Portable Cellular Phone SAR Test Report

Tests Requested By:	Motorola Mobility, LLC 600 N. US Highway 45 Libertyville, IL 60048
Test Report #:	25377-1F
Date of Report:	May 8, 2013
Date of Test:	Mar 31, 2013 – Apr 25, 2013
FCC ID #:	IHDT56PB2
IC ID #:	N/A
Generic Name:	M0DD8
Test Laboratory:	Motorola Mobility, LLC - ADR Test Services Laboratory 600 N. US Highway 45 Libertyville, IL 60048
Report Author:	Katerina Bruggemann Engineer

Accreditation:

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

Tests:	Procedures:
Electromagnetic Specific Absorption Rate	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)

2404

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)

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....10
2.4.3 Wi-Fi 802.11....11
2.4.4 Bluetooth....16
2.4.5 Near-Field Communications....17
2.5 Transmitter power reduction conditions and modes....18
2.6 Accessories for the Device Under Test....20
2.6.1 Body-Worn Carry Accessories....20
3 Test Equipment Used....20
3.1 Dosimetric Measurement System....20
3.2 Additional Equipment....21
3.3 Test System Validations....22
3.4 Test System Verifications (System Performance Checks)....24
3.5 Simulated Tissue Dielectric Properties....26
4 Test Setup Information, SAR Measurement Results, and Analysis....28
4.1 Overview of Test Setup and Results....28
4.2 Head-Adjacent Exposure Results....29
4.3 Body-Worn Accessory Exposure Results....32
4.4 Mobile Hotspot Exposure Results....33
4.5 Measurement Variability Analysis....36
4.6 Description and Evaluation of Simultaneous Transmitters....37
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	Mar-08-2013	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 25	1.43	0.25	0.22
CDMA 800	0.71	0.34	0.87
CDMA BC10	0.67	0.24	1.03
CDMA 1900	1.16	0.29	0.39
Wi-Fi 2.45 GHz	0.92	0.05	0.07
Wi-Fi 5.2 GHz	0.40	0.19	
Wi-Fi 5.8 GHz	0.21	0.08	0.05
Bluetooth	N/A		
Simultaneous SAR	1.58		

2 Details of the Device Under Test

2.1 Sample Information

Serial Number(s) (Functional Use)	LXSZ1V0005 LXVE110019 LXSZ1V0022	(CDMA conducted power measurements, CDMA head/body/mobile hotspot SAR testing, (Wi-Fi 2.4 GHz and 5 GHz head/body/mobile hotspot SAR testing) (LTE conducted power measurements, LTE head/body/mobile hotspot SAR testing)
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 (800/1900 MHz) Antenna

Type	Internal	
Location	Bottom of Transceiver	
Dimensions	Width	7.52 mm
	Length	51.6 mm

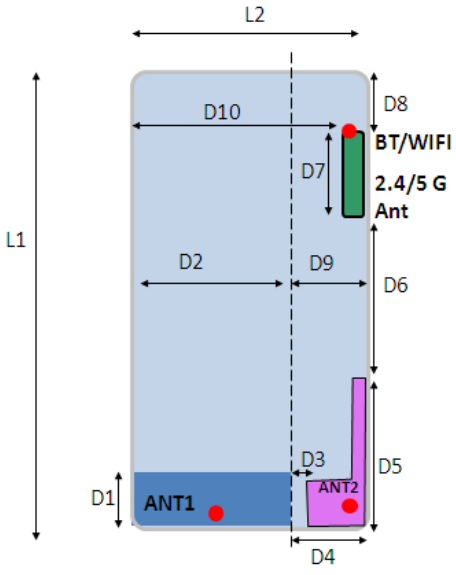
LTE Band 25 Antenna

Type	Internal	
Location	Bottom Left-Side of Transceiver	
Dimensions	Width	11 mm
	Length	25.22 mm

Bluetooth / Wi-Fi 2.4 / Wi-Fi 5 GHz Antenna

Type	Internal	
Location	Top Left-Side of Transceiver	
Dimensions	Width	2.7 mm
	Length	31.6 mm

Back of Phone



[mm]	
L1	128.5
L2	65
D1	7.52
D2	40.9
D3	10.7
D4	13.4
D5	31.6
D6	56
D7	25.22
D8	15.933
D9	24.1
D10	54

2.3 Transmission Band Summary

Mode(s) of Operation	Modulation Mode(s)	Target Output Power Setting	Tune-Up Tolerance	Duty Cycle	Transmitting Frequency Range(s)
LTE Band 25	QPSK, 16QAM	23.0 dBm	-1.0 dB / +1.0 dB	1:1	1850.0 – 1915.0 MHz
CDMA 800	QPSK	24.0 dBm	-1.0 dB / +1.0 dB	1:1	824.70 - 848.31 MHz
CDMA BC10	QPSK	24.0 dBm	-1.0 dB / +1.0 dB	1:1	817.90 - 823.10 MHz
CDMA 1900	QPSK	24.0 dBm	-1.0 dB / +1.0 dB	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

This device supports voice call functionality over GSM and WCDMA on non-US cellular networks. The GSM/WCDMA network functions have been disabled by firmware and are SIM locked for all US operators. Further information regarding this functionality is contained within Exhibit 12

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

2.4.1 LTE

Technical Description

LTE Summary Information

FCC ID			IHDT56PB2
Form Factor			Portable Handset
Frequency Range(s)			Band 25: 1850.0 – 1915.0 MHz
Channel Bandwidth(s)			Band 25: 20, 15, 10, 5, 3, 1.4 MHz
Low, Middle, High Channel Numbers and Frequencies			
Low	**Mid**	**High**	**Band: Channel Bandwidth**
26140 (1860 MHz)	26365 (1882.5 MHz)	26590 (1905 MHz)	Band 25: 20 MHz
26115 (1857.5 MHz)	26365 (1882.5 MHz)	26615 (1907.5 MHz)	Band 25: 15 MHz
26090 (1855 MHz)	26365 (1882.5 MHz)	26640 (1910 MHz)	Band 25: 10 MHz
26065 (1852.5 MHz)	26365 (1882.5 MHz)	26665 (1912.5 MHz)	Band 25: 5 MHz
26055 (1851.5 MHz)	26365 (1882.5 MHz)	26675 (1913.5 MHz)	Band 25: 3 MHz
26046 (1850.6 MHz)	26365 (1882.5 MHz)	26684 (1914.4 MHz)	Band 25: 1.4 MHz
UE Category			3
Modulations Supported			QPSK, 16QAM
Description of LTE Tx and Antenna Implementation			Band 25: 1 TX/RX Antenna, 1 RX Antenna
LTE Voice Available?			Yes (3rd Party 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 LTE?			Yes
Power Reduction used for SVLTE?			Yes
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.

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 25
	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 SVLTE / 3rd Party 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 25 (20 MHz Channel Bandwidth) - Measured Conducted Power (dBm)															
Modulation			QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Start RB			0	50	99	0	25	50	0	0	50	99	0	25	50	0
RB Allocation			1	1	1	50	50	50	100	1	1	1	50	50	50	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	*Frequency (MHz)*	*Channel*														
20 MHz	*1860*	*26140*	23.98	23.83	23.94	22.78	22.84	22.72	22.82	23.00	22.96	23.00	21.64	22.01	21.62	21.69
20 MHz	*1882.5*	*26365*	23.84	23.85	23.85	22.79	22.92	22.73	22.87	22.46	22.50	22.45	21.95	21.83	21.71	21.98
20 MHz	*1905*	*26590*	23.76	23.75	23.13	22.63	22.74	22.56	22.62	22.65	22.70	22.02	21.79	21.80	21.59	21.66

LTE Band 25 (15 MHz Channel Bandwidth) - Measured Conducted Power (dBm)															
Modulation			QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Start RB			0	37	74	0	19	39	0	0	37	74	0	19	39	0
RB Allocation			1	1	1	36	36	36	75	1	1	1	36	36	36	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	1.0	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
Channel BW	*Frequency (MHz)*	*Channel*														
15 MHz	*1857.5*	*26115*	24.00	23.90	23.91	22.78	22.76	22.88	22.77	23.00	23.00	22.96	21.79	21.84	21.92	21.81
15 MHz	*1882.5*	*26365*	23.90	23.84	23.82	22.87	22.96	22.82	22.80	22.88	22.90	22.89	21.78	21.80	21.75	21.93
15 MHz	*1907.5*	*26615*	23.72	23.64	22.99	22.78	22.67	22.37	22.52	22.35	22.41	21.69	21.78	21.66	21.51	21.50

LTE Band 25 (10 MHz Channel Bandwidth) - Measured Conducted Power (dBm)															
Modulation			QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Start RB			0	25	49	0	12	25	0	0	25	49	0	12	25	0
RB Allocation			1	1	1	25	25	25	50	1	1	1	25	25	25	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	*Frequency (MHz)*	*Channel*														
10 MHz	*1855*	*26090*	23.90	23.98	23.92	22.91	22.91	22.85	22.80	23.00	23.00	23.00	21.90	21.96	21.93	21.76
10 MHz	*1882.5*	*26365*	23.82	23.78	23.85	22.91	22.96	22.82	22.85	22.49	22.48	22.45	22.00	22.00	21.99	21.89
10 MHz	*1910*	*26640*	23.60	23.52	22.97	22.67	22.54	22.20	22.47	22.25	22.15	21.66	21.70	21.59	21.34	21.46

LTE Band 25 (5 MHz Channel Bandwidth) - Measured Conducted Power (dBm)															
Modulation			QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Start RB			0	12	24	0	6	13	0	0	12	24	0	6	13	0
RB Allocation			1	1	1	12	12	12	25	1	1	1	12	12	12	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	*Frequency (MHz)*	*Channel*														
5 MHz	*1852.5*	*26065*	24.00	23.85	23.86	22.98	22.99	22.97	22.92	22.53	22.54	22.51	21.91	21.93	22.08	22.07
5 MHz	*1882.5*	*26365*	23.96	23.88	23.88	22.93	22.86	22.93	22.85	23.11	23.00	22.99	21.83	21.98	21.99	22.00
5 MHz	*1912.5*	*26665*	23.52	23.20	23.00	22.40	22.31	22.16	22.19	22.89	22.56	22.32	21.45	21.32	21.20	21.22

LTE Band 25 (3 MHz Channel Bandwidth) - Measured Conducted Power (dBm)															
Modulation			QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Start RB			0	7	14	0	3	7	0	0	7	14	0	3	7	0
RB Allocation			1	1	1	8	8	8	15	1	1	1	8	8	8	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	*Frequency (MHz)*	*Channel*														
3 MHz	*1851.5*	*26055*	23.97	23.79	23.94	22.99	22.91	22.89	23.05	22.52	22.43	22.57	21.92	21.78	21.78	21.82
3 MHz	*1882.5*	*26365*	23.97	23.86	23.93	22.92	22.89	22.95	22.89	22.59	22.45	22.48	22.07	22.14	22.09	22.13
3 MHz	*1913.5*	*26675*	23.18	23.04	22.87	22.12	22.10	22.13	22.13	22.42	22.30	22.16	21.22	21.20	21.12	21.29

LTE Band 25 (1.4 MHz Channel Bandwidth) - Measured Conducted Power (dBm)															
Modulation			QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Start RB			0	3	5	0	1	3	0	0	3	5	0	1	3	0
RB Allocation			1	1	1	3	3	3	6	1	1	1	3	3	3	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	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Max Limit with MPR (dBm)			24.0	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
Channel BW	*Frequency (MHz)*	*Channel*														
1.4 MHz	*1850.6*	*26046*	24.00	23.94	23.98	23.95	23.87	23.98	22.96	23.00	23.00	23.00	22.98	22.86	22.89	21.95
1.4 MHz	*1882.5*	*26365*	23.85	23.80	23.86	23.94	23.80	23.91	22.95	22.50	22.41	22.53	23.10	23.05	23.05	21.99
1.4 MHz	*1914.4*	*26684*	23.06	22.94	22.92	23.00	22.99	22.95	22.01	21.91	21.87	21.85	22.04	22.02	21.97	21.15

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	25.09	25.08	25.17	25.19	25.15	25.19
	384	25.16	25.15	25.2	25.24	25.2	25.22
	777	24.95	24.94	25	25.03	24.99	25.02
CDMA BC10	564	25.18	25.23	25	25.04	25.27	25.26
CDMA 1900	25	25.08	25.1	25.11	25.14	25.17	25.22
	600	25.16	25.18	25.2	25.17	25.25	25.3
	1175	24.8	24.82	24.85	24.82	24.89	24.96

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]			
	[MHz]			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]							
	[MHz]			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]							
	[MHz]			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]								
	[MHz]			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]								
	[MHz]			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]							
	[MHz]			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]							
	[MHz]			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	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	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	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	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	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	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	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	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	Body-Worn Accessory	Mobile Hotspot
All Modes	Data	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:

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

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.

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

Note that simultaneous SAR evaluations include estimations for Bluetooth SAR, as detailed in section 4.6 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.

For the Wi-Fi transmitter, reduced power limits are enforced when the Wi-Fi transmitter is operating simultaneously with any other transmitter(s). A table of the reduced limits used for testing is given below.

Mode(s) of Operation	Wi-Fi 2.4 GHz	Wi-Fi 5.2 GHz	Wi-Fi 5.8 GHz
Channel Ranges	1-11	36-48	149-165
Maximum Output Power (dBm)	19.18	15.60	20.13
Reduced Maximum Output Power Target (dBm)	10.0	11.0	11.0

The DUT supports Simultaneous Voice and LTE (SVLTE), allowing a 1x CDMA voice call while simultaneously providing an LTE link for data transport on the cellular network. While operating in SVLTE, *if the power on the 1x CDMA transmitter for voice is operating above 18 dBm*, a reduced maximum LTE transmit power limit is enforced to ensure SAR exposure compliance is maintained. When the power of the 1x CDMA transmitter is operating at or below 18 dBm or this combination of transmitters is not in use, the LTE transmitter operates up to its maximum power limit. Note that both conditions (1x CDMA above 18 dBm and LTE at reduced power, or 1x CDMA at or below 18 dBm with LTE at full power) are demonstrated for SAR compliance in section 6. A table of the reduced limits used for testing is given below.

The LTE transmitter may also operate as the data transport to the network during a mobile hotspot session. For operation in this state, the noted reduced power limit is strictly enforced regardless of other transmit conditions.

Mode(s) of Operation	LTE Band 25					
Test Channel	Applicable to all channels/channel bandwidths					
Modulation	QPSK			16QAM		
RB Allocation	1 RB	50%	100%	1 RB	50%	100%
Maximum Output Power Setting (dBm)	24.0	24.0	24.0	24.0	24.0	24.0
Output Power with MPR (dBm)	24.0	23.0	23.0	23.0	22.0	22.0
Reduced Maximum Output Power Setting (dBm)	18.0	18.0	18.0	18.0	18.0	18.0

While operating in a mobile hotspot session, either as data transport to the network or voice transport for SVLTE during a mobile hotspot session, a reduced maximum power limit is enforced on the CDMA 1900 transmitter to ensure SAR exposure compliance is maintained. A table of the reduced limits used for testing is given below.

Mode(s) of Operation	CDMA 1900
Channel Ranges	25-1175
Maximum Output Power Setting (dBm)	25.0
Reduced Maximum Output Power Setting (dBm)	18.0

While operating in a mobile hotspot session, either as data transport to the network or voice transport for SVLTE during a mobile hotspot session, a reduced maximum power limit is enforced on the CDMA 800 transmitter to ensure SAR exposure compliance is maintained. This reduced limit only takes affect when the earpiece speaker is off. A table of the reduced limits used for testing is given below.

Mode(s) of Operation	CDMA 800
Channel Ranges	1013-777
Maximum Output Power Setting (dBm)	25.0
Reduced Maximum Output Power Setting (dBm)	24.0

See section 4.6 for tables detailing the complete interoperation of this power limit reduction schema.

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 ±11% (K=1) with an expanded uncertainty of ±22% (K=2). The overall 1 g RSS uncertainty of the measurement system is ±11% (K=1) with an expanded uncertainty of ±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
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, D835V2	422tr	18-Mar-2011	18-Mar-2012	Calibration extension, see note.
Dipole Validation Kit, D835V2	423tr	12-Sept-2012	12-Sept-2013	
Dipole Validation Kit, D835V2	436tr	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, 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		Result	Date	Mod. Type	Dielectric Parameters		Result
				Measured σ (S/m)	Measured ε_r				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	PASS
3184	Head	1800	1/10/2013	1.336	38.94	PASS	1/11/2013	GMSK	1.342	39.026	PASS
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	PASS
3184	Body	1800	1/14/2013	1.450	52.38	PASS	1/11/2013	GMSK	1.579	51.544	PASS
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		Result	Date	Mod. Type	Dielectric Parameters		Result
				Measured σ (S/m)	Measured ε_r				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	PASS
3124	Head	1800	1/15/2013	1.365	38.34	PASS	1/14/2013	GMSK	1.373	39.61	PASS
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	PASS
3124	Body	1800	1/15/2013	1.448	51.40	PASS	1/14/2013	GMSK	1.45	52.38	PASS
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		Result	Date	Mod. Type	Dielectric Parameters		Result
				Measured σ (S/m)	Measured ε_r				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 4 System Validation Measurements											
Probe	Tissue Type	*f* (MHz)	CW Validations				Modulated Validations				
			Date	Dielectric Parameters		Result	Date	Mod. Type	Dielectric Parameters		Result
				Measured σ (S/m)	Measured ε_r				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 ±10% from the target SAR indicated in Appendix 7. These frequencies are within ±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 cm ± 0.5 cm. For frequencies above 3 GHz, the simulated tissue depth was verified to be 10 cm ± 0.5 cm. Z-axis scans showing the SAR penetration are also included in Appendix 1.

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		
835	**Measured,** Mar-31-2013	3124	436	1.98	9.90	0.9146	1.2	41.07	-1.1	22.0	20.1
	Recommended Limits	3124	436		9.73	0.90	±10%	41.5	±10%	18-25	18-25
1800	**Measured,** Apr-01-2013	3124	2d190	7.37	36.85	1.355	-3.6	37.42	-6.5	22.3	20.1
	Measured, Apr-02-2013	3124	2d190	7.60	38.00	1.351	-3.6	36.69	-8.3	22.1	19.8
	Recommended Limits	3124	2d190		39.3	1.40	±10%	40.0	±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 (S/m)	Measured ε_r	Deviation ε_r		
2450	**Measured,** Apr-10-2013	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	±10%	39.2	±10%	18-25	18-25
5200	**Measured,** Apr-05-2013	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,** Apr-06-2013	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-23-2013	3037	2d191	7.99	39.95	1.368	-2.2	38.20	-4.5	21.0	18.6
	Recommended Limits	3037	2d191		39.2	1.40	±10%	40.0	±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
	Recommended Limits	3180	422		9.77	0.97	±10%	55.2	±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		
835	**Measured,** Mar-31-2013	3124	436	1.98	9.90	0.9985	3.1	54.30	-1.7	21.9	20.0
	Recommended Limits	3124	436		10.1	0.97	±10%	55.2	±10%	18-25	18-25
1800	**Measured,** Apr-01-2013	3124	2d190	7.62	38.10	1.443	-5.3	49.31	-7.5	22.5	20.2
	Measured, Apr-16-2013	3124	2d190	7.77	38.85	1.458	-4.0	49.37	-7.4	21.6	19.0
	Recommended Limits	3124	2d190		37.80	1.52	±10%	53.3	±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 (S/m)	Measured ε_r	Deviation ε_r		
2450	**Measured,** Apr-11-2013	3730	740	5.15	51.5	1.990	+2.1%	50.29	-4.6%	21.7	19.8
	Measured, Apr-21-2013	3730	740	5.07	50.7	1.987	2.1	49.41	-6.3	21.5	20.0
	Recommended Limits	3730	740		49.5	1.95	±10%	52.7	±10%	18-25	18-25
5200	**Measured,** Apr-06-2013	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,** Apr-06-2013	3730	1088	7.21	72.1	6.183	+3.1%	45.32	-6.0%	21.4	18.6
	Measured, Apr-09-2013	3730	1088	7.02	70.2	5.987	-0.2%	44.11	-8.5%	21.3	19.7
	Recommended Limits	3730	1088		75.4	6.00	-5%/+10%	48.2	-10%/+5%	18-25	18-25

DASY52™ Measurement System 4 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-25-2013	3037	423	1.96	9.80	1.017	5.2	54.47	-1.4	21.3	19.9
	Recommended Limits	3037	423		9.31	0.97	±10%	55.2	±10%	18-25	18-25
1800	**Measured,** Apr-23-2013	3037	2d191	8.04	40.2	1.439	-5.3	49.33	-7.5	22.1	19.1
	Measured, Apr-25-2013	3037	2d191	7.97	39.85	1.458	-4.0	48.67	-8.7	21.3	19.6
	Recommended Limits	3037	2d191		37.8	1.52	±10%	53.3	±10%	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 ±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 $\rho = 1\ ^{g}/_{cm^3}$ 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)**
835	Mar-31-2013	820.0	0.90 ±10%	41.58 ±10%	0.90	0.2%	41.2	-0.9%	20.1
		835.0	0.90 ±10%	41.50 ±10%	0.91	1.2%	41.1	-1.1%	
		849.0	0.92 ±10%	41.50 ±10%	0.93	1.7%	40.9	-1.5%	
1880	Apr-01-2013	1850.0	1.40 ±10%	40.00 ±10%	1.40	0.0%	37.2	-7.0%	20.0
		1880.0	1.40 -5%/+10%	40.00 -10%/+5%	1.43	2.2%	37.1	-7.4%	
		1915.0	1.40 -5%/+10%	40.00 -10%/+5%	1.47	5.0%	36.9	-7.8%	
	Apr-02-2013	1850.0	1.40 ±10%	40.00 ±10%	1.40	0.0%	36.4	-9.0%	19.6
		1880.0	1.40 -5%/+10%	40.00 -10%/+5%	1.43	2.2%	36.3	-9.3%	
		1915.0	1.40 -5%/+10%	40.00 -10%/+5%	1.47	5.0%	36.1	-9.8%	
	Apr-23-2013	1850.0	1.40 ±10%	40.00 ±10%	1.42	1.5%	37.9	-5.2%	20.0
		1880.0	1.40 -5%/+10%	40.00 -10%/+5%	1.45	3.6%	37.8	-5.6%	
		1915.0	1.40 -5%/+10%	40.00 -10%/+5%	1.49	6.5%	37.6	-6.0%	
2450	Apr-11-2013	2412.0	1.77 ±10%	39.27 ±10%	1.76	-0.4%	37.2	-5.2%	19.8
		2450.0	1.80 ±10%	39.20 ±10%	1.80	0.0%	37.1	-5.4%	
		2462.0	1.81 ±10%	39.18 ±10%	1.81	-0.2%	37.0	-5.5%	
5500	Apr-05-2013	5180.0	4.63 -5%/+10%	36.02 -10%/+5%	4.61	-0.5%	35.6	-1.3%	19.7
		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)**
835	Mar-31-2013	820.0	0.97 ±10%	55.26 ±10%	0.98	1.2%	54.4	-1.6%	19.6
		835.0	0.97 ±10%	55.20 ±10%	1.00	3.1%	54.3	-1.7%	
		849.0	0.99 ±10%	55.16 ±10%	1.01	2.4%	54.2	-1.9%	
	Apr-19-2013	820.0	0.97 ±10%	55.26 ±10%	0.99	2.2%	53.8	-2.6%	20.1
		835.0	0.97 ±10%	55.20 ±10%	1.00	3.1%	53.7	-2.8%	
		849.0	0.99 ±10%	55.16 ±10%	1.02	3.4%	53.5	-3.0%	
	Apr-25-2013	820.0	0.97 ±10%	55.26 ±10%	1.00	3.3%	54.6	-1.2%	20.1
		835.0	0.97 ±10%	55.20 ±10%	1.02	5.2%	54.5	-1.4%	
		849.0	0.99 ±10%	55.16 ±10%	1.03	4.4%	54.3	-1.6%	
1880	Apr-01-2013	1850.0	1.52 ±10%	53.30 ±10%	1.49	-2.0%	49.1	-7.9%	19.8
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.53	0.7%	49.0	-8.1%	
		1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.58	4.0%	48.9	-8.3%	
	Apr-16-2013	1850.0	1.52 ±10%	53.30 ±10%	1.52	0.0%	49.1	-7.9%	19.5
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.55	2.0%	49.0	-8.1%	
		1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.60	5.3%	48.9	-8.4%	
	Apr-23-2013	1850.0	1.52 ±10%	53.30 ±10%	1.50	-1.4%	49.1	-7.9%	19.8
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.53	0.7%	49.0	-8.2%	
		1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.58	4.0%	48.8	-8.5%	
	Apr-25-2013	1850.0	1.52 ±10%	53.30 ±10%	1.52	0.0%	48.5	-9.1%	20.1
		1880.0	1.52 -5%/+10%	53.30 -10%/+5%	1.55	2.0%	48.4	-9.3%	
		1915.0	1.52 -5%/+10%	53.30 -10%/+5%	1.60	5.3%	48.2	-9.6%	
2450	Apr-11-2013	2412.0	1.91 ±10%	52.75 ±10%	1.94	1.4%	50.4	-4.4%	20.1
		2450.0	1.95 ±10%	52.70 ±10%	1.99	2.1%	50.3	-4.6%	
		2462.0	1.97 ±10%	52.68 ±10%	2.00	1.7%	50.3	-4.7%	
	Apr-21-2013	2412.0	1.91 ±10%	52.75 ±10%	1.94	1.4%	49.5	-6.2%	19.7
		2450.0	1.95 ±10%	52.70 ±10%	1.99	2.1%	49.4	-6.3%	
		2462.0	1.97 ±10%	52.68 ±10%	2.00	1.7%	49.4	-6.3%	
5500	Apr-05-2013	5180.0	5.28 -5%/+10%	49.05 -10%/+5%	5.25	-0.6%	46.8	-4.6%	19.7
		5500.0	5.65 -5%/+10%	48.61 -10%/+5%	5.73	1.4%	46.0	-5.4%	
		5825.0	6.03 -5%/+10%	48.17 -10%/+5%	6.22	3.2%	45.3	-6.1%	
	Apr-06-2013	5180.0	5.28 -5%/+10%	49.05 -10%/+5%	5.31	0.6%	46.4	-5.5%	20.0
		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%	
	Apr-09-2013	5180.0	5.28 -5%/+10%	49.05 -10%/+5%	5.08	-3.8%	45.6	-7.1%	20.0
		5500.0	5.65 -5%/+10%	48.61 -10%/+5%	5.54	-2.0%	44.8	-7.9%	
		5825.0	6.03 -5%/+10%	48.17 -10%/+5%	6.02	-0.2%	44.1	-8.6%	

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:

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

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 B25, 20 MHz BW QPSK (1 RB @ Low)	26140	1860	24.0	23.98	19.4	-0.010	0.499	0.50	0.850	0.86	
LTE B25, 20 MHz BW QPSK (1 RB @ Mid)	26365	1882.5	24.0	23.85	19.4	0.000	0.629	0.65	1.080	1.12	
LTE B25, 20 MHz BW QPSK (1 RB @ Low)	26590	1905	24.0	23.76	19.4	0.030	0.814	0.86	1.340	1.42	
					19.0	**-0.100**	**0.822**	**0.89**	**1.320**	**1.43**	**A-43**
LTE B25, 20 MHz BW QPSK (50% RB@ Mid)	26365	1882.5	23.0	22.92	19.4	-0.010	0.320	0.33	0.549	0.56	
LTE B25, 20 MHz BW QPSK (100% RB)	26365	1882.5	23.0	22.87	19.4	-0.090	0.670	0.70	1.150	1.21	
LTE B25, 20 MHz BW QPSK (1 RB @ Low)	26140	1860	18.0		18.9	0.220	0.111	0.11	0.174	0.17	
LTE B25, 20 MHz BW QPSK (50% RB@ Mid)	26365	1882.5	18.0		19.1	-0.270	0.178	0.19	0.288	0.31	
CDMA 800, RC3 SO55	384	836.5	25.0	25.16	20.0	-0.160	0.438	0.45	0.638	0.66	
	384	836.5	18.0		19.1	-0.07	0.0867	0.09	0.127	0.13	
CDMA BC10, RC3 SO55	564	820.1	25.0	25.18	20.0	-0.010	0.389	0.39	0.566	0.57	
	564	820.1	18.0		19.1	0.03	0.0789	0.08	0.115	0.12	
CDMA 1900, RC3 SO55	600	1880	25.0	25.16	19.8	0.080	0.330	0.33	0.547	0.55	
	600	1880	18.0		19	0.09	0.0891	0.09	0.151	0.15	
802.11b, 1 Mbps	6	2437		19.16	19.2	0.19	0.129	0.13	0.249	0.25	
			10.0		19.3	0.00	0.0191	0.02	0.038	0.04	
802.11a, 6 Mbps	36	5180		15.56	18.5	-0.10	0.0903	0.09	0.265	0.27	
			11.0		20.0	0.15	0.034	0.03	0.084	0.08	
802.11a, 6 Mbps	157	5785		20.09	18.5	-0.12	0.053	0.05	0.182	0.19	
			11.0		19.1	-0.43	0.006	0.01	0.033	0.04	

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 B25, 20 MHz BW QPSK (1 RB @ Low)	26140	1860	24.0	23.98	19.3	0.030	0.341	0.34	0.577	0.58	
LTE B25, 20 MHz BW QPSK (50% RB@ Mid)	26365	1882.5	23.0	22.92	19.3	0.030	0.208	0.21	0.356	0.36	
LTE B25, 20 MHz BW QPSK (1 RB @ Low)	26140	1860	18.0		18.8	0.170	0.086	0.09	0.136	0.14	
LTE B25, 20 MHz BW QPSK (50% RB@ Mid)	26365	1882.5	18.0		18.8	-0.020	0.103	0.10	0.167	0.17	
CDMA 800, RC3 SO55	384	836.5	25.0	25.16	20.0	0.030	0.481	0.48	0.704	0.70	
CDMA 800, TDSO SO32	384	836.5	25.0	25.16	**20**	**0.01**	**0.536**	**0.54**	**0.712**	**0.71**	**A-44**
CDMA 800, RC3 SO55	384	836.5	18.0		19.1	0.00	0.103	0.10	0.152	0.15	
CDMA BC10, RC3 SO55	564	820.1	25.0	25.18	20.0	0.000	0.446	0.45	0.65	0.65	
CDMA BC10, TDSO SO32	564	820.1	25.0	25.18	**20**	**-0.02**	**0.506**	**0.51**	**0.667**	**0.67**	**A-45**
CDMA BC10, RC3 SO55	564	820.1	18.0		19.1	0.02	0.0954	0.10	0.14	0.14	
CDMA 1900, RC3 SO55	25	1851.3	25.0	25.08	20.0	0.020	0.614	0.61	1.05	1.05	
	600	1880	25.0	25.16	19.8	0.010	0.701	0.70	1.15	1.15	
	1175	1908.8	25.0	24.80	20.0	0.070	0.609	0.64	1.06	1.11	
CDMA 1900, TDSO SO32	25	1851.3	25.0	25.11	19.8	0.04	0.669	0.67	1.09	1.09	
	600	1880	25.0	25.20	**19.8**	**0.05**	**0.703**	**0.70**	**1.16**	**1.16**	**A-46**
					19.7	0.10	0.548	0.55	1.08	1.08	
	1175	1908.8	25.0	24.85	19.8	0.11	0.626	0.65	1.03	1.07	
CDMA 1900, RC3 SO55	600	1880	18.0		19	-0.05	0.209	0.21	0.364	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-47**
	6	2437	10.0		19.0	-0.18	0.058	0.06	0.127	0.13	
802.11a, 6 Mbps	36	5180		15.56	**18.5**	**-0.191**	**0.123**	**0.13**	**0.379**	**0.40**	**A-48**
			11.0		20.1	-0.40	0.036	0.04	0.113	0.12	
802.11a, 6 Mbps	157	5785		20.09	**18.6**	**-0.23**	**0.069**	**0.07**	**0.203**	**0.21**	**A-49**
			11.0		19.1	0.78	0.008	0.01	0.026	0.03	

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 B25, 20 MHz BW QPSK (1 RB @ Low)	26140	1860	24.0	23.98	19.3	0.060	0.181	0.18	0.315	0.32	
LTE B25, 20 MHz BW QPSK (50% RB@ Mid)	26365	1882.5	23.0	22.92	19.3	0.110	0.114	0.12	0.200	0.20	
LTE B25, 20 MHz BW QPSK (1 RB @ Low)	26140	1860	18.0		18.7	0.220	0.040	0.04	0.064	0.06	
LTE B25, 20 MHz BW QPSK (50% RB@ Mid)	26365	1882.5	18.0		18.7	0.250	0.050	0.05	0.081	0.08	
CDMA 800, RC3 SO55	384	836.5	25.0	25.16	20.0	-0.030	0.275	0.28	0.393	0.40	
	384	836.5	18.0		19.1	-0.01	0.0546	0.05	0.0784	0.08	
CDMA BC10, RC3 SO55	564	820.1	25.0	25.18	20.0	0.030	0.249	0.25	0.356	0.36	
	564	820.1	18.0		19.1	0.04	0.0542	0.05	0.0778	0.08	
CDMA 1900, RC3 SO55	600	1880	25.0	25.16	19.8	0.220	0.303	0.30	0.532	0.53	
	600	1880	18.0		19	-0.13	0.0775	0.08	0.131	0.13	
802.11b, 1 Mbps	6	2437		19.16	19.3	-0.05	0.0873	0.09	0.171	0.17	
			10.0		19.2	0.37	0.009	0.01	0.018	0.02	
802.11a, 6 Mbps	36	5180		15.56	18.5	0.10	0.0679	0.07	0.308	0.31	
			11.0		20.0	0.14	0.033	0.03	0.092	0.09	
802.11a, 6 Mbps	157	5785		20.09	18.6	-0.19	0.0658	0.07	0.194	0.20	
			11.0		19.1	0.25	0.025	0.02	0.050	0.05	

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 B25, 20 MHz BW QPSK (1 RB @ Low)	26140	1860	24.0	23.98	19.3	0.040	0.190	0.19	0.347	0.35	
LTE B25, 20 MHz BW QPSK (50% RB@ Mid)	26365	1882.5	23.0	22.92	19.3	0.000	0.121	0.12	0.217	0.22	
LTE B25, 20 MHz BW QPSK (1 RB @ Low)	26140	1860	18.0		18.8	-0.070	0.045	0.05	0.078	0.08	
LTE B25, 20 MHz BW QPSK (50% RB@ Mid)	26365	1882.5	18.0		18.8	-0.040	0.057	0.06	0.096	0.10	
CDMA 800, RC3 SO55	384	836.5	25.0	25.16	20.0	0.060	0.299	0.30	0.43	0.43	
	384	836.5	18.0		19.1	0.01	0.0541	0.05	0.0778	0.08	
CDMA BC10, RC3 SO55	564	820.1	25.0	25.18	20.0	-0.010	0.281	0.28	0.402	0.40	
	564	820.1	18.0		19.1	0.03	0.0568	0.06	0.0814	0.08	
CDMA 1900, RC3 SO55	600	1880	25.0	25.16	20.0	-0.010	0.285	0.29	0.47	0.47	
	600	1880	18.0		19	-0.11	0.0755	0.08	0.126	0.13	
802.11b, 1 Mbps	6	2437		19.16	19.3	-0.09	0.158	0.16	0.339	0.35	
			10.0		18.9	-0.81	0.021	0.02	0.043	0.05	
802.11a, 6 Mbps	36	5180		15.56	18.4	-0.20	0.0675	0.07	0.277	0.29	
			11.0		20.2	-0.03	0.021	0.02	0.082	0.08	
802.11a, 6 Mbps	157	5785		20.09	18.6	0.09	0.049	0.05	0.171	0.17	
			11.0		19.1	-0.19	0.007	0.01	0.020	0.02	

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

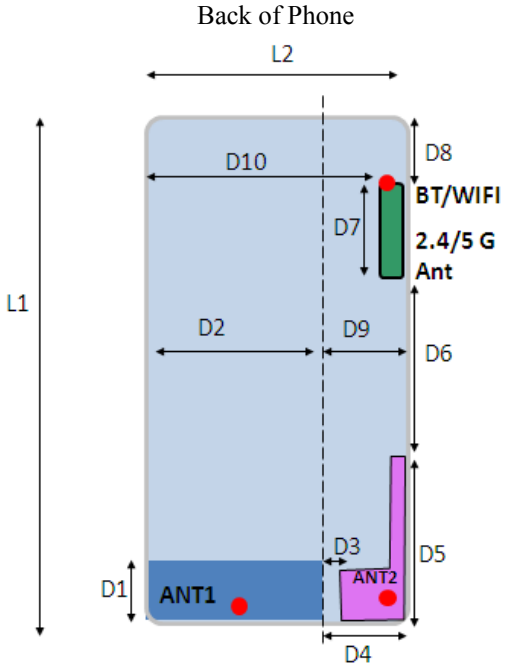
Body-Worn Accessory Position, Front of Phone 25 mm from Phantom											
Mode	Channel	*f* (MHz)	DUT Power		Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value		Plot Page
			Maximum (dBm)	Measured (dBm)			Measured (W/kg)	Corrected (W/kg)	Measured (W/kg)	Corrected (W/kg)	
LTE B25, 20 MHz BW QPSK (1 RB @ Low)	26140	1860	24.0	23.98	**19.0**	**0.060**	**0.165**	**0.17**	**0.251**	**0.25**	**A-51**
LTE B25, 20 MHz BW QPSK (50% RB@ Mid)	26365	1882.5	23.0	22.92	19.5	-0.020	0.081	0.08	0.130	0.13	
CDMA 800, TDSO SO32	384	836.5	25.0	25.20	20.0	0.020	0.217	0.22	0.31	0.31	
CDMA BC10, TDSO SO32	564	820.1	25.0	25.00	20.0	-0.050	0.137	0.14	0.195	0.20	
CDMA 1900, TDSO SO32	600	1880	25.0	25.20	19.4	-0.060	0.148	0.15	0.233	0.24	
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 B25, 20 MHz BW QPSK (1 RB @ Low)	26140	1860	24.0	23.98	19.3	-0.020	0.154	0.16	0.247	0.25	
LTE B25, 20 MHz BW QPSK (50% RB@ Mid)	26365	1882.5	23.0	22.92	19.5	-0.040	0.081	0.08	0.128	0.13	
CDMA 800, TDSO SO32	384	836.5	25.0	25.20	**20**	**0.03**	**0.258**	**0.26**	**0.344**	**0.34**	**A-52**
CDMA BC10, TDSO SO32	564	820.1	25.0	25.00	**20**	**0.07**	**0.175**	**0.18**	**0.238**	**0.24**	**A-53**
CDMA 1900, TDSO SO32	600	1880	25.0	25.20	**19.4**	**-0.03**	**0.185**	**0.19**	**0.289**	**0.29**	**A-54**
802.11b, 1 Mbps	6	2437		19.16	**19.8**	**-0.10**	**0.028**	**0.03**	**0.051**	**0.05**	**A-55**
802.11a, 6 Mbps	36	5180		15.56	18.4	-0.066	**0.0867**	**0.09**	**0.190**	**0.19**	**A-56**
802.11a, 6 Mbps	157	5785		20.09	**19.1**	**-0.11**	**0.034**	**0.04**	**0.083**	**0.08**	**A-57**

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

4.4 Mobile Hotspot Exposure Results



[mm]	
L1	128.5
L2	65
D1	7.52
D2	40.9
D3	10.7
D4	13.4
D5	31.6
D6	56
D7	25.22
D8	15.933
D9	24.1
D10	54

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

Body-Worn Accessory 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 B25, 20 MHz BW QPSK (1 RB @ Low)	26140	1860	18.0		19.3	-0.140	0.131	0.14	0.215	0.22	
LTE B25, 20 MHz BW QPSK (50% RB@ Mid)	26365	1882.5	18.0		19.3	-0.010	0.132	0.13	0.216	0.22	
					19.5	**-0.190**	**0.091**	**0.10**	**0.165**	**0.17**	**A-59**
CDMA 800, TDSO SO32	1013	824.7	24.0		18.0	-0.19	0.501	0.52	0.651	0.68	
	384	836.5	24.0		18.1	0.05	0.658	0.66	0.856	0.86	
	777	848.3	24.0		18.0	0.07	0.558	0.56	0.729	0.73	
CDMA BC10, TDSO SO32	564	820.1	25.0	25.26	18.0	0.04	0.747	0.75	0.973	0.97	
CDMA 1900, TDSO SO32	600	1880.0	18.0		19.0	-0.02	0.211	0.21	0.375	0.38	
802.11b, 1 Mbps	6	2437	10.0		20.0	-0.13	0.009	0.01	0.023	0.02	
802.11a, 6 Mbps	157	5785	11.0		19.1	0.20	0.005	0.00	0.018	0.02	

Table 4-7: SAR measurement results in a mobile hotspot 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 B25, 20 MHz BW QPSK (1 RB @ Low)	26140	1860	18.0		19.3	-0.060	0.132	0.13	0.214	0.22	
LTE B25, 20 MHz BW QPSK (50% RB@ Mid)	26365	1882.5	18.0		19.3	-0.010	0.123	0.12	0.202	0.20	
CDMA 800, TDSO SO32	1013	824.7	24.0		18.4	-0.08	0.499	0.51	0.653	0.67	
	384	836.5	24.0		18.7	0.00	0.619	0.62	0.81	0.81	
	777	848.3	24.0		18.1	0.14	0.503	0.50	0.66	0.66	
CDMA BC10, TDSO SO32	564	820.1	25.0	25.26	**18.0**	**0.02**	**0.78**	**0.78**	**1.03**	**1.03**	**A-61**
					20.0	-0.13	0.756	0.78	1.00	1.03	
CDMA 1900, TDSO SO32	600	1880.0	18.0		**19.0**	**0.02**	**0.221**	**0.22**	**0.394**	**0.39**	**A-62**
802.11b, 1 Mbps	6	2437	10.0		20.0	-0.03	0.022	0.02	0.049	0.05	
802.11a, 6 Mbps	157	5785	11.0		19.1	-0.02	0.013	0.01	0.037	0.04	

Table 4-8: SAR measurement results in a mobile hotspot 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 B25, 20 MHz BW QPSK (1 RB @ Low)	26140	1860	18.0		19.2	0.060	0.058	0.06	0.100	0.10	
LTE B25, 20 MHz BW QPSK (50% RB@ Mid)	26365	1882.5	18.0		19.2	0.040	0.081	0.08	0.140	0.14	
CDMA 800, TDSO SO32	384	836.5	24.0		19.2	-0.16	0.135	0.14	0.236	0.24	
CDMA BC10, TDSO SO32	564	820.1	25.0	25.26	17.9	-0.05	0.146	0.15	0.251	0.25	
CDMA 1900, TDSO SO32	600	1880.0	18.0		19.0	0.03	0.174	0.17	0.326	0.33	

Table 4-9: SAR measurement results in a mobile hotspot 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 B25, 20 MHz BW QPSK (1 RB @ Low)	26140	1860	18.0		19.2	0.000	0.067	0.07	0.122	0.12	
LTE B25, 20 MHz BW QPSK (50% RB@ Mid)	26365	1882.5	18.0		19.2	-0.010	0.090	0.09	0.160	0.16	
CDMA 800, TDSO SO32	384	836.5	24.0		19.0	-0.03	0.421	0.42	0.613	0.62	
CDMA BC10, TDSO SO32	564	820.1	25.0	25.26	17.9	0.06	0.421	0.42	0.612	0.61	
CDMA 1900, TDSO SO32	600	1880.0	18.0		19.0	0.07	0.0359	0.04	0.0622	0.06	
802.11b, 1 Mbps	6	2437	10.0		**20.0**	**0.00**	**0.033**	**0.03**	**0.0731**	**0.07**	**A-63**
802.11a, 6 Mbps	157	5785	11.0		**19.1**	**-0.08**	**0.010**	**0.01**	**0.0452**	**0.05**	**A-64**

Table 4-10: SAR measurement results in a mobile hotspot 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, TDSO SO32	1013	824.7	24.0		18.5	-0.03	0.459	0.46	0.665	0.67	
	384	836.5	24.0		18.6	0.02	0.591	0.59	0.862	0.86	
					19.9	**0.02**	**0.604**	**0.60**	**0.870**	**0.87**	**A-60**
	777	848.3	24.0		18.5	-0.10	0.576	0.59	0.845	0.86	
CDMA BC10, TDSO SO32	564	820.1	25.0	25.26	17.9	-0.07	0.649	0.66	0.939	0.95	
CDMA 1900, TDSO SO32	600	1880.0	18.0		19.0	-0.04	0.138	0.14	0.232	0.23	

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

Body-Worn Accessory 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	10.0		20.0	0.05	0.003	0.00	0.006	0.01	
802.11a, 6 Mbps	157	5785	11.0		19.1	0.48	0.000	0.00	0.000	0.00	

Table 4-12: SAR measurement results in a mobile hotspot 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:

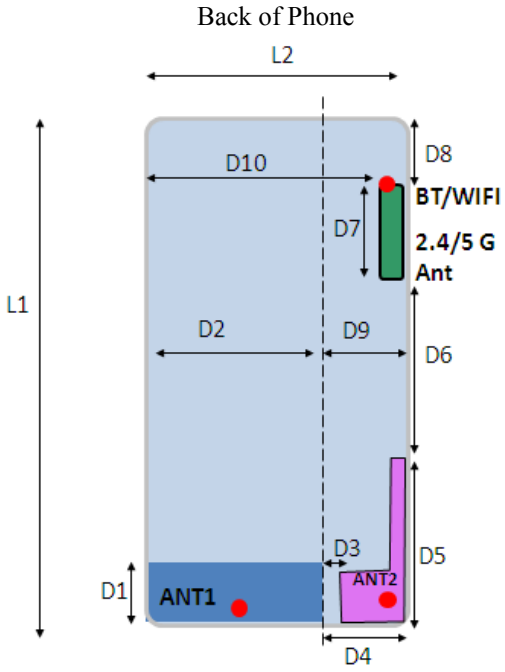
1. If the original highest measured SAR is < 0.8 $^{W}/_{kg}$, the following steps do not apply and no repeat measurements were executed.
2. If the original highest measured SAR is ≥ 0.8 $^{W}/_{kg}$, that measurement was repeated once.
3. If the ratio of the largest to smallest SAR for the original and first repeated measurement was > 1.2, or if the original or first repeated measurement was ≥ 1.45 $^{W}/_{kg}$, 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 ≥ 1.5 $^{W}/_{kg}$, 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)**	**Ratio**
EVDO 800	Right Edge of Phone 10m away from Phantom	384	836.5	0.862	0.870	1.0	N/A	N/A	N/A	N/A
EVDO BC10	Back of Phone 10m away from Phantom	564	820.1	1.03	1.00	1.0	N/A	N/A	N/A	N/A
CDMA 1900	RH Cheek	600	1880.0	1.16	1.08	1.1	N/A	N/A	N/A	N/A
LTE Band 25	LH Cheek	26590	1905.0	1.34	1.32	1.0	N/A	N/A	N/A	N/A

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. By design some or all of the transmitters built into the phone may operate simultaneously, as described in the tables on the following pages. A simplified model of the transmit paths and a diagram of the separation distances between the transmitting antennas are provided below.



[mm]	
L1	128.5
L2	65
D1	7.52
D2	40.9
D3	10.7
D4	13.4
D5	31.6
D6	56
D7	25.22
D8	15.933
D9	24.1
D10	54

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:

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

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.
- *18*, *10*, and *11* 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)	>18	LTE B25 (Data)	18			SVLTE
H2	1x CDMA 800 (Voice)	<18	LTE B25 (Data)	MAX			SVLTE
H3	1x CDMA 800 (Voice)	MAX	Wi-Fi 2.4 GHz (Data)	10			Voice + Background Data
H4	1x CDMA 800 (Voice)	MAX	Wi-Fi 5 GHz (Data)	11			Voice + Background Data
H5	1x CDMA BC10 (Voice)	>18	LTE B25 (Data)	18			SVLTE
H6	1x CDMA BC10 (Voice)	<18	LTE B25 (Data)	MAX			SVLTE
H7	1x CDMA BC10 (Voice)	MAX	Wi-Fi 2.4 GHz (Data)	10			Voice + Background Data
H8	1x CDMA BC10 (Voice)	MAX	Wi-Fi 5 GHz (Data)	11			Voice + Background Data
H9	1x CDMA 1900 (Voice)	>18	LTE B25 (Data)	18			SVLTE
H10	1x CDMA 1900 (Voice)	<18	LTE B25 (Data)	MAX			SVLTE
H11	1x CDMA 1900 (Voice)	MAX	Wi-Fi 2.4 GHz (Data)	10			Voice + Background Data
H12	1x CDMA 1900 (Voice)	MAX	Wi-Fi 5 GHz (Data)	11			Voice + Background Data
H13	LTE B25 (Data)	MAX	Wi-Fi 2.4 GHz (Data)	10			VOIP during Mobile Hotspot
H14	LTE B25 (Data)	MAX	Wi-Fi 5 GHz (Data)	11			VOIP during Mobile Hotspot
H15	1x CDMA 800 (Voice)	MAX	LTE B25 (Data)	18	Wi-Fi 2.4 GHz (Data)	10	SVLTE during Mobile Hotspot
H16	1x CDMA 800 (Voice)	MAX	LTE B25 (Data)	18	Wi-Fi 5 GHz (Data)	11	SVLTE during Mobile Hotspot
H17	1x CDMA BC10 (Voice)	MAX	LTE B25 (Data)	18	Wi-Fi 2.4 GHz (Data)	10	SVLTE during Mobile Hotspot
H18	1x CDMA BC10 (Voice)	MAX	LTE B25 (Data)	18	Wi-Fi 5 GHz (Data)	11	SVLTE during Mobile Hotspot
H19	1x CDMA 1900 (Voice)	18	LTE B25 (Data)	18	Wi-Fi 2.4 GHz (Data)	10	SVLTE during Mobile Hotspot
H20	1x CDMA 1900 (Voice)	18	LTE B25 (Data)	18	Wi-Fi 5 GHz (Data)	11	SVLTE during Mobile Hotspot

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)		
						Case H2	Case H6	Case H10
Band		1x CDMA 800	1x CDMA BC10	1x CDMA 1900	LTE Band 25	1x CDMA 800 + LTE Band 25	1x CDMA BC10+ Wi-Fi 2.4 GHz	1x CDMA 1900 + Wi-Fi 5 GHz
Power Condition or Reduced Limit		18 dBm	18 dBm	18 dBm	MAX			
Position	Left Head Cheek	0.13	0.12	0.15	1.43	1.56	1.55	1.58
	Right Head Cheek	0.15	0.14	0.37	0.58	0.73	0.72	0.95
	Left Head 15° Tilt	0.08	0.08	0.13	0.32	0.4	0.4	0.45
	Right Head 15° Tilt	0.08	0.08	0.13	0.35	0.43	0.43	0.48

Table 4-14: SAR summations for simultaneous evaluation in Head Positions (CDMA below <18 evaluation)

		Transmitter Stand-Alone 1 g SAR Values (W/kg)			1 g SAