1	16-QAM 37 1	16-QAM 74 1	16-QAM 0 36	16-QAM 19 36	16-QAM 39 36	16-QAM 0 75
Max Limit (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
MPR Target (dB)			0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
Max Limit with MPR (dBm)			24.0	24.0	24.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.0	22.0	22.0	22.0
Channel BW (MHz)	Frequency (MHz)	Channel														
15	1717.5	20025	23.51	23.61	23.51	22.44	22.56	22.61	22.39	22.46	22.58	22.61	21.34	21.50	21.48	21.41
15	1732.5	20175	23.59	23.67	23.60	22.68	22.63	22.62	22.60	22.19	22.29	22.24	21.62	21.68	21.76	21.55
15	1747.5	20325	23.76	23.68	23.60	22.54	22.58	22.48	22.43	22.85	22.76	22.71	21.68	21.61	21.50	21.43

LTE Band 4																
Modulation Start RB RB Allocation			QPSK 0 1	QPSK 25 1	QPSK 49 1	QPSK 0 25	QPSK 12 25	QPSK 25 25	QPSK 0 50	16-QAM 0 1	16-QAM 25 1	16-QAM 49 1	16-QAM 0 25	16-QAM 12 25	16-QAM 25 25	16-QAM 0 50
Max Limit (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
MPR Target (dB)			0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
Max Limit with MPR (dBm)			24.0	24.0	24.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.0	22.0	22.0	22.0
Channel BW (MHz)	Frequency (MHz)	Channel														
10	1715.0	20000	23.44	23.40	23.59	22.41	22.45	22.57	22.37	21.97	21.92	22.12	21.52	21.45	21.58	21.42
10	1732.5	20175	23.61	23.63	23.66	22.72	22.64	22.65	22.64	22.28	22.23	22.22	21.70	21.63	21.76	21.62
10	1750.0	20350	23.67	23.63	23.60	22.63	22.46	22.47	22.38	22.74	22.66	22.70	21.66	21.57	21.50	21.40

LTE Band 4																
Modulation Start RB RB Allocation			QPSK 0 1	QPSK 12 1	QPSK 24 1	QPSK 0 12	QPSK 6 12	QPSK 13 12	QPSK 0 25	16-QAM 0 1	16-QAM 12 1	16-QAM 24 1	16-QAM 0 12	16-QAM 6 12	16-QAM 13 12	16-QAM 0 25
Max Limit (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
MPR Target (dB)			0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
Max Limit with MPR (dBm)			24.0	24.0	24.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.0	22.0	22.0	22.0
Channel BW (MHz)	Frequency (MHz)	Channel														
5	1712.5	19975	23.50	23.52	23.43	22.33	22.39	22.47	22.36	21.92	21.97	21.96	21.39	21.35	21.40	21.49
5	1732.5	20175	23.65	23.66	23.77	22.65	22.60	22.70	22.62	22.79	22.84	22.86	21.79	21.73	21.82	21.72
5	1752.5	20375	23.56	23.51	23.53	22.44	22.46	22.41	22.43	22.89	22.80	22.79	21.48	21.40	21.46	21.38

LTE Band 4																	
Modulation Start RB RB Allocation			QPSK 0 1	QPS 7 1	QPSK 14 1	QPSK 0 8	QPSK 3 8	QPS 7 8	QPSK 0 15	16-QAM 0 1	16-QAM 7 1	16-QAM 14 1	16-QAM 0 8	16-QAM 3 8	16-QAM 7 8	16-QAM 0 15	
Max Limit (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	
MPR Target (dB)			0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	
Max Limit with MPR (dBm)			24.0	24.0	24.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.0	22.0	22.0	22.0	
Channel BW (MHz)	Frequency (MHz)	Channel															
	3	1711.5	19965	23.45	23.29	23.41	22.44	22.37	22.43	22.47	22.50	21.94	21.92	21.33	21.35	21.35	21.32
	3	1732.5	20175	23.70	23.75	23.71	22.69	22.62	22.60	22.69	22.82	22.30	22.22	21.60	21.63	21.70	21.58
	3	1753.5	20385	23.43	23.46	23.39	22.48	22.44	22.52	22.47	22.66	22.08	21.97	21.47	21.42	21.51	21.38

LTE Band 4																	
Modulation Start RB RB Allocation			QPSK 0 1	QPSK 3 1	QPSK 5 1	QPSK 0 3	QPSK 1 3	QPSK 3 3	QPSK 0 6	16-QAM 0 1	16-QAM 3 1	16-QAM, 5 1	16-QAM 0 3	16-QAM 1 3	16-QAM 3 3	16-QAM 0 6	
Max Limit (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	
MPR Target (dB)			0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	
Max Limit with MPR (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.0	
Channel BW (MHz)	Frequency (MHz)	Channel															
	1.4	1710.6	19956	23.44	23.40	23.44	23.38	23.32	23.40	22.32	22.47	22.50	22.57	22.27	22.29	22.32	21.22
	1.4	1732.5	20175	23.54	23.56	23.57	23.59	23.59	23.61	22.58	22.19	22.22	22.22	22.81	22.83	22.82	21.84
	1.4	1754.4	20394	23.65	23.55	23.51	23.52	23.50	23.50	22.55	22.38	22.36	22.29	22.54	22.55	22.48	21.60

LTE Band 12																	
Modulation Start RB RB Allocation			QPSK 0 1	QPSK 25 1	QPSK 49 1	QPSK 0 25	QPSK 12 25	QPSK 25 25	QPSK 0 50	16-QAM 0 1	16-QAM 25 1	16-QAM 49 1	16-QAM 0 25	16-QAM 12 25	16-QAM 25 25	16-QAM 0 50	
Max Limit (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	
MPR Target (dB)			0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	
Max Limit with MPR (dBm)			24.0	24.0	24.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.0	22.0	22.0	22.0	
Channel BW (MHz)	Frequency (MHz)	Channel															
	10	704.0	23060	23.95	23.91	23.92	22.94	22.92	22.99	22.85	23.00	22.97	23.00	21.86	21.87	21.91	21.84
	10	707.5	23095	23.78	23.81	23.73	22.93	22.90	22.83	22.84	22.31	22.42	22.35	21.98	21.95	21.88	21.92
	10	711.0	23130	23.84	23.77	23.88	22.84	22.79	22.81	22.77	22.47	22.38	22.43	21.84	21.78	21.83	21.74

LTE Band 12																	
Modulation Start RB RB Allocation			QPSK 0 1	QPSK 12 1	QPSK 24 1	QPSK 0 12	QPSK 6 12	QPSK 13 12	QPSK 0 25	16-QAM 0 1	16-QAM 12 1	16-QAM 24 1	16-QAM 0 12	16-QAM 6 12	16-QAM 13 12	16-QAM 0 25	
Max Limit (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	
MPR Target (dB)			0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	
Max Limit with MPR (dBm)			24.0	24.0	24.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.0	22.0	22.0	22.0	
Channel BW (MHz)	Frequency (MHz)	Channel															
	5	701.5	23035	24.00	23.96	23.91	22.93	22.93	22.83	22.82	22.99	23.00	23.00	21.91	21.96	21.93	21.84
	5	707.5	23095	23.79	23.94	23.93	22.89	22.82	22.85	22.81	23.00	23.00	23.00	21.87	21.82	21.82	21.82
	5	713.5	23155	23.71	23.68	23.80	22.78	22.80	22.84	22.79	22.32	22.22	22.34	21.77	21.70	21.81	21.86

LTE Band 12																	
Modulation Start RB RB Allocation			QPSK 0 1	QPS 7 1	QPSK 14 1	QPSK 0 8	QPSK 3 8	QPS 7 8	QPSK 0 15	16-QAM 0 1	16-QAM 7 1	16-QAM 14 1	16-QAM 0 8	16-QAM 3 8	16-QAM 7 8	16-QAM 0 15	
Max Limit (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	
MPR Target (dB)			0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	
Max Limit with MPR (dBm)			24.0	24.0	24.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.0	22.0	22.0	22.0	
Channel BW (MHz)	Frequency (MHz)	Channel															
	3	700.5	23025	23.97	23.71	23.98	22.83	22.85	22.85	22.90	23.00	22.90	23.04	21.78	21.75	21.83	21.91
	3	707.5	23095	23.94	23.75	23.82	22.91	22.95	22.78	22.94	22.51	22.44	22.34	21.90	21.81	21.79	21.77
	3	714.5	23165	23.66	23.77	23.75	22.72	22.82	22.87	22.78	23.00	22.29	22.24	21.67	21.71	21.88	21.58

LTE Band 12																
Modulation Start RB RB Allocation			QPSK 0 1	QPSK 3 1	QPSK 5 1	QPSK 0 3	QPSK 1 3	QPSK 3 3	QPSK 0 6	16-QAM 0 1	16-QAM 3 1	16-QAM, 5 1	16-QAM 0 3	16-QAM 1 3	16-QAM 3 3	16-QAM 0 6
Max Limit (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
MPR Target (dB)			0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0
Max Limit with MPR (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.0
Channel BW (MHz)	Frequency (MHz)	Channel														
1.4	699.6	23016	23.74	23.78	23.66	23.88	23.89	23.80	22.85	22.35	22.35	22.21	23.03	23.00	22.93	22.03
1.4	707.5	23095	23.89	23.77	23.78	23.84	23.83	23.79	22.90	23.03	22.96	22.93	22.87	22.83	22.71	21.67
1.4	715.4	23174	23.85	23.87	23.74	23.75	23.85	23.72	22.86	22.63	22.60	22.56	22.73	22.76	22.83	21.86

LTE Band 5																	
Modulation Start RB RB Allocation			QPSK 0 1	QPSK 25 1	QPSK 49 1	QPSK 0 25	QPSK 12 25	QPSK 25 25	QPSK 25 25	QPSK 0 50	16-QAM 0 1	16-QAM 25 1	16-QAM 49 1	16-QAM 0 25	16-QAM 12 25	16-QAM 25 25	16-QAM 25 0
Max Limit (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
MPR Target (dB)			0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
Max Limit with MPR (dBm)			24.0	24.0	24.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.0	22.0	22.0	22.0
Channel BW (MHz)	Frequency (MHz)	Channel															
10	829	20450	23.76	23.65	23.61	22.73	22.65	22.69	22.57	22.32	22.27	22.19	21.76	21.73	21.67	21.59	
10	836.5	20525	23.66	23.71	23.85	22.75	22.71	22.68	22.64	22.29	22.33	22.47	21.79	21.83	21.78	21.56	
10	844	20600	23.84	23.81	23.49	22.80	22.69	22.57	22.55	22.91	22.84	22.57	21.77	21.75	21.59	21.50	

LTE Band 5																
Modulation Start RB RB Allocation			QPSK 0 1	QPSK 12 1	QPSK 24 1	QPSK 0 12	QPSK 6 12	QPSK 13 12	QPSK 0 25	16-QAM 0 1	16-QAM 12 1	16-QAM 24 1	16-QAM 0 12	16-QAM 6 12	16-QAM 13 12	16-QAM 0 25
Max Limit (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
MPR Target (dB)			0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
Max Limit with MPR (dBm)			24.0	24.0	24.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.0	22.0	22.0	22.0
Channel BW (MHz)	Frequency (MHz)	Channel														
5	826.5	20425	24.00	23.90	23.75	22.93	22.88	22.71	22.75	23.00	23.00	23.00	21.87	21.76	21.68	21.58
5	836.5	20525	23.73	23.80	23.82	22.82	22.79	22.82	22.76	22.27	22.35	22.48	21.75	21.81	21.74	21.77
5	846.5	20625	23.83	23.77	23.40	22.60	22.63	22.60	22.53	22.92	22.91	22.52	21.71	21.75	21.69	21.55

LTE Band 5																
Modulation Start RB RB Allocation			QPSK 0 1	QPS 7 1	QPSK 14 1	QPSK 0 8	QPSK 3 8	QPS 7 8	QPSK 0 15	16-QAM 0 1	16-QAM 7 1	16-QAM 14 1	16-QAM 0 8	16-QAM 3 8	16-QAM 7 8	16-QAM 0 15
Max Limit (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
MPR Target (dB)			0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
Max Limit with MPR (dBm)			24.0	24.0	24.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.0	22.0	22.0	22.0
Channel BW (MHz)	Frequency (MHz)	Channel														
3	825.5	20415	24.00	23.98	23.98	22.89	22.88	22.86	22.79	22.98	23.00	23.00	21.84	21.83	21.70	21.85
3	836.5	20525	23.76	23.76	23.69	22.66	22.78	22.73	22.75	22.31	22.28	22.27	21.71	21.81	21.78	21.62
3	847.5	20635	23.68	23.56	23.29	22.56	22.53	22.45	22.48	22.82	22.13	21.82	21.64	21.58	21.52	21.44

LTE Band 5																
Modulation Start RB RB Allocation			QPSK 0 1	QPSK 3 1	QPSK 5 1	QPSK 0 3	QPSK 1 3	QPSK 3 3	QPSK 0 6	16-QAM 0 1	16-QAM 3 1	16-QAM, 5 1	16-QAM 0 3	16-QAM 1 3	16-QAM 3 3	16-QAM 0 6
Max Limit (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
MPR Target (dB)			0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0
Max Limit with MPR (dBm)			24.0	24.0	24.0	24.0	24.0	24.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.0
Channel BW (MHz)	Frequency (MHz)	Channel														
1.4	824.6	20406	23.87	23.88	23.94	23.90	23.83	23.88	22.88	22.62	22.59	22.67	22.80	22.78	22.85	21.88
1.4	836.5	20525	23.67	23.68	23.62	23.70	23.71	23.71	22.72	23.00	22.99	22.96	22.70	22.75	22.69	21.68
1.4	848.4	20644	23.64	23.47	23.35	23.48	23.40	23.34	22.47	22.06	21.86	21.82	22.64	22.56	22.50	21.55

2.4.2 CDMA

Technical Description

The phone under test contains CDMA2000 1x and CDMA2000 1xEV-DO (Rel. A) transmitters that support both voice (circuit-switched) and data (packet-switched) capabilities.

Exposure Conditions and Test Exclusions

Mode	Type	Head-Adjacent	Body-Worn Accessory	Mobile Hotspot
RC3 SO55 Loopback	Voice	Tested (1)	Excluded (2)	N/A
RC1 SO55 Loopback	Voice	Excluded (2)	Excluded (2)	N/A
TDSO SO32 FCH	Data	Tested (3)	Tested (1)	Excluded (2)
TDSO SO32 FCH+SCH	Data	Excluded (2)	Excluded (2)	Excluded (2)
EVDO Rel. 0 (RTAP)	Data	Excluded (2)	Excluded (2)	Tested (1)
EVDO Rel. A (RETAP)	Data	Excluded (2)	Excluded (2)	Excluded (2)

Notes:

- (1) Per FCC KDB 941225 D01, RC3 SO55 is tested as the default mode for Head SAR measurements, TDSO SO32 on FCH with other code channels disabled is tested as the default mode for Body SAR measurements, and EVDO Rel. 0 (RTAP) is tested as the default mode in the Mobile Hotspot SAR exposure condition as a EVDO Data Device.
- (2) Per FCC KDB 941225 D01, the noted modes were excluded from testing as each exhibited measured output power not higher than that found in the default modes for each exposure condition.
- (3) TDSO SO32 FCH, as a data-only mode, was tested against the Head to support evaluation for 3rd Party VOIP applications potentially installed and used by the end-user.

Device Test Setup

For CDMA modes, the test sample was operated using transmission to a base station simulator. The base station simulator was set up for the proper channel and transmit mode of operation on the phone's uplink. The transmitter power level and power control were set to "All Up Bits" for RC3 operation, and "Alternating Bits" for TDSO SO32 operation.

Conducted Power Measurements

Power measurements were executed per FCC KDB 941225 D01:

Measured Conducted Power (dBm) for CDMA modes							
		Loopback		Data		EVDO Rel. 0	EVDO Rel. A
Band	Channel	RC3 SO55	RC1 SO55	TDSO SO32 FCH	TDSO SO32 FCH+SCH	RTAP 153.6k	Subtype 2 RETAP
CDMA 800	1013	24.64	24.57	24.57	24.55	24.56	24.55
	384	24.39	24.37	24.35	24.33	24.32	24.32
	777	24.09	24.06	24.04	24.02	24.03	24.02
CDMA 1900	25	24.73	24.73	24.71	24.72	24.83	24.83
	600	24.71	24.69	24.67	24.67	24.71	24.71
	1175	24.78	24.69	24.56	24.59	24.58	24.55

Note that the device's system architecture does not support simultaneous voice and data during a single CDMA session to the cellular network. Operation in TDSO and EVDO modes is for data transmission only.

2.4.3 Wi-Fi 802.11

Technical Description

The phone under test contains a Wi-Fi 802.11b/g/n transmitter capable of data transmission in the 2.45 GHz ISM band, and contains a Wi-Fi 802.11a/n transmitter capable of data transmission in the 5 GHz U-NII bands.

Exposure Conditions and Test Exclusions

Mode	Type	Head-Adjacent	Body-Worn Accessory	Mobile Hotspot
802.11b / 802.11a	Data	Tested (1)	Tested (1)	Tested (1)
802.11g / 802.11n	Data	Excluded (1)	Excluded (1)	Excluded (1)

Notes:

- (1) Per FCC KDB 248227 D01 and the April 2010 FCC/TCB Meeting Notes, the highest average output power channel for the lowest data rate for 802.11b or 802.11a was selected for SAR evaluation. Other 802.11 modes (including 802.11g and 802.11n) were not investigated when the average output powers over all channels and data rates were not more than ¼ dB higher than the tested channel in the lowest data rate of the 802.11b or 802.11a mode. The **bolded** data rates and channels in the following conducted power tables were used for SAR testing. For cases where alternate channels, higher data rates, or 802.11 modes resulted in output power more than ¼ dB higher than the tested configuration, additional SAR tests were conducted. Alternate configurations selected for additional testing are marked in **highlighted bold**, and were tested in all applicable exposure conditions.

Device Test Setup

For Wi-Fi 802.11 modes, the test sample was operated using manufacturer test mode software per guidance provided in FCC KDB 248227. The test software was set up for the proper channel, transmitter power level and transmit modes of operation on the phone's uplink.

Conducted Power Measurements

Mode	Freq	Channel	Detector	802.11b Conducted Power [dBm]			
				Data Rate [Mbps]			
				1	2	5.5	11
802.11b	2412	1	AVG	17.03	17.06	17.22	17.09
			PEAK	19.62	19.65	19.80	19.71
802.11b	2417	2	AVG	17.07	17.04	17.03	17.05
			PEAK	19.68	19.65	19.65	19.66
802.11b	2437	6	AVG	19.16	19.18	19.14	19.14
			PEAK	21.70	21.67	21.69	21.70
802.11b	2462	11	AVG	18.31	18.11	18.24	18.25
			PEAK	20.97	20.78	20.82	20.91

Mode	Freq	Channel	Detector	802.11g Conducted Power [dBm]							
				Data Rate [Mbps]							
				6	9	12	18	24	36	48	54
802.11g	2412	1	AVG	12.15	12.06	12.02	11.99	11.98	11.99	12.06	11.91
			PEAK	19.50	19.47	19.42	19.45	19.49	19.41	19.48	19.32
802.11g	2417	2	AVG	14.12	14.17	14.10	14.13	14.04	14.12	14.11	14.09
			PEAK	21.05	21.14	21.17	21.14	21.10	21.19	21.19	21.17
802.11g	2422	3	AVG	15.17	15.16	15.15	15.19	15.11	15.13	15.17	15.12
			PEAK	21.83	21.83	21.79	21.86	21.84	21.86	21.90	21.84
802.11g	2437	6	AVG	17.13	17.08	17.08	17.12	16.27	16.29	16.28	15.21
			PEAK	22.78	22.81	22.82	22.85	22.54	22.53	22.55	22.00
802.11g	2457	10	AVG	15.15	15.18	15.19	15.22	15.14	15.12	15.16	15.14
			PEAK	22.04	22.09	22.04	22.17	22.07	22.09	22.13	22.12
802.11g	2462	11	AVG	13.12	13.16	13.13	13.10	13.09	13.17	13.12	13.11
			PEAK	20.31	20.34	20.37	20.31	20.35	20.36	20.32	20.30

Mode	Freq	Channel	Detector	20MHz 802.11n (2.4GHz - 400ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			7.2	14.4	21.7	28.9	43.4	57.8	65.0	72.2
802.11n	2412	1	AVG	10.95	10.91	10.94	10.92	10.94	10.95	10.93	10.99
			PEAK	18.39	18.42	18.35	18.39	18.38	18.40	18.43	18.44
802.11n	2417	2	AVG	13.14	13.12	13.09	13.09	13.13	13.16	13.11	13.18
			PEAK	20.32	20.37	20.42	20.31	20.34	20.36	20.28	20.38
802.11n	2422	3	AVG	14.23	14.22	14.19	14.19	14.18	14.23	14.27	14.18
			PEAK	21.17	21.15	21.17	21.26	21.27	21.23	21.15	21.25
802.11n	2437	6	AVG	17.13	17.11	17.16	17.08	17.14	17.14	17.12	17.17
			PEAK	22.79	22.77	22.82	22.81	22.89	22.82	22.85	22.80
802.11n	2457	10	AVG	14.28	14.27	14.24	14.25	14.30	14.28	14.23	14.24
			PEAK	21.52	21.57	21.49	21.57	21.62	21.61	21.50	21.56
802.11n	2462	11	AVG	12.00	11.95	11.96	11.98	12.02	12.03	11.96	11.99
			PEAK	19.57	19.63	19.57	19.61	19.64	19.56	19.53	19.60

Mode	Freq	Channel	Detector	20MHz 802.11n (2.4GHz - 800ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			6.5	13.0	19.5	26.0	39.0	52.0	58.5	65.0
802.11n	2412	1	AVG	10.87	10.83	10.83	10.91	10.91	10.90	10.88	10.89
			PEAK	18.39	18.42	18.41	18.45	18.44	18.46	18.44	18.47
802.11n	2417	2	AVG	12.88	12.88	12.87	12.89	12.85	12.92	12.88	12.84
			PEAK	20.07	20.16	20.04	20.14	20.04	20.07	20.17	20.16
802.11n	2422	3	AVG	14.15	14.11	14.16	14.13	14.12	14.13	14.12	14.16
			PEAK	21.17	21.22	21.27	21.17	21.19	21.24	21.16	21.19
802.11n	2437	6	AVG	17.12	17.15	17.07	17.14	17.14	17.16	17.08	17.09
			PEAK	22.83	22.82	22.86	22.93	22.89	22.90	22.79	22.86
802.11n	2457	10	AVG	14.16	14.12	14.15	14.18	14.18	14.11	14.19	14.20
			PEAK	21.47	21.53	21.57	21.52	21.50	21.57	21.44	21.44
802.11n	2462	11	AVG	11.91	11.90	11.86	11.88	11.92	11.94	11.91	11.89
			PEAK	19.36	19.41	19.32	19.37	19.39	19.35	19.38	19.43

Mode	Freq	Channel	Detector	802.11a Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			6	9	12	18	24	36	48	54
802.11a	5180	36	AVG	15.56	15.55	15.54	15.52	15.50	15.51	15.49	15.47
802.11a	5200	40	AVG	15.35	15.33	15.34	15.31	15.31	15.32	15.30	15.31
802.11a	5220	44	AVG	15.48	15.47	15.45	15.49	15.46	15.45	15.43	15.47
802.11a	5240	48	AVG	15.52	15.48	15.47	15.50	15.49	15.45	15.41	15.43

Mode	Freq	Channel	Detector	20MHz BW 802.11n (5GHz - 400ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			7.2	14.4	21.7	28.9	43.3	57.8	65.0	72.2
802.11n	5180	36	AVG	15.59	15.56	15.55	15.60	15.59	15.58	15.55	15.57
802.11n	5200	40	AVG	15.31	15.28	15.35	15.35	15.30	15.30	15.31	15.26
802.11n	5220	44	AVG	15.43	15.44	15.40	15.49	15.44	15.48	15.44	15.47
802.11n	5240	48	AVG	15.49	15.50	15.47	15.46	15.53	15.43	15.41	15.40

Mode	Freq	Channel	Detector	20MHz BW 802.11n (5GHz - 800ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			6.5	13.0	19.5	26.0	39.0	52.0	58.5	65.0
802.11n	5180	36	AVG	15.57	15.52	15.51	15.52	15.53	15.56	15.46	15.52
802.11n	5200	40	AVG	15.32	15.29	15.37	15.32	15.27	15.32	15.31	15.28
802.11n	5220	44	AVG	15.52	15.44	15.49	15.47	15.50	15.44	15.42	15.48
802.11n	5240	48	AVG	15.55	15.46	15.45	15.46	15.48	15.46	15.43	15.38

Mode	Freq	Channel	Detector	20MHz BW 802.11ac (5GHz - 400ns GI) Conducted Power [dBm]								
				Data Rate [Mbps]								
	[MHz]			7.2	14.4	21.7	28.9	43.3	57.8	65.0	72.2	MCS8
802.11ac	5180	36	AVG	15.41	15.43	15.40	15.42	15.46	15.45	15.41	15.42	15.40
802.11ac	5200	40	AVG	15.46	15.40	15.48	15.49	15.50	15.52	15.44	15.42	15.43
802.11ac	5220	44	AVG	15.48	15.44	15.48	15.48	15.55	15.50	15.41	15.49	15.46
802.11ac	5240	48	AVG	15.41	15.41	15.37	15.42	15.53	15.46	15.45	15.46	15.46

Mode	Freq	Channel	Detector	20MHz BW 802.11ac (5GHz - 800ns GI) Conducted Power [dBm]								
				Data Rate [Mbps]								
	[MHz]			6.5	13.0	19.5	26.0	39.0	52.0	58.5	65.0	MCS8
802.11ac	5180	36	AVG	15.59	15.58	15.69	15.65	15.61	15.74	15.44	15.59	14.58
802.11ac	5200	40	AVG	15.29	15.41	15.48	15.46	15.42	15.48	15.32	15.32	14.26
802.11ac	5220	44	AVG	15.37	15.43	15.54	15.55	15.52	15.63	15.38	15.49	14.51
802.11ac	5240	48	AVG	15.54	15.57	15.65	15.59	15.57	15.72	15.42	15.47	14.49

Mode	Freq	Channel	Detector	40MHz BW 802.11n (5GHz - 400ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			15.0	30.0	45.0	60.0	90.0	120.0	135.0	150.0
802.11n	5190	38	AVG	14.18	14.16	14.14	14.15	14.16	14.16	14.15	14.17
802.11n	5230	46	AVG	14.17	14.14	14.15	14.17	14.15	14.18	14.13	14.16

Mode	Freq	Channel	Detector	40MHz BW 802.11n (5GHz - 800ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			13.5	27.0	40.5	54.0	81.0	108.0	121.5	135.0
802.11n	5190	38	AVG	14.15	14.20	14.16	14.19	14.19	14.16	14.15	14.16
802.11n	5230	46	AVG	14.20	14.14	14.14	14.13	14.19	14.16	14.17	14.12

Mode	Freq	Channel	Detector	40MHz BW 802.11ac [5GHz - 400ns GI] Conducted Power [dBm]									
				Data Rate [Mbps]									
	[MHz]			15.0	30.0	45.0	60.0	90.0	120.0	135.0	150.0	MCS8	MCS9
802.11ac	5190	38	AVG	14.01	13.94	13.91	13.92	13.82	13.85	13.90	13.89	13.02	12.01
802.11ac	5230	46	AVG	13.99	13.97	13.94	13.93	13.90	13.89	13.89	13.87	13.05	11.99

Mode	Freq	Channel	Detector	40MHz BW 802.11ac (5GHz - 800ns GI) Conducted Power [dBm]									
				Data Rate [Mbps]									
	[MHz]			13.5	27.0	40.5	54.0	81.0	108.0	121.5	135.0	MCS8	MCS9
802.11ac	5190	38	AVG	14.11	14.17	14.06	14.03	13.93	14.05	13.91	13.99	13.19	12.17
802.11ac	5230	46	AVG	13.99	14.08	14.03	14.01	13.98	14.04	13.97	13.95	13.23	12.21

Mode	Freq	Channel	Detector	80MHz BW 802.11ac (5GHz - 400ns GI) Conducted Power [dBm]									
				Data Rate [Mbps]									
	[MHz]			32.5	65	97.5	130	195	260	292.5	325	390	433.3
802.11ac	5210	42	AVG	14.25	14.28	14.27	14.31	14.30	14.26	14.28	14.29	14.25	12.28

Mode	Freq	Channel	Detector	80MHz BW 802.11ac (5GHz - 800ns GI) Conducted Power [dBm]									
				Data Rate [Mbps]									
	[MHz]			29.3	58.5	87.8	117	175.5	234	263.3	292.5	351	390
802.11ac	5210	42	AVG	14.33	14.29	14.32	14.30	14.28	14.31	14.30	14.28	14.29	12.47

Mode	Freq	Channel	Detector	802.11a Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			6	9	12	18	24	36	48	54
802.11a	5745	149	AVG	20.07	20.03	19.24	19.17	19.15	18.19	17.11	16.29
			PEAK	24.12	24.10	23.81	23.80	23.84	23.49	23.02	22.63
802.11a	5765	153	AVG	20.07	20.13	19.07	19.14	19.09	18.07	17.07	16.25
			PEAK	24.05	24.05	23.72	23.82	23.78	23.41	23.01	22.56
802.11a	5785	157	AVG	20.09	20.13	19.11	19.13	19.06	18.01	16.98	16.11
			PEAK	24.02	24.02	23.72	23.71	23.72	23.43	22.92	22.45
802.11a	5805	161	AVG	20.07	20.10	19.06	19.09	19.08	18.13	17.11	16.12
			PEAK	24.01	24.04	23.71	23.74	23.73	23.42	22.96	22.51
802.11a	5825	165	AVG	20.02	20.01	19.05	19.08	19.09	18.03	17.01	16.05
			PEAK	24.01	24.02	23.73	23.75	23.72	23.37	22.95	22.47

Mode	Freq	Channel	Detector	20MHz BW 802.11n (5GHz - 400ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
	[MHz]			7.2	14.4	21.7	28.9	43.4	57.8	65.0	72.2
802.11n	5745	149	AVG	19.23	19.34	19.32	19.16	18.26	17.14	16.20	15.23
			PEAK	24.44	24.49	24.49	24.47	24.13	23.64	23.03	22.35
802.11n	5765	153	AVG	19.28	19.26	19.23	19.20	18.19	17.05	16.15	15.18
			PEAK	24.42	24.48	24.49	24.38	24.07	23.51	22.97	22.24
802.11n	5785	157	AVG	19.17	19.18	19.24	19.22	18.08	16.96	16.15	15.11
			PEAK	24.35	24.36	24.40	24.40	23.98	23.41	22.93	22.25
802.11n	5805	161	AVG	19.23	19.22	19.23	19.21	18.26	17.05	16.25	15.28
			PEAK	24.30	24.34	24.32	24.30	24.01	23.43	22.97	22.31
802.11n	5825	165	AVG	19.25	19.26	19.23	19.22	18.21	17.01	16.26	15.26
			PEAK	24.32	24.35	24.32	24.31	23.98	23.40	22.99	22.27

Mode	Freq	Channel	Detector	20MHz BW 802.11n (5GHz - 800ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
				6.5	13.0	19.5	26.0	39.0	52.0	58.5	65.0
802.11n	5745	149	AVG	19.00	19.13	19.14	19.04	18.06	17.04	16.18	15.13
			PEAK	24.20	24.24	24.26	24.18	23.92	23.46	22.92	22.22
802.11n	5765	153	AVG	19.08	19.04	19.02	19.02	18.09	17.00	16.11	15.12
			PEAK	24.04	24.06	24.08	24.07	23.78	23.31	22.87	22.29
802.11n	5785	157	AVG	19.14	19.07	18.99	19.08	18.09	16.84	16.05	15.08
			PEAK	24.16	24.16	24.15	24.21	23.88	23.32	22.86	22.11
802.11n	5805	161	AVG	19.15	19.13	19.14	19.07	18.19	16.95	16.14	15.06
			PEAK	24.37	24.35	24.41	24.39	24.08	23.46	22.90	22.15
802.11n	5825	165	AVG	19.14	19.06	19.17	19.15	18.15	16.95	16.03	15.08
			PEAK	24.32	24.27	24.27	24.28	23.90	23.39	22.75	22.12

Mode	Freq	Channel	Detector	20MHz BW 802.11ac (5GHz - 400ns GI) Conducted Power [dBm]								
				Data Rate [Mbps]								
				MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
802.11ac	5745	149	AVG	18.90	18.98	18.94	18.98	18.02	17.01	15.98	14.92	13.93
			PEAK	23.75	23.72	23.69	23.82	23.52	23.19	22.64	21.97	21.28
802.11ac	5765	153	AVG	18.88	18.94	18.95	19.02	17.99	17.02	15.98	14.88	13.94
			PEAK	23.79	23.74	23.72	23.83	23.52	23.25	22.67	21.94	21.30
802.11ac	5785	157	AVG	18.94	18.94	18.99	18.99	18.00	16.98	16.02	14.90	13.93
			PEAK	23.77	23.67	23.65	23.87	23.48	23.14	22.69	21.92	21.31
802.11ac	5805	161	AVG	18.87	18.99	18.93	18.96	18.03	17.00	15.98	14.93	13.97
			PEAK	23.78	23.67	23.68	23.86	23.58	23.14	22.68	22.03	21.29
802.11ac	5825	165	AVG	18.87	19.00	18.93	18.94	18.06	17.06	15.94	14.89	13.92
			PEAK	23.80	23.73	23.67	23.81	23.58	23.14	22.58	21.93	21.25

Mode	Freq	Channel	Detector	20MHz BW 802.11ac (5GHz - 800ns GI) Conducted Power [dBm]								
				Data Rate [Mbps]								
				MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
802.11ac	5745	149	AVG	18.94	18.97	18.90	18.99	18.00	17.06	15.97	14.91	13.95
			PEAK	23.80	23.79	23.76	23.75	23.51	23.26	22.59	21.96	21.33
802.11ac	5765	153	AVG	18.95	19.02	18.91	19.03	18.04	17.02	15.97	14.90	13.91
			PEAK	23.69	23.78	23.62	23.76	23.47	23.22	22.69	21.99	21.24
802.11ac	5785	157	AVG	18.92	18.95	18.96	18.99	18.00	16.97	16.00	14.97	13.89
			PEAK	23.78	23.75	23.64	23.80	23.58	23.15	22.63	21.97	21.29
802.11ac	5805	161	AVG	18.87	18.99	18.96	18.97	17.98	17.02	15.94	14.89	13.93
			PEAK	23.81	23.72	23.68	23.78	23.59	23.13	22.68	22.00	21.28
802.11ac	5825	165	AVG	18.90	18.95	18.99	19.03	18.06	17.05	15.95	14.97	13.96
			PEAK	23.73	23.69	23.65	23.76	23.56	23.23	22.64	21.96	21.27

Mode	Freq	Channel	Detector	40MHz BW 802.11n (5GHz - 400ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
				15.0	30.0	45.0	60.0	90.0	120.0	135.0	150.0
802.11n	5755	151	AVG	18.72	18.69	18.56	18.63	17.63	16.72	15.53	14.47
			PEAK	23.78	23.73	23.70	23.70	23.32	22.87	22.12	21.43
802.11n	5775	155	AVG	18.72	18.67	18.72	18.69	17.60	16.67	15.65	14.32
			PEAK	23.74	23.71	23.76	23.74	23.22	22.74	22.23	21.29
802.11n	5795	159	AVG	18.69	18.67	18.71	18.57	17.67	16.71	15.51	14.43
			PEAK	23.73	23.74	23.74	23.67	23.30	22.85	22.14	21.40
802.11n	5815	163	AVG	18.57	18.73	18.72	18.70	17.64	16.69	15.67	14.38
			PEAK	23.66	23.77	23.76	23.76	23.29	22.84	22.19	21.40

Mode	Freq	Channel	Detector	40MHz BW 802.11n (5GHz - 800ns GI) Conducted Power [dBm]							
				Data Rate [Mbps]							
				13.5	27.0	40.5	54.0	81.0	108.0	121.5	135.0
802.11n	5755	151	AVG	18.55	18.54	18.54	18.55	17.65	16.63	15.48	14.52
			PEAK	23.69	23.67	23.73	23.73	23.30	22.76	22.06	21.47
802.11n	5775	155	AVG	18.58	18.59	18.55	18.58	17.64	16.72	15.56	14.37
			PEAK	23.70	23.70	23.69	23.71	23.33	22.84	22.07	21.36
802.11n	5795	159	AVG	18.71	18.73	18.74	18.52	17.63	16.68	15.62	14.38
			PEAK	23.76	23.73	23.74	23.68	23.30	22.77	22.13	21.37
802.11n	5815	163	AVG	18.66	18.69	18.67	18.64	17.70	16.62	15.64	14.31
			PEAK	23.69	23.73	23.72	23.74	23.34	22.79	22.21	21.25

Mode	Freq [MHz]	Channel	Detector	40MHz BW 802.11ac (5GHz - 400ns GI) Conducted Power [dBm]									
				Data Rate [Mbps]									
				15.0	30.0	45.0	60.0	90.0	120.0	135.0	150.0	MCS8	MCS9
802.11ac	5755	151	AVG	17.72	17.73	17.76	17.78	16.57	15.49	14.58	13.59	12.65	10.86
			PEAK	23.42	23.34	23.42	23.41	22.85	22.42	22.01	21.61	20.55	18.61
802.11ac	5775	155	AVG	17.73	17.73	17.80	17.79	16.58	15.55	14.55	13.59	12.68	10.85
			PEAK	23.36	23.38	23.37	23.38	22.82	22.42	22.02	21.65	20.48	18.72
802.11ac	5795	159	AVG	17.70	17.71	17.81	17.83	16.58	15.52	14.55	13.63	12.63	10.85
			PEAK	23.34	23.45	23.46	23.46	22.79	22.53	21.93	21.72	20.61	18.66
802.11ac	5815	163	AVG	17.77	17.75	17.73	17.75	16.56	15.54	14.62	13.65	12.70	10.85
			PEAK	23.48	23.29	23.39	23.42	22.92	22.51	21.94	21.62	20.49	18.57

Mode	Freq [MHz]	Channel	Detector	40MHz BW 802.11ac (5GHz - 800ns GI) Conducted Power [dBm]									
				Data Rate [Mbps]									
				13.5	27.0	40.5	54.0	81.0	108.0	121.5	135.0	MCS8	MCS9
802.11ac	5755	151	AVG	17.87	17.95	17.87	17.85	16.78	15.69	14.78	13.72	12.76	11.96
			PEAK	24.09	24.25	24.11	24.04	23.60	23.14	23.15	22.06	21.70	21.02
802.11ac	5775	155	AVG	17.83	17.86	17.84	17.85	16.82	15.68	14.78	13.64	12.68	11.93
			PEAK	24.05	24.09	24.00	24.02	23.63	23.10	23.11	22.01	21.73	21.05
802.11ac	5795	159	AVG	17.88	17.93	17.90	17.84	16.70	15.69	14.76	13.76	12.81	11.98
			PEAK	24.05	23.98	24.04	24.07	23.59	23.04	23.19	22.09	21.64	21.07
802.11ac	5815	163	AVG	17.82	17.76	17.76	17.85	16.80	15.63	14.78	13.66	12.79	11.89
			PEAK	24.01	24.01	24.07	23.96	23.50	23.14	23.14	22.06	21.69	20.98

Mode	Freq [MHz]	Channel	Detector	80MHz BW 802.11ac (5GHz - 400ns GI) Conducted Power [dBm]									
				Data Rate [Mbps]									
				32.5	65	97.5	130	195	260	292.5	325	MCS8	MCS9
802.11ac	5775	155	AVG	17.67	17.31	16.89	16.61	15.44	14.38	13.53	12.60	11.46	9.72
			PEAK	26.19	25.76	25.90	26.40	24.89	23.77	22.89	21.90	20.49	18.99
802.11ac	5795	159	AVG	17.59	17.19	17.01	16.63	15.32	14.27	13.69	12.56	11.50	9.59
			PEAK	26.07	25.98	26.02	26.36	25.08	23.69	22.91	21.97	20.63	18.89

Mode	Freq [MHz]	Channel	Detector	80MHz BW 802.11ac (5GHz - 800ns GI) Conducted Power [dBm]									
				Data Rate [Mbps]									
				29.3	58.5	87.8	117	175.5	234	263.3	292.5	MCS8	MCS9
802.11ac	5775	155	AVG	17.55	17.20	16.87	16.53	15.36	14.31	13.56	12.46	11.47	9.61
			PEAK	26.12	25.81	25.92	26.23	24.92	23.72	22.88	21.82	20.49	18.89
802.11ac	5795	159	AVG	17.53	17.10	16.81	16.59	15.38	14.24	13.55	12.37	11.42	9.66
			PEAK	26.22	25.67	25.86	26.22	24.91	23.79	22.93	21.79	20.46	18.80

2.4.4 Bluetooth

Technical Description

The phone under test contains a Bluetooth transmitter capable of data transmission in the 2.45 GHz ISM band.

Exposure Conditions and Test Exclusions

Mode	Type	Head-Adjacent	Dispatch/Push-to-Talk	Body-Worn Accessory	Mobile Hotspot
All Modes	Data	Excluded (1)	Excluded (1)	Excluded (1)	Excluded (1)

Notes:

- (1) Per FCC KDB 447498 D01, standalone SAR measurements of the Bluetooth transmitter in this phone were not required based on the maximum conducted power and the Bluetooth antenna-to-user separation distance. As detailed by the KDB publication, the SAR exclusion threshold for distances < 50 mm is defined by the following equation:

$$\frac{[\text{maximum power of channel, including tune – up tolerance}]_{(mW)}}{[\text{minimum test separation distance}]_{(mm)}} \times \sqrt{f_{(GHz)}} \leq 3.0$$

Based on the maximum conducted power of Bluetooth and the most conservative antenna-to-user separation distance used in testing, standalone SAR measurements for Bluetooth were not required.

$$\frac{[10.728]_{(mW)}}{[10]_{(mm)}} \times \sqrt{2.44_{(GHz)}} = 1.7 \leq 3.0$$

Note that simultaneous SAR evaluations include estimations for Bluetooth SAR, as detailed in section 4.7 below.

Conducted Power Measurements

Frequency [MHz]	Data Rate [Mbps]	Channel Number	Peak Conducted Power [mW]
2402	1.0	0	5.879
2441	1.0	39	7.649
2480	1.0	78	8.011
2402	2.0	0	7.451
2441	2.0	39	9.694
2480	2.0	78	10.139
2402	3.0	0	7.881
2441	3.0	39	10.252
2480	3.0	78	10.728

Frequency [MHz]	Mode	Channel Number	Peak Conducted Power [mW]
2402	LE	0	5.860
2441	LE	39	7.396
2480	LE	78	8.011

2.4.5 Near-Field Communications

Technical Description

This device contains an integrated Near Field Communications (NFC) module.

Test Exclusion Evaluation

Evaluation of SAR test requirements for the NFC transmitter was performed per the guidance in FCC KDB 447498, FCC KDB 865664 and FCC KDB 648474. FCC KDB 865664 specifies that the FCC SAR test requirements are applicable to 100 MHz - 6 GHz only, but states that numerical SAR simulation may be appropriate for transmit frequencies below 100 MHz. Additionally, KDB 447498 provides guidance on test exclusion based on maximum transmit power capabilities, which this NFC transmitter falls into. Finally, KDB 648474 states that "phones with built-in NFC, wireless charging or similar functions that do not require separate SAR testing for these specific capabilities can generally be tested according to the normally required SAR measurement procedures. The SAR influence of the additional accessory hardware and functionality to the transmitters and antennas that require SAR Testing are considered during the required SAR testing; therefore, it is transparent to the testing process." Therefore, no SAR measurements of the NFC transmitter are required.

2.5 Transmitter power reduction conditions and modes

The phone utilizes reduced limits for the maximum transmit power for its transmitters when operating under the following noted conditions to ensure SAR exposure compliance is maintained. Tables of the reduced limits used for testing are given below. A complete description of this functionality is provided in the “Operational Description” contained within Exhibit 12. The implementation to trigger the reduction in power requires the device to be radiating, which prevents conducted power measurements of this functionality without modification to the unit.

While operating in body-adjacent exposure configurations during a mobile hotspot session, a reduced maximum power limit is enforced on the CDMA 1900 transmitters. Tables of the reduced limits used for testing are given below.

Mode(s) of Operation	CDMA 1900
Channel Ranges	25-1175
Maximum Output Power Setting (dBm)	25
Reduced Maximum Output Power Setting (dBm)	18

2.6 Accessories for the Device Under Test

2.6.1 Body-Worn Carry Accessories

There are no body-worn accessories available for this phone at the time of testing thus the device was tested per the Supplement C testing guidelines for devices that do not have body-worn accessories. A separation distance of 25 mm between the device and the flat phantom was used for testing body-worn accessory SAR. The chosen separation distance of 25 mm is utilized in order to support any case or holder accessories offered or to be offered by Motorola for this product. The device was tested with the front and back of the device facing the phantom. Both sides of the device were tested for Body SAR for the purpose of including the SAR evaluation for body-worn accessories that support the device with either side facing the user.

3 Test Equipment Used

3.1 Dosimetric Measurement System

The Motorola Mobility ADR Test Services Laboratory utilizes a DASY52™ Dosimetric Assessment System manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All SAR measurements are taken within a shielded enclosure. The overall 10 g RSS uncertainty of the measurement system is $\pm 11\%$ (K=1) with an expanded uncertainty of $\pm 22\%$ (K=2). The overall 1 g RSS uncertainty of the measurement system is $\pm 11\%$ (K=1) with an expanded uncertainty of $\pm 22\%$ (K=2). The measurement uncertainty budget is given in Appendix 5. Per IEEE 1528, this uncertainty budget is applicable to the SAR range of 0.4 W/kg to 10 W/kg.

The list of calibrated equipment used for the measurements is shown in the following table. All equipment was brought into service and used only during its noted calibration period, except where indicated. Equipment without a calibration period was in service for the entirety of the test period.

Description	Serial Number	Cal Date	Cal Due Date	Service Notes
DASY™ DAE V1	656	7-Feb-2013	7-Feb-2014	Measurement System 1
E-Field Probe ES3DV3	3180	11-Feb-2013	11-Feb-2014	Measurement System 1
Twin SAM Phantom V4.0	TP-1156			Measurement System 1
Twin SAM Phantom V4.0	TP-1319			Measurement System 1
MFP V5.1 C Triple Modular Flat Phantom	1101			Measurement System 1
DASY™ DAE V1	376	3-Sep-2012	3-Sep-2013	Measurement System 2
E-Field Probe ES3DV3	3124	20-Aug-2012	20-Aug-2013	Measurement System 2
Twin SAM Phantom V4.0	TP-1235			Measurement System 2
Twin SAM Phantom V4.0	TP-1136			Measurement System 2
MFP V5.1 C Triple Modular Flat Phantom	1102			Measurement System 2
DASY™ DAE V1	784	6-Mar-2013	6-Mar-2014	Measurement System 3
E-Field Probe EX3DV4	3730	24-Aug-2012	24-Aug-2013	Measurement System 3
E-Field Probe ES3DV3	3282	21-Jan-2013	21-Jan-2014	Measurement System 3
Twin SAM Phantom V4.0	TP-1106			Measurement System 3
Twin SAM Phantom V4.0	TP-1153			Measurement System 3
MFP V5.1 C Triple Modular Flat Phantom	1103			Measurement System 3
DASY™ DAE V1	703	11-Sep-2012	11-Sep-2013	Measurement System 4
E-Field Probe ES3DV3	3037	13-Sep-2012	13-Sep-2013	Measurement System 4
Twin SAM Phantom V4.0	TP-1132			Measurement System 4
Twin SAM Phantom V4.0	TP-1162			Measurement System 4
MFP V5.1 C Triple Modular Flat Phantom	1104			Measurement System 4
Dipole Validation Kit, D750V3	1040	10-Aug-2011	10-Aug-2012	Calibration extension, see note.
Dipole Validation Kit, D835V2	422tr	18-Mar-2011	18-Mar-2012	Calibration extension, see note.
Dipole Validation Kit, D1800V2	2d190	5-Jan-2012	5-Jan-2013	Calibration extension, see note.
Dipole Validation Kit, D1800V2	2d191	5-Jan-2012	5-Jan-2013	Calibration extension, see note.
Dipole Validation Kit, D1800V2	259tr	20-Oct-2011	20-Oct-2012	Calibration extension, see note.
Dipole Validation Kit, D2450V2	740	7-Feb-2012	7-Feb-2013	Calibration extension, see note.
Dipole Validation Kit, D5GHzV2	1088	20-May-2011	20-May-2012	Calibration extension, see note.

Note: Per FCC KDB 450824 D02, evaluation for the extension of the dipole calibration was carried out. Results are provided in Appendix 7 in addition to the original calibration certificate.

3.2 Additional Equipment

Description	Serial Number	Cal Date	Cal Due Date	Service Notes
Signal Generator HP8648C	3847A04810	26-Sep-2011	26-Sep-2013	
Power Meter E4419B	GB39511090	12-Aug-2011	12-Aug-2013	
Power Sensor #1 - E9301A	US39211009	28-Aug-2012	28-Aug-2013	
Power Sensor #2 - E9301A	US39211013	2-Nov-2012	2-Nov-2013	
Signal Generator HP8648C	3847M01245	23-Aug-2011	23-Aug-2013	
Power Meter E4419B	GB39511087	28-Aug-2012	28-Aug-2014	
Power Sensor #1 - E9301A	US39210915	14-Jan-2013	14-Jan-2014	
Power Sensor #2 - E9301A	US39210916	14-Jan-2013	14-Jan-2014	
Signal Generator HP8648C	3847A04632	13-Aug-2011	13-Aug-2013	
Power Meter E4419B	GB39511086	4-Nov-2011	4-Nov-2013	
Power Sensor #1 - E9301A	US39211007	28-Aug-2012	28-Aug-2013	
Power Sensor #2 - E9301A	US39211008	28-Aug-2012	28-Aug-2013	
Signal Generator N5181A	MY50143026	27-Oct-2011	27-Oct-2014	
Power Meter E4419B	GB39511088	11-Aug-2011	11-Aug-2013	
Power Sensor #1 - E9301A	US39210929	27-Jul-2012	27-Jul-2013	
Power Sensor #2 - E9301A	US39210930	27-Jun-2012	27-Jun-2013	
Network Analyzer E5071C	MY46212851	10-May-2012	10-May-2013	
Dielectric Probe Kit DAK-3.5	1072			

3.3 Test System Validations

Per [5] and FCC KDB 865664 D01, each SAR system (including probes, system components, and software) used for device testing was validated against its performance specifications prior to deployment. These validation measurements are taken to ensure the accuracy of device test results. Validation measurements utilize reference dipoles and the required tissue-equivalent media, and include assessments of system sensitivity, probe linearity, and probe isotropy. Per FCC KDB 865664 D02, a tabulated summary of the validation results for each SAR system used in testing is given below.

DASY52™ Measurement System 1										
System Validation Measurements										
Probe	Tissue Type	f (MHz)	CW Validations				Modulated Validations			
			Date	Dielectric Parameters			Date	Mod. Type	Dielectric Parameters	
				Measured σ (S/m)	Measured ϵ_r	Result			Measured σ (S/m)	Measured ϵ_r
3184	Head	750	1/14/2013	0.876	42.76	PASS				
3184	Head	835	1/10/2013	0.919	40.99	PASS	1/11/2013	GMSK	0.915	40.926
3184	Head	1800	1/10/2013	1.336	38.94	PASS	1/11/2013	GMSK	1.342	39.026
3184	Head	1900	1/10/2013	1.443	38.49	PASS				
3184	Head	2450	1/11/2013	1.818	37.98	PASS				
3184	Body	750	1/14/2013	0.980	54.73	PASS				
3184	Body	835	1/14/2013	0.978	53.83	PASS	1/11/2013	GMSK	0.98	53.925
3184	Body	1800	1/14/2013	1.450	52.38	PASS	1/11/2013	GMSK	1.579	51.544
3184	Body	1900	1/14/2013	1.568	52.00	PASS				
3184	Body	2450	1/14/2013	1.980	51.87	PASS				

DASY52™ Measurement System 2										
System Validation Measurements										
Probe	Tissue Type	f (MHz)	CW Validations				Modulated Validations			
			Date	Dielectric Parameters			Date	Mod. Type	Dielectric Parameters	
				Measured σ (S/m)	Measured ϵ_r	Result			Measured σ (S/m)	Measured ϵ_r
3124	Head	750	1/16/2013	0.876	42.29	PASS				
3124	Head	835	1/16/2013	0.895	39.11	PASS	1/14/2013	GMSK	0.914	40.63
3124	Head	1800	1/15/2013	1.365	38.34	PASS	1/14/2013	GMSK	1.373	39.61
3124	Head	1900	1/15/2013	1.457	38.20	PASS				
3124	Head	2450	1/16/2013	1.812	39.28	PASS				
3124	Head	2600	1/16/2013	1.971	38.77	PASS				
3124	Body	750	1/16/2013	0.967	54.55	PASS				
3124	Body	835	1/15/2013	0.989	53.55	PASS	1/15/2013	GMSK	0.99	53.547
3124	Body	1800	1/15/2013	1.448	51.40	PASS	1/14/2013	GMSK	1.45	52.38
3124	Body	1900	1/15/2013	1.568	51.03	PASS				
3124	Body	2450	1/16/2013	1.992	50.89	PASS				
3124	Body	2600	1/16/2013	2.179	50.40	PASS				

DASY52™ Measurement System 3											
System Validation Measurements											
Probe	Tissue Type	f (MHz)	CW Validations				Modulated Validations				
			Date	Dielectric Parameters			Date	Mod. Type	Dielectric Parameters		Result
				Measured σ (S/m)	Measured ϵ_r	Result			Measured σ (S/m)	Measured ϵ_r	
3730	Head	2450	1/16/2013	1.812	39.28	PASS					
3730	Head	2600	1/16/2013	1.972	38.77	PASS					
3730	Head	5200	1/15/2013	4.547	35.00	PASS					
3730	Head	5300	1/15/2013	4.663	34.79	PASS					
3730	Head	5600	1/15/2013	4.981	34.10	PASS					
3730	Head	5800	1/14/2013	5.204	33.67	PASS					
3730	Body	2450	1/16/2013	1.992	50.89	PASS					
3730	Body	2600	1/16/2013	2.179	50.40	PASS					
3730	Body	5200	1/14/2013	5.204	46.23	PASS					
3730	Body	5300	1/14/2013	5.353	46.00	PASS					
3730	Body	5600	1/14/2013	5.766	45.24	PASS					
3730	Body	5800	1/14/2013	6.061	44.77	PASS					

DASY52™ Measurement System 3											
System Validation Measurements											
Probe	Tissue Type	f (MHz)	CW Validations				Modulated Validations				
			Date	Dielectric Parameters			Date	Mod. Type	Dielectric Parameters		Result
				Measured σ (S/m)	Measured ϵ_r	Result			Measured σ (S/m)	Measured ϵ_r	
3282	Head	750	13-Feb-13	0.8832	40.41	pass					
3282	Head	835	11-Feb-13	0.917	40.16	pass	2/26/2013	GMSK	0.922	40.676	pass
3282	Head	1800	11-Feb-13	1.357	39.87	pass	2/26/2013	GMSK	1.374	39.31	pass
3282	Head	1900	11-Feb-13	1.465	39.36	pass					
3282	Head	2450	12-Feb-13	1.786	38.49	pass	3/12/2013	OFDM	1.795	37.65	pass
3282	Body	750	11-Feb-13	0.9941	53.51	pass					
3282	Body	835	11-Feb-13	0.983	52.72	pass	2/26/2013	GMSK	0.993	54.823	pass
3282	Body	1800	11-Feb-13	1.367	48.7	pass	2/26/2013	GMSK	1.443	49.96	pass
3282	Body	1900	11-Feb-13	1.475	48.27	pass					
3282	Body	2450	12-Feb-13	2.147	46.15	pass	3/12/2013	OFDM	1.999	50.5	pass

DASY52™ Measurement System 4											
System Validation Measurements											
Probe	Tissue Type	f (MHz)	CW Validations				Modulated Validations				
			Date	Dielectric Parameters			Date	Mod. Type	Dielectric Parameters		Result
				Measured σ (S/m)	Measured ϵ_r	Result			Measured σ (S/m)	Measured ϵ_r	
3037	Head	750	1/8/2013	0.861	43.20	PASS					
3037	Head	835	1/7/2013	0.936	42.10	PASS	1/10/2013	GMSK	0.936	41.632	PASS
3037	Head	1800	1/7/2013	1.352	38.58	PASS	1/8/2013	GMSK	1.345	38.568	PASS
3037	Head	1900	1/7/2013	1.459	38.05	PASS					
3037	Head	2450	1/8/2013	1.822	37.87	PASS					
3037	Head	2600	1/8/2013	1.974	37.32	PASS					
3037	Body	750	1/8/2013	0.911	54.83	PASS					
3037	Body	835	1/7/2013	0.997	53.94	PASS	1/8/2013	GMSK	1.00	54.83	PASS
3037	Body	1800	1/7/2013	1.443	52.70	PASS	1/8/2013	GMSK	1.43	52.459	PASS
3037	Body	1900	1/7/2013	1.567	52.25	PASS					
3037	Body	2450	1/8/2013	1.999	51.31	PASS					
3037	Body	2600	1/8/2013	2.177	50.77	PASS					

3.4 Test System Verifications (System Performance Checks)

System accuracy verifications of the DASY52™ were performed using the measurement equipment listed in Section 3.1. The daily system performance check occurs within the flat section of the SAM phantom.

A SAR measurement was performed to verify the measured SAR was within $\pm 10\%$ from the target SAR indicated in Appendix 7. These frequencies are within $\pm 10\%$ of the compliance test mid-band frequency as required in [1] and [5]. The test was conducted within 24 hours prior to the measurement of the phone. Recommended limits for permittivity and conductivity, specified in [5], are shown in the table below. The obtained results from the system accuracy verification are also displayed in the table below. SAR values are normalized to 1 W forward power delivered to the dipole. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values. The distributions of SAR compare well with those of the reference measurements (see Appendix 1). For frequencies below 3 GHz, the simulated tissue depth was verified to be $15.0 \text{ cm} \pm 0.5 \text{ cm}$. For frequencies above 3 GHz, the simulated tissue depth was verified to be $10 \text{ cm} \pm 0.5 \text{ cm}$. Z-axis scans showing the SAR penetration are also included in Appendix 1.

DASY52™ Measurement System 1											
System Verification Measurements for Head SAR Measurements											
f (MHz)	Description	Probe	Dipole	Measured SAR (W/kg), 1 gram	Normalized SAR (W/kg), 1 gram	Dielectric Parameters				Ambient Temp (°C)	Tissue Temp (°C)
						Measured σ (S/m)	Deviation σ (S/m)	Measured ϵ_r	Deviation ϵ_r		
835	Measured, Apr-20-2013	3180	422tr	1.83	9.15	0.9051	1.2	39.01	-6.0	21.9	19.5
	Measured, Apr-21-2013	3180	422tr	1.85	9.25	0.9193	2.3	39.15	-5.7	21.2	20.0
	Recommended Limits	3180	422tr		9.33	0.90	$\pm 10\%$	41.5	$\pm 10\%$	18-25	18-25
1800	Measured, Apr-24-2013	3180	259tr	7.70	38.5	1.382	-1.5	37.76	-5.6	22.1	20.0
	Recommended Limits	3180	259tr		38.1	1.40	$\pm 10\%$	40.0	$\pm 10\%$	18-25	18-25

DASY52™ Measurement System 2											
System Verification Measurements for Head SAR Measurements											
f (MHz)	Description	Probe	Dipole	Measured SAR (W/kg), 1 gram	Normalized SAR (W/kg), 1 gram	Dielectric Parameters				Ambient Temp (°C)	Tissue Temp (°C)
						Measured σ (S/m)	Deviation σ (S/m)	Measured ϵ_r	Deviation ϵ_r		
750	Measured, Apr-18-2013	3124	1040	1.62	8.1	0.8992	0.8	42.62	1.7	21.9	19.5
	Recommended Limits	3124	1040		8.4	0.89	$\pm 10\%$	41.9	$\pm 10\%$	18-25	18-25

DASY52™ Measurement System 3											
System Verification Measurements for Head SAR Measurements											
f (MHz)	Description	Probe	Dipole	Measured SAR (W/kg), 1 gram	Normalized SAR (W/kg), 1 gram	Dielectric Parameters				Ambient Temp (°C)	Tissue Temp (°C)
						Measured σ (S/m)	Deviation σ (%)	Measured ϵ_r	Deviation ϵ_r (%)		
2450	Measured, 10-Apr-2013	3730	740	5.42	54.2	1.788	-0.7%	37.69	-3.9%	21.6	19.8
	Recommended Limits	3730	740		52.3	1.80	$\pm 10\%$	39.2	$\pm 10\%$	18-25	18-25
5200	Measured, 05-Apr-2013	3730	1088	7.74	77.4	4.636	-0.3%	35.52	-1.3%	21.2	19.1
	Recommended Limits	3730	1088		80.2	4.65	-5%/+10%	36.0	-10%/+5%	18-25	18-25
5800	Measured, 06-Apr-2013	3730	1088	7.96	79.6	5.324	+1.0%	34.15	-3.5%	21.4	18.7
	Recommended Limits	3730	1088		79.0	5.27	-5%/+10%	35.4	-10%/+5%	18-25	18-25

DASY52™ Measurement System 4											
System Verification Measurements for Head SAR Measurements											
f (MHz)	Description	Probe	Dipole	Measured SAR (W/kg), 1 gram	Normalized SAR (W/kg), 1 gram	Dielectric Parameters				Ambient Temp (°C)	Tissue Temp (°C)
						Measured σ (S/m)	Deviation σ (S/m)	Measured ϵ_r	Deviation ϵ_r		
1800	Measured, Apr-19-2013	3037	2d191	7.63	38.2	1.361	-2.9	36.93	-7.7	21.4	19.1
	Recommended Limits	3037	2d191		39.2	1.40	$\pm 10\%$	40.0	$\pm 10\%$	18-25	18-25

DASY52™ Measurement System 1											
System Verification Measurements for Body SAR Measurements											
f (MHz)	Description	Probe	Dipole	Measured SAR (W/kg), 1 gram	Normalized SAR (W/kg), 1 gram	Dielectric Parameters				Ambient Temp (°C)	Tissue Temp (°C)
						Measured σ (S/m)	Deviation σ (S/m)	Measured ϵ_r	Deviation ϵ_r		
835	Measured, Apr-19-2013	3180	422	1.93	9.65	1.004	3.1	53.69	-2.8	21.7	19.1
	Measured, Apr-21-2013	3180	422	1.90	9.50	0.9977	3.1	51.50	-6.8	21.9	19.5
	Measured, Apr-25-2013	3180	422	1.89	9.45	1.009	4.2	52.72	-4.5	22.3	20.2
	Recommended Limits	3180	422		9.77	0.97	±10%	55.2	±10%	18-25	18-25
1800	Measured, Apr-22-2013	3180	259tr	7.67	38.4	1.416	-6.6	49.48	-7.2	22.0	19.2
	Measured, Apr-25-2013	3180	259tr	7.76	38.8	1.458	-4.0	48.67	-8.7	22.4	19.8
	Recommended Limits	3180	259tr		39.1	1.52	±10%	53.3	±10%	18-25	18-25

DASY52™ Measurement System 2											
System Verification Measurements for Body SAR Measurements											
f (MHz)	Description	Probe	Dipole	Measured SAR (W/kg), 1 gram	Normalized SAR (W/kg), 1 gram	Dielectric Parameters				Ambient Temp (°C)	Tissue Temp (°C)
						Measured σ (S/m)	Deviation σ (S/m)	Measured ϵ_r	Deviation ϵ_r		
750	Measured, Apr-17-2013	3124	1040	1.70	8.5	0.9877	2.8	53.84	-3.1	22.2	19.6
	Recommended Limits	3124	1040		8.8	0.96	±10%	55.5	±10%	18-25	18-25

DASY52™ Measurement System 3											
System Verification Measurements for Body SAR Measurements											
f (MHz)	Description	Probe	Dipole	Measured SAR (W/kg), 1 gram	Normalized SAR (W/kg), 1 gram	Dielectric Parameters				Ambient Temp (°C)	Tissue Temp (°C)
						Measured σ (S/m)	Deviation σ (%)	Measured ϵ_r	Deviation ϵ_r (%)		
1800	Measured, Apr-18-2013	3282	2d190	7.68	38.4	1.581	4.0	49.84	-6.5	22.0	19.4
	Measured, Apr-19-2013	3282	2d190	7.64	38.2	1.452	-4.7	49.19	-7.8	21.8	18.6
	Recommended Limits	3282	2d190		37.8	1.52	±10%	53.3	±10%	18-25	18-25
2450	Measured, 11-Apr-2013	3730	740	5.15	51.5	1.990	+2.1%	50.29	-4.6%	21.7	19.8
	Recommended Limits	3730	740		49.5	1.95	±10%	52.7	±10%	18-25	18-25
5200	Measured, 06-Apr-2013	3730	1088	7.51	75.1	5.285	-0.3%	46.78	-4.5%	21.2	18.4
	Recommended Limits	3730	1088		75.5	5.30	-5%/+10%	49.0	-10%/+5%	18-25	18-25
5800	Measured, 06-Apr-2013	3730	1088	7.21	72.1	6.183	+3.1%	45.32	-6.0%	21.4	18.6
	Recommended Limits	3730	1088		75.4	6.00	-5%/+10%	48.2	-10%/+5%	18-25	18-25

3.5 Simulated Tissue Dielectric Properties

Validation, System Performance Check, and device SAR measurements are performed using the DASY52™ system along with liquids specified to simulate head and body tissues subjected to electromagnetic exposure. The list of ingredients and the percent composition of the tissue-simulating liquids used for testing are indicated in the following table.

Ingredient	782 / 835 / 900 MHz Head	782 / 835 / 900 MHz Body	1800 MHz / 1900 MHz Head	1800 MHz / 1900 MHz Body	2450 MHz Head	2450 MHz Body	5 GHz Head	5 GHz Body
Sugar	57.0	44.9	--	--	--	--	--	--
DGBE	--	--	47.0	30.8	6.89	8.0	--	--
Water	40.45	53.06	52.62	68.8	57.95	71.8	65.52	78.66
Salt	1.45	0.94	0.38	0.4	0.15	0.2	--	--
HEC	1.0	1.0	--	--	--	--	--	--
Bact.	0.1	0.1	--	--	--	--	--	--
Triton X-100	--	--	--	--	35.02	20.0	17.24	10.67
Di(ethylene glycol) Hexyl Ether	--	--	--	--	--	--	17.24	10.67

Prior to conducting SAR measurements, the relative permittivity, ϵ_r , and conductivity, σ , of the tissue-simulating liquids were measured with a SPEAG™ DAK-3.5 Dielectric Assessment Kit across the frequency ranges of interest. These values, along with recommended targets, percent deviation from the targets, and the temperature of the simulated tissue are shown in the tables below.

For SAR measurements, the dielectric measurements from the DAK-3.5 are imported into the DASY software which performs interpolation to determine the dielectric parameters at the specific frequencies used for device testing. The DASY software also implements SAR error compensation algorithms to automatically correct the measured SAR results for deviations between the measured and target dielectric parameters. This error compensation has been verified by the lab to meet the requirements in FCC KDB 865664 D01. Therefore, where frequencies of test fall within ± 50 MHz of a calibration point of the probe used for test, the acceptable range of tissue variation is $\pm 10\%$ per FCC KDB 865664 D01 section 2.4. For test frequencies outside of ± 50 MHz of a probe calibration point, the range of tissue variation is reduced per section 2.6 part 2 of the same KDB, to ensure that tissues used in testing are within the required specification regardless of device performance. A mass density of $\rho = 1 \text{ g/cm}^3$ was entered into the system for all cases. It can be seen that the measured parameters are within tolerance of the recommended targets specified in [1] and [5].

Head Simulated-Tissue Dielectric Parameters									
Index	Date Measured	f (MHz)	Target σ (S/m)	Target ϵ_r	Measured σ (S/m)	Deviation σ (%)	Measured ϵ_r	Deviation ϵ_r (%)	Temp (°C)
710	Apr-18-2013	699.6	0.89 ±10%	42.20 ±10%	0.86	-3.4%	43.0	1.9%	20.1
		710.0	0.89 ±10%	42.15 ±10%	0.87	-2.3%	42.9	1.9%	
		716.0	0.89 ±10%	42.12 ±10%	0.87	-2.4%	42.9	1.8%	
835	Apr-20-2013	820.0	0.90 ±10%	41.58 ±10%	0.89	-1.0%	39.2	-5.8%	20.3
		835.0	0.90 ±10%	41.50 ±10%	0.91	1.2%	39.0	-6.0%	
		849.0	0.92 ±10%	41.50 ±10%	0.92	0.6%	38.9	-6.4%	
	Apr-21-2013	820.0	0.90 ±10%	41.58 ±10%	0.91	1.3%	39.4	-5.4%	20.7
		835.0	0.90 ±10%	41.50 ±10%	0.92	2.3%	39.2	-5.7%	
		849.0	0.92 ±10%	41.50 ±10%	0.93	1.7%	39.0	-6.1%	
1730	Apr-19-2013	1709.0	1.35 -5%/+10%	40.13 -10%/+5%	1.35	0.2%	37.5	-6.5%	19.8
		1730.0	1.36 -5%/+10%	40.10 -10%/+5%	1.38	1.5%	37.4	-6.8%	
		1755.0	1.37 -5%/+10%	40.06 -10%/+5%	1.40	1.9%	37.3	-7.0%	
1880	Apr-24-2013	1850.0	1.40 ±10%	40.00 ±10%	1.44	2.9%	37.5	-6.4%	19.6
		1880.0	1.40 -5%/+10%	40.00 -10%/+5%	1.47	5.0%	37.3	-6.8%	
		1915.0	1.40 -5%/+10%	40.00 -10%/+5%	1.51	7.9%	37.1	-7.3%	
2450	10-Apr-2013	2412.0	1.77 ±10%	39.27 ±10%	1.75	-1.0%	37.8	-3.8%	20.0
		2450.0	1.80 ±10%	39.20 ±10%	1.79	-0.6%	37.7	-3.9%	
		2462.0	1.81 ±10%	39.18 ±10%	1.80	-0.8%	37.7	-3.9%	
5500	05-Apr-2013	5180.0	4.63 -5%/+10%	36.02 -10%/+5%	4.61	-0.5%	35.6	-1.3%	20.0
		5500.0	4.96 -5%/+10%	35.65 -10%/+5%	4.98	0.5%	34.8	-2.4%	
		5825.0	5.30 -5%/+10%	35.36 -10%/+5%	5.36	1.3%	34.1	-3.6%	

Body Simulated-Tissue Dielectric Parameters									
Index	Date Measured	f (MHz)	Target σ (S/m)	Target ϵ_r	Measured σ (S/m)	Deviation σ (%)	Measured ϵ_r	Deviation ϵ_r (%)	Temp (°C)
710	Apr-17-2013	699.6	0.96 ±10%	55.73 ±10%	0.95	-1.0%	54.1	-3.0%	20.2
		710.0	0.96 ±10%	55.69 ±10%	0.96	-0.1%	54.0	-3.0%	
		716.0	0.96 ±10%	55.66 ±10%	0.97	1.0%	54.0	-3.0%	
835	Apr-19-2013	820.0	0.97 ±10%	55.26 ±10%	0.91	1.3%	40.7	-2.3%	20.3
		835.0	0.97 ±10%	55.20 ±10%	0.93	3.4%	40.5	-2.5%	
		849.0	0.99 ±10%	55.16 ±10%	0.94	2.8%	40.3	-2.9%	
	Apr-21-2013	820.0	0.97 ±10%	55.26 ±10%	0.91	1.3%	39.4	-5.4%	20.1
		835.0	0.97 ±10%	55.20 ±10%	0.92	2.3%	39.2	-5.7%	
		849.0	0.99 ±10%	55.16 ±10%	0.93	1.7%	39.0	-6.1%	
	Apr-25-2013	820.0	0.97 ±10%	55.26 ±10%	0.93	3.5%	41.1	-1.3%	20.5
		835.0	0.97 ±10%	55.20 ±10%	0.94	4.5%	40.9	-1.6%	
		849.0	0.99 ±10%	55.16 ±10%	0.96	5.0%	40.7	-2.0%	
1730	Apr-18-2013	1709.0	1.47 -5%/+10%	53.55 -10%/+5%	1.48	1.0%	50.2	-6.3%	19.1
		1730.0	1.48 -5%/+10%	53.50 -10%/+5%	1.50	1.4%	50.1	-6.3%	
		1755.0	1.49 -5%/+10%	53.39 -10%/+5%	1.53	2.5%	50.0	-6.3%	
	Apr-19-2013	1709.0	1.47 -5%/+10%	53.55 -10%/+5%	1.49	1.7%	50.4	-6.0%	20.0
		1730.0	1.48 -5%/+10%	53.50 -10%/+5%	1.52	2.8%	50.3	-6.1%	
1880	Apr-22-2013	1755.0	1.49 -5%/+10%	53.39 -10%/+5%	1.55	3.9%	50.2	-6.1%	19.9
		1850.0	1.52 ±10%	53.30 ±10%	1.48	-2.7%	49.3	-7.6%	
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.51	-0.7%	49.2	-7.8%	
	Apr-25-2013	1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.56	2.7%	49.0	-8.1%	19.6
		1850.0	1.52 ±10%	53.30 ±10%	1.52	0.0%	48.5	-9.1%	
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.55	2.0%	48.4	-9.3%	
2450	11-Apr-2013	1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.60	5.3%	48.2	-9.6%	19.8
		2412.0	1.91 ±10%	52.75 ±10%	1.94	1.4%	50.4	-4.4%	
		2450.0	1.95 ±10%	52.70 ±10%	1.99	2.1%	50.3	-4.6%	
5500	05-Apr-2013	2462.0	1.97 ±10%	52.68 ±10%	2.00	1.7%	50.3	-4.7%	19.0
		5180.0	5.28 -5%/+10%	49.05 -10%/+5%	5.25	-0.6%	46.8	-4.6%	
		5500.0	5.65 -5%/+10%	48.61 -10%/+5%	5.73	1.4%	46.0	-5.4%	
	06-Apr-2013	5825.0	6.03 -5%/+10%	48.17 -10%/+5%	6.22	3.2%	45.3	-6.1%	19.0
		5180.0	5.28 -5%/+10%	49.05 -10%/+5%	5.31	0.6%	46.4	-5.5%	
		5500.0	5.65 -5%/+10%	48.61 -10%/+5%	5.77	2.2%	45.5	-6.4%	
		5825.0	6.03 -5%/+10%	48.17 -10%/+5%	6.27	4.0%	44.7	-7.2%	

4 Test Setup Information, SAR Measurement Results, and Analysis

4.1 Overview of Test Setup and Results

The phone was tested in the exposure configurations stipulated in [1], [4], [5], [9], and per FCC KDB 941225 D06 for mobile hotspot operation. The phone was positioned into these configurations using the device holder supplied with the DASY52™ SAR measurement system. The default settings for the SAR scans are set in accordance with FCC KDB 865664 D01 for all area scan resolutions, zoom scan resolutions and volumes, and probe positioning. Please refer to the DASY52™ manual for additional information on SAR scanning procedures and algorithms used.

The SAR measurements were performed using the SAM and Flat phantoms listed in section 3.1. The same phantoms and simulated tissues were used for the system performance checks and the device SAR measurements. Consequently the Z-axis scans included in Appendix 1 are applicable for verification of the required simulated tissue depths of 15.0 cm ± 0.5 cm for frequencies less than 3 GHz, or 10.0 cm ± 0.5 cm for frequencies greater than 3 GHz.

The SAR results shown in following tables are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to [6]. Also shown are the maximum device power, measured device power, temperature of the simulated tissue after the test, the measured drift and the scaled SAR. The exact method of scaling is:

$$\text{Scaled SAR} = (\text{Measured SAR}) * 10^{\left(\frac{(\text{Maximum Power}) - (\text{Measured Power})}{10}\right)} * 10^{\left(\frac{-\text{Drift}}{10}\right)}$$

The SAR reported at the end of the measurement process by the DASY52™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test. Note that measured SAR is scaled only in the manner which results in a more conservative scaled value, i.e. to a higher SAR value as a consequence of measured power being below the maximum allowed power, or for negative drift values.

Per FCC KDB 447498 D01, area-scan based 1 g SAR estimation was used for initial testing in all combinations of device modes and exposure conditions. The highest SAR measurements for each combination of device mode and exposure condition, and all conditions where the area scan estimation reported values greater than 1.2 W/kg, were further evaluated with a zoom scan. When operating conditions for the SAR system verifications did not demonstrate that the verification area scan 1 g SAR estimation resulted in values within 3% of zoom scan 1 g SAR, zoom scans were executed for all SAR tests.

The test conditions that produced the highest SAR values for each combination of DUT mode and exposure condition are indicated as **bold** numbers in the following tables. Plots of these tests are included in Appendices 2 through 4.

4.2 Head-Adjacent Exposure Results

Left Cheek-Touch Position											
Mode	Channel	f (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
			Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
LTE B12, 10 MHz BW QPSK (1 RB @ Mid)	23095	707.5	24.0	23.81	19.5	-0.150	0.239	0.26	0.317	0.34	A-43
LTE B12, 10 MHz BW QPSK (50% RB @ Low)	23095	707.5	23.0	22.93	19.5	0.120	0.159	0.16	0.212	0.22	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	20525	836.5	24.0	23.85	19.6	-0.180	0.396	0.43	0.529	0.57	A-44
LTE B5, 10 MHz BW QPSK (50% RB @ Low)	20525	836.5	23.0	22.75	19.5	0.200	0.261	0.28	0.351	0.37	
LTE B4, 20 MHz BW QPSK (1 RB @ High)	20175	1732.5	24.0	24.10	18.8	-0.100	0.148	0.15	0.233	0.24	
LTE B4, 20 MHz BW QPSK (50% RB @ High)	20175	1732.5	23.0	22.66	18.8	0.180	0.106	0.11	0.167	0.18	
CDMA 800, RC3 SO55	1013	824.7	25.0	24.64	20	-0.08	0.331	0.37	0.437	0.48	
CDMA 1900, RC3 SO55	1175	1908.8	25.0	24.78	18.8	-0.49	0.202	0.24	0.335	0.39	
CDMA 1900, TDSO SO32 (+FCH-SCH) Mode	25	1851.3	25.0	24.71	18.8	-0.40	0.424	0.50	0.677	0.79	A-47
802.11b, 1 Mbps	6	2437		19.16	19.2	0.19	0.129	0.13	0.249	0.25	
			15.0		19.3	0.08	0.062	0.06	0.126	0.13	
802.11a, 6 Mbps	36	5180		15.56	18.5	-0.10	0.0903	0.09	0.265	0.27	
802.11a, 6 Mbps	157	5785		20.09	18.5	-0.12	0.053	0.05	0.182	0.19	
			15.0		18.7	-0.30	0.0574	0.06	0.157	0.17	

Table 4-1: SAR measurement results in a head-adjacent position against the ICNIRP and ANSI SAR Limit.

Right Cheek-Touch Position											
Mode	Channel	f (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
			Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
LTE B12, 10 MHz BW QPSK (1 RB @ Mid)	23095	707.5	24.0	23.81	19.5	-0.010	0.161	0.17	0.210	0.22	
LTE B12, 10 MHz BW QPSK (50% RB @ Low)	23095	707.5	23.0	22.93	19.5	0.070	0.118	0.12	0.154	0.16	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	20525	836.5	24.0	23.85	19.6	-0.130	0.230	0.25	0.305	0.33	
LTE B5, 10 MHz BW QPSK (50% RB @ Low)	20525	836.5	23.0	22.75	19.6	0.050	0.188	0.20	0.249	0.26	
LTE B4, 10 MHz BW QPSK (50% RB @ Mid)	20175	1732.5	24.0	24.10	18.7	0.000	0.204	0.20	0.319	0.32	A-45
LTE B4, 10 MHz BW QPSK (50% RB @ High)	20175	1732.5	23.0	22.66	18.8	0.210	0.146	0.16	0.228	0.25	
CDMA 800, RC3 SO55	1013	824.7	25.0	24.64	20.0	0.01	0.41	0.45	0.547	0.59	A-46
CDMA 800, TDSO SO32 (+FCH- SCH) Mode	1013	824.7	25.0	24.57	20.0	0.00	0.378	0.42	0.506	0.56	
CDMA 1900, RC3 SO55	1175	1908.8	25.0	24.78	18.9	0.24	0.209	0.22	0.352	0.37	
802.11b, 1 Mbps	1	2412		17.03	19.2	-0.16	0.333	0.35	0.711	0.74	
	6	2437		19.16	19.3	-0.08	0.360	0.37	0.800	0.81	
	11	2462		18.31	19.2	-0.18	0.398	0.41	0.879	0.92	A-48
	6	2437	15.0		19.3	-0.01	0.182	0.18	0.416	0.42	
802.11a, 6 Mbps	40	5200		15.56	18.5	-0.191	0.123	0.13	0.379	0.40	A-49
802.11a, 6 Mbps	157	5785		20.09	18.6	-0.23	0.069	0.07	0.203	0.21	A-50
			15.0		18.7	-0.18	0.0321	0.03	0.101	0.11	

Table 4-2: SAR measurement results in a head-adjacent position against the ICNIRP and ANSI SAR Limit.

Left 15° Tilt Position											
Mode	Channel	f (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
			Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
LTE B12, 10 MHz BW QPSK (1 RB @ Mid)	23095	707.5	24.0	23.81	19.5	-0.040	0.135	0.14	0.172	0.18	
LTE B12, 10 MHz BW QPSK (50% RB @ Low)	23095	707.5	23.0	22.93	19.5	-0.060	0.090	0.09	0.115	0.12	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	20525	836.5	24.0	23.85	19.6	0.040	0.158	0.16	0.208	0.22	
LTE B5, 10 MHz BW QPSK (50% RB @ Low)	20525	836.5	23.0	22.75	19.5	-0.100	0.108	0.12	0.143	0.15	
LTE B4, 10 MHz BW QPSK (50% RB @ Mid)	20175	1732.5	24.0	24.10	18.7	0.050	0.133	0.13	0.209	0.21	
LTE B4, 10 MHz BW QPSK (50% RB @ High)	20175	1732.5	23.0	22.66	18.8	-0.060	0.093	0.10	0.146	0.16	
CDMA 800, RC3 SO55	1013	824.7	25.0	24.64	20	0.07	0.218	0.24	0.284	0.31	
CDMA 1900, RC3 SO55	1175	1908.8	25.0	24.78	18.8	0.24	0.134	0.14	0.221	0.23	
802.11b, 1 Mbps	6	2437		19.16	19.3	-0.05	0.0873	0.09	0.171	0.17	
			15.0		19.3	0.12	0.0343	0.03	0.0661	0.07	
802.11a, 6 Mbps	40	5200		15.56	18.5	0.10	0.0679	0.07	0.308	0.31	
802.11a, 6 Mbps	157	5785		20.09	18.6	-0.19	0.0658	0.07	0.194	0.20	
			15.0		18.7	-0.13	0.041	0.04	0.138	0.14	

Table 4-3: SAR measurement results in a head-adjacent position against the ICNIRP and ANSI SAR Limit.

Right 15° Tilt Position											
Mode	Channel	f (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
			Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
LTE B12, 10 MHz BW QPSK (1 RB @ Mid)	23095	707.5	24.0	23.81	19.5	0.080	0.118	0.12	0.151	0.16	
LTE B12, 10 MHz BW QPSK (50% RB @ Low)	23095	707.5	23.0	22.93	19.5	-0.030	0.090	0.09	0.115	0.12	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	20525	836.5	24.0	23.85	19.5	-0.030	0.127	0.13	0.171	0.18	
LTE B5, 10 MHz BW QPSK (50% RB @ Low)	20525	836.5	23.0	22.75	19.6	0.160	0.100	0.11	0.134	0.14	
LTE B4, 10 MHz BW QPSK (50% RB @ Mid)	20175	1732.5	24.0	24.10	18.8	0.010	0.123	0.12	0.211	0.21	
LTE B4, 10 MHz BW QPSK (50% RB @ High)	20175	1732.5	23.0	22.66	18.8	0.110	0.085	0.09	0.146	0.16	
CDMA 800, RC3 SO55	1013	824.7	25.0	24.64	20	0.12	0.261	0.28	0.34	0.37	
CDMA 1900, RC3 SO55	1175	1908.8	25.0	24.78	18.9	-0.04	0.0989	0.11	0.174	0.18	
802.11b, 1 Mbps	6	2437		19.16	19.3	-0.09	0.158	0.16	0.339	0.35	
			15.0		19.3	-0.15	0.0772	0.08	0.165	0.17	
802.11a, 6 Mbps	40	5200		15.56	18.4	-0.20	0.0675	0.07	0.277	0.29	
802.11a, 6 Mbps	157	5785		20.09	18.6	0.09	0.049	0.05	0.171	0.17	
			15.0		19.1	0.29	0.0367	0.04	0.123	0.12	

Table 4-4: SAR measurement results in a head-adjacent position against the ICNIRP and ANSI SAR Limit.

4.3 Body-Worn Accessory Exposure Results

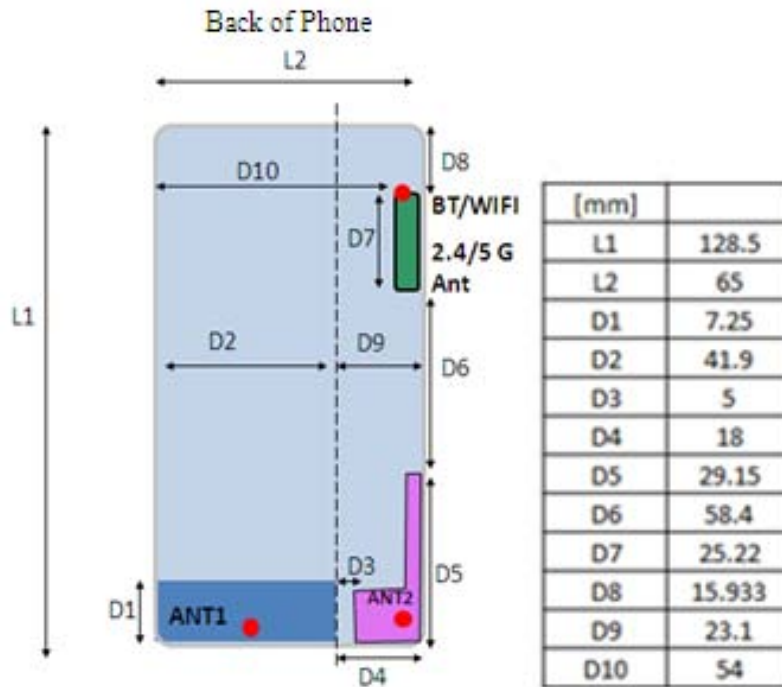
Body-Worn Accessory Position, Front of Phone 25 mm from Phantom											
Mode	Channel	f (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
			Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
LTE B12, 10 MHz BW QPSK (1 RB @ Mid)	23095	707.5	24.0	23.81	19.2	-0.190	0.063	0.07	0.083	0.09	
LTE B12, 10 MHz BW QPSK (50% RB @ Low)	23095	707.5	23.0	22.93	19.2	0.080	0.061	0.06	0.080	0.08	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	20525	836.5	24.0	23.85	18	0.110	0.126	0.13	0.168	0.17	A-53
LTE B5, 10 MHz BW QPSK (50% RB @ Low)	20525	836.5	23.0	22.75	18	0.040	0.079	0.08	0.105	0.11	
LTE B4, 10 MHz BW QPSK (50% RB @ Mid)	20175	1732.5	24.0	24.10	19.3	-0.040	0.126	0.13	0.194	0.20	A-54
LTE B4, 10 MHz BW QPSK (50% RB @ High)	20175	1732.5	23.0	22.66	19.3	0.150	0.090	0.10	0.138	0.15	
CDMA 800, RC3 SO55	1013	824.7	25.0	24.57	20.0	-0.05	0.279	0.31	0.37	0.41	A-55
CDMA 1900, RC3 SO55	25	1851.3	25.0	24.71	18.8	-0.19	0.219	0.24	0.35	0.39	
802.11b, 1 Mbps	6	2437		19.16	19.8	0.13	0.007	0.01	0.016	0.02	
802.11a, 6 Mbps	36	5180		15.56	18.4	0.02	0.0247	0.02	0.0584	0.06	
802.11a, 6 Mbps	157	5785		20.09	19.0	-0.14	0.015	0.02	0.036	0.04	

Table 4-5: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

Body-Worn Accessory Position, Back of Phone 25 mm from Phantom											
Mode	Channel	f (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
			Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
LTE B12, 10 MHz BW QPSK (1 RB @ Mid)	23095	707.5	24.0	23.81	19.5	0.080	0.105	0.11	0.139	0.15	A-52
LTE B12, 10 MHz BW QPSK (50% RB @ Low)	23095	707.5	23.0	22.93	19.5	0.070	0.066	0.07	0.088	0.09	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	20525	836.5	24.0	23.85	17.9	-0.040	0.105	0.11	0.140	0.15	
LTE B5, 10 MHz BW QPSK (50% RB @ Low)	20525	836.5	23.0	22.75	17.9	0.030	0.068	0.07	0.090	0.10	
LTE B4, 10 MHz BW QPSK (50% RB @ Mid)	20175	1732.5	24.0	24.10	19.1	-0.280	0.102	0.11	0.155	0.17	
LTE B4, 10 MHz BW QPSK (50% RB @ High)	20175	1732.5	23.0	22.66	19.1	0.050	0.070	0.08	0.106	0.11	
CDMA 800, RC3 SO55	1013	824.7	25.0	24.57	20	-0.02	0.25	0.28	0.331	0.37	
CDMA 1900, RC3 SO55	25	1851.3	25.0	24.71	18.8	-0.08	0.314	0.34	0.504	0.55	A-56
802.11b, 1 Mbps	6	2437		19.16	19.8	-0.10	0.028	0.03	0.051	0.05	A-57
802.11a, 6 Mbps	36	5180		15.56	18.4	-0.066	0.0867	0.09	0.190	0.19	A-58
802.11a, 6 Mbps	157	5785		20.09	19.1	-0.11	0.034	0.04	0.083	0.08	A-59

Table 4-6: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

4.4 Mobile Hotspot Exposure Results



Mobile Hotspot Surfaces/Edges for SAR testing						
Mode	Front	Back	Left	Right	Top	Bottom
LTE	Yes	Yes	Yes	No	No	Yes
CDMA	Yes	Yes	Yes	Yes	No	Yes
Wi-Fi	Yes	Yes	Yes	No	Yes	No

Mobile Hotspot Position, Front of Phone 10 mm from Phantom											
Mode	Channel	f (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
			Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
LTE B12, 10 MHz BW QPSK (1 RB @ Mid)	23095	707.5	24.0	23.81	19.5	-0.220	0.182	0.20	0.238	0.26	
LTE B12, 10 MHz BW QPSK (50% RB @ Low)	23095	707.5	23.0	22.93	19.5	0.040	0.113	0.11	0.149	0.15	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	20525	836.5	24.0	23.85	18	0.080	0.259	0.27	0.433	0.45	
LTE B5, 10 MHz BW QPSK (50% RB @ Low)	20525	836.5	23.0	22.75	18	0.020	0.109	0.12	0.182	0.19	
LTE B4, 10 MHz BW QPSK (50% RB @ Mid)	20175	1732.5	24.0	24.10	19.1	0.000	0.372	0.37	0.592	0.59	
LTE B4, 10 MHz BW QPSK (50% RB @ High)	20175	1732.5	23.0	22.66	19.1	-0.040	0.250	0.27	0.398	0.43	
CDMA 800, RC3 SO55	1013	824.7	25.0	24.56	19.6	0.00	0.483	0.53	0.627	0.69	A-64
CDMA 1900, RC3 SO55	25	1851.3	18.0	18.00	19.7	0.12	0.251	0.25	0.475	0.48	
802.11b, 1 Mbps	6	2437	15.0		19.8	-0.09	0.0268	0.03	0.0526	0.05	
802.11a, 6 Mbps	157	5785	15.0		18.6	0.00	0.0200	0.02	0.0585	0.06	

Table 4-7: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

Body-Worn Accessory Position, Back of Phone 10 mm from Phantom											
Mode	Channel	f (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
			Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
LTE B12, 10 MHz BW QPSK (1 RB @ Mid)	23095	707.5	24.0	23.81	19.5	-0.010	0.211	0.22	0.286	0.30	
LTE B12, 10 MHz BW QPSK (50% RB @ Low)	23095	707.5	23.0	22.93	19.5	0.000	0.140	0.14	0.190	0.19	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	20525	836.5	24.0	23.85	17.9	-0.040	0.294	0.31	0.475	0.50	A-62
LTE B5, 10 MHz BW QPSK (50% RB @ Low)	20525	836.5	23.0	22.75	17.9	-0.120	0.130	0.14	0.209	0.23	
LTE B4, 10 MHz BW QPSK (50% RB @ Mid)	20175	1732.5	24.0	24.10	19.1	0.030	0.457	0.46	0.734	0.73	A-63
LTE B4, 10 MHz BW QPSK (50% RB @ High)	20175	1732.5	23.0	22.66	19.1	0.050	0.313	0.34	0.505	0.55	
CDMA 800, RC3 SO55	1013	824.7	25.0	24.56	19.7	-0.05	0.431	0.48	0.557	0.62	
CDMA 1900, RC3 SO55	25	1851.3	18.0	18.00	19.7	-0.20	0.309	0.32	0.599	0.63	
802.11b, 1 Mbps	6	2437	15.0		19.4	-0.01	0.0545	0.05	0.114	0.11	
802.11a, 6 Mbps	157	5785	15.0		18.7	-0.05	0.0341	0.03	0.0992	0.10	

Table 4-8: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

Body-Worn Accessory Position, Bottom Edge of Phone 10 mm from Phantom											
Mode	Channel	f (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
			Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
LTE B12, 10 MHz BW QPSK (1 RB @ Mid)	23095	707.5	24.0	23.81	19.2	-0.070	0.098	0.10	0.168	0.18	
LTE B12, 10 MHz BW QPSK (50% RB @ Low)	23095	707.5	23.0	22.93	19.2	0.050	0.059	0.06	0.101	0.10	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	20525	836.5	24.0	23.85	20	-0.050	0.203	0.21	0.341	0.36	
LTE B5, 10 MHz BW QPSK (50% RB @ Low)	20525	836.5	23.0	22.75	20	0.030	0.114	0.12	0.198	0.21	
LTE B4, 10 MHz BW QPSK (50% RB @ Mid)	20175	1732.5	24.0	24.10	19.3	-0.160	0.286	0.30	0.534	0.55	
LTE B4, 10 MHz BW QPSK (50% RB @ High)	20175	1732.5	23.0	22.66	19.3	0.060	0.200	0.22	0.373	0.40	
CDMA 800, RC3 SO55	1013	824.7	25.0	24.56	19.8	0.01	0.0869	0.10	0.152	0.17	
CDMA 1900, RC3 SO55	25	1851.3	18.0	18.00	19.7	0.01	0.408	0.41	0.820	0.82	A-65
	25	1851.3	18.0	18.00	19.7	-0.03	0.423	0.43	0.849	0.85	
	600	1880	18.0	18.00	19.6	0.15	0.363	0.36	0.733	0.73	
	1175	1908.8	18.0	18.00	19.6	0.02	0.363	0.36	0.738	0.74	

Table 4-9: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot Position, Left Edge of Phone 10 mm from Phantom											
Mode	Channel	f (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
			Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
LTE B12, 10 MHz BW QPSK (1 RB @ Mid)	23095	707.5	24.0	23.81	19.2	-0.080	0.228	0.24	0.323	0.34	A-61
LTE B12, 10 MHz BW QPSK (50% RB @ Low)	23095	707.5	23.0	22.93	19.2	-0.080	0.147	0.15	0.211	0.22	
LTE B5, 10 MHz BW QPSK (1 RB @ High)	20525	836.5	24.0	23.85	18.5	0.020	0.246	0.25	0.357	0.37	
LTE B5, 10 MHz BW QPSK (50% RB @ Low)	20525	836.5	23.0	22.75	18.5	-0.080	0.173	0.19	0.251	0.27	
LTE B4, 10 MHz BW QPSK (50% RB @ Mid)	20175	1732.5	24.0	24.10	19.3	-0.050	0.289	0.29	0.595	0.60	
LTE B4, 10 MHz BW QPSK (50% RB @ High)	20175	1732.5	23.0	22.66	19.3	-0.050	0.206	0.23	0.424	0.46	
CDMA 800, RC3 SO55	1013	824.7	25.0	24.56	20.2	0.00	0.314	0.35	0.458	0.51	
CDMA 1900, RC3 SO55	25	1851.3	18.0	18.00	18.9	-0.09	0.0206	0.02	0.0353	0.04	
802.11b, 1 Mbps	6	2437	15.0		19.4	-0.081	0.107	0.11	0.234	0.24	A-66
802.11a, 6 Mbps	157	5785	15.0		18.6	-0.020	0.050	0.05	0.164	0.16	A-67

Table 4-10: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

Body-Worn Accessory Position, Right Edge of Phone 10 mm from Phantom											
Mode	Channel	f (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
			Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
CDMA 800, RC3 SO55	1013	824.7	25.0	24.56	20.0	0.01	0.428	0.47	0.621	0.69	
CDMA 1900, RC3 SO55	25	1851.3	18.0	18.00	19.0	-0.01	0.0788	0.08	0.135	0.14	

Table 4-11: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot Position, Top Edge of Phone 10 mm from Phantom											
Mode	Channel	f (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
			Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
802.11b, 1 Mbps	6	2437	15		19.4	-0.110	0.00634	0.01	0.0141	0.01	
802.11a, 6 Mbps	157	5785	15		18.5	-0.220	0.0252	0.03	0.0715	0.08	

Table 4-12: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

4.5 Measurement Variability Analysis

Per FCC KDB 865664 D01, SAR measurement variability was assessed for each frequency band as determined by the SAR probe calibration points and tissue-equivalent mediums used for the device measurements. These additional measurements are executed after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The phone was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for these measurements, to minimize any unexpected variations in the repeated results.

SAR measurement variability was assessed using the following procedures for each frequency band:

1. If the original highest measured SAR is $< 0.8 \text{ W/kg}$, the following steps do not apply and no repeat measurements were executed.
2. If the original highest measured SAR is $\geq 0.8 \text{ W/kg}$, that measurement was repeated once.
3. If the ratio of the largest to smallest SAR for the original and first repeated measurement was > 1.2 , or if the original or first repeated measurement was $\geq 1.45 \text{ W/kg}$, the measurement was repeated a second time.
4. If the ratio of the largest to smallest SAR for the original, first repeated, or second repeated measurement was > 1.2 , and one of those measurements was $\geq 1.5 \text{ W/kg}$, the measurement was repeated a third time.

SAR Measurement Variability Results									
Mode	Exposure Condition	Channel	f (MHz)	Original Measured SAR (W/kg)	1st Repeated SAR (W/kg)	Ratio	2nd Repeated SAR (W/kg)	Ratio	3rd Repeated SAR (W/kg)
EVDO 1900	BOTTOM EDGE of Phone 10 mm away from phantom	25	1851	0.82	0.85	1.04			

Table 4-13: SAR measurement results for Variability Analysis

4.6 Description and Evaluation of Simultaneous Transmitters

Per FCC KDB 447498 D01, the necessity of simultaneous SAR testing was evaluated for the licensed and unlicensed transmitters of the phone under test.

When standalone SAR test exclusion applies to a mode and antenna that transmits simultaneously with other modes and antennas, the KDB directs that the standalone SAR of that mode must be estimated for evaluation in the SAR summations.

For simultaneous SAR evaluation, Bluetooth SAR was estimated and included in all applicable SAR summations. For Body-Worn Accessory simultaneous SAR evaluation, the value used for inclusion in these summations was found to be:

$$\frac{[10]_{(mW)}}{[25]_{(mm)}} \times \frac{\sqrt{2.44_{(GHz)}}}{7.5} = 0.1 \text{ W/kg}_{(estimated)}$$

Note that Head-Adjacent exposure configurations are not applicable to Bluetooth operation, and therefore were not considered for simultaneous evaluation. Further, Bluetooth and Wi-Fi share the same transmit path, and cannot transmit simultaneously.

A description of the power conditions or reduced limits for simultaneous transmit modes is provided in section 2.5 and in expanded detail in Exhibit 12. The notation used in the “Exposure Condition” tables is as follows for the *PWR* column:

- *MAX* indicates the transmitter in this case has no reduced power limit enforced and may operate up to its maximum power, and no conditions are contingent on this transmitter’s operation.
- *15* and *18* indicate an enforced power limit, at the value stated in dBm, on the noted transmitter for this simultaneous transmit case.

Per FCC KDB 447498 D01 section 4.3.2, when the sum of the 1 g SAR values of all simultaneously transmitting antennas and device modes in an exposure condition is within the SAR limit, that simultaneous transmission configuration may be excluded from SAR measurements. Simultaneous SAR summations for the head-adjacent, dispatch/push-to-talk, body-worn accessory, and mobile hotspot exposure conditions with the worst-case SAR transmitter configurations are presented in the following tables.

Head Exposure Conditions; Simultaneous Transmit Configurations, including Power Conditions or Reduced Limits							
Case	Transmitter #1		Transmitter #2		Transmitter #3		Notes
	Transmitter Configuration	PWR	Transmitter Configuration	PWR	Transmitter Configuration	PWR	
H1	1x CDMA 800 (Voice)	MAX	Wi-Fi 2.4 GHz (Data)	15			Voice + Background Data
H2	1x CDMA 800 (Voice)	MAX	Wi-Fi 5 GHz (Data)	15			Voice + Background Data
H3	1x CDMA 1900 (Voice)	MAX	Wi-Fi 2.4 GHz (Data)	15			Voice + Background Data
H4	1x CDMA 1900 (Voice)	MAX	Wi-Fi 5 GHz (Data)	15			Voice + Background Data
H5	LTE B12 (Data)	MAX	Wi-Fi 2.4 GHz (Data)	15			VOIP + Background Data or Mobile Hotspot
H6	LTE B12 (Data)	MAX	Wi-Fi 5 GHz (Data)	15			VOIP + Background Data or Mobile Hotspot
H7	LTE B5 (Data)	MAX	Wi-Fi 2.4 GHz (Data)	15			VOIP + Background Data or Mobile Hotspot
H8	LTE B5 (Data)	MAX	Wi-Fi 5 GHz (Data)	15			VOIP + Background Data or Mobile Hotspot
H9	LTE B4 (Data)	MAX	Wi-Fi 2.4 GHz (Data)	15			VOIP + Background Data or Mobile Hotspot
H10	LTE B4 (Data)	MAX	Wi-Fi 5 GHz (Data)	15			VOIP + Background Data or Mobile Hotspot

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)			
						Case H1	Case H2	Case H3	Case H4
Band		1x CDMA 800	1x CDMA 1900	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	1x CDMA 800 + Wi-Fi 2.4 GHz	1x CDMA 800 + Wi-Fi 5 GHz	1x CDMA 1900 + Wi-Fi 2.4 GHz	1x CDMA 1900 + Wi-Fi 5 GHz
Power Condition or Reduced Limit		MAX	MAX	15 dBm	15 dBm				
Position	Left Head Cheek	0.48	0.79	0.13	0.27	0.61	0.75	0.92	1.06
	Right Head Cheek	0.59	0.37	0.42	0.40	1.01	0.99	0.79	0.77
	Left Head 15° Tilt	0.31	0.23	0.07	0.31	0.38	0.62	0.3	0.54
	Right Head 15° Tilt	0.37	0.18	0.17	0.29	0.54	0.66	0.35	0.47

Table 4-14: SAR summations for simultaneous evaluation in Head Positions (CDMA evaluation)

		Transmitter Stand-Alone 1 g SAR Values (W/kg)					1 g SAR Summations (W/kg)					
							Case H5	Case H6	Case H7	Case H8	Case H9	Case H10
Band		LTE Band 12	LTE Band 5	LTE Band 4	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	LTE Band 12+ Wi-Fi 2.4 GHz	LTE Band 12+ Wi-Fi 5 GHz	LTE Band 5+ Wi-Fi 2.4 GHz	LTE Band 5+ Wi-Fi 5 GHz	LTE Band 4+ Wi-Fi 2.4 GHz	LTE Band 4+ Wi-Fi 5 GHz
Power Condition or Reduced Limit		MAX	MAX	MAX	15 dBm	15 dBm						
Position	Left Head Cheek	0.34	0.57	0.24	0.13	0.27	0.47	0.61	0.7	0.84	0.37	0.51
	Right Head Cheek	0.22	0.33	0.32	0.42	0.40	0.64	0.62	0.75	0.73	0.74	0.72
	Left Head 15° Tilt	0.18	0.22	0.21	0.07	0.31	0.25	0.49	0.29	0.53	0.28	0.52
	Right Head 15° Tilt	0.16	0.18	0.21	0.17	0.29	0.33	0.45	0.35	0.47	0.38	0.5

Table 4-15: SAR summations for simultaneous evaluation in Head Positions (LTE evaluation)

Body-Worn Accessory Exposure Conditions; Simultaneous Transmit Configurations, including Power Conditions or Reduced Limits							
Case	Transmitter #1		Transmitter #2		Transmitter #3		Notes
	Transmitter Configuration	PWR	Transmitter Configuration	PWR	Transmitter Configuration	PWR	
B1	1x CDMA 800 (Voice)	MAX	Wi-Fi 2.4 GHz (Data)	15			Voice + Background Data
B2	1x CDMA 800 (Voice)	MAX	Wi-Fi 5 GHz (Data)	15			Voice + Background Data
B3	1x CDMA 1900 (Voice)	MAX	Wi-Fi 2.4 GHz (Data)	15			Voice + Background Data
B4	1x CDMA 1900 (Voice)	MAX	Wi-Fi 5 GHz (Data)	15			Voice + Background Data
B5	LTE B12 (Data)	MAX	Wi-Fi 2.4 GHz (Data)	15			VOIP + Background Data
B6	LTE B12 (Data)	MAX	Wi-Fi 5 GHz (Data)	15			VOIP + Background Data
B7	LTE B5 (Data)	MAX	Wi-Fi 2.4 GHz (Data)	15			VOIP + Background Data
B8	LTE B5 (Data)	MAX	Wi-Fi 5 GHz (Data)	15			VOIP + Background Data
B9	LTE B4 (Data)	MAX	Wi-Fi 2.4 GHz (Data)	15			VOIP + Background Data
B10	LTE B4 (Data)	MAX	Wi-Fi 5 GHz (Data)	15			VOIP + Background Data
B11	1x CDMA 800 (Voice)	MAX	Bluetooth	MAX			Voice + BT (Estimated)
B12	1x CDMA 1900 (Voice)	MAX	Bluetooth	MAX			Voice + BT (Estimated)
B13	LTE B12 (Data)	MAX	Bluetooth	MAX			VOIP + BT (Estimated)
B14	LTE B5 (Data)	MAX	Bluetooth	MAX			VOIP + BT (Estimated)
B15	LTE B4 (Data)	MAX	Bluetooth	MAX			VOIP + BT (Estimated)

Note that during typical operation, the power of the transmitters is controlled in the manner described in this table. The summations given in the following tables for the Body-Worn Accessory exposure conditions are shown without power conditions or reduced limits enforced, e.g. all SAR values are for transmitters operating at their maximum power levels. As the SAR summations show results below the compliance limit using values from higher-power configurations than allowed during typical operation, compliance with those reductions employed is implied.

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)			
						Case B1	Case B2	Case B3	Case B4
Band		1x CDMA 800	1x CDMA 1900	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	1x CDMA 800 + Wi-Fi 2.4 GHz	1x CDMA 800 + Wi-Fi 5 GHz	1x CDMA 1900 + Wi-Fi 2.4 GHz	1x CDMA 1900 + Wi-Fi 5 GHz
Power Condition or Reduced Limit		MAX	MAX	MAX	MAX				
Posi tion	Front of Phone 25mm away from phantom	0.41	0.39	0.02	0.06	0.43	0.47	0.41	0.45
	Back of Phone 25mm away from phantom	0.37	0.55	0.05	0.19	0.42	0.56	0.6	0.74

Table 4-16: SAR summations for simultaneous evaluation – CDMA in Body-Worn Accessory Positions

		Transmitter Stand-Alone 1 g SAR Values (W/kg)					1 g SAR Summations (W/kg)					
							Case B5	Case B6	Case B7	Case B8	Case B9	Case B10
Band		LTE Band 12	LTE Band 5	LTE Band 4	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	LTE Band 12+ Wi-Fi 2.4 GHz	LTE Band 12+ Wi-Fi 5 GHz	LTE Band 5+ Wi-Fi 2.4 GHz	LTE Band 5+ Wi-Fi 5 GHz	LTE Band 4+ Wi-Fi 2.4 GHz	LTE Band 4+ Wi-Fi 5 GHz
Power Condition or Reduced Limit		MAX	MAX	MAX	MAX	MAX						
Posi tion	Front of Phone 25mm away from phantom	0.09	0.17	0.20	0.02	0.06	0.11	0.15	0.19	0.23	0.22	0.26
	Back of Phone 25mm away from phantom	0.15	0.15	0.17	0.05	0.19	0.2	0.34	0.2	0.34	0.22	0.36

Table 4-17: SAR summations for simultaneous evaluation – LTE in Body-Worn Accessory Positions

		Transmitter Stand-Alone 1 g SAR Values (W/kg)			1 g SAR Summations (W/kg)	
		1x CDMA 800	1x CDMA 1900	Bluetooth	Case B11	Case B12
Band		1x CDMA 800	1x CDMA 1900	Bluetooth	1x CDMA 800 + Bluetooth	1x CDMA 800 + Bluetooth
Power Condition or Reduced Limit		MAX	MAX	MAX		
Position	Front of Phone 25mm away from phantom	0.41	0.39	0.1	0.51	0.49
	Back of Phone 25mm away from phantom	0.37	0.55	0.1	0.47	0.65

Table 4-18: SAR summations for simultaneous evaluation – CDMA in Body-Worn Accessory Positions (Bluetooth)

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)		
		LTE Band 12	LTE Band 5	LTE Band 4	Bluetooth	Case B13	Case B14	Case B15
Band		LTE Band 12	LTE Band 5	LTE Band 4	Bluetooth	LTE Band 12+ Bluetooth	LTE Band 5+ Bluetooth	LTE Band 4+ Bluetooth
Power Condition or Reduced Limit		MAX	MAX	MAX	MAX			
Position	Front of Phone 25mm away from phantom	0.09	0.17	0.20	0.1	0.19	0.27	0.30
	Back of Phone 25mm away from phantom	0.15	0.15	0.17	0.1	0.25	0.25	0.27

Table 4-19: SAR summations for simultaneous evaluation – LTE in Body-Worn Accessory Positions (Bluetooth)

Mobile Hotspot Exposure Conditions; Simultaneous Transmit Configurations, including Power Conditions or Reduced Limits							
Case	Transmitter #1		Transmitter #2		Transmitter #3		Notes
	Transmitter Configuration	PWR	Transmitter Configuration	PWR	Transmitter Configuration	PWR	
M1	EVDO 800 (Data)	MAX	Wi-Fi 2.4 GHz (Data)	15			Mobile Hotspot
M2	EVDO 800 (Data)	MAX	Wi-Fi 5 GHz (Data)	15			Mobile Hotspot
M3	EVDO 1900 (Data)	18	Wi-Fi 2.4 GHz (Data)	15			Mobile Hotspot
M4	EVDO 1900 (Data)	18	Wi-Fi 5 GHz (Data)	15			Mobile Hotspot
M5	LTE B12 (Data)	MAX	Wi-Fi 2.4 GHz (Data)	15			Mobile Hotspot
M6	LTE B12 (Data)	MAX	Wi-Fi 5 GHz (Data)	15			Mobile Hotspot
M7	LTE B5 (Data)	MAX	Wi-Fi 2.4 GHz (Data)	15			Mobile Hotspot
M8	LTE B5 (Data)	MAX	Wi-Fi 5 GHz (Data)	15			Mobile Hotspot
M9	LTE B4 (Data)	MAX	Wi-Fi 2.4 GHz (Data)	15			Mobile Hotspot
M10	LTE B4 (Data)	MAX	Wi-Fi 5 GHz (Data)	15			Mobile Hotspot

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)			
Band		EVDO 800	EVDO 1900	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	Case M1	Case M2	Case M3	Case M4
Power Condition or Reduced Limit		MAX	MAX	MAX	MAX	EVDO 800 + Wi-Fi 2.4 GHz	EVDO 800 + Wi-Fi 5 GHz	1x EVDO 1900 + Wi-Fi 2.4 GHz	1x EVDO 1900 + Wi-Fi 5 GHz
Position	Front of Phone 10 mm from Phantom	0.69	0.48	0.05	0.06	0.74	0.75	0.53	0.54
	Back of Phone 10 mm from Phantom	0.62	0.63	0.11	0.10	0.73	0.72	0.74	0.73
	Left Edge of Phone 10 mm from Phantom	0.51	0.04	0.24	0.16	0.75	0.67	0.28	0.2

Table 4-20: SAR summations for simultaneous evaluation – Positions during a Mobile Hotspot session

		Transmitter Stand-Alone 1 g SAR Values (W/kg)					1 g SAR Summations (W/kg)					
Band		LTE Band 12	LTE Band 5	LTE Band 4	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	Case M5	Case M6	Case M7	Case M8	Case M9	Case M10
Power Condition or Reduced Limit		MAX	MAX	MAX	MAX	MAX	LTE Band 12+ Wi-Fi 2.4 GHz	LTE Band 12+ Wi-Fi 5 GHz	LTE Band 5+ Wi-Fi 2.4 GHz	LTE Band 5+ Wi-Fi 5 GHz	LTE Band 4+ Wi-Fi 2.4 GHz	LTE Band 4+ Wi-Fi 5 GHz
Position	Front of Phone 10 mm from Phantom	0.26	0.45	0.59	0.05	0.06	0.31	0.32	0.5	0.51	0.64	0.65
	Back of Phone 10 mm from Phantom	0.30	0.50	0.73	0.11	0.10	0.41	0.4	0.61	0.6	0.84	0.83
	Left Edge of Phone 10 mm from Phantom	0.34	0.37	0.60	0.24	0.16	0.58	0.5	0.61	0.53	0.84	0.76

Table 4-21: SAR summations for simultaneous evaluation – Positions during a Mobile Hotspot session

5 References to Test Standards and Guidance

- [1] CENELEC, EN 62209-1:2006 “Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)”
- [2] CENELEC, EN 50360:2001 “Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)”.
- [3] ANSI / IEEE, C95.1 1992 Edition “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”
- [4] FCC OET Bulletin 65 Supplement C 01-01
- [5] IEEE 1528 2003 Edition “IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”
- [6] ICNIRP Guidelines “Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz)”
- [7] IC RSS-102 “Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
- [8] IC Notice 2012-DRS1203 “RE: Applicability of Latest FCC RF Exposure KDB Procedures (Publication Date: October 24, 2012) and Other Procedures”
- [9] CENELEC, EN 62209-2:2010 “Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)”
- [10] FCC KDB Publication 248227 D01 v01r02 “SAR Measurement Procedures for 802.11 a/b/g Transmitters”
- [11] FCC KDB Publication 447498 D01 v05 “Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies”
- [12] FCC KDB Publication 648474 D04 v01 “SAR Evaluation Considerations for Wireless Handsets”
- [13] FCC KDB Publication 865664 D01 v01 “SAR Measurement Requirements for 100 MHz to 6 GHz”
- [14] FCC KDB Publication 865664 D02 v01 “RF Exposure Compliance Reporting and Documentation Considerations”
- [15] FCC KDB Publication 941225 D01 v02 “SAR Measurement Procedures for 3G Devices”
- [16] FCC KDB Publication 941225 D03 v01 “Recommended SAR Test Reduction Procedures for GSM/GPRS/EDGE”
- [17] FCC KDB Publication 941225 D05 v02r01 “SAR Evaluation Considerations for LTE Devices”
- [18] FCC KDB Publication 941225 D06 v01 “SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities”

Appendix 1

SAR Distribution Plots for Test System Verification

System Accuracy Verification Measurements for Head SAR Measurements

Date/Time: 4/18/2013 2:45:43 PM

DUT Serial: D750V3 - SN:1040**DASY Configuration:**

- Probe: ES3DV3 - SN3124; ConvF(5.07,5.07,5.07); Calibrated: 8/20/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/3/2012
- Phantom: R#2 Glycol SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1136
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 750.0 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=750$ MHz; $\sigma = 0.8992$; $\epsilon_r = 42.62$ mho/m; $\rho = 1000$ kg/m³

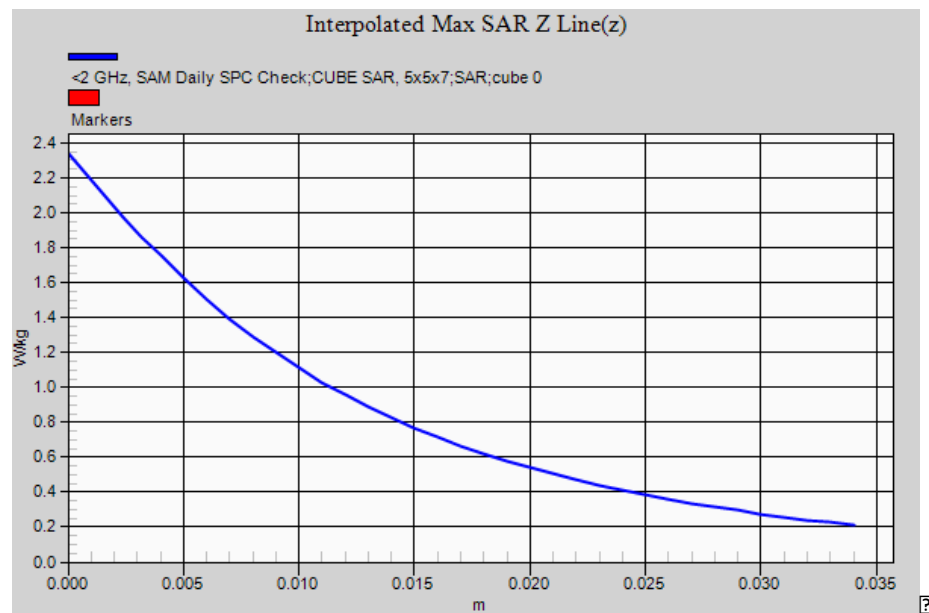
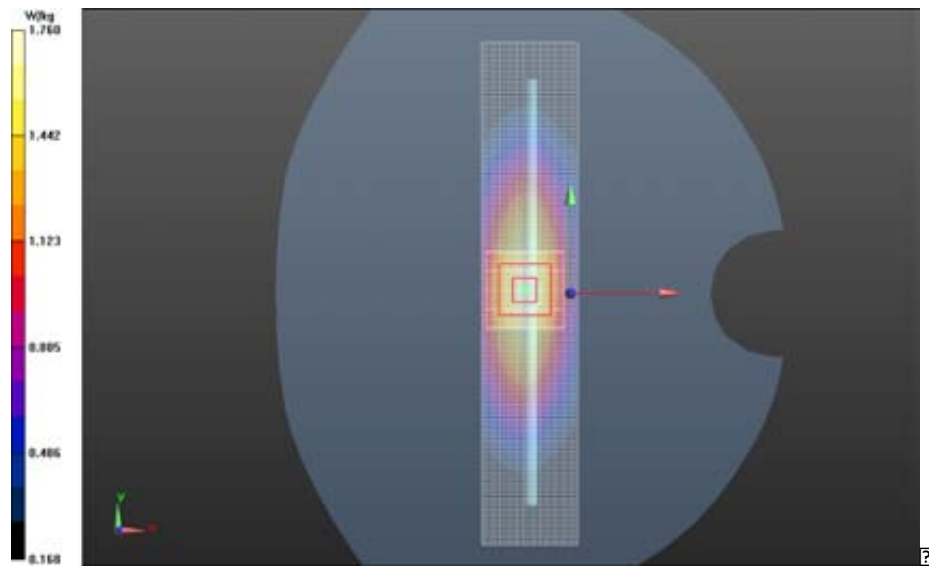
**<2 GHz, SAM Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid:
 dx=1.000 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 1.62 W/kg; SAR(10g) = 1.09 W/kg

**<2 GHz, SAM Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid:
 dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 44.635 V/m, Power Drift = 0.00473 dB

Averaged SAR: SAR(1g) = 1.62 W/kg; SAR(10g) = 1.07 W/kg



<2 GHz, SAM Daily SPC Check

Date/Time: 4/20/2013 1:47:58 PM

DUT Serial: D835V2 - SN:422tr

DASY Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#1 - Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1156
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 835.0 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=835$ MHz; $\sigma = 0.9051$; $\epsilon_r = 39.01$ mho/m; $\rho = 1000$ kg/m³

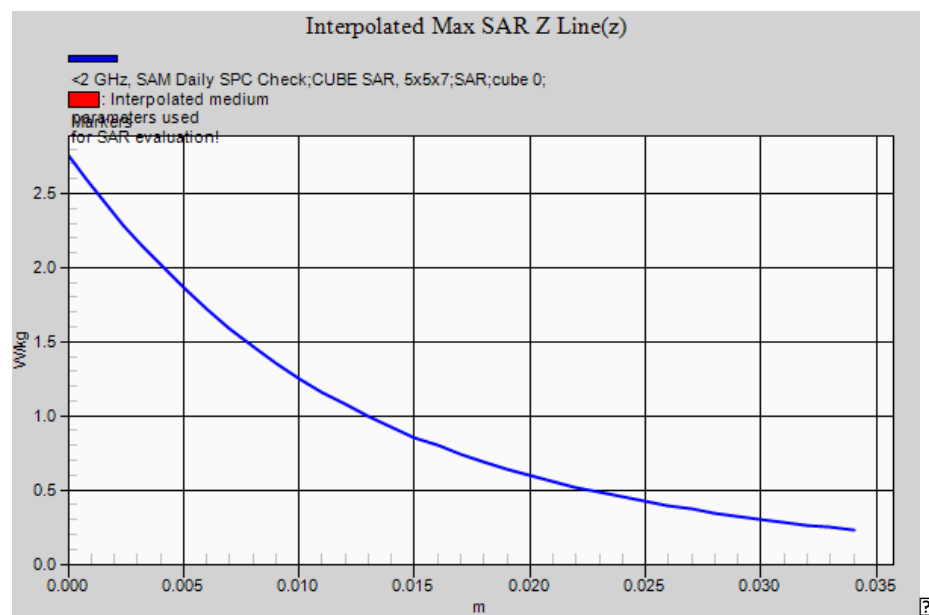
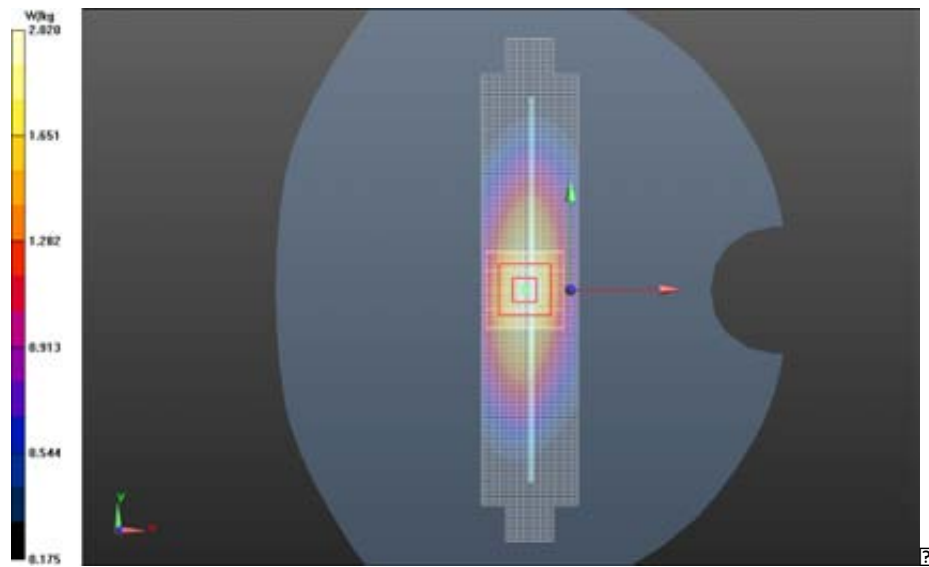
**<2 GHz, SAM Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid:
dx=1.000 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 1.85 W/kg; SAR(10g) = 1.24 W/kg

**<2 GHz, SAM Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid:
dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 48.128 V/m, Power Drift = -0.020 dB

Averaged SAR: SAR(1g) = 1.83 W/kg; SAR(10g) = 1.21 W/kg



<2 GHz, SAM Daily SPC Check

Date/Time: 4/21/2013 11:29:48 AM

DUT Serial: D835V2 - SN:422tr

DASY Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#1 - Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1156
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 835.0 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=835$ MHz; $\sigma = 0.9193$; $\epsilon_r = 39.15$ mho/m; $\rho = 1000$ kg/m³

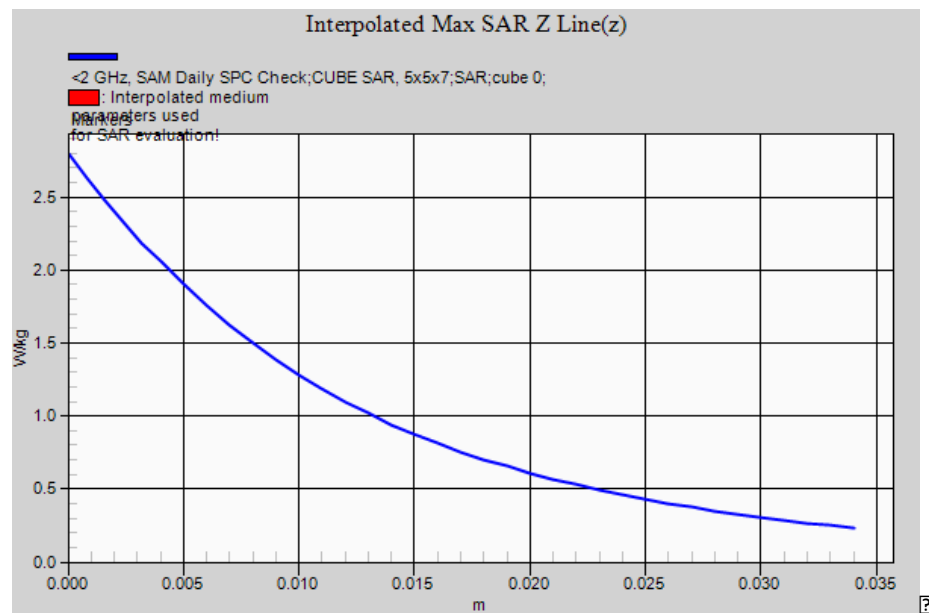
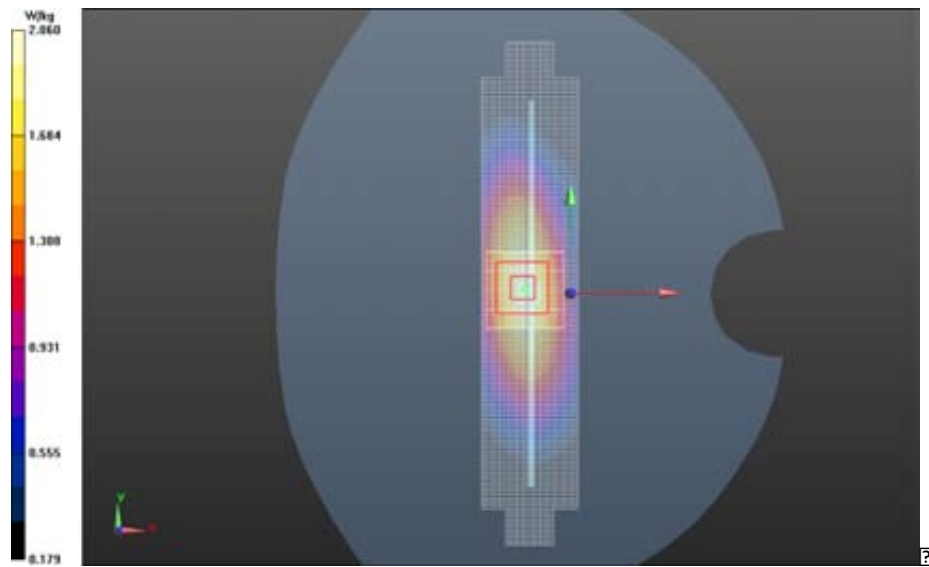
**<2 GHz, SAM Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid:
dx=1.000 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 1.86 W/kg; SAR(10g) = 1.24 W/kg

**<2 GHz, SAM Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid:
dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 47.772 V/m, Power Drift = -0.013 dB

Averaged SAR: SAR(1g) = 1.85 W/kg; SAR(10g) = 1.22 W/kg



<2 GHz, SAM Daily SPC Check

Date/Time: 4/19/2013 7:50:55 AM

DUT Serial: D1800V2 - SN:2d191

DASY Configuration:

- Probe: ES3DV3 - SN3037; ConvF(5.15,5.15,5.15); Calibrated: 9/13/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/11/2012
- Phantom: R#4 Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 1800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=1800$ MHz; $\sigma = 1.361$; $\epsilon_r = 36.93$ mho/m; $\rho = 1000$ kg/m³

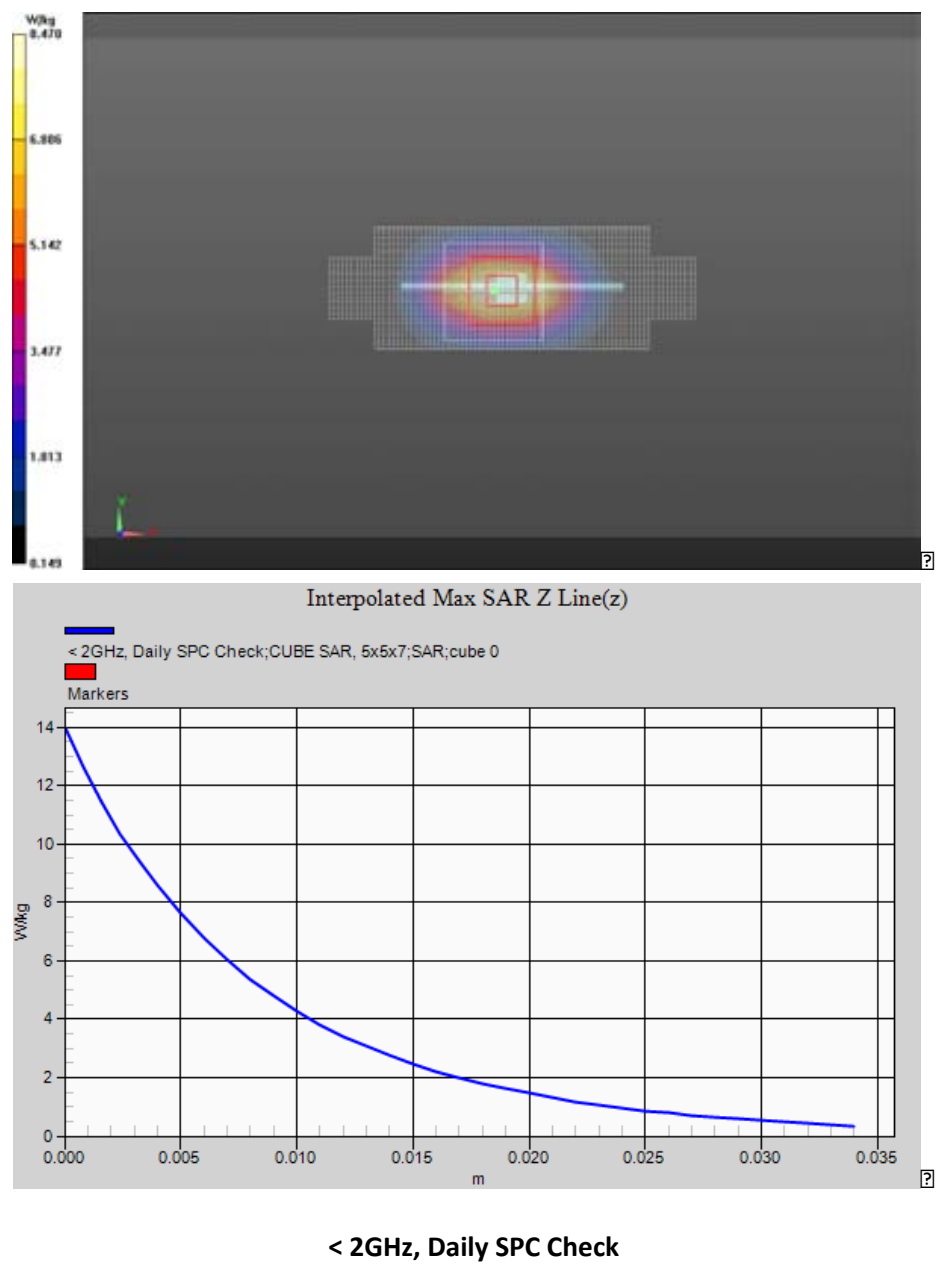
< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 7.75 W/kg; SAR(10g) = 4.19 W/kg

< 2GHz, Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 79.321 V/m, Power Drift = 0.013 dB

Averaged SAR: SAR(1g) = 7.63 W/kg; SAR(10g) = 4.02 W/kg



Date/Time: 4/24/2013 7:22:44 AM

DUT Serial: D1800V2 - SN:259tr

DASY Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 1800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=1800$ MHz; $\sigma = 1.382$; $\epsilon_r = 37.76$ mho/m; $\rho = 1000$ kg/m³

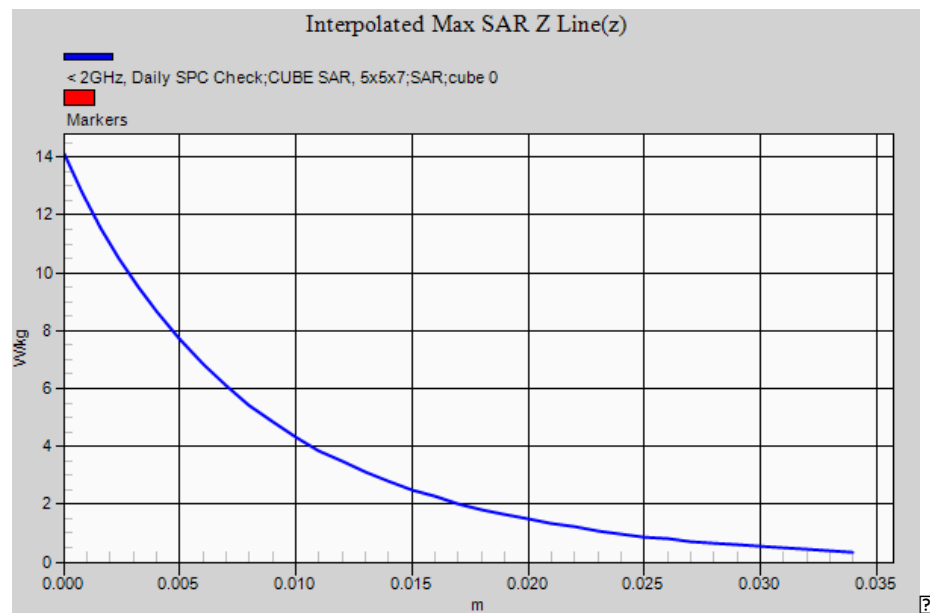
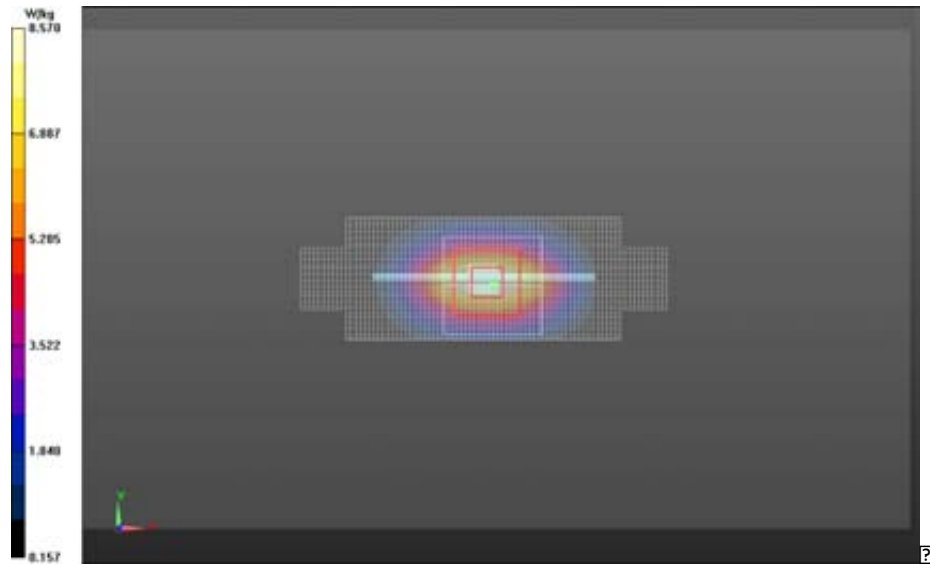
< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 7.77 W/kg; SAR(10g) = 4.23 W/kg

< 2GHz, Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 79.957 V/m, Power Drift = -0.011 dB

Averaged SAR: SAR(1g) = 7.70 W/kg; SAR(10g) = 4.07 W/kg



< 2GHz, Daily SPC Check

Date/Time: 4/10/2013 5:52:58 PM

DUT Serial: D2450V2 - SN:740

DASY Configuration:

- Probe: EX3DV4 - SN3730; ConvF(7.62,7.62,7.62); Calibrated: 8/24/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn784; Calibrated: 3/6/2013
- Phantom: R#3, 2450 WiFi SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1153
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 2450 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=2450$ MHz; $\sigma = 1.788$; $\epsilon_r = 37.69$ mho/m; $\rho = 1000$ kg/m³

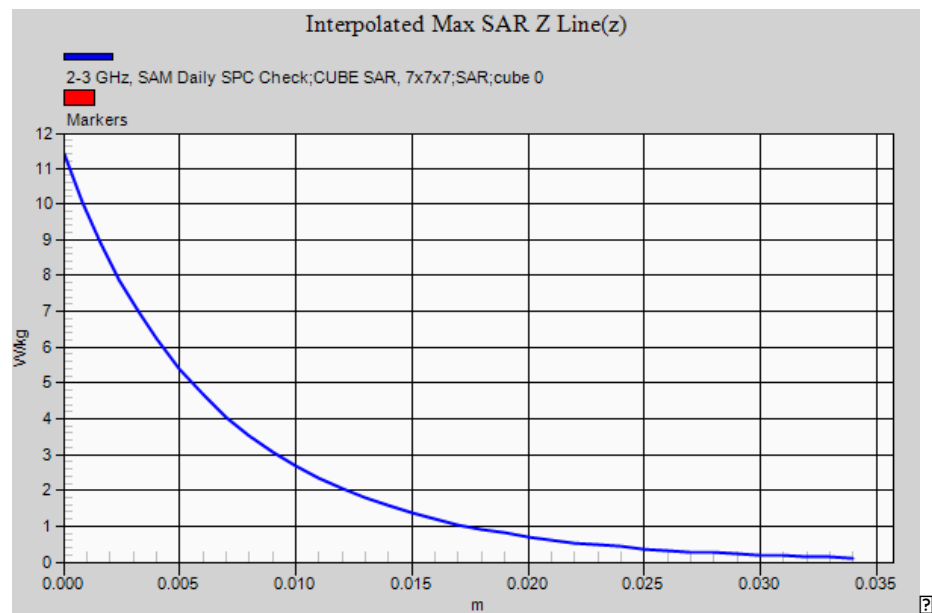
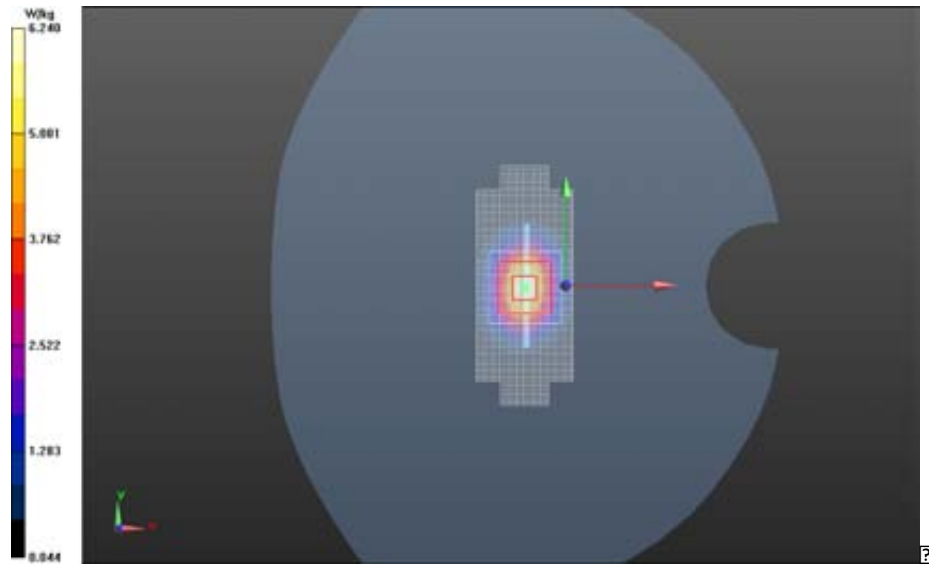
**2-3 GHz, SAM Daily SPC Check/fastSAR, Dipole Area Scan (41x221x1): Interpolated grid:
dx=1.000 mm, dy=1.000 mm**

Fast SAR: SAR(1g) = 5.42 W/kg; SAR(10g) = 2.55 W/kg

**2-3 GHz, SAM Daily SPC Check/CUBE SAR, 7x7x7 (31x31x36)/Cube 0: Interpolated grid:
dx=1.000 mm, dy=1.000 mm, dz=1.000 mm**

Reference Value = 59.306 V/m, Power Drift = -0.035 dB

Averaged SAR: SAR(1g) = 5.42 W/kg; SAR(10g) = 2.51 W/kg



2-3 GHz, SAM Daily SPC Check

Date/Time: 4/5/2013 5:31:28 PM

DUT Serial: D5GHzV2 - SN:1088

DASY Configuration:

- Probe: EX3DV4 - SN3730; ConvF(7.62,7.62,7.62); Calibrated: 8/24/2012;
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn784; Calibrated: 3/6/2013
- Phantom: R#3, 5GHz SAM, REV.2 (13nov12); Type: SAM; Serial: TP-1106
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 5200 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=5200$ MHz; $\sigma = 4.636$; $\epsilon_r = 35.52$ mho/m; $\rho = 1000$ kg/m³

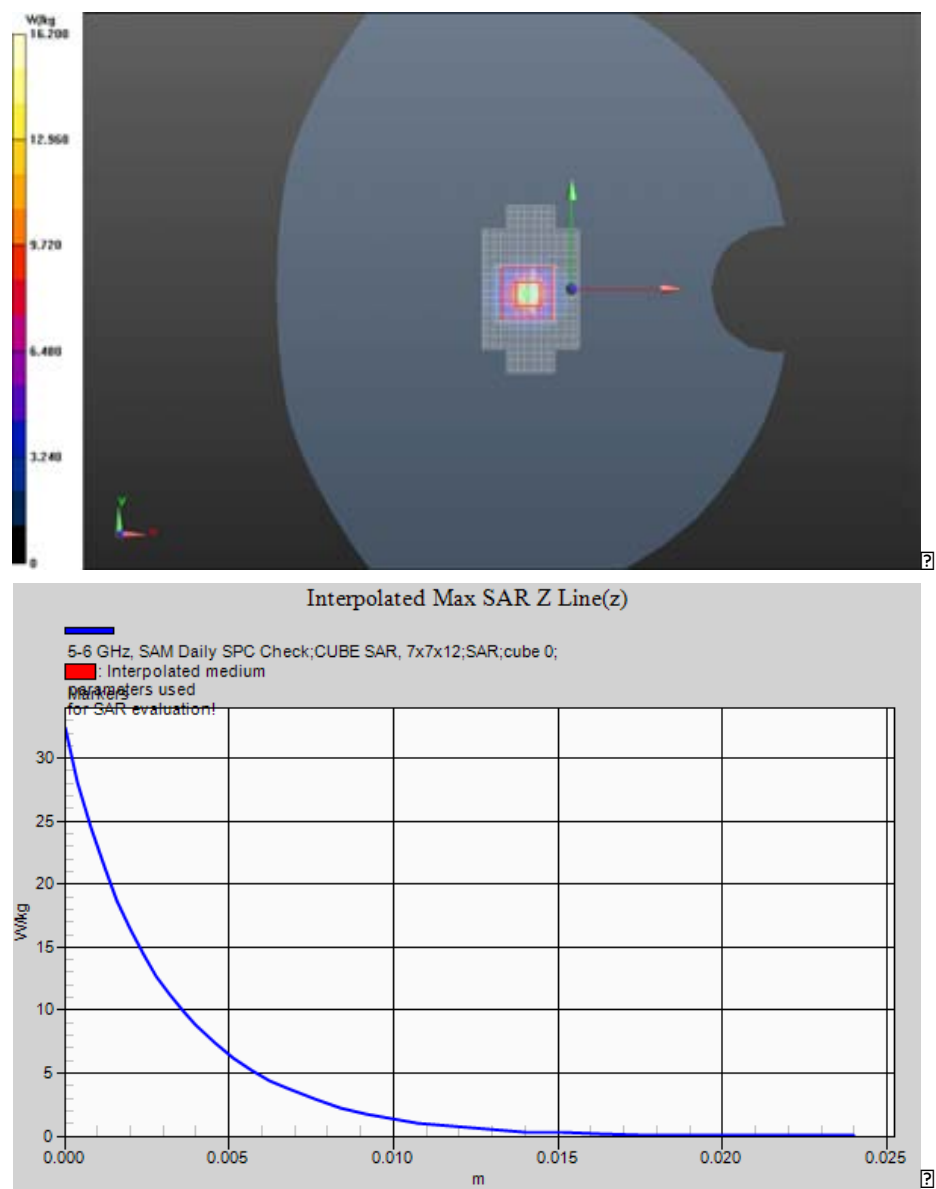
**5-6 GHz, SAM Daily SPC Check/fastSAR, Dipole Area Scan (41x211x1): Interpolated grid:
dx=1.000 mm, dy=1.000 mm**

Fast SAR: SAR(1g) = 7.39 W/kg; SAR(10g) = 2.04 W/kg

**5-6 GHz, SAM Daily SPC Check/CUBE SAR, 7x7x12 (31x31x31)/Cube 0: Interpolated grid:
dx=0.800 mm, dy=0.800 mm, dz=0.400 mm**

Reference Value = 60.441 V/m, Power Drift = -0.013 dB

Averaged SAR: SAR(1g) = 7.74 W/kg; SAR(10g) = 2.18 W/kg



5-6 GHz, SAM Daily SPC Check

Date/Time: 4/6/2013 5:12:58 AM

DUT Serial: D5GHzV2 - SN:1088

DASY Configuration:

- Probe: EX3DV4 - SN3730; ConvF(7.62,7.62,7.62); Calibrated: 8/24/2012;
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn784; Calibrated: 3/6/2013
- Phantom: R#3, 5GHz SAM, REV.2 (13nov12); Type: SAM; Serial: TP-1106
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 5800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=5800$ MHz; $\sigma = 5.324$; $\epsilon_r = 34.15$ mho/m; $\rho = 1000$ kg/m³

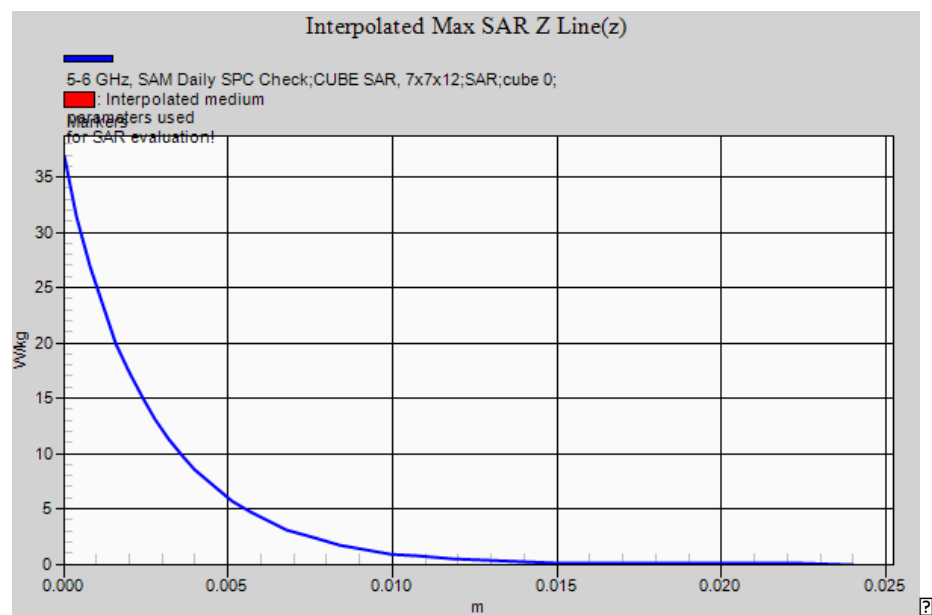
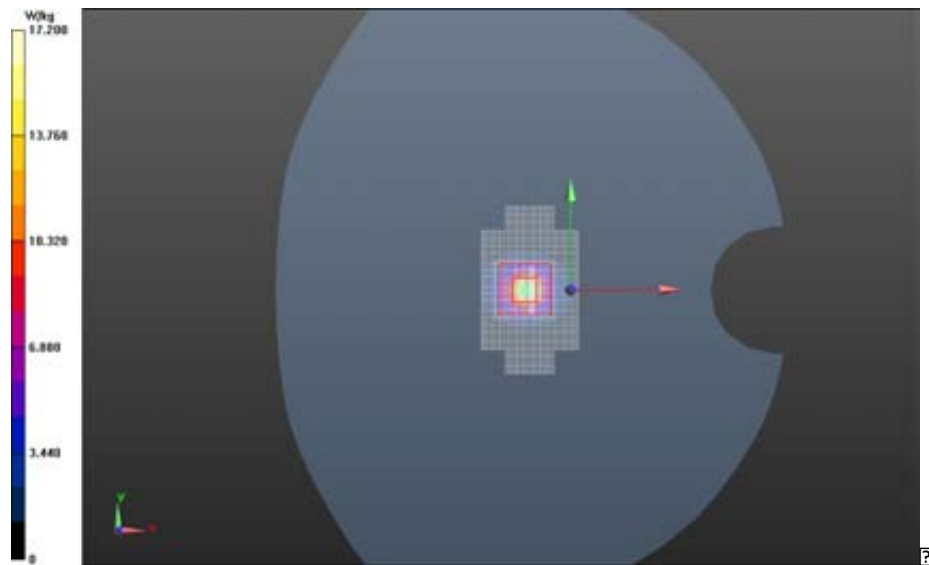
**5-6 GHz, SAM Daily SPC Check/fastSAR, Dipole Area Scan (41x211x1): Interpolated grid:
dx=1.000 mm, dy=1.000 mm**

Fast SAR: SAR(1g) = 7.64 W/kg; SAR(10g) = 2.09 W/kg

**5-6 GHz, SAM Daily SPC Check/CUBE SAR, 7x7x12 (31x31x31)/Cube 0: Interpolated grid:
dx=0.800 mm, dy=0.800 mm, dz=0.400 mm**

Reference Value = 60.715 V/m, Power Drift = -0.024 dB

Averaged SAR: SAR(1g) = 7.96 W/kg; SAR(10g) = 2.23 W/kg



5-6 GHz, SAM Daily SPC Check

System Accuracy Verification Measurements for Body SAR Measurements

Date/Time: 4/17/2013 7:11:45 PM

DUT Serial: D750V3 - SN:1040**DASY Configuration:**

- Probe: ES3DV3 - SN3124; ConvF(5.07,5.07,5.07); Calibrated: 8/20/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/3/2012
- Phantom: R#2 Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 750.0 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=750$ MHz; $\sigma = 0.9877$; $\epsilon_r = 53.84$ mho/m; $\rho = 1000$ kg/m³

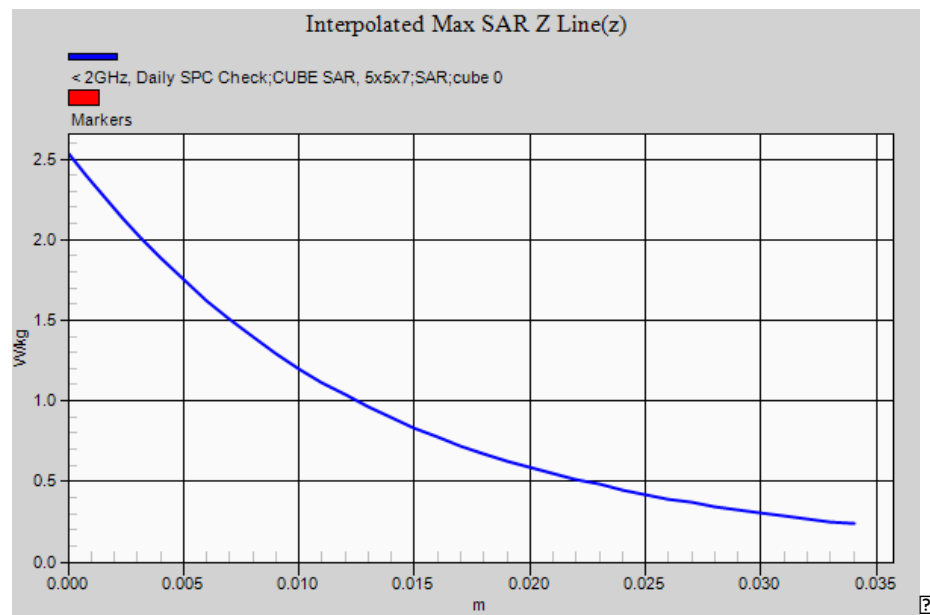
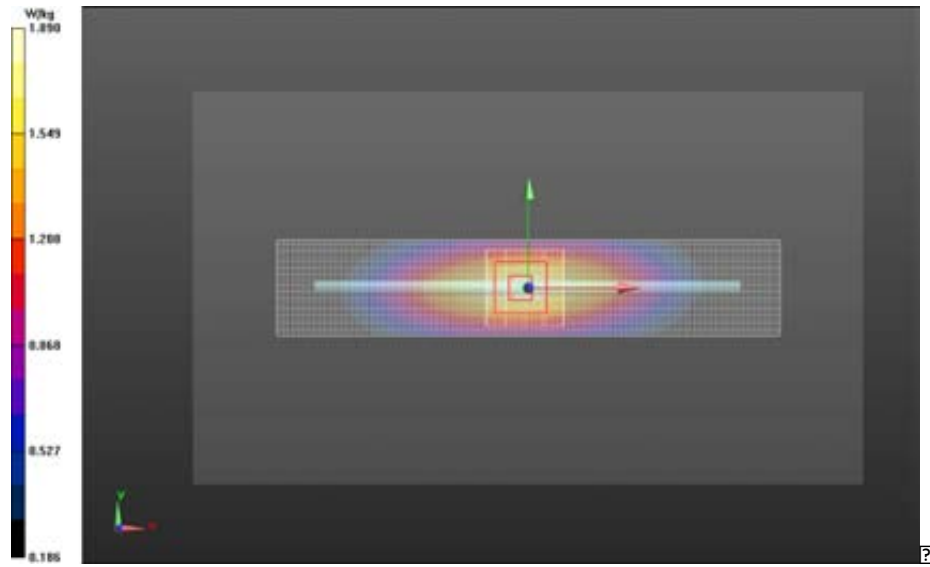
< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 1.71 W/kg; SAR(10g) = 1.15 W/kg

< 2GHz, Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 44.291 V/m, Power Drift = 0.00921 dB

Averaged SAR: SAR(1g) = 1.70 W/kg; SAR(10g) = 1.13 W/kg



< 2GHz, Daily SPC Check

Date/Time: 4/19/2013 9:31:24 AM

DUT Serial: D835V2 - SN:422tr

DASY Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 835.0 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=835$ MHz; $\sigma = 1.004$; $\epsilon_r = 53.69$ mho/m; $\rho = 1000$ kg/m³

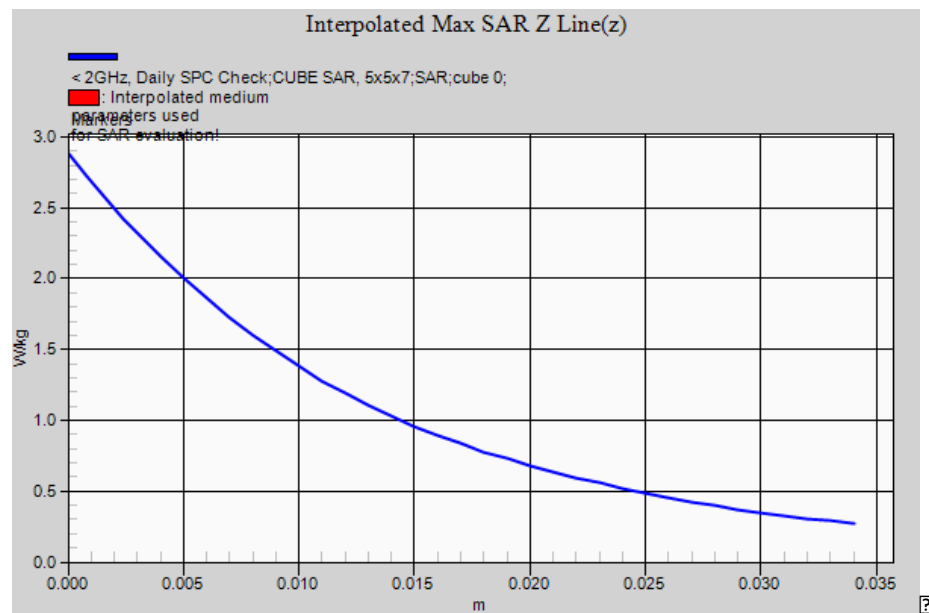
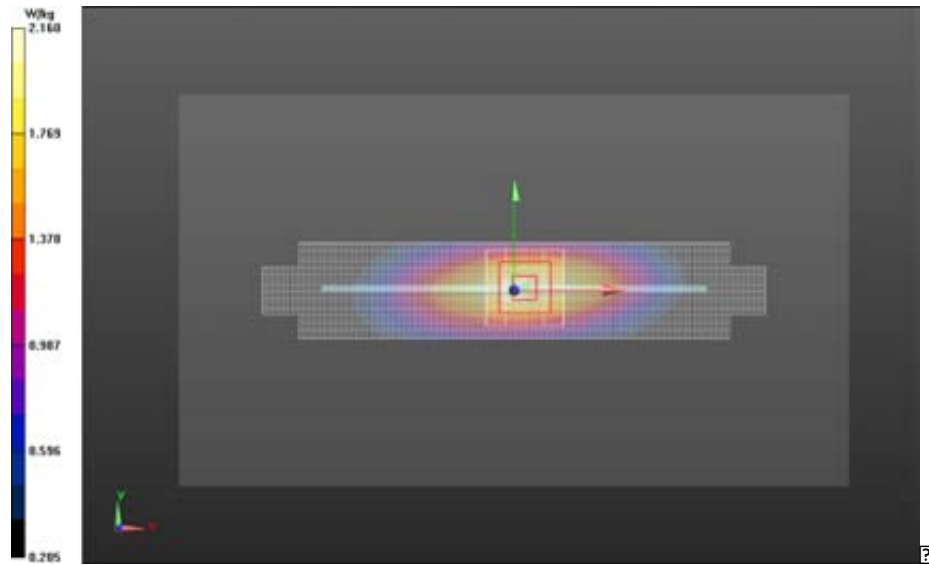
< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 1.95 W/kg; SAR(10g) = 1.30 W/kg

< 2GHz, Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 47.746 V/m, Power Drift = -0.139 dB

Averaged SAR: SAR(1g) = 1.93 W/kg; SAR(10g) = 1.29 W/kg



< 2GHz, Daily SPC Check

Date/Time: 4/21/2013 1:42:02 PM

DUT Serial: D835V2 - SN:422tr**DASY Configuration:**

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 835.0 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000

Medium Parameters used: $f=835$ MHz; $\sigma = 0.9977$; $\epsilon_r = 51.50$ mho/m; $\rho = 1000$ kg/m³

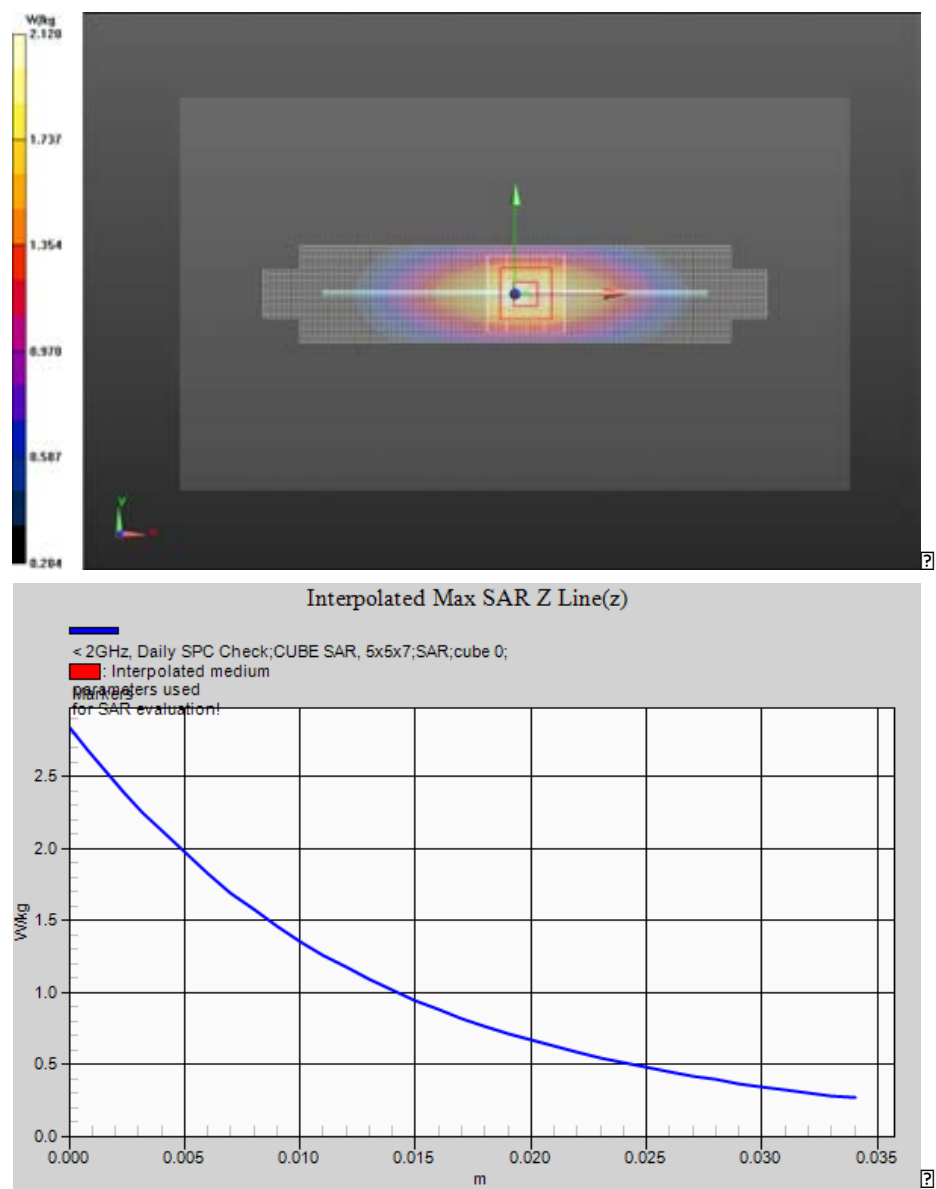
< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 1.90 W/kg; SAR(10g) = 1.27 W/kg

< 2GHz, Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 46.910 V/m, Power Drift = -0.021 dB

Averaged SAR: SAR(1g) = 1.90 W/kg; SAR(10g) = 1.26 W/kg



< 2GHz, Daily SPC Check

Date/Time: 4/25/2013 5:12:21 PM

DUT Serial: D835V2 - SN:422tr**DASY Configuration:**

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 835.0 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=835$ MHz; $\sigma = 1.009$; $\epsilon_r = 52.72$ mho/m; $\rho = 1000$ kg/m³

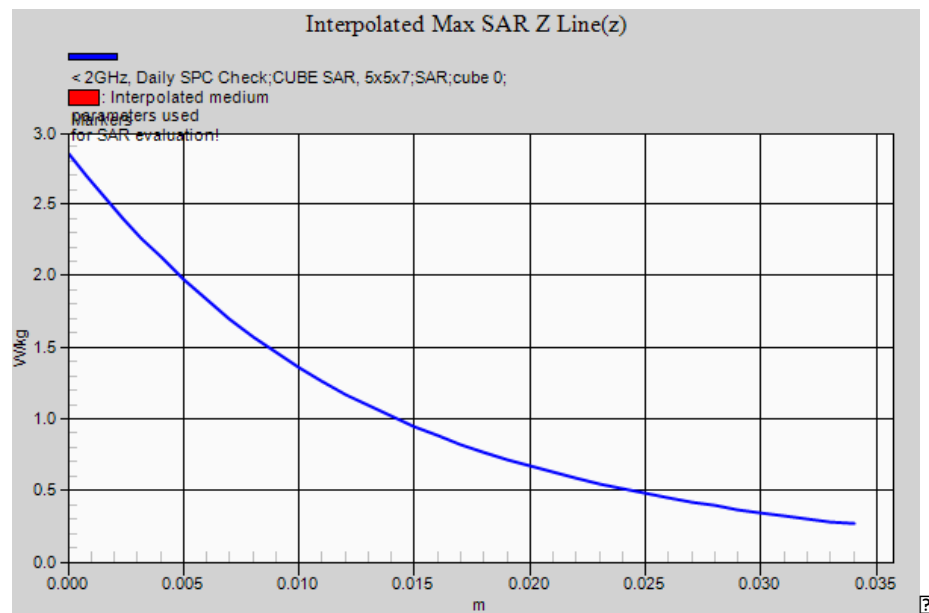
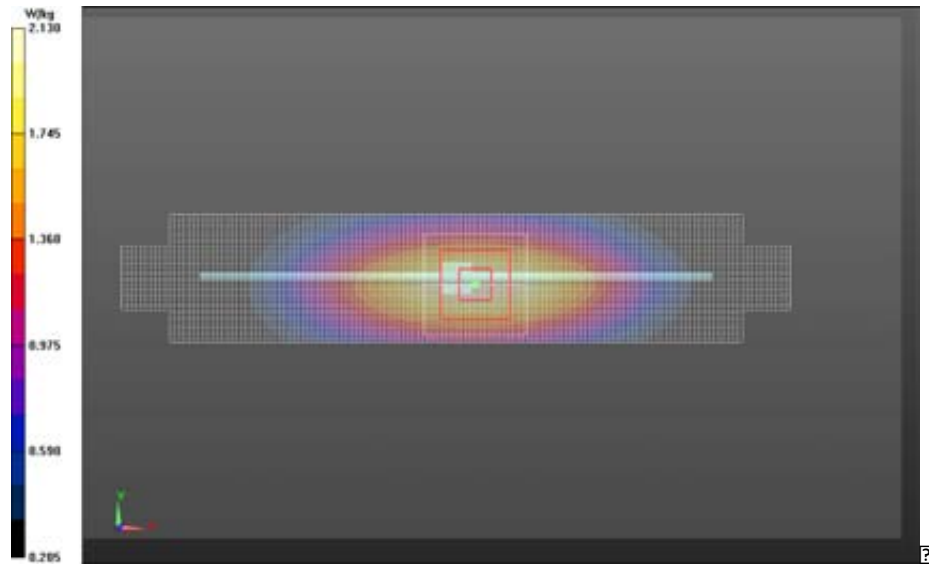
< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 1.90 W/kg; SAR(10g) = 1.26 W/kg

< 2GHz, Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 46.353 V/m, Power Drift = -0.00914 dB

Averaged SAR: SAR(1g) = 1.89 W/kg; SAR(10g) = 1.26 W/kg



< 2GHz, Daily SPC Check

Date/Time: 4/18/2013 3:01:49 PM

DUT Serial: D1800V2 - SN:2d190**DASY Configuration:**

- Probe: ES3DV3 - SN3282; ConvF(4.98,4.98,4.98); Calibrated: 1/21/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 5/23/2012
- Phantom: R#-3, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 1800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=1800$ MHz; $\sigma = 1.581$; $\epsilon_r = 49.84$ mho/m; $\rho = 1000$ kg/m³

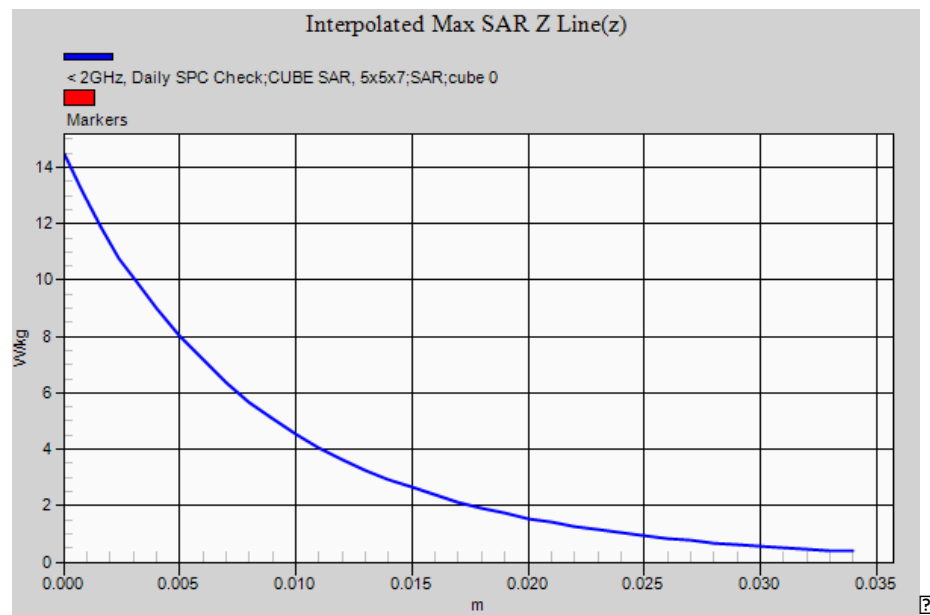
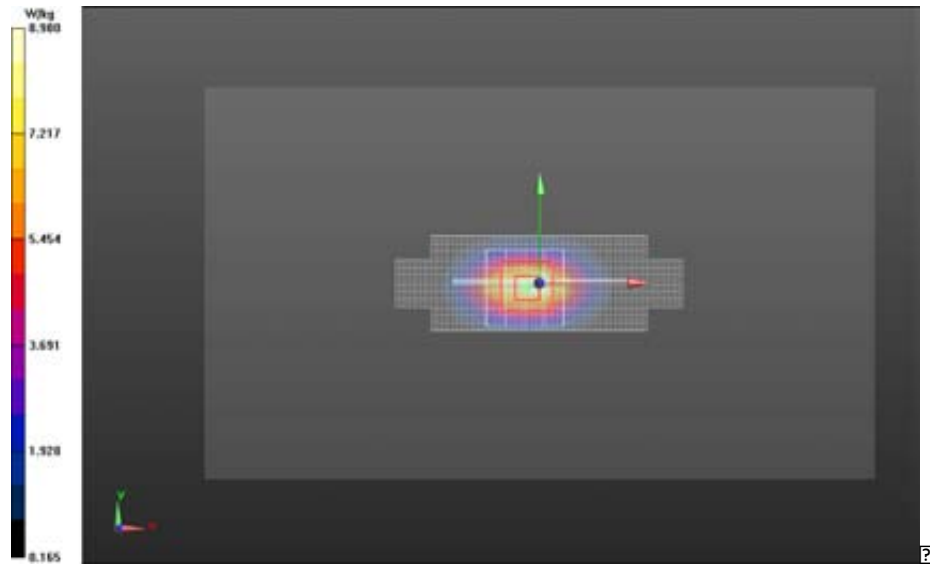
< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 7.84 W/kg; SAR(10g) = 4.20 W/kg

< 2GHz, Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 73.604 V/m, Power Drift = -0.00386 dB

Averaged SAR: SAR(1g) = 7.68 W/kg; SAR(10g) = 4.07 W/kg



< 2GHz, Daily SPC Check

Date/Time: 4/19/2013 2:54:34 PM

DUT Serial: D1800V2 - SN:2d190**DASY Configuration:**

- Probe: ES3DV3 - SN3282; ConvF(4.98,4.98,4.98); Calibrated: 1/21/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 5/23/2012
- Phantom: R#-3, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 1800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000

Medium Parameters used: $f=1800$ MHz; $\sigma = 1.452$; $\epsilon_r = 49.19$ mho/m; $\rho = 1000$ kg/m³

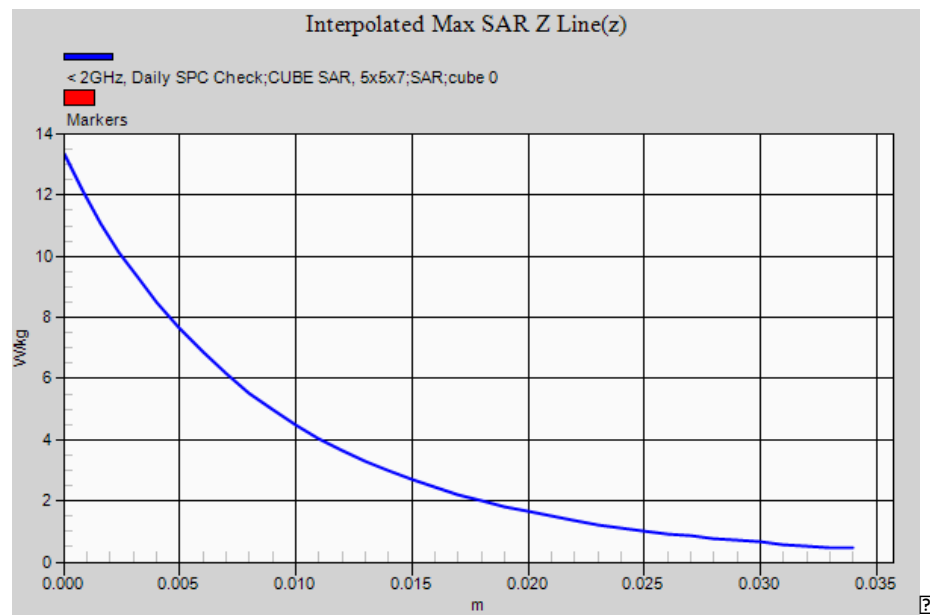
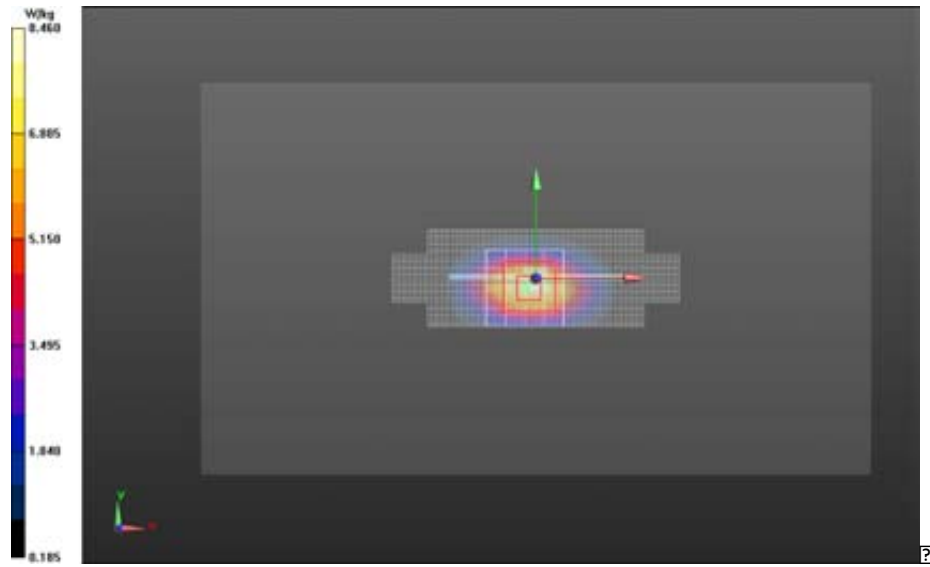
< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 7.73 W/kg; SAR(10g) = 4.13 W/kg

< 2GHz, Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 73.367 V/m, Power Drift = -0.049 dB

Averaged SAR: SAR(1g) = 7.64 W/kg; SAR(10g) = 4.08 W/kg



< 2GHz, Daily SPC Check

Date/Time: 4/22/2013 2:48:05 AM

DUT Serial: D1800V2 - SN:259tr**DASY Configuration:**

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 1800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=1800$ MHz; $\sigma = 1.416$; $\epsilon_r = 49.48$ mho/m; $\rho = 1000$ kg/m³

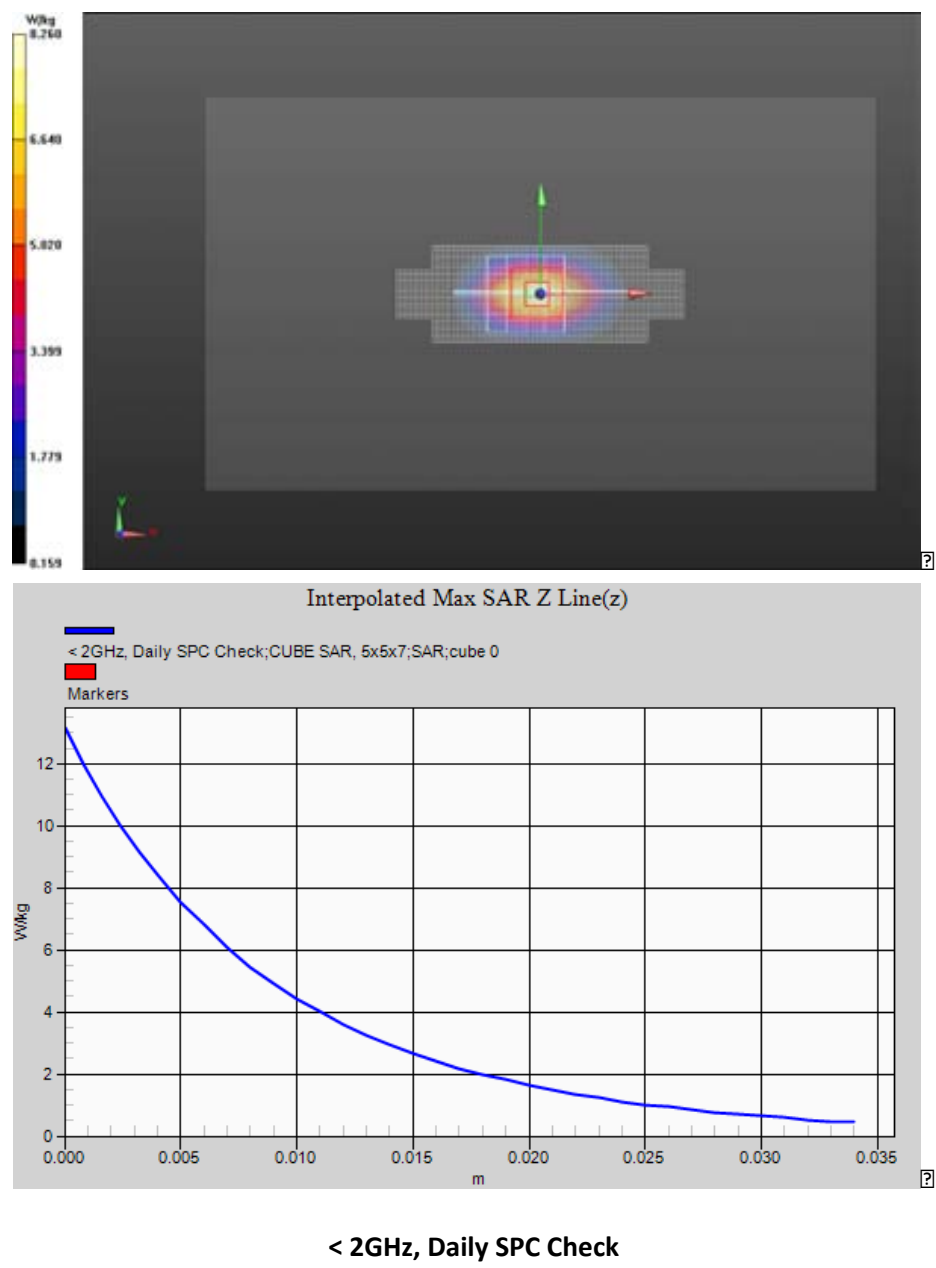
< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 7.75 W/kg; SAR(10g) = 4.13 W/kg

< 2GHz, Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 78.147 V/m, Power Drift = -0.054 dB

Averaged SAR: SAR(1g) = 7.67 W/kg; SAR(10g) = 4.08 W/kg



Date/Time: 4/25/2013 5:47:28 PM

DUT Serial: D1800V2 - SN:259tr**DASY Configuration:**

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 1800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=1800$ MHz; $\sigma = 1.458$; $\epsilon_r = 48.67$ mho/m; $\rho = 1000$ kg/m³

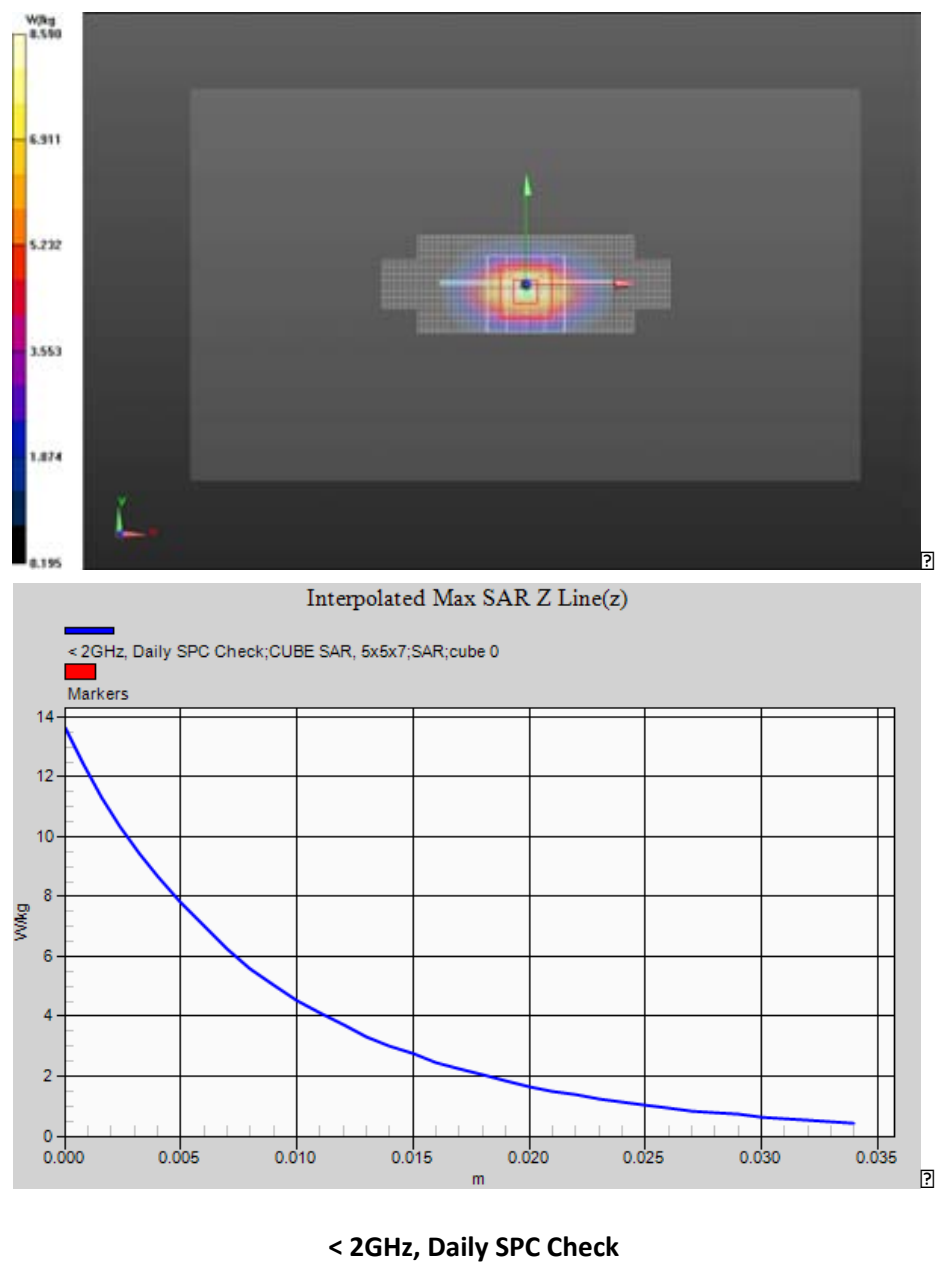
< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 7.87 W/kg; SAR(10g) = 4.22 W/kg

< 2GHz, Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 78.590 V/m, Power Drift = -0.037 dB

Averaged SAR: SAR(1g) = 7.76 W/kg; SAR(10g) = 4.14 W/kg



Date/Time: 4/11/2013 6:40:22 PM

DUT Serial: D2450V2 - SN:740**DASY Configuration:**

- Probe: EX3DV4 - SN3730; ConvF(7.62,7.62,7.62); Calibrated: 8/24/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn784; Calibrated: 3/6/2013
- Phantom: R#-3, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 2450 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=2450$ MHz; $\sigma = 1.990$; $\epsilon_r = 50.29$ mho/m; $\rho = 1000$ kg/m³

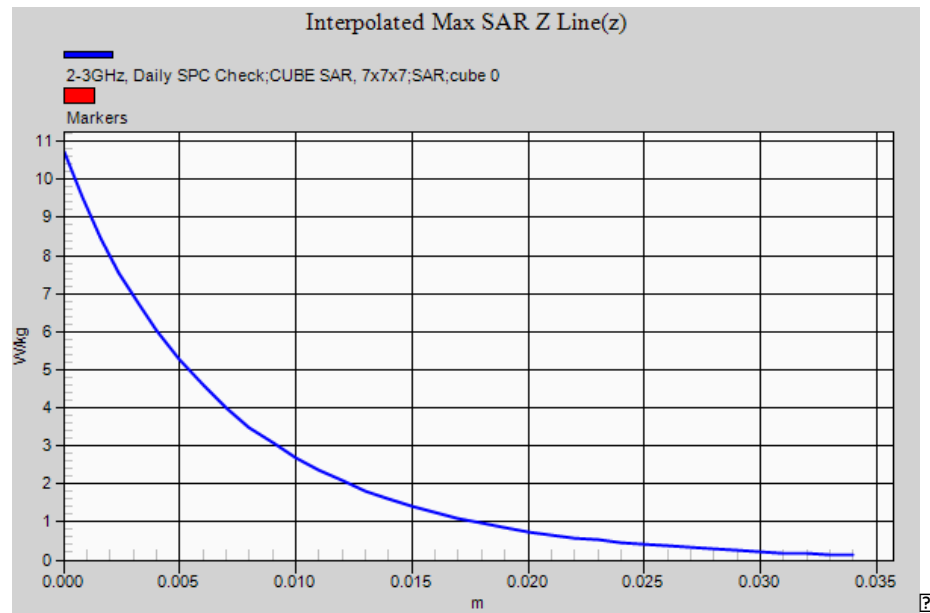
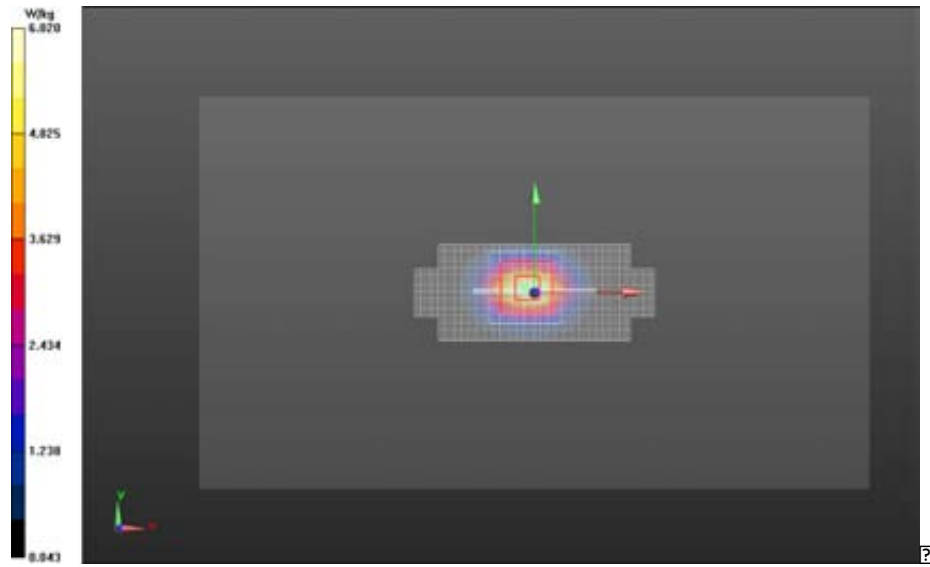
2-3GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x221x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Fast SAR: SAR(1g) = 5.15 W/kg; SAR(10g) = 2.39 W/kg

2-3GHz, Daily SPC Check/CUBE SAR, 7x7x7 (31x31x36)/Cube 0: Interpolated grid: dx=1.000 mm, dy=1.000 mm, dz=1.000 mm

Reference Value = 52.929 V/m, Power Drift = 0.000751 dB

Averaged SAR: SAR(1g) = 5.15 W/kg; SAR(10g) = 2.40 W/kg



2-3GHz, Daily SPC Check

Date/Time: 4/6/2013 12:41:29 AM

DUT Serial: D5GHzV2 - SN:1088**DASY Configuration:**

- Probe: EX3DV4 - SN3730; ConvF(7.62,7.62,7.62); Calibrated: 8/24/2012;
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn784; Calibrated: 3/6/2013
- Phantom: R#-3, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 5200 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=5200$ MHz; $\sigma = 5.285$; $\epsilon_r = 46.78$ mho/m; $\rho = 1000$ kg/m³

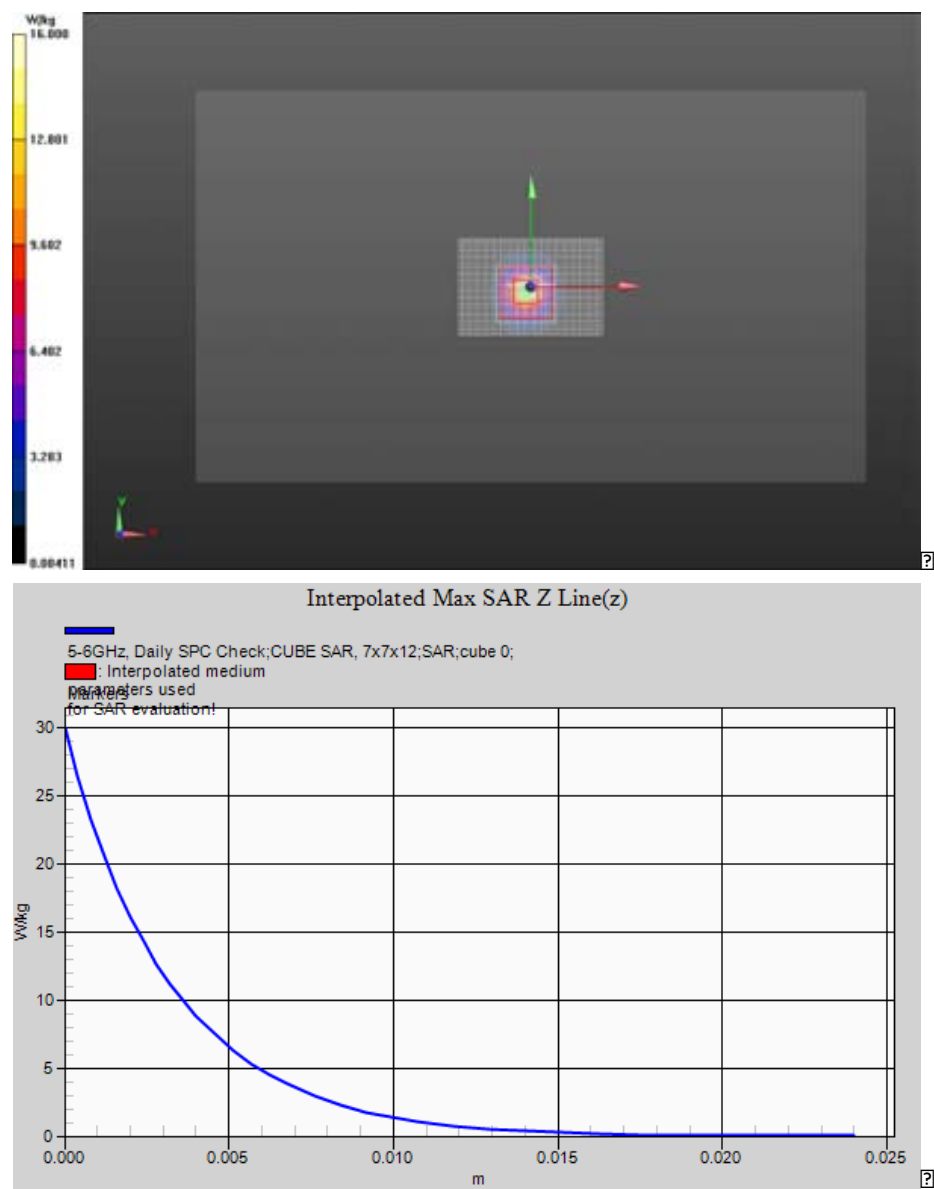
5-6GHz, Daily SPC Check/fastSAR, Dipole Area Scan (221x41x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Fast SAR: SAR(1g) = 6.43 W/kg; SAR(10g) = 1.93 W/kg

5-6GHz, Daily SPC Check/CUBE SAR, 7x7x12 (31x31x31)/Cube 0: Interpolated grid: dx=0.800 mm, dy=0.800 mm, dz=0.400 mm

Reference Value = 57.306 V/m, Power Drift = -0.173 dB

Averaged SAR: SAR(1g) = 7.51 W/kg; SAR(10g) = 2.12 W/kg



5-6GHz, Daily SPC Check

Date/Time: 4/6/2013 9:45:38 AM

DUT Serial: D5GHzV2 - SN:1088**DASY Configuration:**

- Probe: EX3DV4 - SN3730; ConvF(7.62,7.62,7.62); Calibrated: 8/24/2012;
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn784; Calibrated: 3/6/2013
- Phantom: R#-3, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 5800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=5800$ MHz; $\sigma = 6.183$; $\epsilon_r = 45.32$ mho/m; $\rho = 1000$ kg/m³

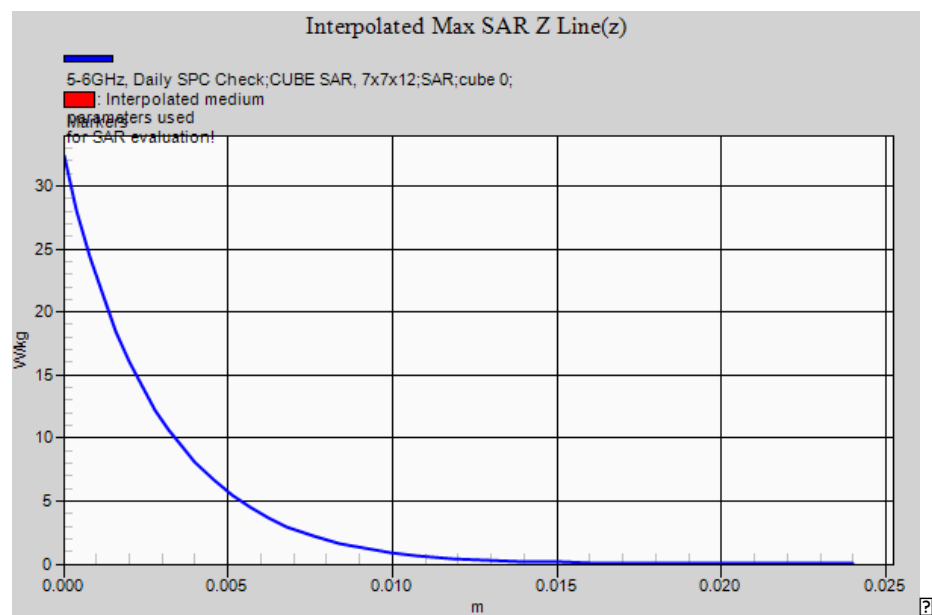
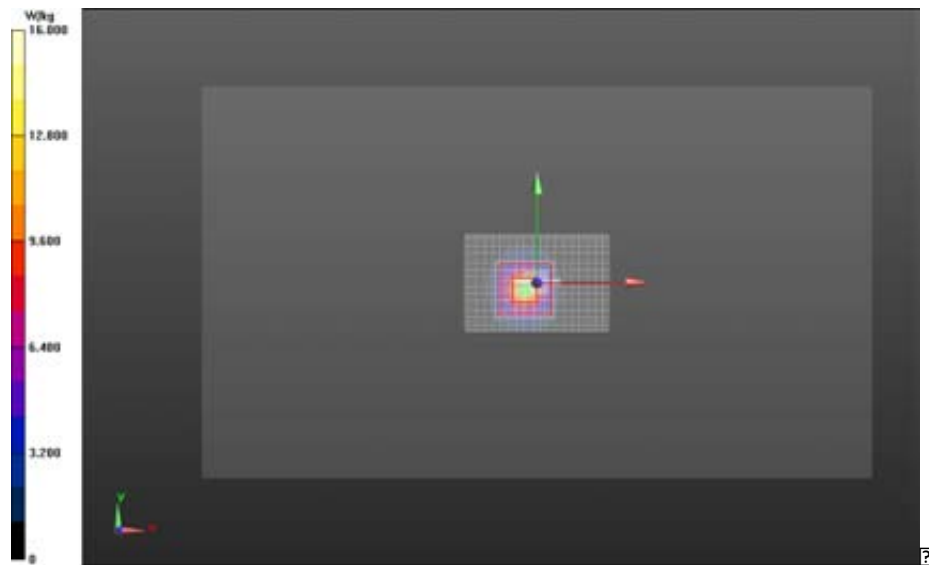
5-6GHz, Daily SPC Check/fastSAR, Dipole Area Scan (221x41x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Fast SAR: SAR(1g) = 5.84 W/kg; SAR(10g) = 1.83 W/kg

5-6GHz, Daily SPC Check/CUBE SAR, 7x7x12 (31x31x31)/Cube 0: Interpolated grid: dx=0.800 mm, dy=0.800 mm, dz=0.400 mm

Reference Value = 45.159 V/m, Power Drift = 0.026 dB

Averaged SAR: SAR(1g) = 7.21 W/kg; SAR(10g) = 2.01 W/kg



5-6GHz, Daily SPC Check

Appendix 2

SAR Distribution Plots for Head-Adjacent Test Results

Date/Time: 4/18/2013 4:03:19 PM

DUT Serial: LXWW1K0003**DASY Configuration:**

- Probe: ES3DV3 - SN3124; ConvF(5.07,5.07,5.07); Calibrated: 8/20/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/3/2012
- Phantom: R#2 Glycol SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1136
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _LTE Band 12; Communication System Band: Band 12: 10MHz BW; Frequency: 707.5 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=707.5$ MHz; $\sigma = 0.8688$; $\epsilon_r = 42.92$ mho/m; $\rho = 1000$ kg/m³

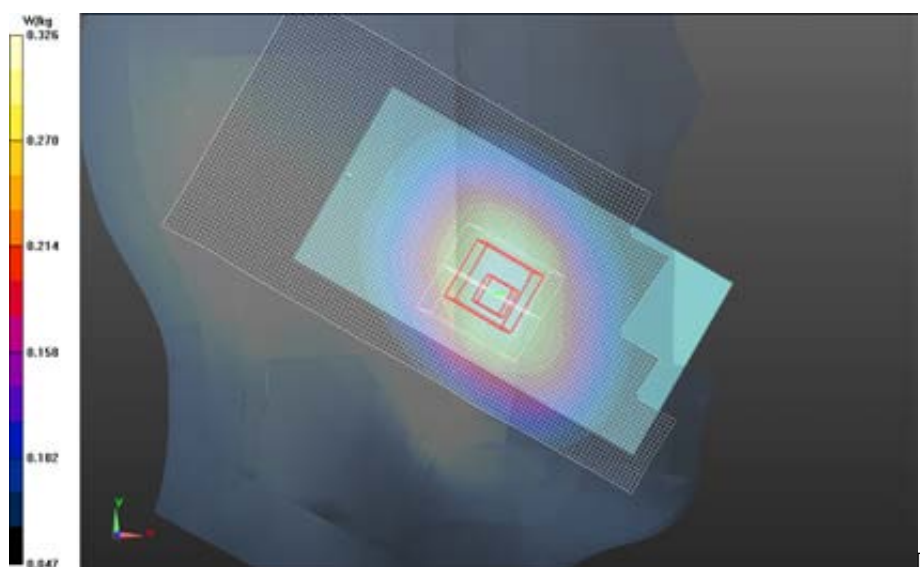
0.6-2GHz, Left Head Template/15mm, Area Scan (61x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.320 W/kg; SAR(10g) = 0.220 W/kg

0.6-2GHz, Left Head Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 20.386 V/m, Power Drift = -0.151 dB

Averaged SAR: SAR(1g) = 0.317 W/kg; SAR(10g) = 0.239 W/kg



0.6-2GHz, Left Head Template

Date/Time: 4/20/2013 4:53:23 PM

DUT Serial: LXWW1K0006

DASY Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#1 - Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1156
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _LTE Band 05; Communication System Band: Band 5: 10 MHz BW; Frequency: 836.5 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=836.5$ MHz; $\sigma = 0.9064$; $\epsilon_r = 39.00$ mho/m; $\rho = 1000$ kg/m³

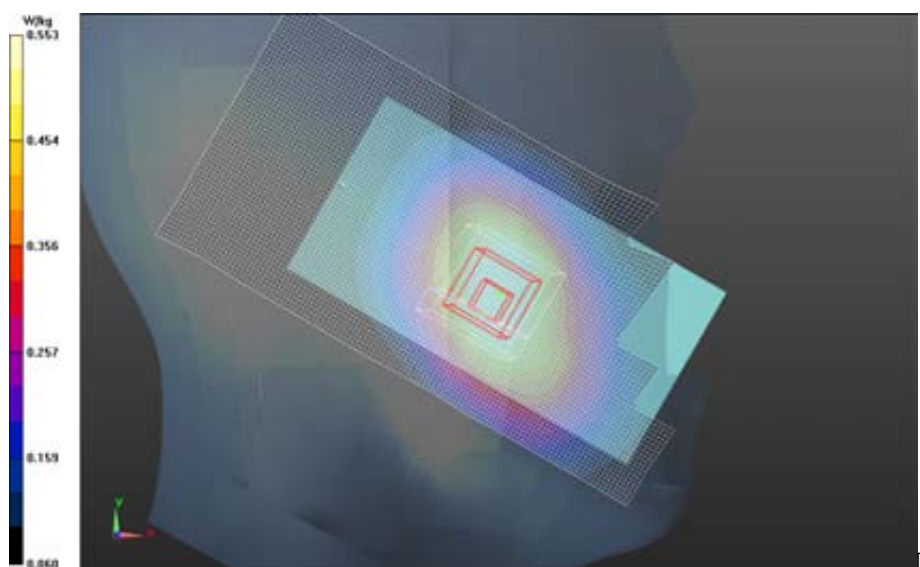
0.6-2GHz, Left Head Template/15mm, Area Scan (61x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.554 W/kg; SAR(10g) = 0.378 W/kg

0.6-2GHz, Left Head Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 26.376 V/m, Power Drift = -0.180 dB

Averaged SAR: SAR(1g) = 0.529 W/kg; SAR(10g) = 0.396 W/kg



0.6-2GHz, Left Head Template

Date/Time: 4/19/2013 11:39:13 PM

DUT Serial: LXWW1K007

DASY Configuration:

- Probe: ES3DV3 - SN3037; ConvF(5.15,5.15,5.15); Calibrated: 9/13/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/11/2012
- Phantom: R#4 Glycol SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1162
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _LTE Band 04; Communication System Band: Band 4: 20 MHz BW; Frequency: 1733 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000

Medium Parameters used: $f=1732.5$ MHz; $\sigma = 1.378$; $\epsilon_r = 37.40$ mho/m; $\rho = 1000$ kg/m³

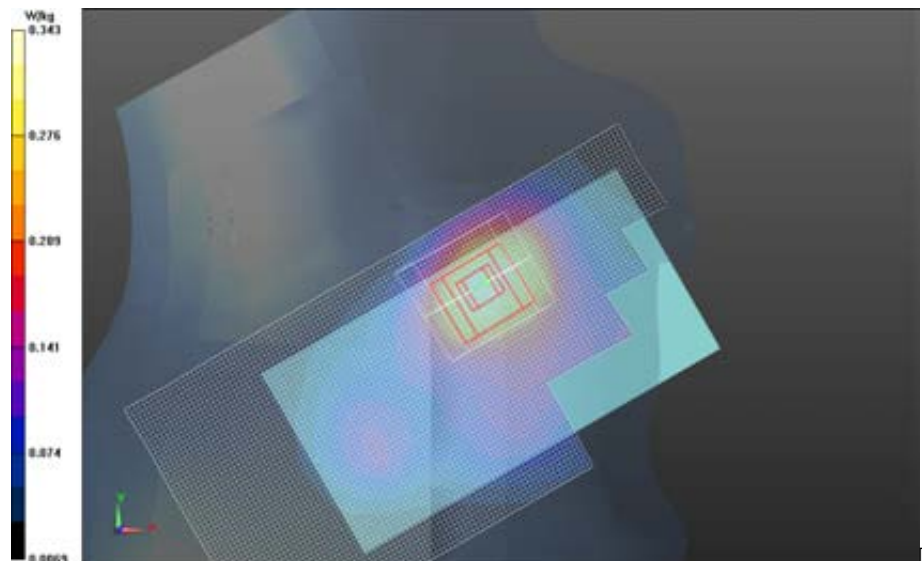
0.6-2GHz Right Head Template/15mm, Area Scan (61x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.310 W/kg; SAR(10g) = 0.188 W/kg

0.6-2GHz Right Head Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 13.945 V/m, Power Drift = -0.00412 dB

Averaged SAR: SAR(1g) = 0.319 W/kg; SAR(10g) = 0.204 W/kg



0.6-2GHz Right Head Template

Date/Time: 4/21/2013 12:35:52 PM

DUT Serial: LXWW1K0001**DASY Configuration:**

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#1 - Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1156
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CDMA; Communication System Band: CDMA 800; Frequency: 824.7 MHz,

Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000

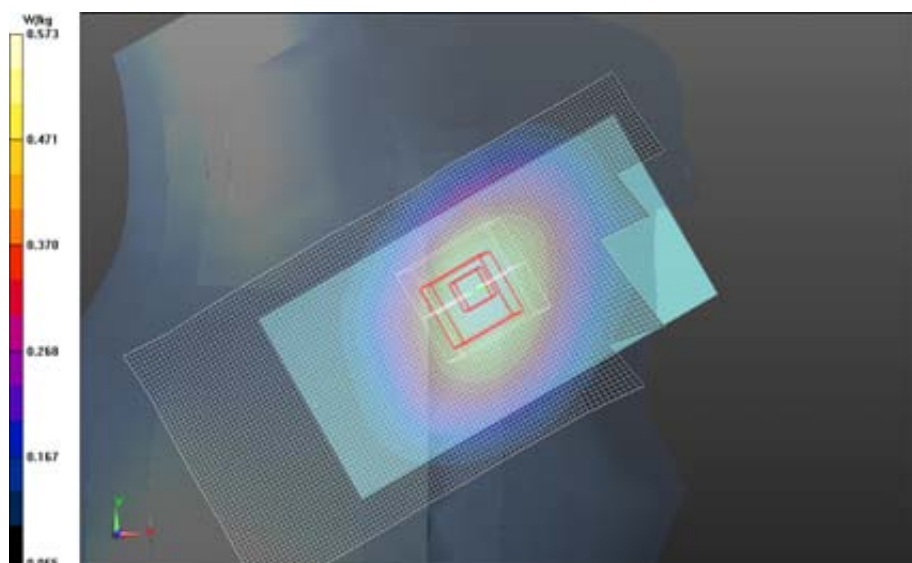
Medium Parameters used: $f=824.7$ MHz; $\sigma = 0.9099$; $\epsilon_r = 39.29$ mho/m; $\rho = 1000$ kg/m³**0.6-2GHz Right Head Template/15mm, Area Scan (61x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 0.548 W/kg; SAR(10g) = 0.373 W/kg

0.6-2GHz Right Head Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 24.983 V/m, Power Drift = 0.011 dB

Averaged SAR: SAR(1g) = 0.547 W/kg; SAR(10g) = 0.410 W/kg



Date/Time: 4/24/2013 10:24:19 AM

DUT Serial: LXWW1K0001**DASY Configuration:**

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#1 - Glycol SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1319
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CDMA; Communication System Band: CDMA 1900; Frequency: 1851 MHz,
Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000

Medium Parameters used: $f=1851.25$ MHz; $\sigma = 1.437$; $\epsilon_r = 37.46$ mho/m; $\rho = 1000$ kg/m³

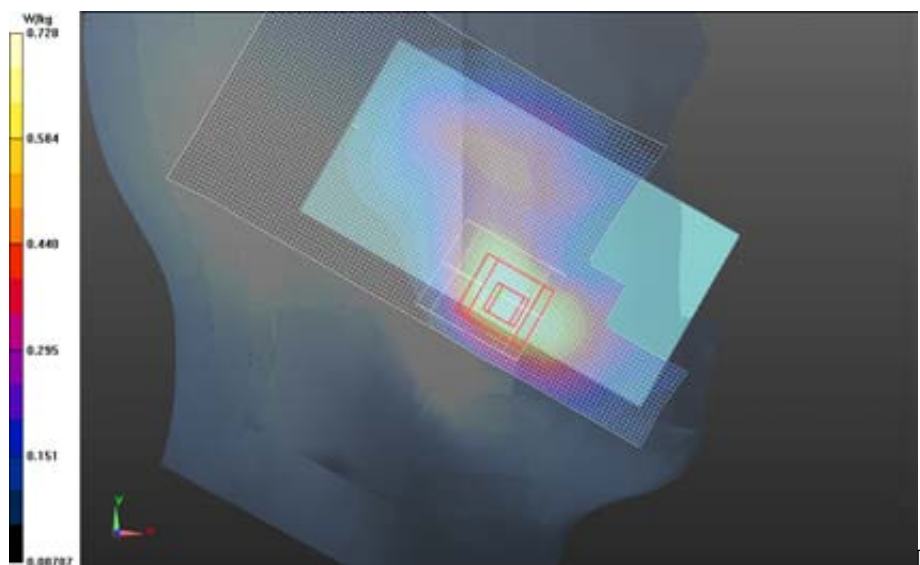
0.6-2GHz, Left Head Template/15mm, Area Scan (61x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.707 W/kg; SAR(10g) = 0.416 W/kg

0.6-2GHz, Left Head Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 18.712 V/m, Power Drift = -0.403 dB

Averaged SAR: SAR(1g) = 0.677 W/kg; SAR(10g) = 0.424 W/kg



Date/Time: 4/11/2013 1:22:41 PM

DUT Serial: LXVE110019

DASY Configuration:

- Probe: EX3DV4 - SN3730; ConvF(7.62,7.62,7.62); Calibrated: 8/24/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn784; Calibrated: 3/6/2013
- Phantom: R#3, 2450 WiFi SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1153
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _Wi-Fi 2450MHz; Communication System Band: 2450MHz WIFI; Frequency: 2462 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=2462$ MHz; $\sigma = 1.800$; $\epsilon_r = 37.66$ mho/m; $\rho = 1000$ kg/m³

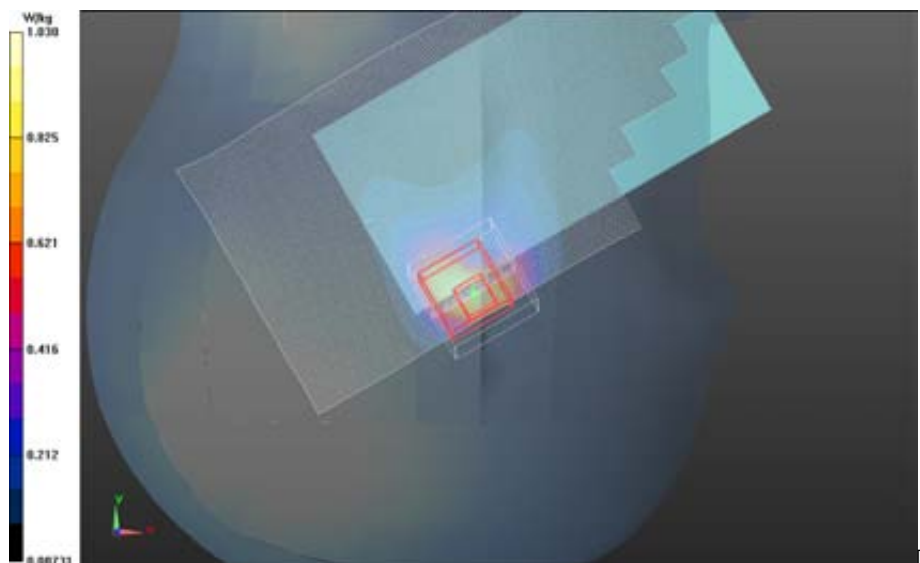
2-3GHz Right Head Template/10mm, Area Scan (91x241x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Fast SAR: SAR(1g) = 0.845 W/kg; SAR(10g) = 0.403 W/kg

2-3GHz Right Head Template/7x7x7 Zoom Scan (2-3GHz) (31x31x36)/Cube 0: Interpolated grid: dx=1.000 mm, dy=1.000 mm, dz=1.000 mm

Reference Value = 12.261 V/m, Power Drift = -0.179 dB

Averaged SAR: SAR(1g) = 0.879 W/kg; SAR(10g) = 0.398 W/kg



Test Laboratory: Motorola Mobility - 5210 MHz WI-FI**DUT Serial: LXVE110019; FCC ID: IHDT56PB1**

Procedure Notes: Power Step: N/A; Antenna Position: Internal; Accessory Model #: N/A

Battery Model #: SNN5923A; Device Position: Cheek

DASY Configuration:

- Probe: EX3DV4 - SN3730; ConvF(7.62,7.62,7.62); Calibrated: 8/24/2012;
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn784; Calibrated: 3/6/2013
- Phantom: R#3, 5GHz SAM, REV.2 (13nov12); Type: SAM; Serial: TP-1106
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: 5210 MHz Sub-Band; Frequency: 5180 MHz; Channel: 36; Duty Cycle: 1:1.000

Radio Configuration: 802.11a Mode, 6 Mbps Data Rate

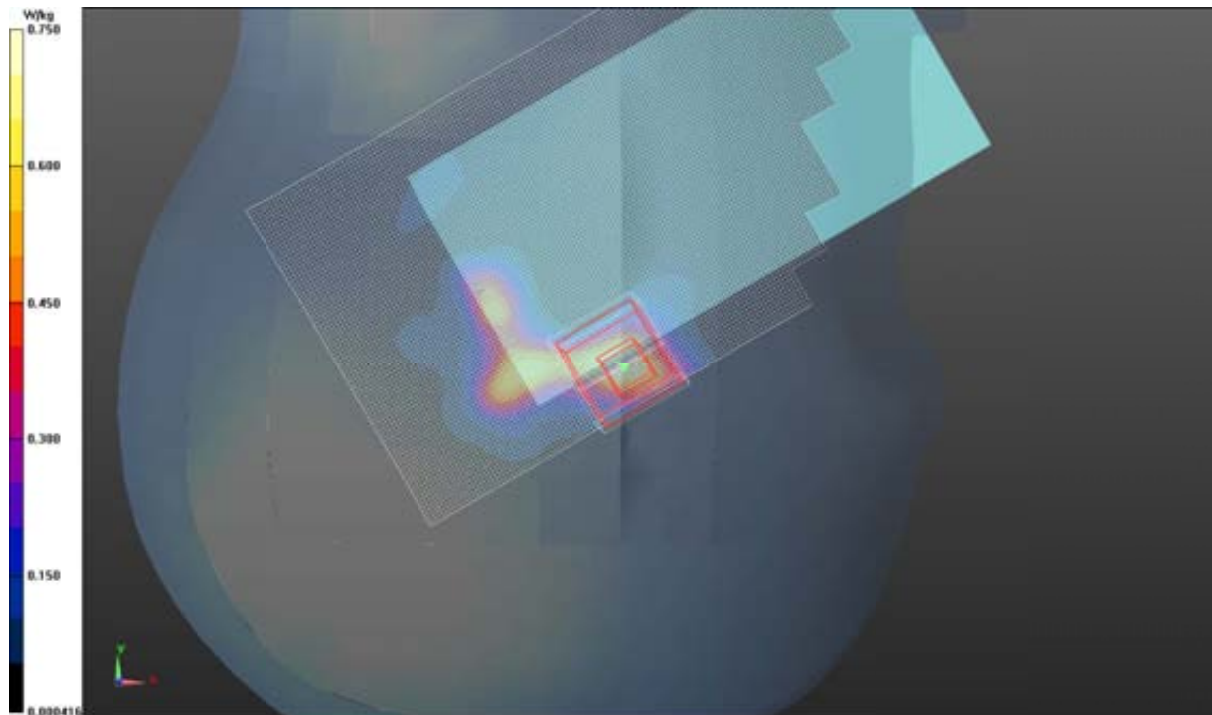
Medium Parameters used: $f=5180$ MHz; $\sigma = 4.614$; $\epsilon_r = 35.56$ mho/m; $\rho = 1000$ kg/m³**Right Head Template/Area Scan - Normal (10mm) (91x211x1):****Interpolated grid: dx=1.000 mm, dy=1.000 mm**

Fast SAR: SAR(1g) = 0.387 W/kg; SAR(10g) = 0.127 W/kg

Right Head Template/7x7x12 Zoom Scan (5-6GHz) (31x31x31)/Cube 0:**Interpolated grid: dx=0.800 mm, dy=0.800 mm, dz=0.400 mm**

Reference Value = 11.861 V/m, Power Drift = -0.191 dB

Averaged SAR: SAR(1g) = 0.379 W/kg; SAR(10g) = 0.123 W/kg

**Right Head Template**

Date/Time: 4/6/2013 10:13:41 AM

Serial: LXVE110019;

Communication System: _WIFI 5-6GHz; Frequency: 5785 MHz; Communication System Channel Number: 157; Duty Cycle: 1:1

Medium: HEAD tissue; Medium parameters used (interpolated): $f = 5785$ MHz; $\sigma = 5.307$ S/m; $\epsilon_r = 34.186$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: EX3DV4 - SN3730; ConvF(4.24, 4.24, 4.24); Calibrated: 8/24/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn784; Calibrated: 3/6/2013
- Phantom: R#3, 5GHz SAM, REV.2 (13nov12); Type: SAM; Serial: TP-1106;
- ; SEMCAD X Version 14.6.8 (7028)

Right Head Template/Area Scan - Normal (10mm) (10x22x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.430 W/kg

Right Head Template/7x7x12 Zoom Scan (5-6GHz) (7x7x6)/Cube 0: Measurement grid:

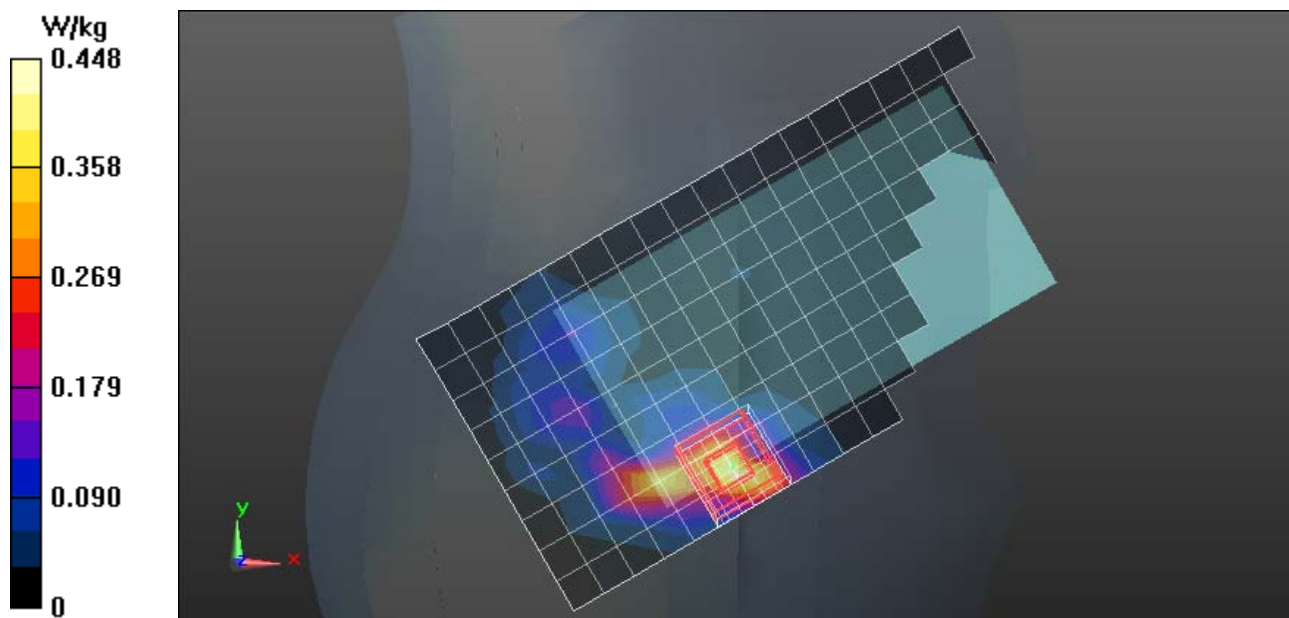
dx=4mm, dy=4mm, dz=2mm

Reference Value = 7.316 V/m; Power Drift = -0.23 dB

Peak SAR (extrapolated) = 0.768 W/kg

SAR(1 g) = 0.203 W/kg; SAR(10 g) = 0.069 W/kg (SAR corrected for target medium)

Maximum value of SAR (measured) = 0.448 W/kg



Appendix 3

SAR Distribution Plots for Body-Worn Accessory Test Results

Date/Time: 4/17/2013 10:11:22 PM

DUT Serial: LXWW1K0003

DASY Configuration:

- Probe: ES3DV3 - SN3124; ConvF(5.07,5.07,5.07); Calibrated: 8/20/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/3/2012
- Phantom: R#2 Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _LTE Band 12; Communication System Band: Band 12: 10MHz BW; Frequency: 707.5 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=707.5$ MHz; $\sigma = 0.9595$; $\epsilon_r = 54.05$ mho/m; $\rho = 1000$ kg/m³

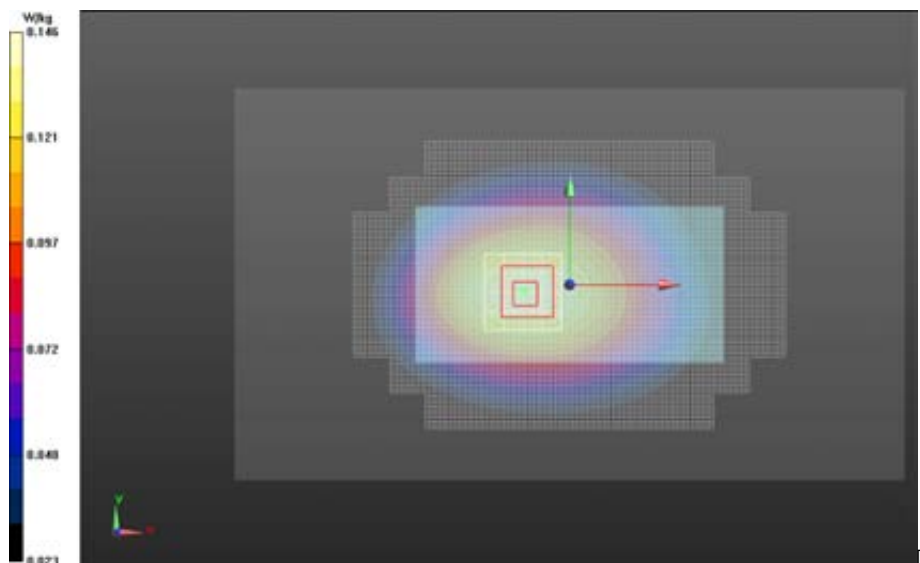
0.6-2GHz Triple Flat Phone Template/Area Scan (15mm), not for EDGES (181x101x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.136 W/kg; SAR(10g) = 0.0974 W/kg

0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0:
Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 12.383 V/m, Power Drift = 0.075 dB

Averaged SAR: SAR(1g) = 0.139 W/kg; SAR(10g) = 0.105 W/kg



0.6-2GHz Triple Flat Phone Template

Date/Time: 4/19/2013 11:27:23 PM

DUT Serial: LXWW1K0006

DASY Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _LTE Band 05; Communication System Band: Band 5: 10 MHz BW; Frequency: 836.5 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000

Medium Parameters used: $f=836.5$ MHz; $\sigma = 1.006$; $\epsilon_r = 53.67$ mho/m; $\rho = 1000$ kg/m³

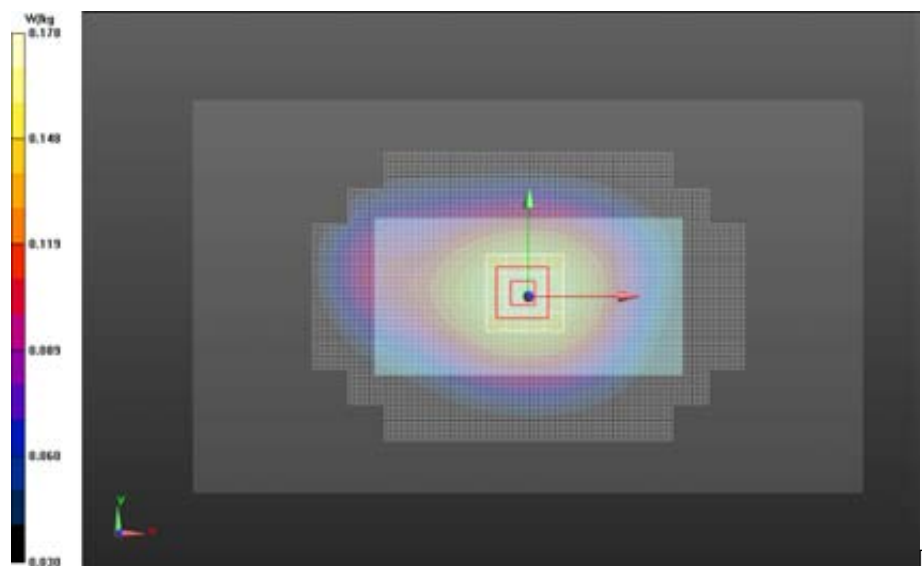
0.6-2GHz Triple Flat Phone Template/Area Scan (15mm), not for EDGES (181x101x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.165 W/kg; SAR(10g) = 0.116 W/kg

0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0:
Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 13.003 V/m, Power Drift = 0.107 dB

Averaged SAR: SAR(1g) = 0.168 W/kg; SAR(10g) = 0.126 W/kg



0.6-2GHz Triple Flat Phone Template

Date/Time: 4/19/2013 12:43:15 AM

DUT Serial: LXWW1K007

DASY Configuration:

- Probe: ES3DV3 - SN3282; ConvF(4.98,4.98,4.98); Calibrated: 1/21/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 5/23/2012
- Phantom: R#-3, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _LTE Band 04; Communication System Band: Band 4: 20 MHz BW; Frequency: 1733 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000

Medium Parameters used: $f=1732.5$ MHz; $\sigma = 1.506$; $\epsilon_r = 50.12$ mho/m; $\rho = 1000$ kg/m³

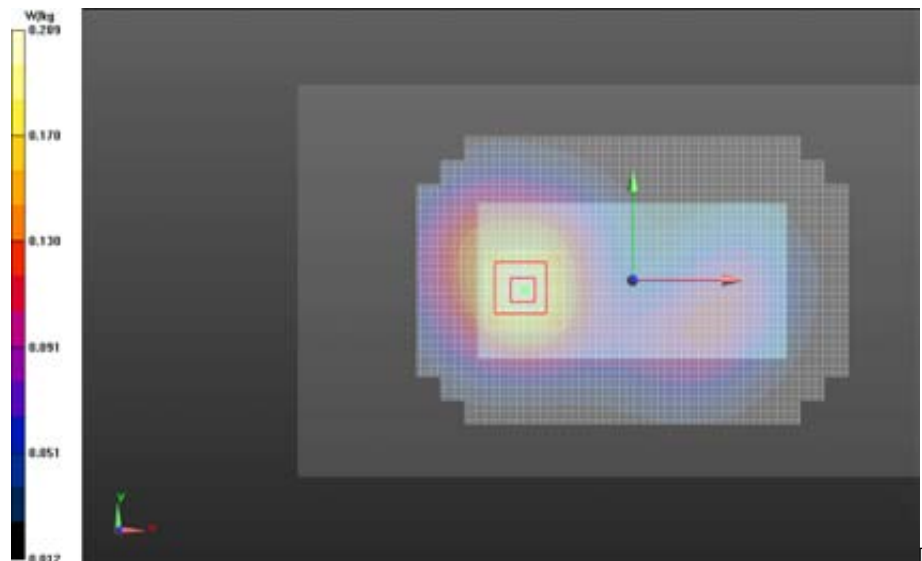
0.6-2GHz Triple Flat Phone Template/Area Scan (10mm) (261x141x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Fast SAR: SAR(1g) = 0.195 W/kg; SAR(10g) = 0.123 W/kg

0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 11.935 V/m, Power Drift = -0.037 dB

Averaged SAR: SAR(1g) = 0.194 W/kg; SAR(10g) = 0.126 W/kg



0.6-2GHz Triple Flat Phone Template

Date/Time: 4/21/2013 2:06:37 PM

DUT Serial: LXWW1K0001

DASY Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CDMA; Communication System Band: CDMA 800; Frequency: 824.7 MHz,
 Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000

Medium Parameters used: $f=824.7$ MHz; $\sigma = 0.9874$; $\epsilon_r = 51.62$ mho/m; $\rho = 1000$ kg/m³

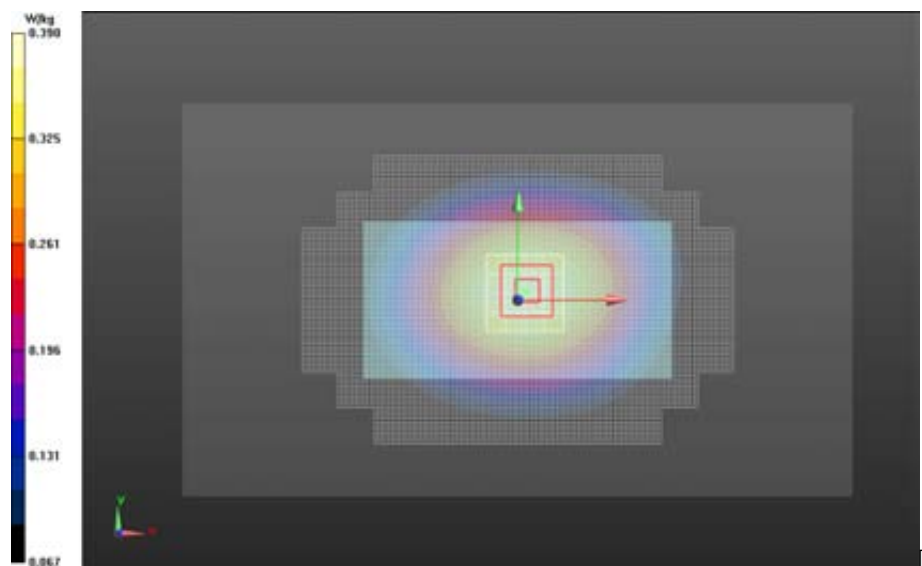
**0.6-2GHz Triple Flat Phone Template/Area Scan (15mm), not for EDGES (181x101x1):
 Interpolated grid: dx=1.500 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 0.371 W/kg; SAR(10g) = 0.261 W/kg

**0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0:
 Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 19.831 V/m, Power Drift = -0.054 dB

Averaged SAR: SAR(1g) = 0.370 W/kg; SAR(10g) = 0.279 W/kg



0.6-2GHz Triple Flat Phone Template

Date/Time: 4/22/2013 9:11:26 AM

DUT Serial: LXWW1K0001

DASY Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CDMA; Communication System Band: CDMA 1900; Frequency: 1851 MHz,
 Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=1851.25$ MHz; $\sigma = 1.478$; $\epsilon_r = 49.29$ mho/m; $\rho = 1000$ kg/m³

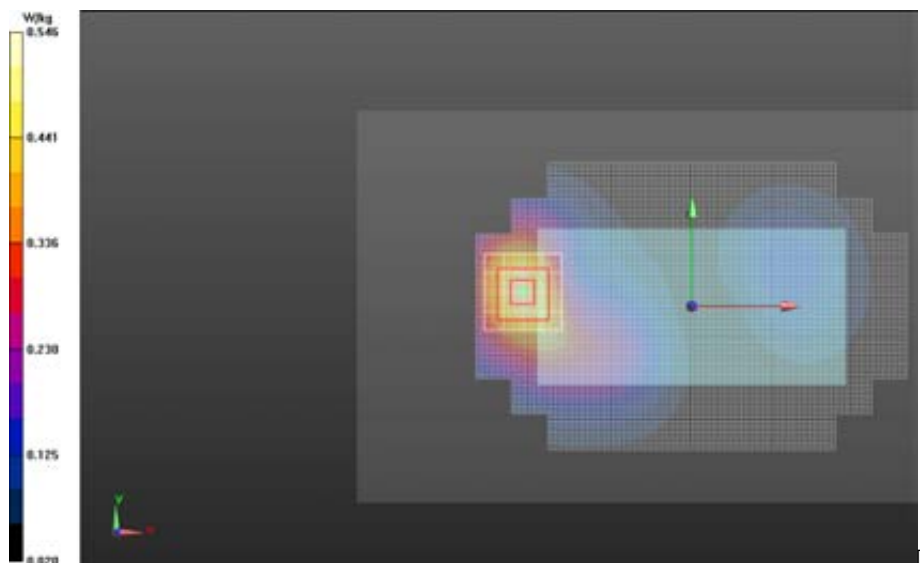
0.6-2GHz Triple Flat Phone Template/Area Scan (15mm), not for EDGES (181x101x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.493 W/kg; SAR(10g) = 0.296 W/kg

0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0:
Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 18.825 V/m, Power Drift = -0.082 dB

Averaged SAR: SAR(1g) = 0.504 W/kg; SAR(10g) = 0.314 W/kg



0.6-2GHz Triple Flat Phone Template

Date/Time: 4/11/2013 8:51:40 PM

DUT Serial: LXVE110019

DASY Configuration:

- Probe: EX3DV4 - SN3730; ConvF(7.62,7.62,7.62); Calibrated: 8/24/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn784; Calibrated: 3/6/2013
- Phantom: R#-3, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _Wi-Fi 2450MHz; Communication System Band: 2450MHz WIFI; Frequency: 2437 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000

Medium Parameters used: $f=2437$ MHz; $\sigma = 1.974$; $\epsilon_r = 50.34$ mho/m; $\rho = 1000$ kg/m³

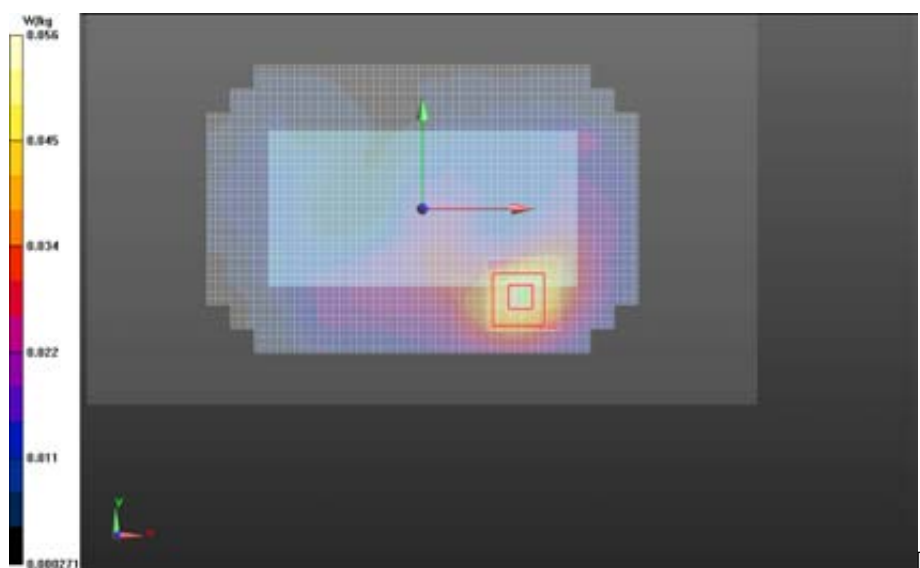
**2-3GHz Triple Flat Phone Template/Area Scan (10mm) (261x141x1): Interpolated grid:
dx=1.000 mm, dy=1.000 mm**

Fast SAR: SAR(1g) = 0.0514 W/kg; SAR(10g) = 0.0283 W/kg

**2-3GHz Triple Flat Phone Template/7x7x7 Zoom Scan (2-3GHz) (31x31x36)/Cube 0:
Interpolated grid: dx=1.000 mm, dy=1.000 mm, dz=1.000 mm**

Reference Value = 5.168 V/m, Power Drift = -0.099 dB

Averaged SAR: SAR(1g) = 0.0505 W/kg; SAR(10g) = 0.0283 W/kg



2-3GHz Triple Flat Phone Template

Date/Time: 4/6/2013 3:07:40 AM

DUT Serial: LXVE110019**DASY Configuration:**

- Probe: EX3DV4 - SN3730; ConvF(7.62,7.62,7.62); Calibrated: 8/24/2012;
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn784; Calibrated: 3/6/2013
- Phantom: R#-3, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _WIFI 5-6GHz; Communication System Band: 5210 MHz Sub-Band; Frequency: 5180 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=5180$ MHz; $\sigma = 5.253$; $\epsilon_r = 46.83$ mho/m; $\rho = 1000$ kg/m³

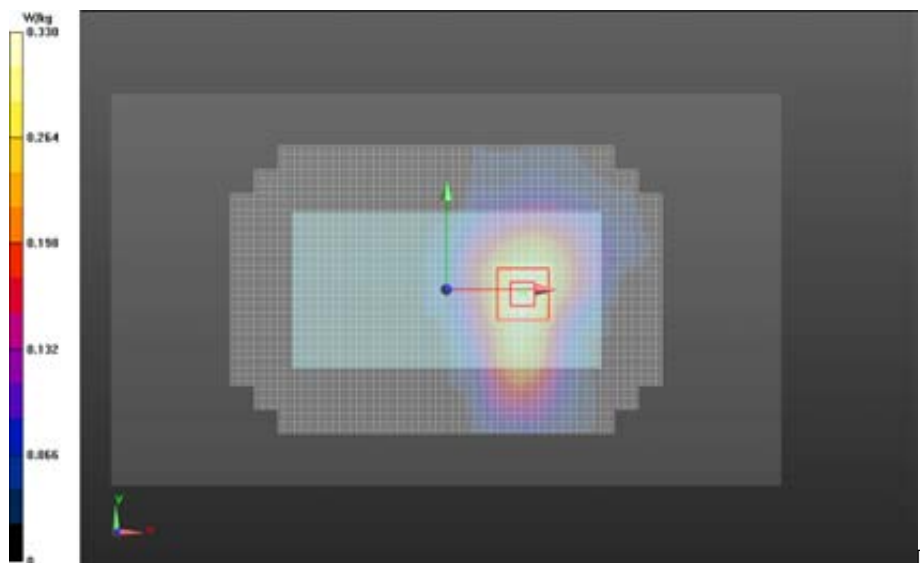
TRIPLE Flat Phone Against Flat Section/Area Scan - Body (10mm) (281x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Fast SAR: SAR(1g) = 0.188 W/kg; SAR(10g) = 0.0854 W/kg

TRIPLE Flat Phone Against Flat Section/7x7x12 Zoom Scan (5-6GHz) (31x31x31)/Cube 0: Interpolated grid: dx=0.800 mm, dy=0.800 mm, dz=0.400 mm

Reference Value = 8.538 V/m, Power Drift = -0.066 dB

Averaged SAR: SAR(1g) = 0.190 W/kg; SAR(10g) = 0.0867 W/kg



TRIPLE Flat Phone Against Flat Section

Date/Time: 4/7/2013 7:06:05 AM

DUT Serial: LXVE110019**DASY Configuration:**

- Probe: EX3DV4 - SN3730; ConvF(7.62,7.62,7.62); Calibrated: 8/24/2012;
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn784; Calibrated: 3/6/2013
- Phantom: R#-3, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _WIFI 5-6GHz; Communication System Band: 5785 MHz Sub-Band; Frequency: 5785 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000

Medium Parameters used: $f=5785$ MHz; $\sigma = 6.209$; $\epsilon_r = 44.80$ mho/m; $\rho = 1000$ kg/m³

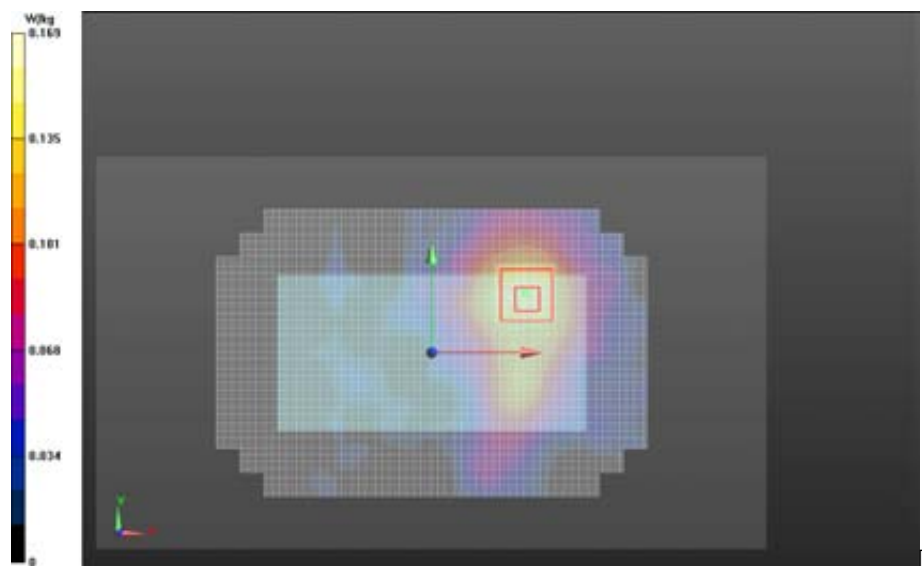
TRIPLE Flat Phone Against Flat Section/Area Scan - Body (10mm) (281x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Fast SAR: SAR(1g) = 0.0895 W/kg; SAR(10g) = 0.0402 W/kg

TRIPLE Flat Phone Against Flat Section/7x7x12 Zoom Scan (5-6GHz) (31x31x31)/Cube 0: Interpolated grid: dx=0.800 mm, dy=0.800 mm, dz=0.400 mm

Reference Value = 5.398 V/m, Power Drift = -0.106 dB

Averaged SAR: SAR(1g) = 0.0825 W/kg; SAR(10g) = 0.0344 W/kg



TRIPLE Flat Phone Against Flat Section

Appendix 4

SAR Distribution Plots for Mobile Hotspot Test Results

Date/Time: 4/18/2013 1:33:03 PM

DUT Serial: LXWW1K0003

DASY Configuration:

- Probe: ES3DV3 - SN3124; ConvF(5.07,5.07,5.07); Calibrated: 8/20/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/3/2012
- Phantom: R#2 Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _LTE Band 12; Communication System Band: Band 12: 10MHz BW; Frequency: 707.5 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=707.5$ MHz; $\sigma = 0.9595$; $\epsilon_r = 54.05$ mho/m; $\rho = 1000$ kg/m³

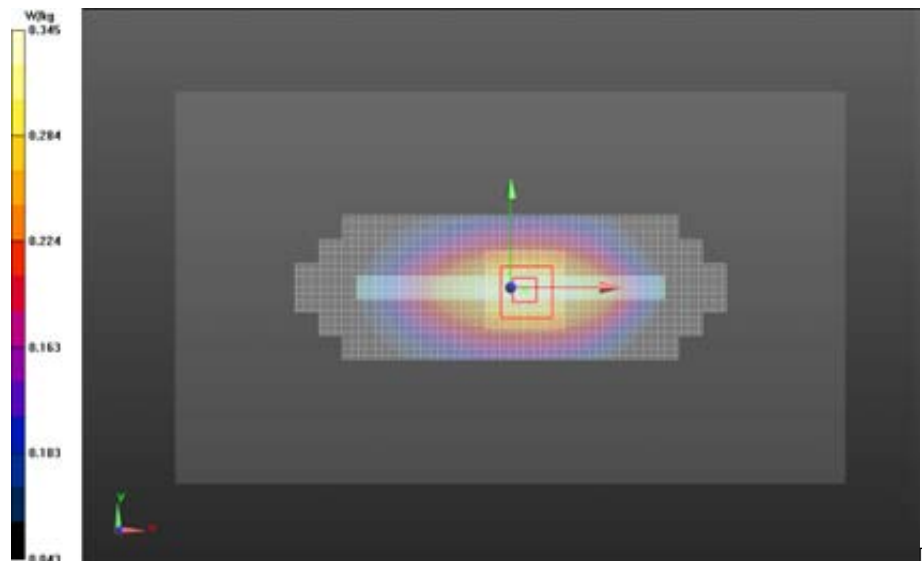
**0.6-2GHz Triple Flat Phone Template/Area Scan (10mm) (261x141x1): Interpolated grid:
 dx=1.000 mm, dy=1.000 mm**

Fast SAR: SAR(1g) = 0.329 W/kg; SAR(10g) = 0.227 W/kg

**0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0:
 Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 19.223 V/m, Power Drift = -0.082 dB

Averaged SAR: SAR(1g) = 0.323 W/kg; SAR(10g) = 0.228 W/kg



0.6-2GHz Triple Flat Phone Template

Date/Time: 4/20/2013 1:12:33 AM

DUT Serial: LXWW1K0006

DASY Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _LTE Band 05; Communication System Band: Band 5: 10 MHz BW; Frequency: 836.5 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=836.5$ MHz; $\sigma = 1.006$; $\epsilon_r = 53.67$ mho/m; $\rho = 1000$ kg/m³

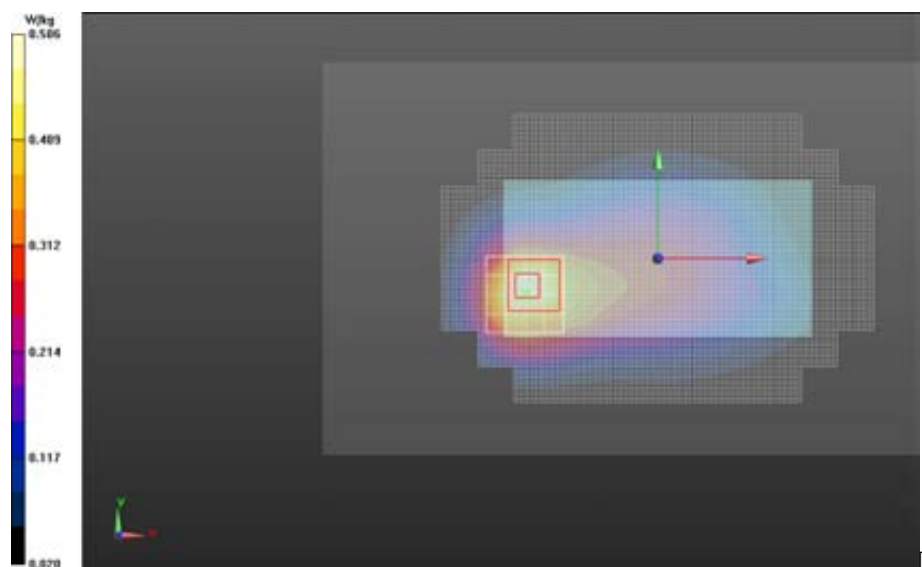
0.6-2GHz Triple Flat Phone Template/Area Scan (15mm), not for EDGES (181x101x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.479 W/kg; SAR(10g) = 0.315 W/kg

0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0:
Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 19.326 V/m, Power Drift = -0.036 dB

Averaged SAR: SAR(1g) = 0.475 W/kg; SAR(10g) = 0.294 W/kg



Date/Time: 4/19/2013 5:33:39 PM

DUT Serial: LXWW1K007

DASY Configuration:

- Probe: ES3DV3 - SN3282; ConvF(4.98,4.98,4.98); Calibrated: 1/21/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 5/23/2012
- Phantom: R#-3, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _LTE Band 04; Communication System Band: Band 4: 20 MHz BW; Frequency: 1733 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=1732.5$ MHz; $\sigma = 1.521$; $\epsilon_r = 50.27$ mho/m; $\rho = 1000$ kg/m³

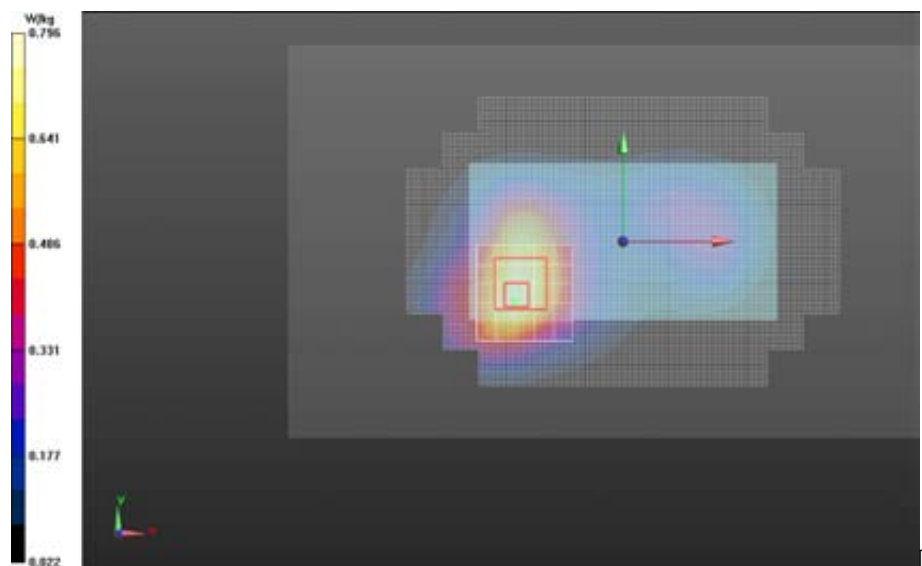
0.6-2GHz Triple Flat Phone Template/Area Scan (15mm), not for EDGES (181x101x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.725 W/kg; SAR(10g) = 0.443 W/kg

0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (26x26x36)/Cube 0:
Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 22.605 V/m, Power Drift = 0.026 dB

Averaged SAR: SAR(1g) = 0.734 W/kg; SAR(10g) = 0.457 W/kg



0.6-2GHz Triple Flat Phone Template

Date/Time: 4/26/2013 12:09:25 AM

DUT Serial: LXWW1K0001

DASY Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CDMA; Communication System Band: CDMA 800; Frequency: 824.7 MHz,

Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000

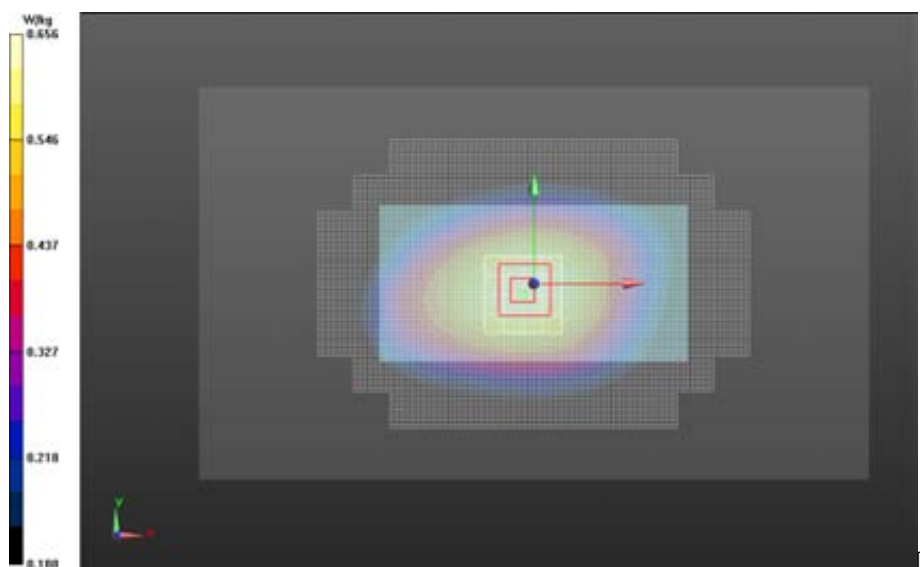
Medium Parameters used: $f=824.7$ MHz; $\sigma = 0.9978$; $\epsilon_r = 52.84$ mho/m; $\rho = 1000$ kg/m³**0.6-2GHz Triple Flat Phone Template/Area Scan (15mm), not for EDGES (181x101x1):****Interpolated grid: dx=1.500 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 0.621 W/kg; SAR(10g) = 0.439 W/kg

0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0:**Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 25.575 V/m, Power Drift = -0.00322 dB

Averaged SAR: SAR(1g) = 0.627 W/kg; SAR(10g) = 0.483 W/kg



Date/Time: 4/26/2013 5:11:51 PM

DUT Serial: LXWW1K0001

DASY Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn656; Calibrated: 2/7/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CDMA; Communication System Band: CDMA 1900; Frequency: 1851 MHz,
 Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=1851.25$ MHz; $\sigma = 1.505$; $\epsilon_r = 49.03$ mho/m; $\rho = 1000$ kg/m³

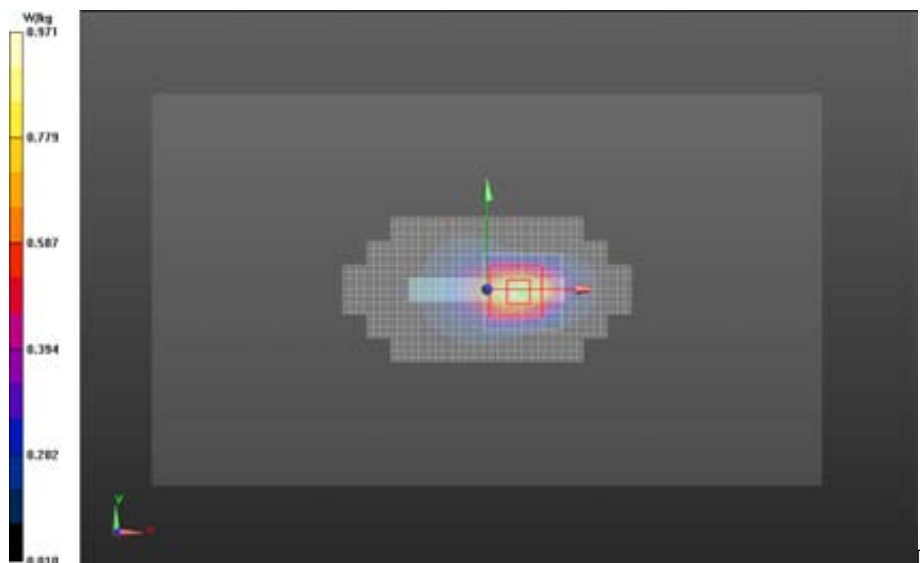
**0.6-2GHz Triple Flat Phone Template/Area Scan (10mm) (261x141x1): Interpolated grid:
 dx=1.000 mm, dy=1.000 mm**

Fast SAR: SAR(1g) = 0.861 W/kg; SAR(10g) = 0.420 W/kg

**0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0:
 Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 25.852 V/m, Power Drift = -0.027 dB

Averaged SAR: SAR(1g) = 0.849 W/kg; SAR(10g) = 0.423 W/kg



0.6-2GHz Triple Flat Phone Template

Date/Time: 4/12/2013 10:48:50 AM

DUT Serial: LXVE110019

DASY Configuration:

- Probe: EX3DV4 - SN3730; ConvF(7.62,7.62,7.62); Calibrated: 8/24/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn784; Calibrated: 3/6/2013
- Phantom: R#-3, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _Wi-Fi 2450MHz; Communication System Band: 2450MHz WIFI; Frequency: 2437 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000

Medium Parameters used: $f=2437$ MHz; $\sigma = 1.974$; $\epsilon_r = 50.34$ mho/m; $\rho = 1000$ kg/m³

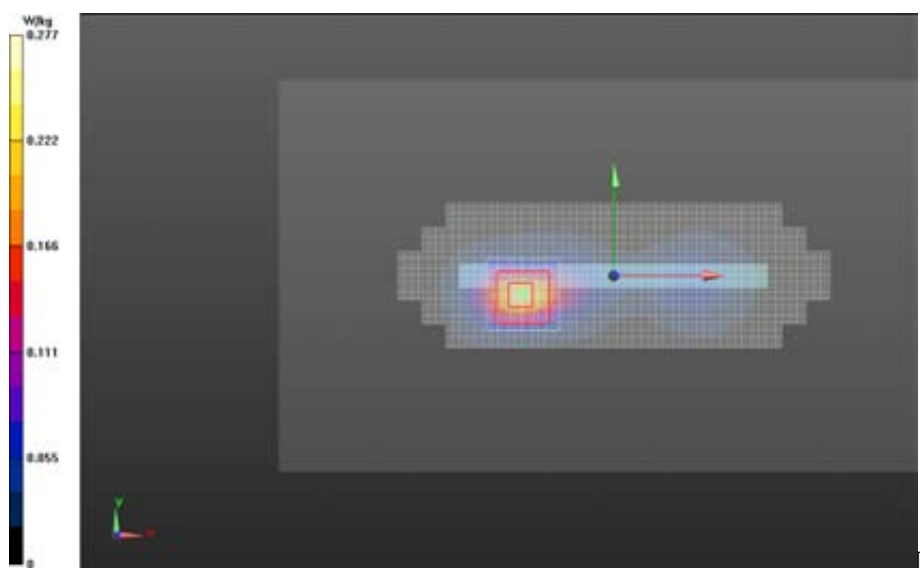
**2-3GHz Triple Flat Phone Template/Area Scan (10mm) (261x141x1): Interpolated grid:
dx=1.000 mm, dy=1.000 mm**

Fast SAR: SAR(1g) = 0.226 W/kg; SAR(10g) = 0.101 W/kg

**2-3GHz Triple Flat Phone Template/7x7x7 Zoom Scan (2-3GHz) (31x31x36)/Cube 0:
Interpolated grid: dx=1.000 mm, dy=1.000 mm, dz=1.000 mm**

Reference Value = 8.235 V/m, Power Drift = -0.081 dB

Averaged SAR: SAR(1g) = 0.234 W/kg; SAR(10g) = 0.107 W/kg



2-3GHz Triple Flat Phone Template

Date/Time: 4/7/2013 3:52:36 AM

DUT Serial: LXVE110019

DASY Configuration:

- Probe: EX3DV4 - SN3730; ConvF(7.62,7.62,7.62); Calibrated: 8/24/2012;
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn784; Calibrated: 3/6/2013
- Phantom: R#-3, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _WIFI 5-6GHz; Communication System Band: 5785 MHz Sub-Band; Frequency: 5785 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: $f=5785$ MHz; $\sigma = 6.209$; $\epsilon_r = 44.80$ mho/m; $\rho = 1000$ kg/m³

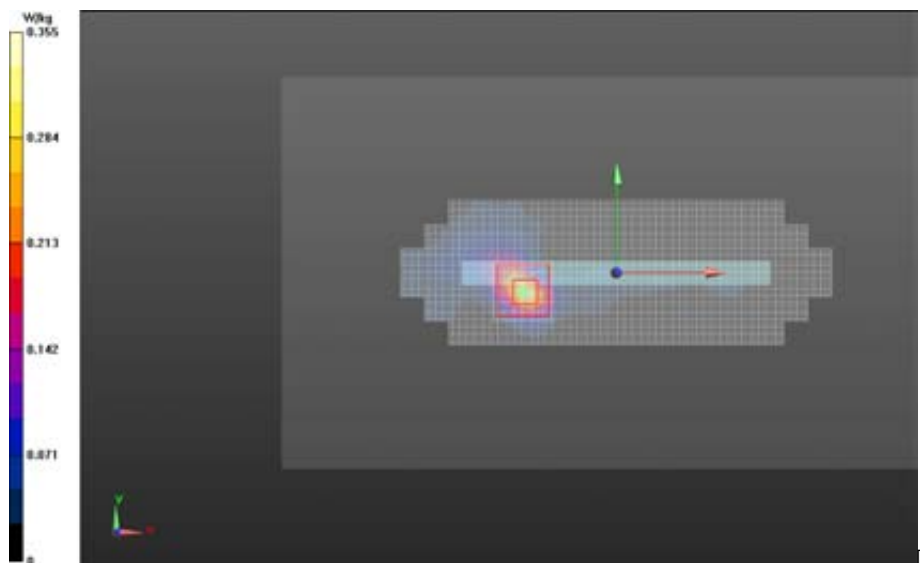
TRIPLE Flat Phone Against Flat Section/Area Scan - Body (10mm) (281x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Fast SAR: SAR(1g) = 0.153 W/kg; SAR(10g) = 0.0474 W/kg

TRIPLE Flat Phone Against Flat Section/7x7x12 Zoom Scan (5-6GHz) (31x31x31)/Cube 0: Interpolated grid: dx=0.800 mm, dy=0.800 mm, dz=0.400 mm

Reference Value = 6.287 V/m, Power Drift = -0.021 dB

Averaged SAR: SAR(1g) = 0.164 W/kg; SAR(10g) = 0.0496 W/kg



TRIPLE Flat Phone Against Flat Section

Appendix 5

Measurement Uncertainty Budget

Uncertainty Budget for Device Under Test, for 735 MHz to 3 GHz

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e = f(d,k)</i>	<i>f</i>	<i>g</i>	<i>h = c x f / e</i>	<i>i = c x g / e</i>	<i>k</i>
Uncertainty Component	Description IEEE 1528(2003) / IEC 62209-1(2005)	Tol. (± %)	Prob Dist	Div.	<i>c_i</i> (1 g)	<i>c_i</i> (10 g)	1 g <i>u_i</i> (±%)	10 g <i>u_i</i> (±%)	<i>v_i</i>
Measurement System									
Probe Calibration [ES3DV3]	E.2.1 / 7.2.1	6.0	N	1.00	1	1	6.0	6.0	∞
Axial Isotropy	E.2.2 / 7.2.1.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2 / 7.2.1.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3 / 7.2.1.5	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4 / 7.2.1.3	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5 / 7.2.1.4	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6 / 7.2.1.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7 / 7.2.1.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8 / 7.2.1.8	1.1	R	1.73	1	1	0.6	0.6	∞
RF Ambient Conditions - Noise	E.6.1 / 7.2.3.6	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1 / 7.2.3.6	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mech. Tolerance	E.6.2 / 7.2.2.1	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t Phantom	E.6.3 / 7.2.2.3	2.9	R	1.73	1	1	1.7	1.7	∞
Max. SAR Evaluation (ext., int., avg.)	E.5 / 7.2.4	3.4	R	1.73	1	1	2.0	2.0	∞
Test sample Related									
Test Sample Positioning	E.4.2 / 7.2.2.4	3.4	N	1.00	1	1	3.4	3.4	79
Device Holder Uncertainty	E.4.1 / 7.2.2.4.2	4.5	N	1.00	1	1	4.5	4.5	11
SAR drift	6.6.2 / 7.2.3.5	0.0	R	1.73	1	1	0.0	0.0	
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1 / 7.2.2.2	6.1	R	1.73	1	1	3.5	3.5	∞
SAR Correction		1.9	R	1.73	1	0.84	1.1	0.9	∞
Liquid Conductivity (measurement)	E.3.3 / 7.2.3.3	1.3	N	1.00	0.64	0.43	0.9	0.6	6
Liquid Permittivity (measurement)	E.3.2 / 7.2.3.4	0.7	N	1.00	0.6	0.49	0.4	0.3	6
Combined Standard Uncertainty			RSS				11	11	390
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				22	22	

Uncertainty Budget for Device Under Test for 3 to 6 GHz

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e = f(d,k)</i>	<i>f</i>	<i>g</i>	<i>h = c x f / e</i>	<i>i = c x g / e</i>	<i>k</i>
Uncertainty Component	Description IEC 62209-2 (2010)	Tol. (± %)	Prob Dist	Div.	<i>c_i</i> (1 g)	<i>c_i</i> (10 g)	1 g <i>u_i</i> (±%)	10 g <i>u_i</i> (±%)	<i>v_i</i>
Measurement System									
Probe Calibration [EX3DV4]	7.2.2.1	6.6	N	1.00	1	1	6.6	6.6	∞
Axial Isotropy	7.2.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	7.2.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	7.2.2.6	2.0	R	1.73	1	1	1.2	1.2	∞
Linearity	7.2.2.5	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	7.2.2	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	7.2.2.7	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	7.2.2.8	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	7.2.2.9	1.1	R	1.73	1	1	0.6	0.6	∞
RF Ambient Conditions - Noise	7.2.4.5	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	7.2.4.5	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mech. Tolerance	7.2.3.1	1.0	R	1.73	1	1	0.6	0.6	∞
Probe Positioning w.r.t Phantom	7.2.3.3	6.7	R	1.73	1	1	3.9	3.9	∞
Max. SAR Evaluation (ext., int., avg.)	7.2.5.3	4.0	R	1.73	1	1	2.3	2.3	∞
Test sample Related									
Test Sample Positioning	7.2.3.4	3.4	N	1.00	1	1	3.4	3.4	79
Device Holder Uncertainty	7.2.3.4	4.5	N	1.00	1	1	4.5	4.5	11
SAR drift	7.2.2.10	0.0	R	1.73	1	1	0.0	0.0	
Phantom and Tissue Parameters									
Phantom Uncertainty	7.2.3.2	6.6	R	1.73	1	1	3.8	3.8	∞
SAR Correction	7.2.4.3	1.9	R	1.73	1	0.84	1.1	0.9	∞
Liquid Conductivity (measurement)	7.2.4.3	1.4	N	1.00	0.64	0.43	0.9	0.6	6
Liquid Permittivity (measurement)	7.2.4.3	0.7	N	1.00	0.6	0.49	0.4	0.4	6
Combined Standard Uncertainty			RSS				12	12	557
Expanded Uncertainty (95% CONFIDENCE LEVEL)			<i>k</i> =2				24	24	

Appendix 6

Probe Calibration Certificates

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Motorola MDb**

Certificate No: **ES3-3037_Sep12**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3037**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes**

Calibration date: **September 13, 2012**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S6054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S6129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	
Issued: September 18, 2012			
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zoughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3037

Manufactured: August 21, 2003
Calibrated: September 13, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3037

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V/m})^2$) ^A	1.13	0.84	0.97	$\pm 10.1 \%$
DCP (mV) ^B	102.8	103.8	101.9	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^C (k=2)
0	CW	0.00	X	0.00	0.00	1.00	148.4	$\pm 3.5 \%$
			Y	0.00	0.00	1.00	162.2	
			Z	0.00	0.00	1.00	177.4	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^C Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3037

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^f	Conductivity (S/m) ^f	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.46	6.46	6.46	0.24	2.00	± 12.0 %
835	41.5	0.90	6.23	6.23	6.23	0.72	1.15	± 12.0 %
1810	40.0	1.40	5.15	5.15	5.15	0.78	1.16	± 12.0 %
1950	40.0	1.40	4.96	4.96	4.96	0.79	1.15	± 12.0 %
2450	39.2	1.80	4.43	4.43	4.43	0.77	1.22	± 12.0 %
2600	39.0	1.96	4.23	4.23	4.23	0.80	1.22	± 12.0 %

^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^f At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3037

Calibration Parameter Determined in Body Tissue Simulating Media

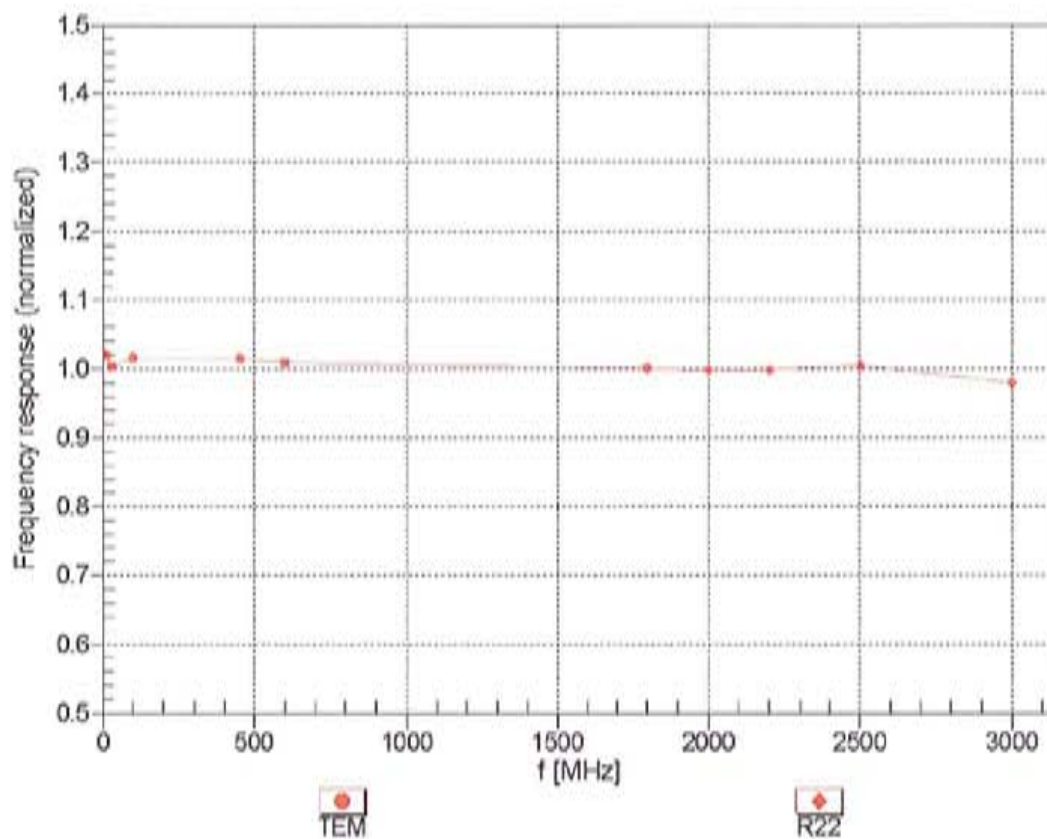
f (MHz) ^G	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.22	6.22	6.22	0.51	1.37	± 12.0 %
835	55.2	0.97	6.16	6.16	6.16	0.34	1.69	± 12.0 %
1810	53.3	1.52	4.83	4.83	4.83	0.66	1.32	± 12.0 %
1950	53.3	1.52	4.76	4.76	4.76	0.63	1.31	± 12.0 %
2450	52.7	1.95	4.13	4.13	4.13	0.80	0.98	± 12.0 %
2600	52.5	2.16	3.92	3.92	3.92	0.80	0.98	± 12.0 %

^G Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

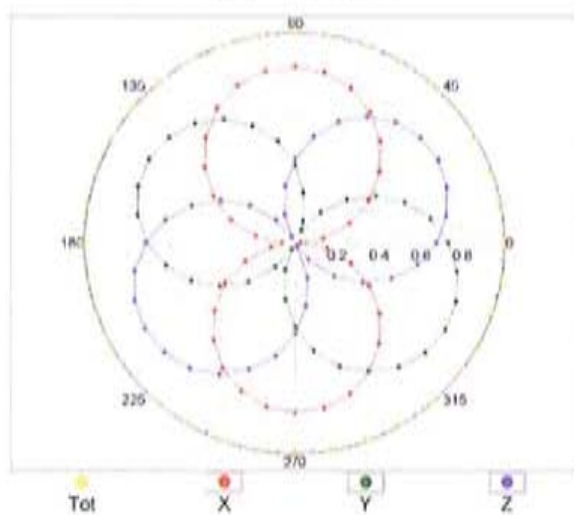
(TEM-Cell:ifi110 EXX, Waveguide: R22)



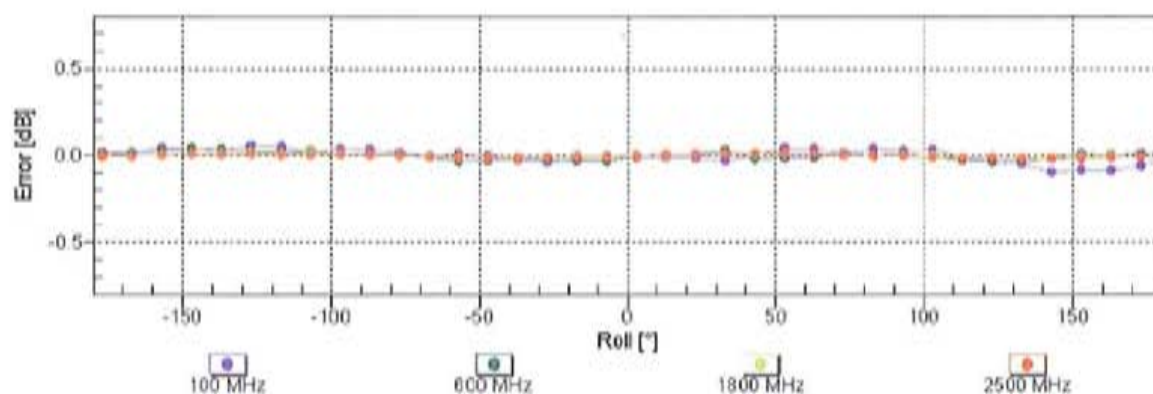
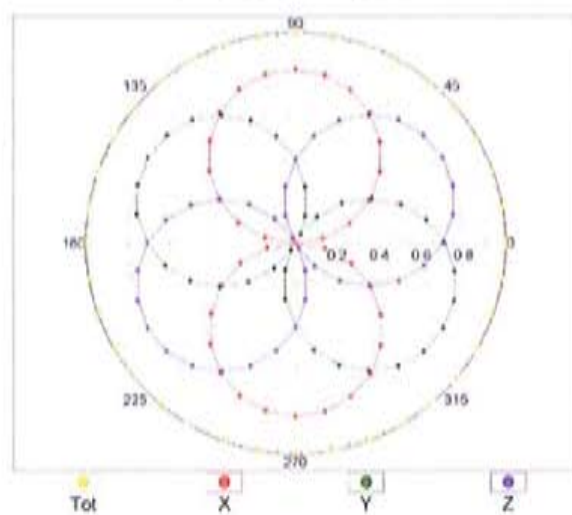
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz,TEM

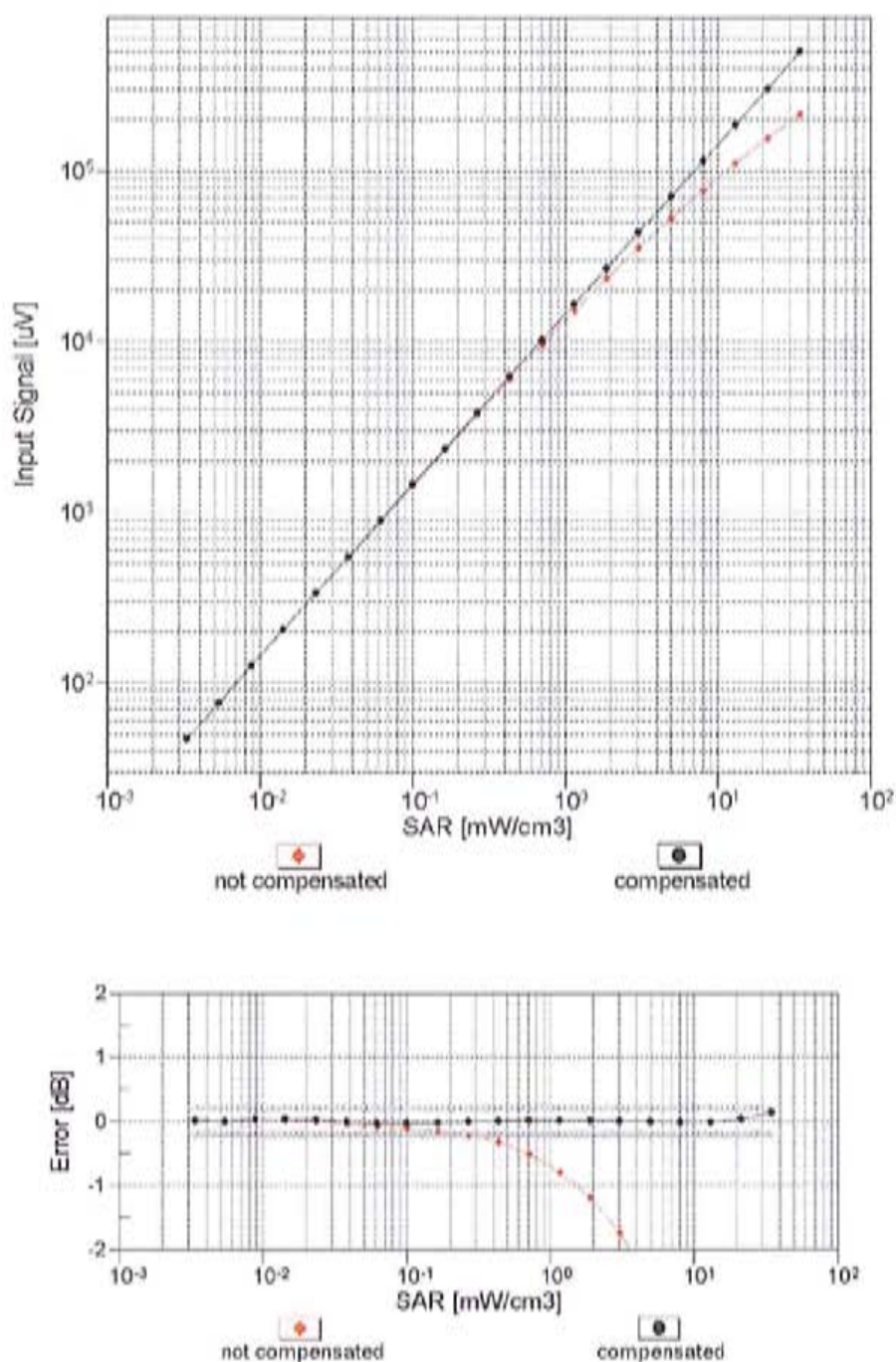


f=1800 MHz,R22



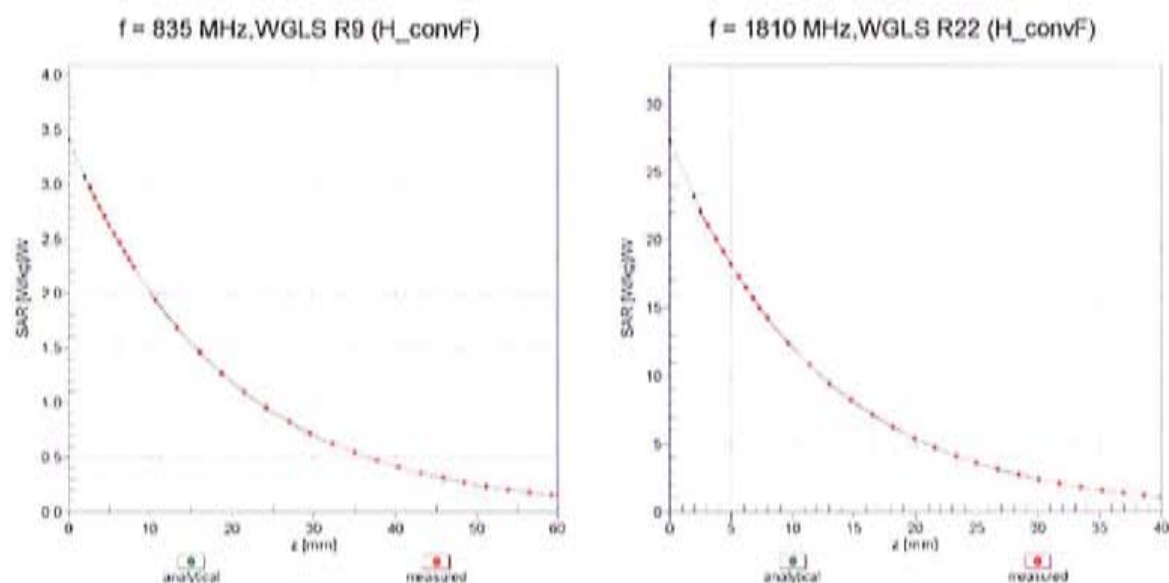
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f = 900 \text{ MHz}$)



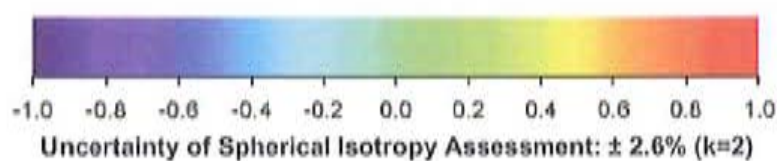
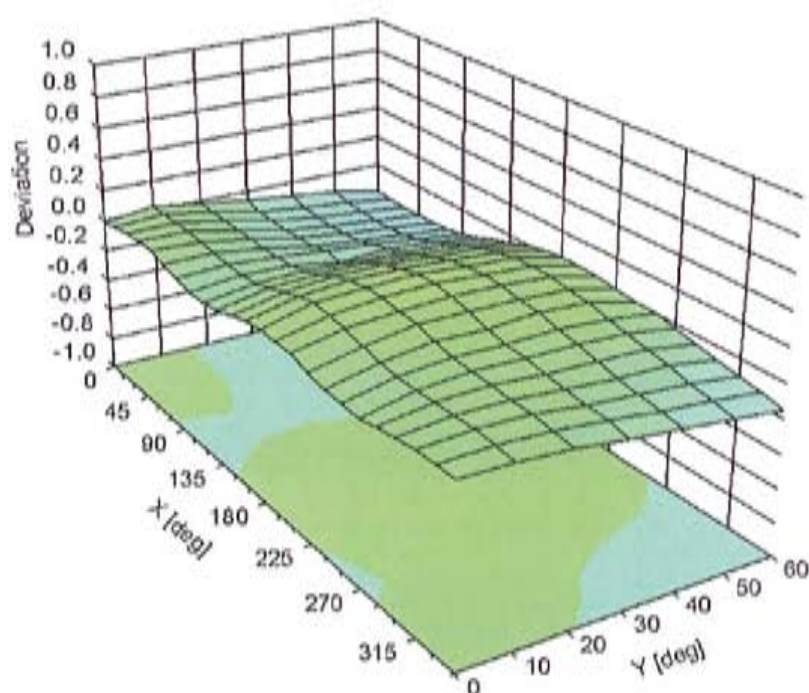
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: ES3DV3 - SN:3037

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	103
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Motorola MDb**

Certificate No: **ES3-3124_Aug12**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3124**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes**

Calibration date: **August 20, 2012**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			Issued: August 20, 2012

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization ϕ	ϕ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3124

Manufactured: July 11, 2006
Calibrated: August 20, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3124

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.27	1.30	1.30	$\pm 10.1 \%$
DCP (mV) ^B	98.9	102.1	100.4	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
0	CW	0.00	X	0.00	0.00	1.00	158.7	$\pm 3.3 \%$
			Y	0.00	0.00	1.00	163.3	
			Z	0.00	0.00	1.00	160.2	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3124

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^G	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.23	6.23	6.23	0.21	2.37	± 12.0 %
835	41.5	0.90	6.01	6.01	6.01	0.57	1.31	± 12.0 %
1810	40.0	1.40	5.07	5.07	5.07	0.66	1.33	± 12.0 %
1950	40.0	1.40	4.88	4.88	4.88	0.80	1.19	± 12.0 %
2450	39.2	1.80	4.37	4.37	4.37	0.67	1.42	± 12.0 %
2600	39.0	1.96	4.26	4.26	4.26	0.80	1.30	± 12.0 %

^G Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3124

Calibration Parameter Determined in Body Tissue Simulating Media

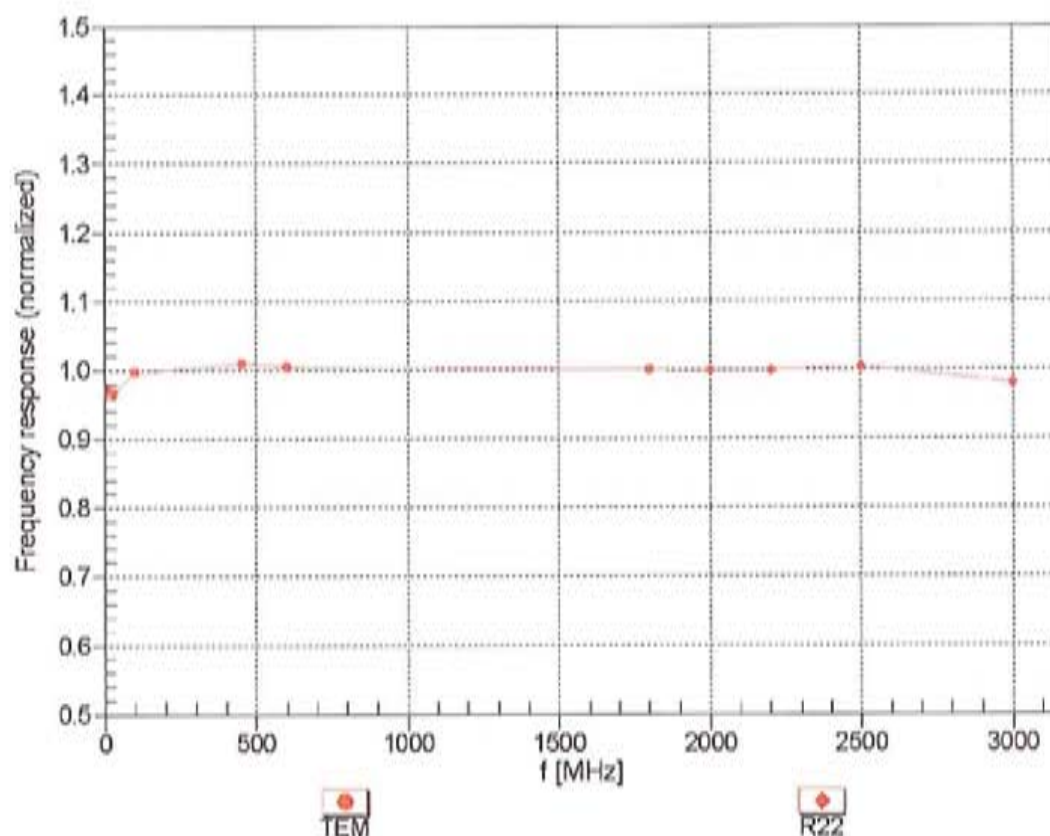
f (MHz) ^c	Relative Permittivity ^f	Conductivity (S/m) ^f	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.15	6.15	6.15	0.50	1.45	± 12.0 %
835	55.2	0.97	6.02	6.02	6.02	0.52	1.46	± 12.0 %
1810	53.3	1.52	4.76	4.76	4.76	0.62	1.57	± 12.0 %
1950	53.3	1.52	4.81	4.81	4.81	0.52	1.63	± 12.0 %
2450	52.7	1.95	4.40	4.40	4.40	0.72	1.15	± 12.0 %
2600	52.5	2.16	4.19	4.19	4.19	0.80	0.98	± 12.0 %

^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^f At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

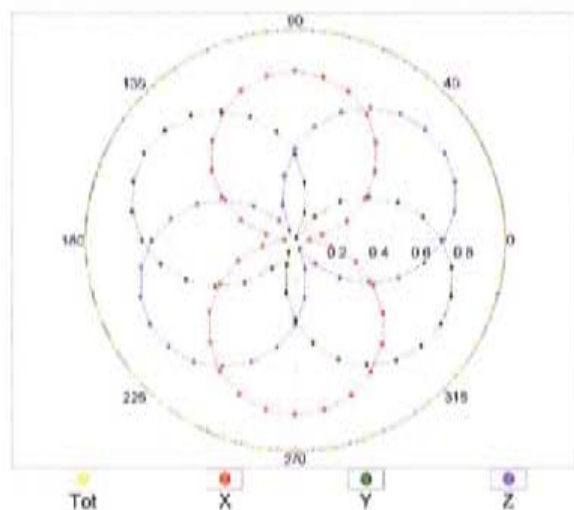
(TEM-Cell:ifi110 EXX, Waveguide: R22)



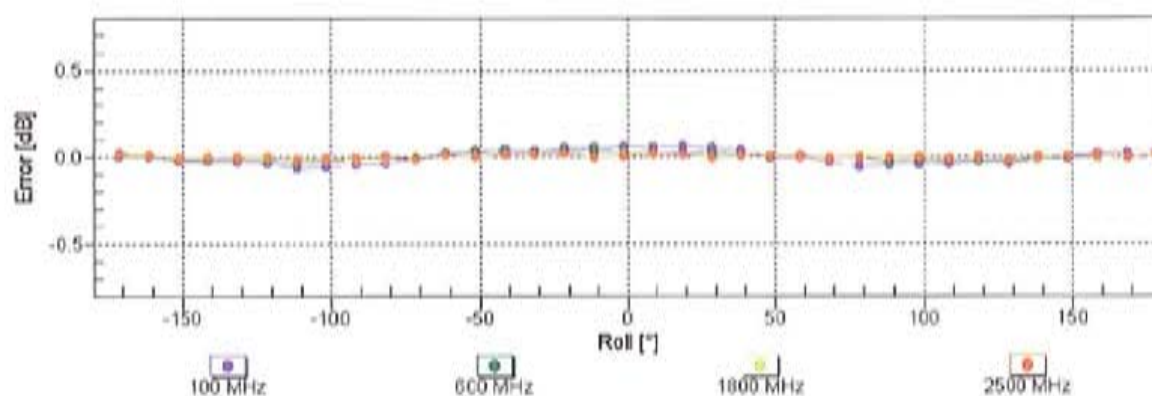
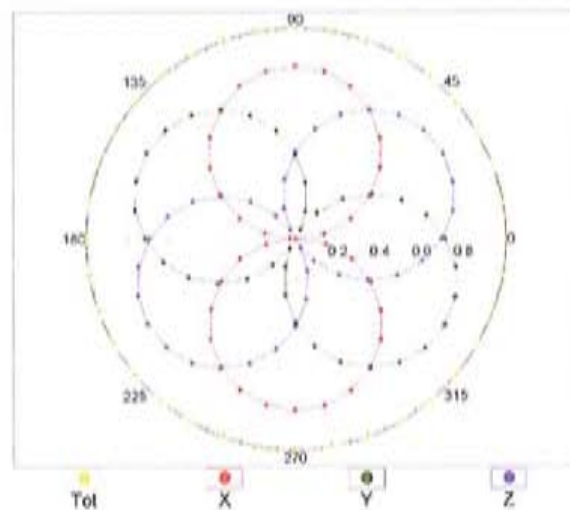
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz,TEM

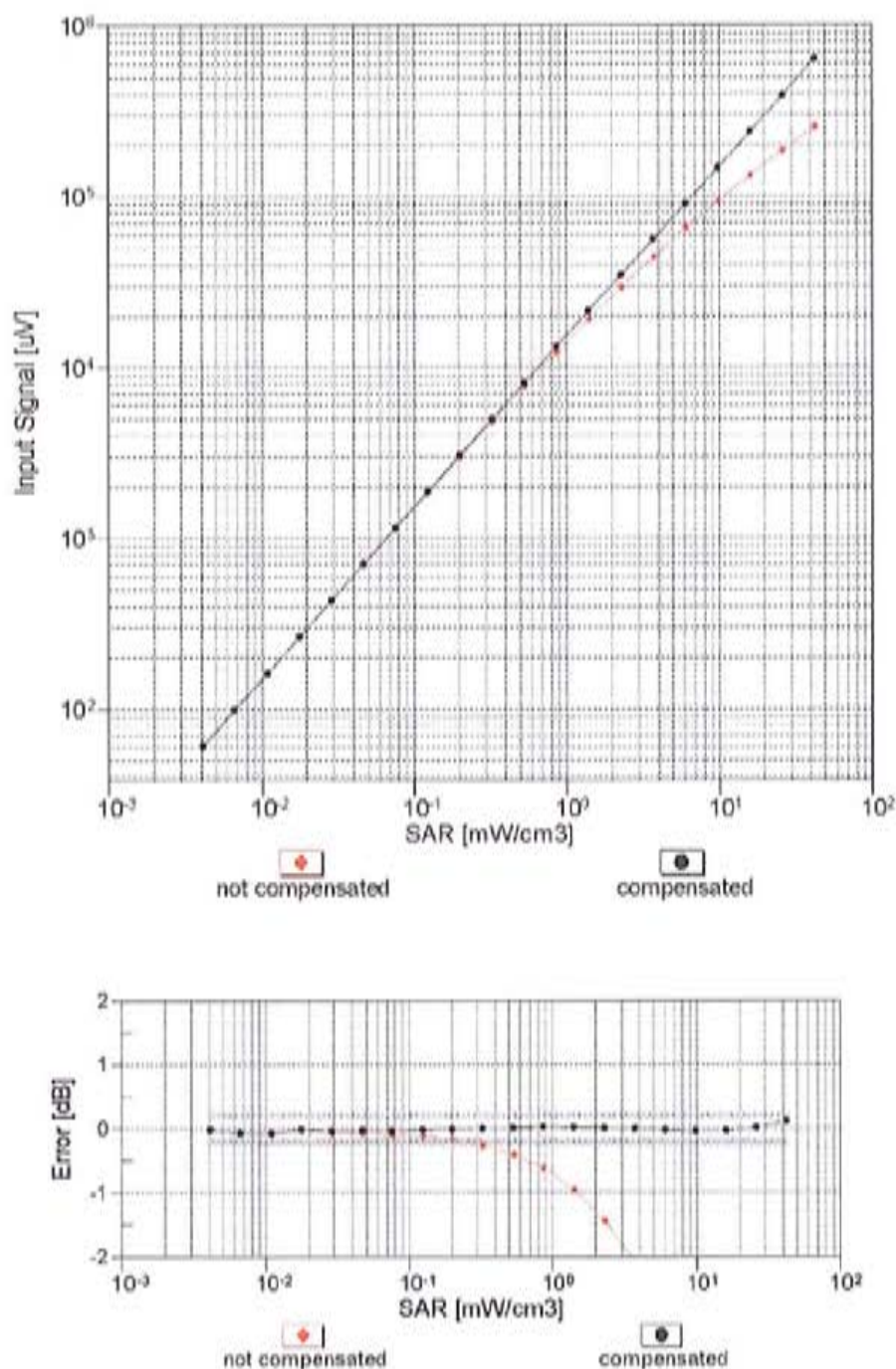


f=1800 MHz,R22



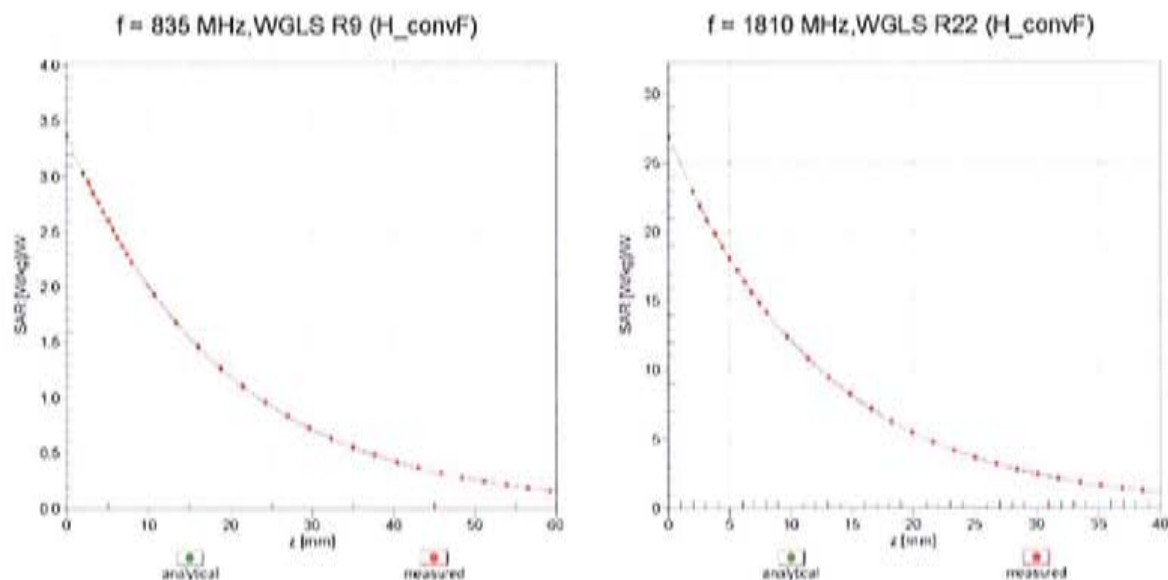
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range f(SAR_{head}) (TEM cell , f = 900 MHz)



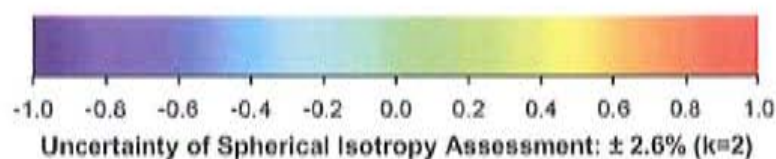
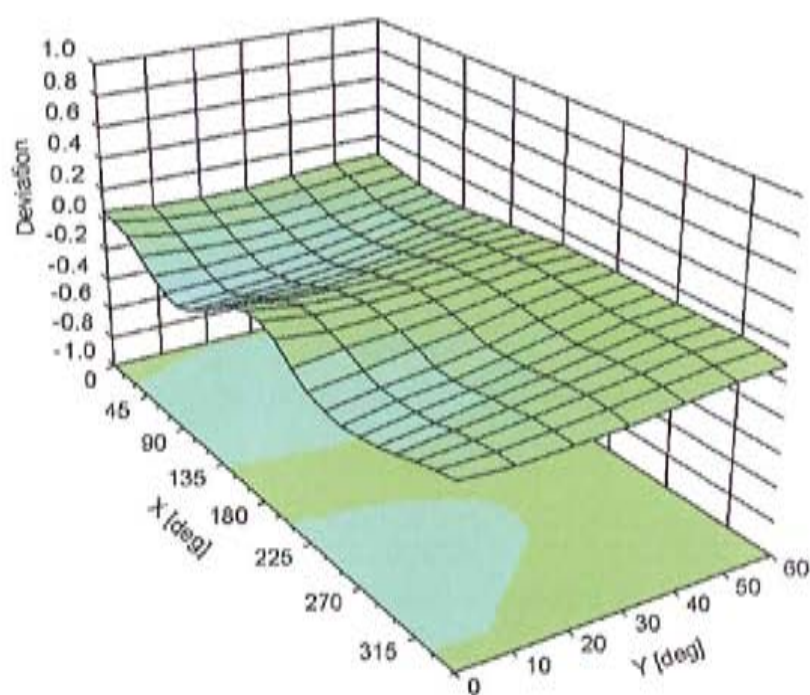
Uncertainty of Linearity Assessment: $\pm 0.6\%$ (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ , θ), $f = 900 \text{ MHz}$



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3124

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	128.4
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
S Service suisse d'étalonnage
C Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Motorola MDb**

Certificate No: **ES3-3180_Feb13/2**

CALIBRATION CERTIFICATE (Replacement of No: ES3-3180_Feb13)

Object **ES3DV3 - SN:3180**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes**

Calibration date: **February 11, 2013**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	31-Jan-13 (No. DAE4-660_Jan13)	Jan-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37300585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature 
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature 
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			Issued: March 5, 2013

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zoughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,y,z}**: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3180

Manufactured: March 25, 2008
Calibrated: February 11, 2013

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3180

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.21	1.05	1.01	$\pm 10.1 \%$
DCP (mV) ^B	103.4	103.9	101.9	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^C (k=2)
0	CW	X	0.0	0.0	1.0	0.00	110.8	$\pm 2.7 \%$
		Y	0.0	0.0	1.0		140.9	
		Z	0.0	0.0	1.0		133.8	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^C Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3180

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^f	Conductivity (S/m) ^f	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.45	6.45	6.45	0.27	1.95	± 12.0 %
835	41.5	0.90	6.23	6.23	6.23	0.33	1.71	± 12.0 %
1810	40.0	1.40	5.01	5.01	5.01	0.76	1.15	± 12.0 %
1950	40.0	1.40	4.79	4.79	4.79	0.61	1.32	± 12.0 %
2450	39.2	1.80	4.40	4.40	4.40	0.54	1.53	± 12.0 %
2600	39.0	1.96	4.21	4.21	4.21	0.72	1.35	± 12.0 %

^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^f At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3180

Calibration Parameter Determined in Body Tissue Simulating Media

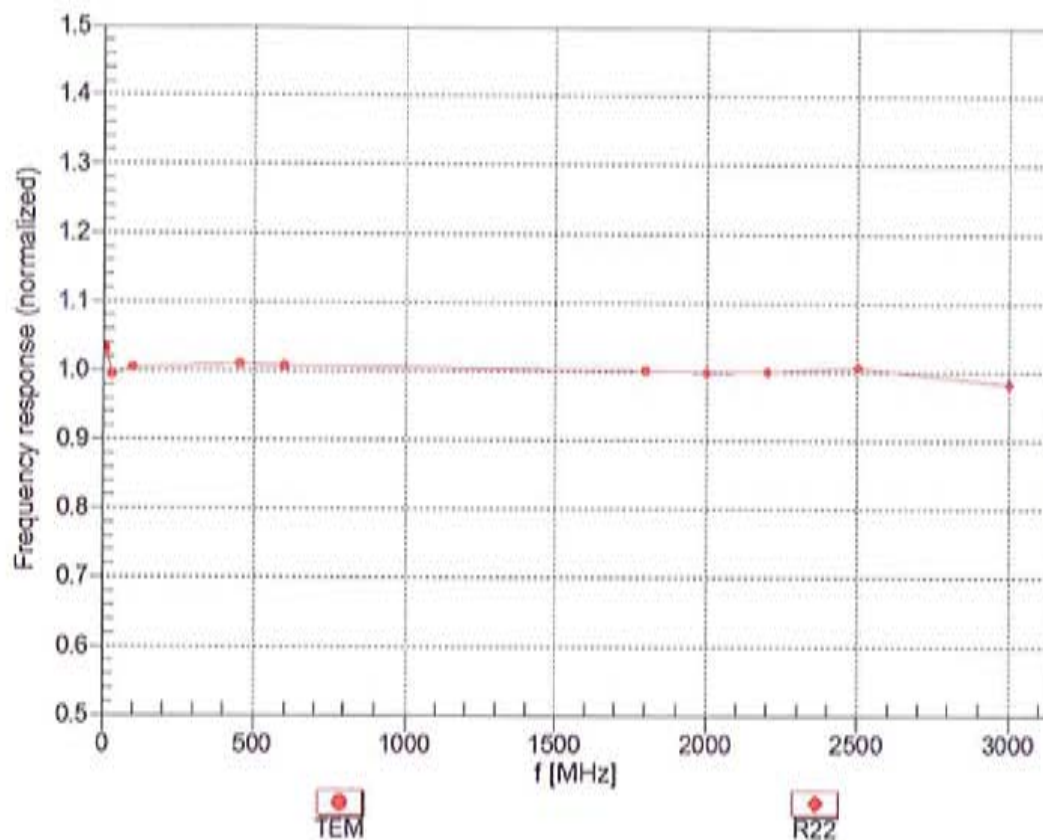
f (MHz) ^c	Relative Permittivity ^f	Conductivity (S/m) ^f	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.14	6.14	6.14	0.55	1.38	± 12.0 %
835	55.2	0.97	6.05	6.05	6.05	0.40	1.60	± 12.0 %
1810	53.3	1.52	4.78	4.78	4.78	0.47	1.53	± 12.0 %
1950	53.3	1.52	4.73	4.73	4.73	0.51	1.60	± 12.0 %
2450	52.7	1.95	4.23	4.23	4.23	0.77	1.19	± 12.0 %
2600	52.5	2.16	3.99	3.99	3.99	0.72	1.06	± 12.0 %

^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^f At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

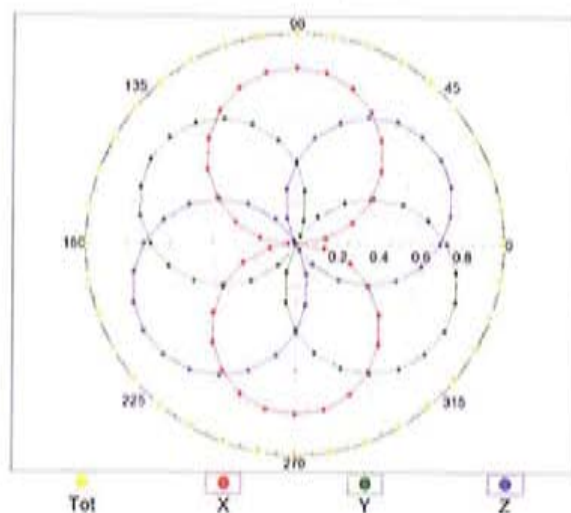
(TEM-Cell: ifi110 EXX, Waveguide: R22)



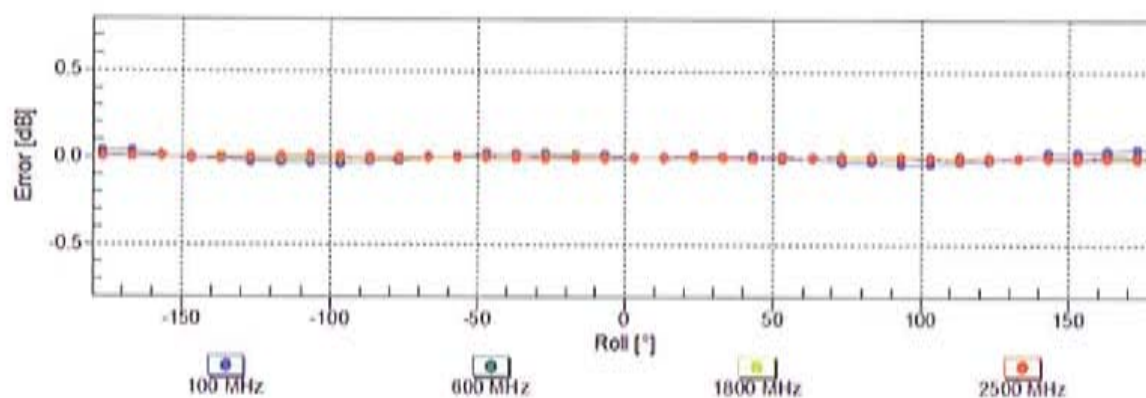
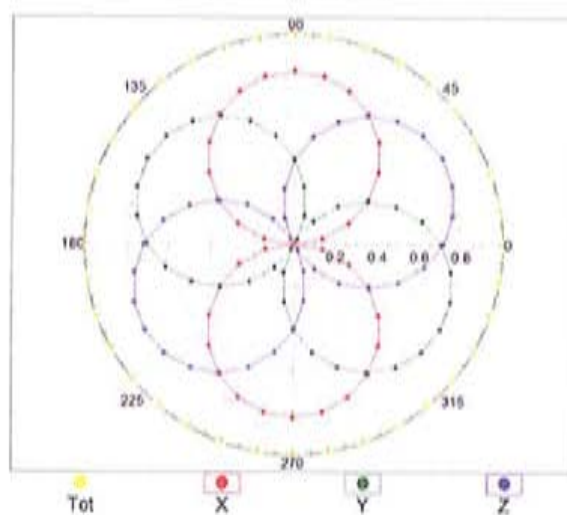
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\vartheta = 0^\circ$

f=600 MHz, TEM

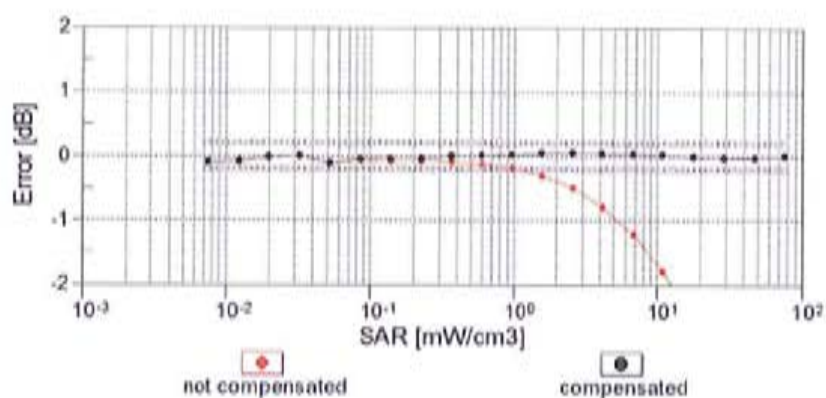
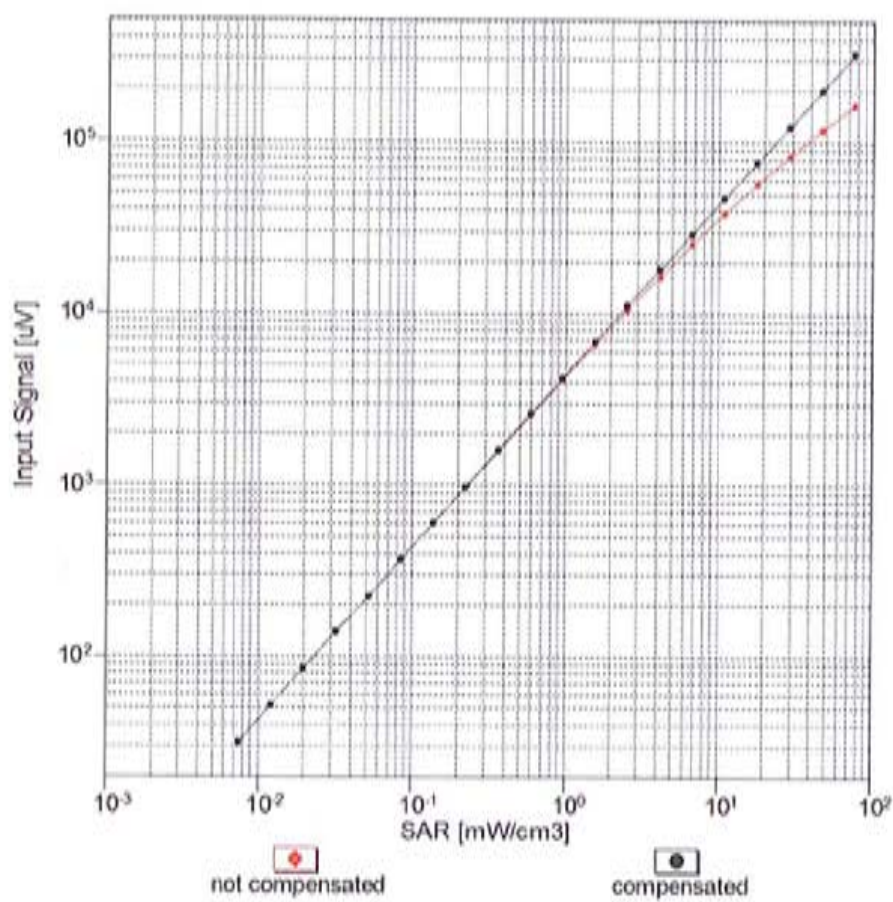


f=1800 MHz, R22



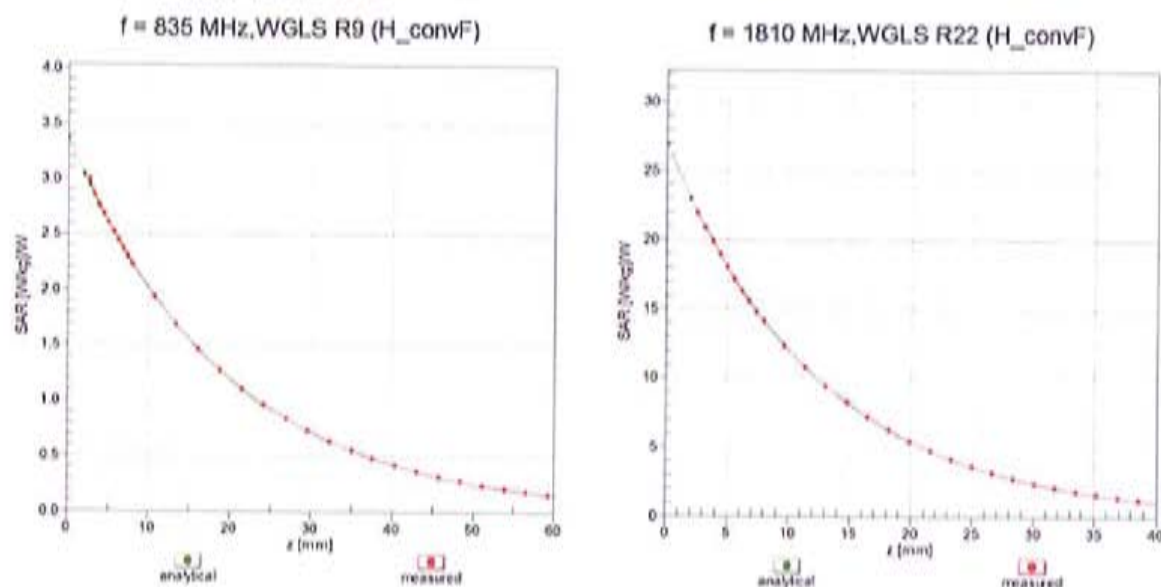
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f = 900 \text{ MHz}$)



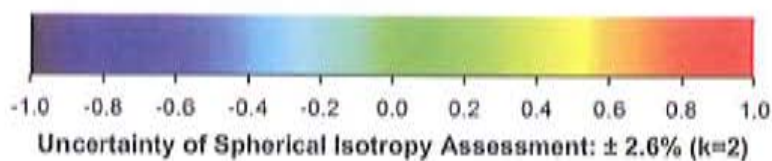
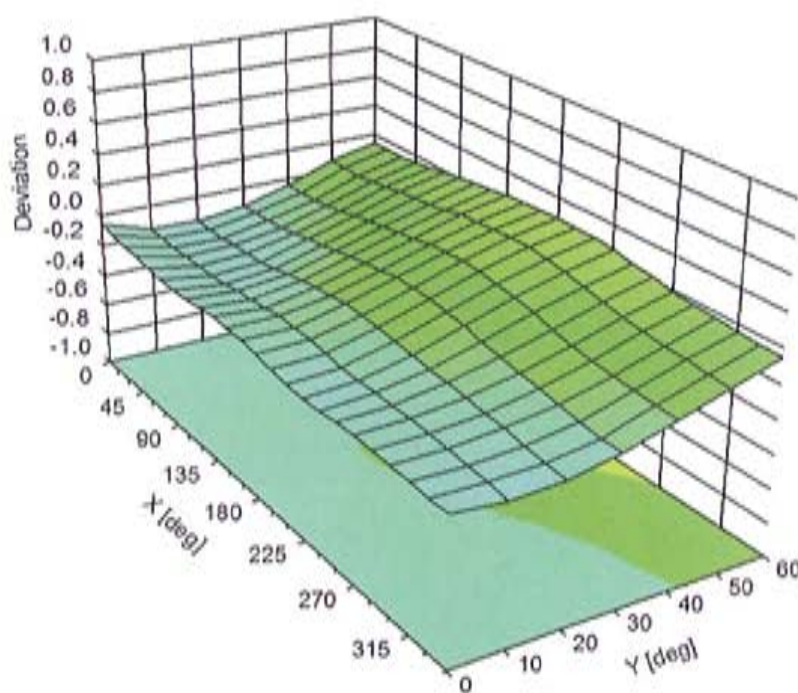
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: ES3DV3 - SN:3180

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-46.8
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Calibration Laboratory of
Schmid & Partner
Engineering AG
 Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Motorola MDb**

Certificate No: **ES3-3282_Jan13**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3282**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4**
Calibration procedure for dosimetric E-field probes

Calibration date: **January 21, 2013**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			Issued: January 21, 2013

Calibration Laboratory of
Schmid & Partner
Engineering AG
 Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
 Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,y,z}; A, B, C, D** are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: In a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3282

Manufactured: June 7, 2010
Calibrated: January 21, 2013

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3282

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.27	1.15	1.18	$\pm 10.1 \%$
DCP (mV) ^B	101.6	101.6	102.1	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	159.1	$\pm 3.0 \%$
		Y	0.0	0.0	1.0		156.1	
		Z	0.0	0.0	1.0		155.1	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3282

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^f	Conductivity (S/m) ^f	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.41	6.41	6.41	0.35	1.63	± 12.0 %
835	41.5	0.90	6.17	6.17	6.17	0.41	1.56	± 12.0 %
1810	40.0	1.40	4.98	4.98	4.98	0.80	1.18	± 12.0 %
1950	40.0	1.40	4.83	4.83	4.83	0.65	1.30	± 12.0 %
2450	39.2	1.80	4.42	4.42	4.42	0.62	1.42	± 12.0 %
2600	39.0	1.96	4.25	4.25	4.25	0.80	1.26	± 12.0 %

^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^f At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3282

Calibration Parameter Determined in Body Tissue Simulating Media

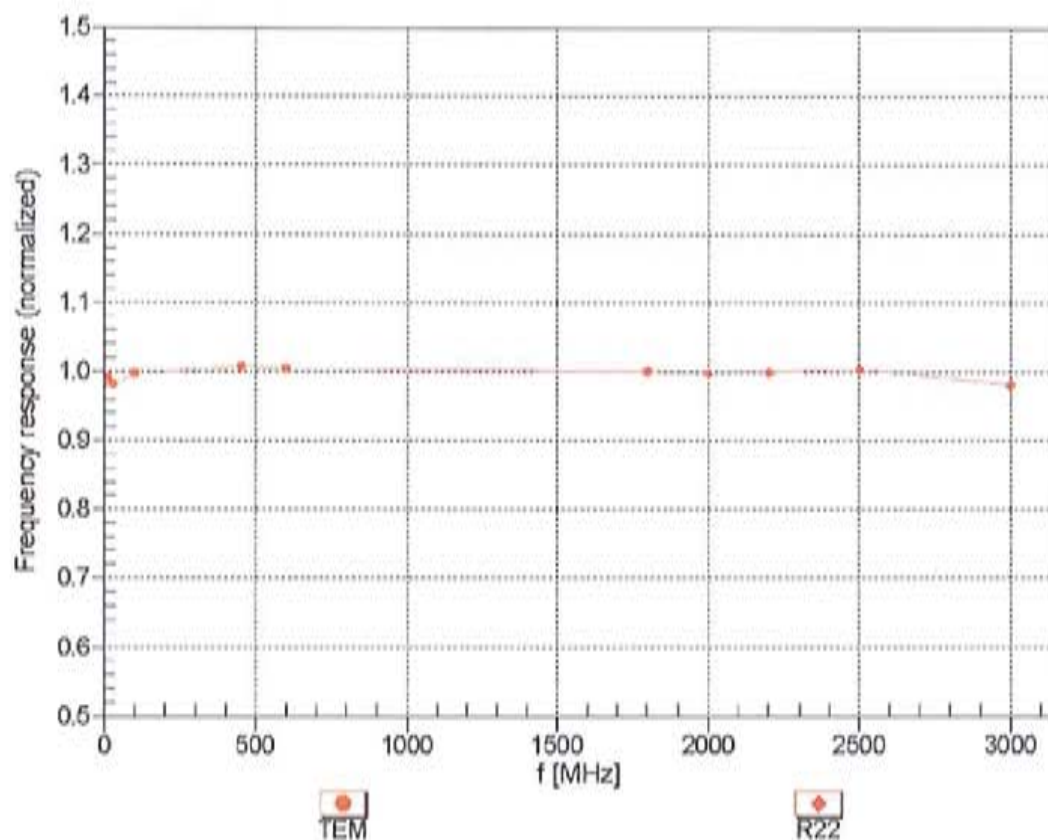
f (MHz) ^c	Relative Permittivity ^f	Conductivity (S/m) ^f	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.12	6.12	6.12	0.60	1.33	± 12.0 %
835	55.2	0.97	6.07	6.07	6.07	0.61	1.33	± 12.0 %
1810	53.3	1.52	4.80	4.80	4.80	0.64	1.37	± 12.0 %
1950	53.3	1.52	4.75	4.75	4.75	0.62	1.38	± 12.0 %
2450	52.7	1.95	4.21	4.21	4.21	0.80	1.08	± 12.0 %
2600	52.5	2.16	4.00	4.00	4.00	0.62	0.88	± 12.0 %

^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^f At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

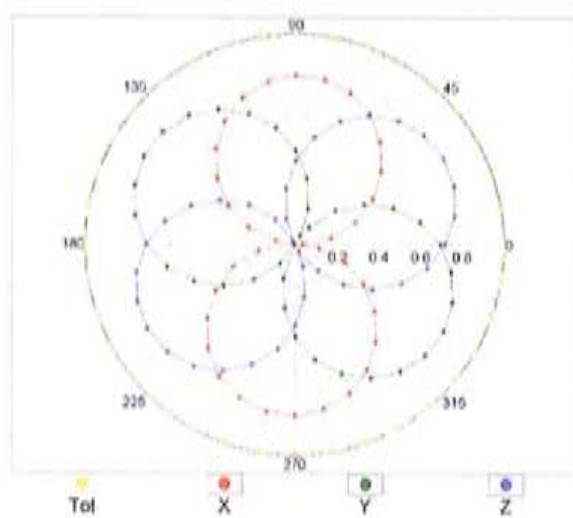
(TEM-Cell:ifi110 EXX, Waveguide: R22)



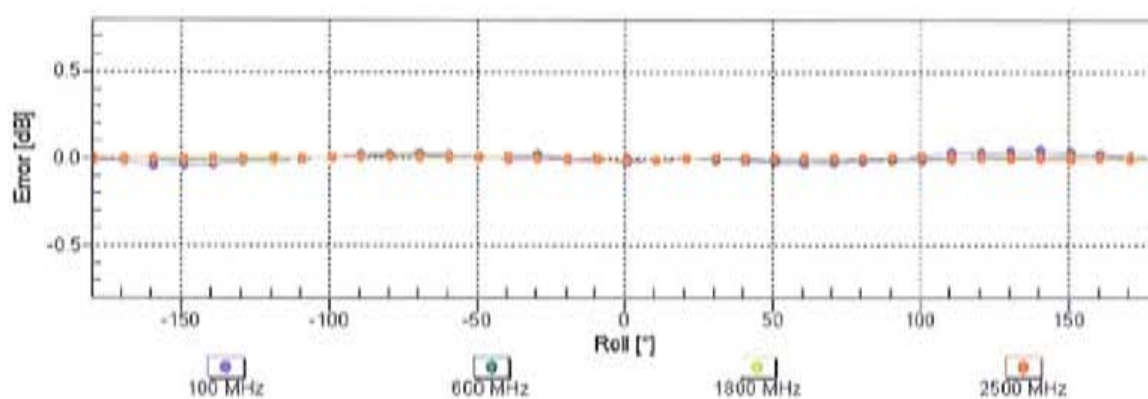
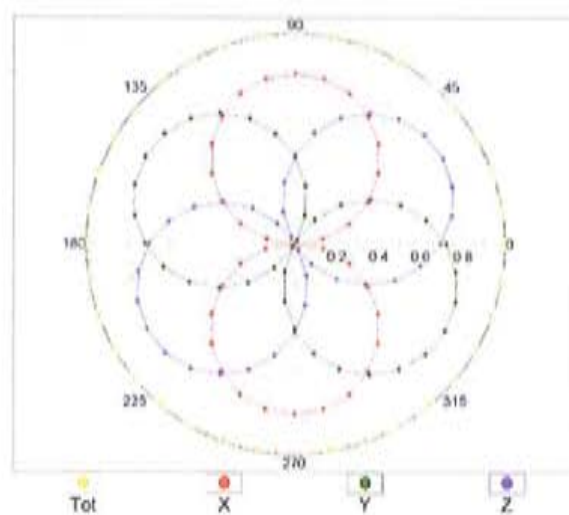
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\vartheta = 0^\circ$

f=600 MHz,TEM

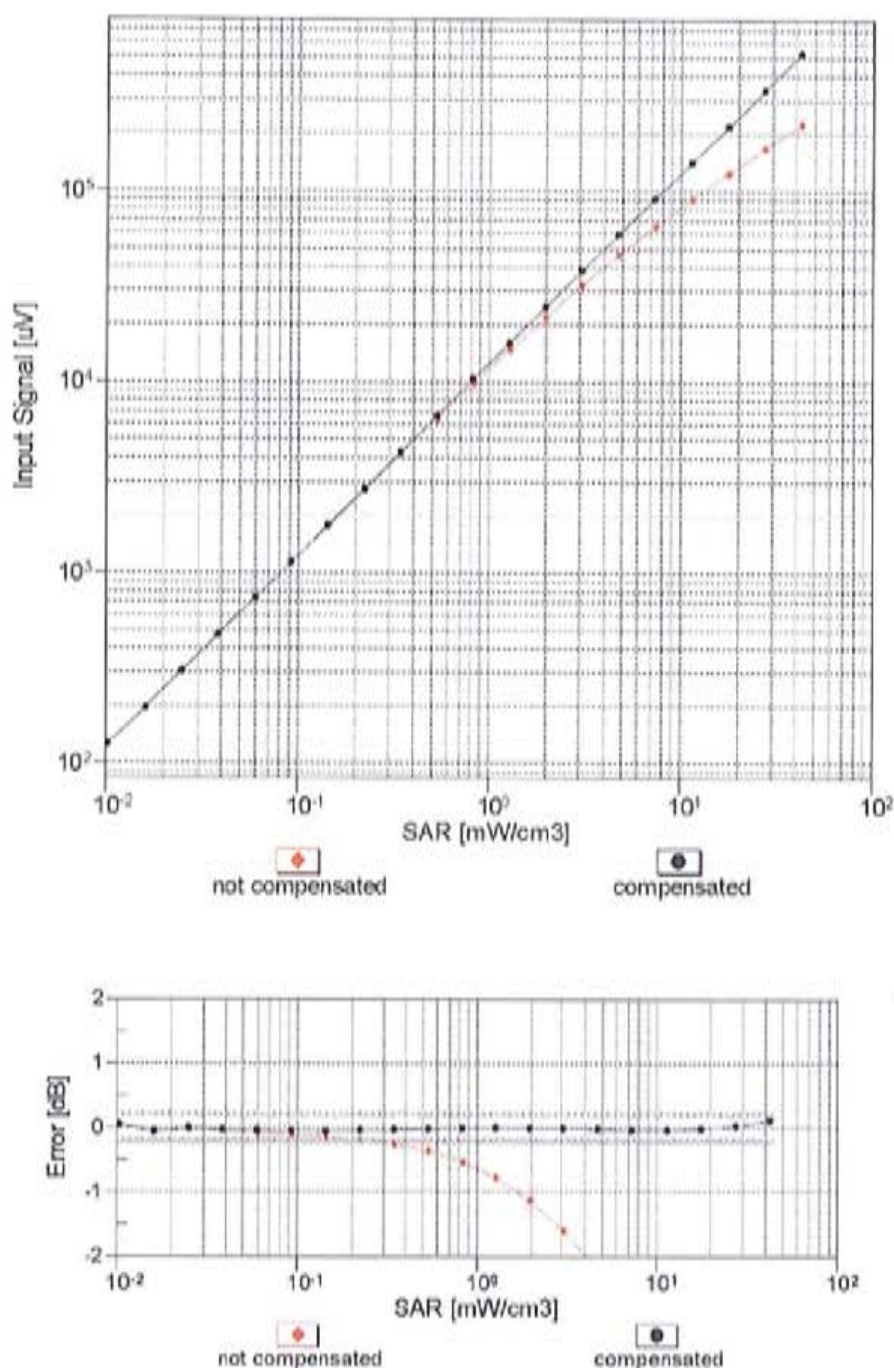


f=1800 MHz,R22



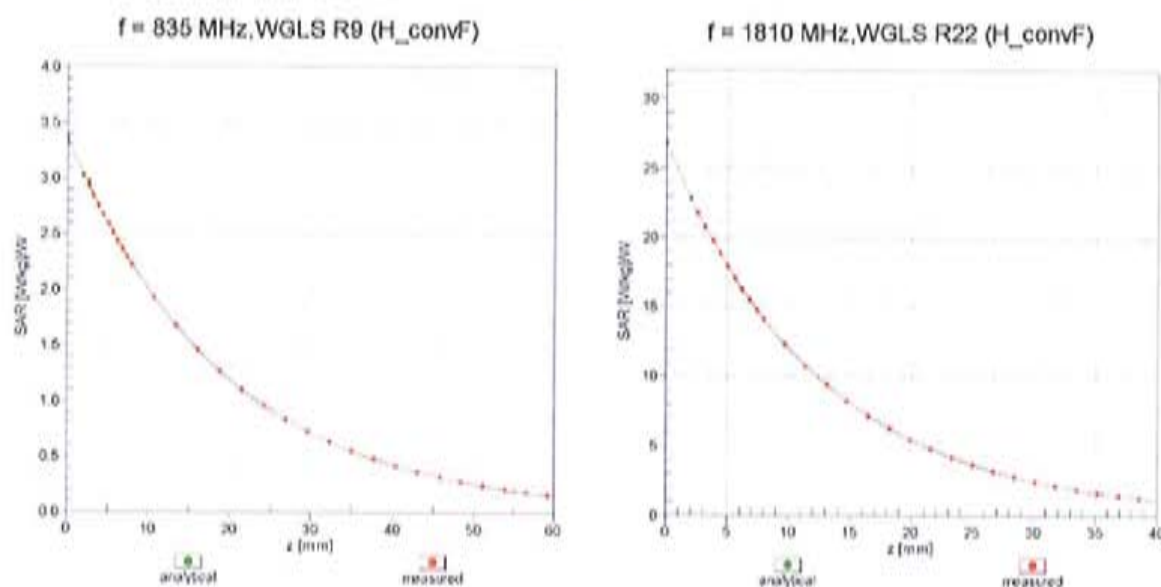
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range f(SAR_{head}) (TEM cell , f = 900 MHz)



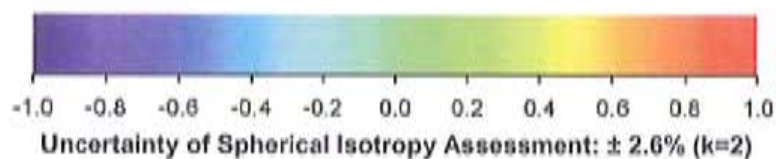
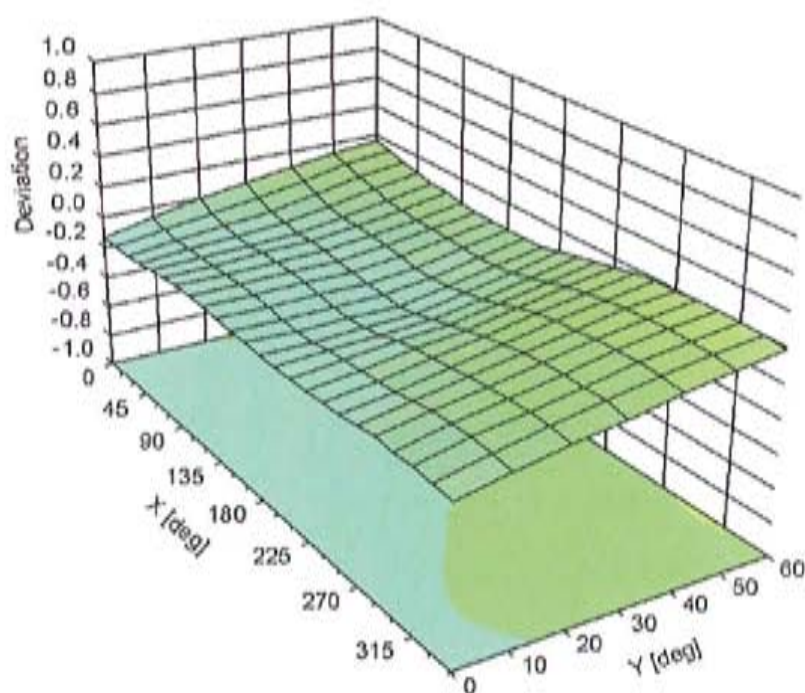
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ , θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: ES3DV3 - SN:3282

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-19.3
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zoughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Motorola MDb**

Certificate No: **EX3-3730_Aug12**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3730**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4**
Calibration procedure for dosimetric E-field probes

Calibration date: **August 24, 2012**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8048C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	
			Issued: August 25, 2012
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe EX3DV4

SN:3730

Manufactured: October 19, 2009
Calibrated: August 24, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3730

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.41	0.52	0.49	$\pm 10.1 \%$
DCP (mV) ^B	100.4	101.9	100.3	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^C (k=2)
0	CW	0.00	X	0.00	0.00	1.00	197.2	$\pm 3.0 \%$
			Y	0.00	0.00	1.00	169.7	
			Z	0.00	0.00	1.00	159.3	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter; uncertainty not required.

^C Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3730

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	9.38	9.38	9.38	0.47	0.77	± 12.0 %
835	41.5	0.90	8.99	8.99	8.99	0.32	0.95	± 12.0 %
1810	40.0	1.40	7.62	7.62	7.62	0.59	0.71	± 12.0 %
1950	40.0	1.40	7.36	7.36	7.36	0.54	0.74	± 12.0 %
2450	39.2	1.80	6.90	6.90	6.90	0.31	0.97	± 12.0 %
2600	39.0	1.96	6.72	6.72	6.72	0.46	0.81	± 12.0 %
5200	36.0	4.66	4.90	4.90	4.90	0.35	1.80	± 13.1 %
5300	35.9	4.76	4.73	4.73	4.73	0.35	1.80	± 13.1 %
5600	35.5	5.07	4.38	4.38	4.38	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.24	4.24	4.24	0.45	1.80	± 13.1 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3730

Calibration Parameter Determined in Body Tissue Simulating Media

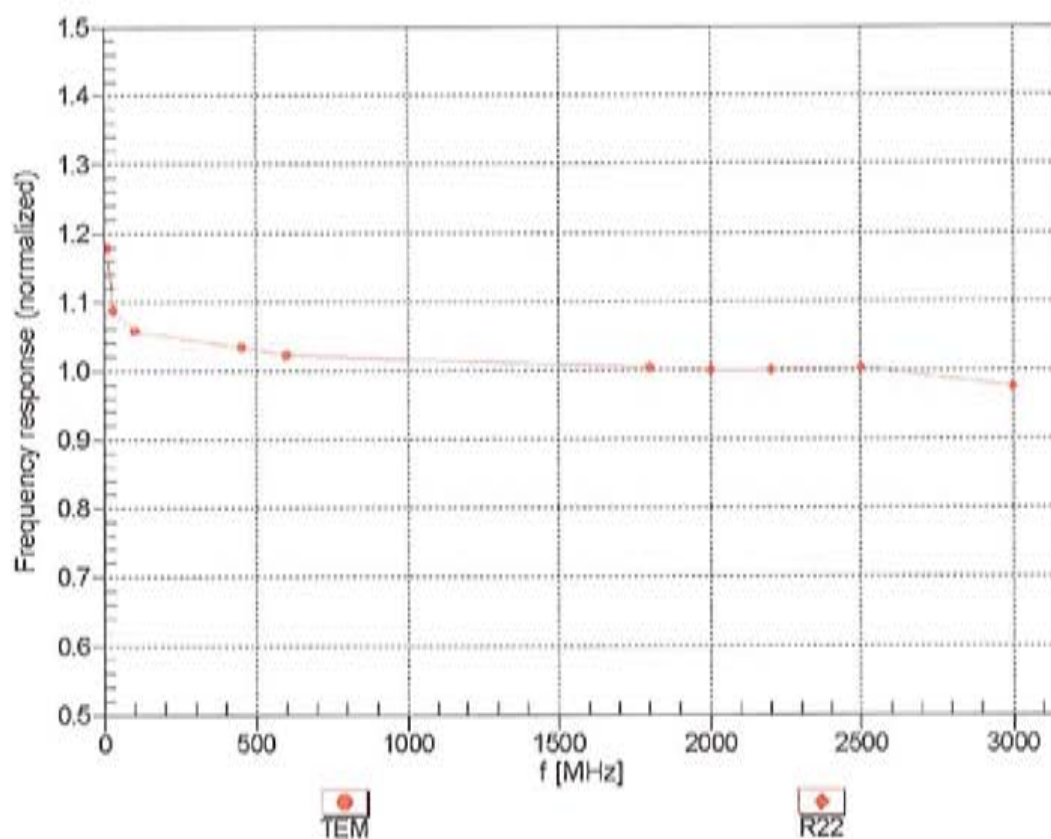
f (MHz) ^c	Relative Permittivity ^f	Conductivity (S/m) ^f	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	9.21	9.21	9.21	0.39	0.92	± 12.0 %
835	55.2	0.97	9.10	9.10	9.10	0.22	1.40	± 12.0 %
1810	53.3	1.52	7.45	7.45	7.45	0.46	0.77	± 12.0 %
1950	53.3	1.52	7.40	7.40	7.40	0.49	0.74	± 12.0 %
2450	52.7	1.95	6.86	6.86	6.86	0.80	0.50	± 12.0 %
2600	52.5	2.16	6.60	6.60	6.60	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.13	4.13	4.13	0.45	1.90	± 13.1 %
5300	48.9	5.42	3.94	3.94	3.94	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.40	3.40	3.40	0.55	1.90	± 13.1 %
5800	48.2	6.00	3.81	3.81	3.81	0.50	1.90	± 13.1 %

^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^f At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

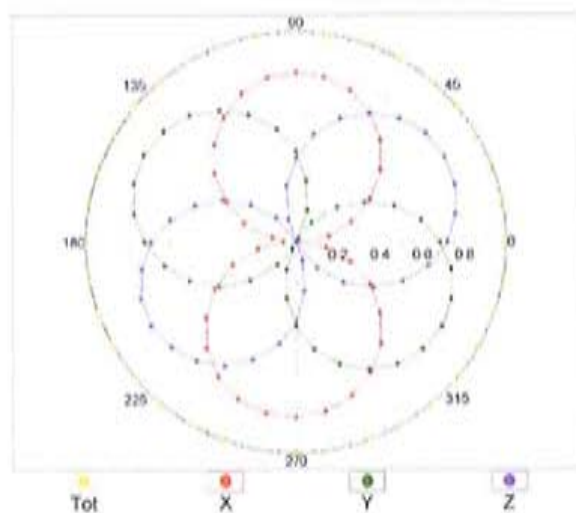
(TEM-Cell: Ifi110 EXX, Waveguide: R22)



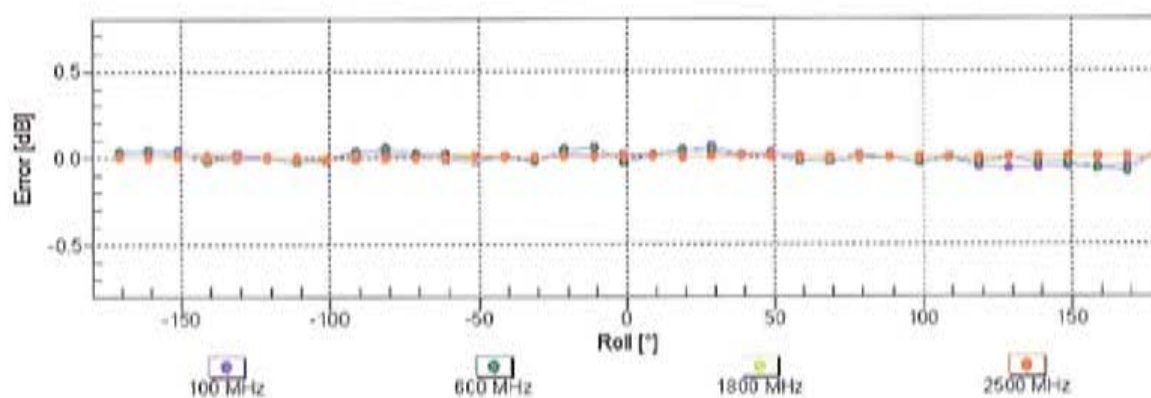
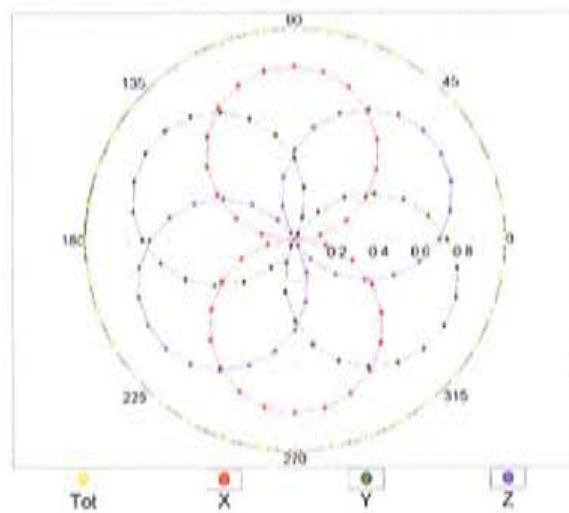
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\vartheta = 0^\circ$

$f=600$ MHz,TEM

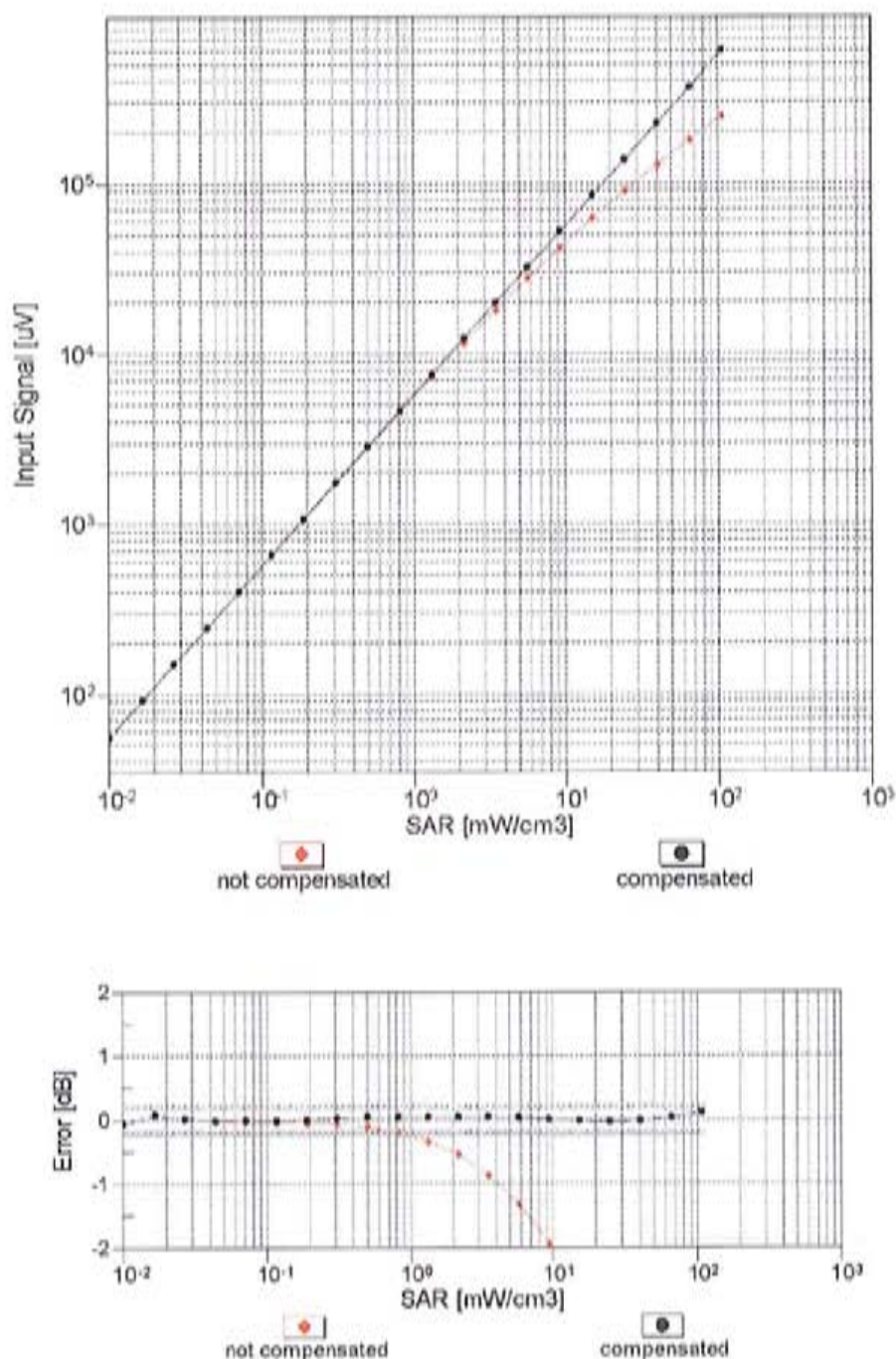


$f=1800$ MHz,R22



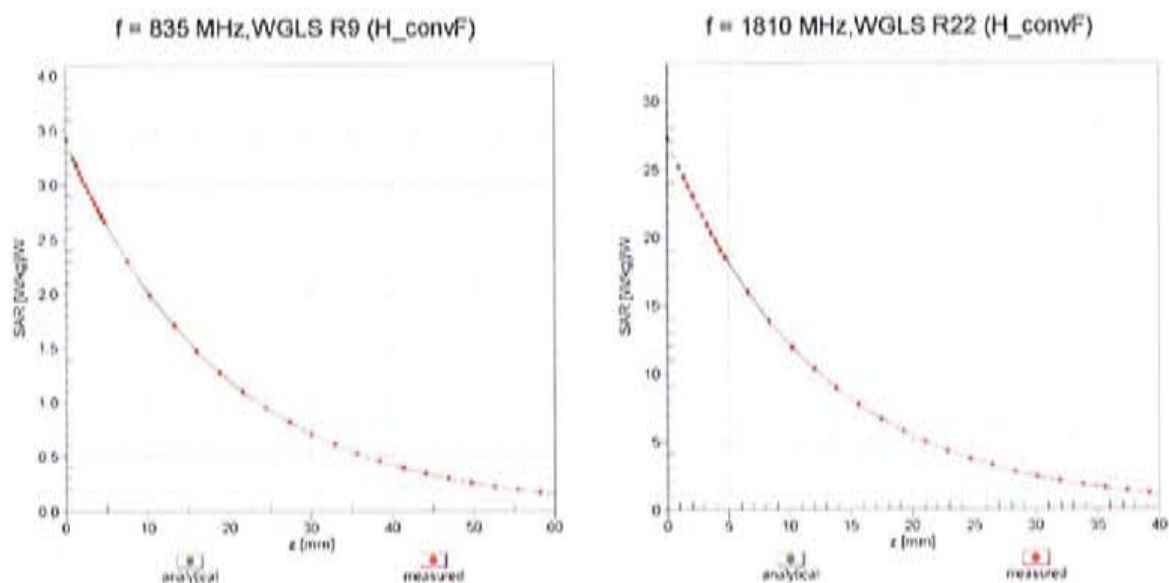
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f = 900 \text{ MHz}$)



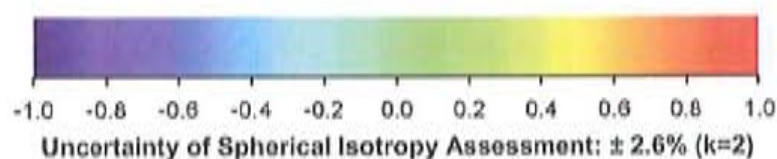
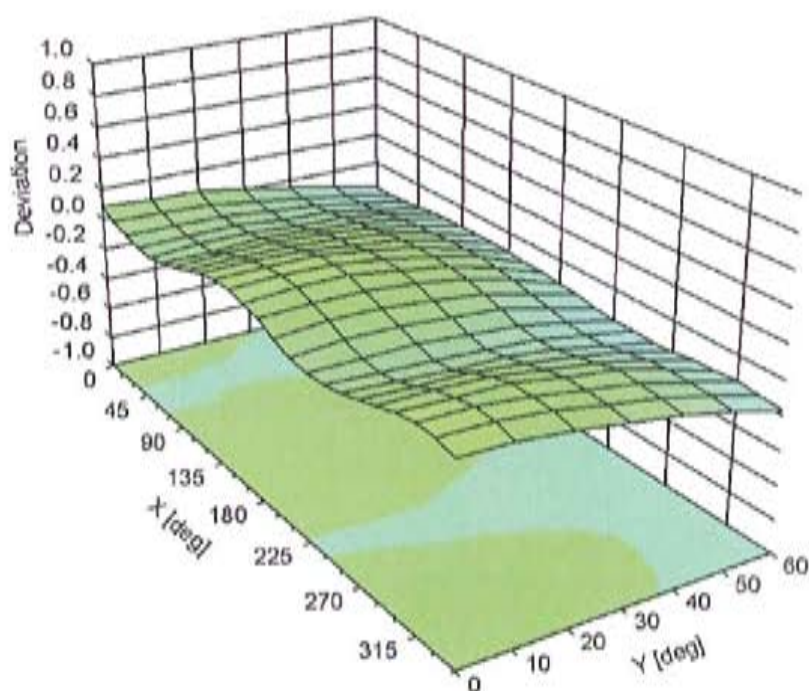
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ , θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: EX3DV4 - SN:3730

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	138.8
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm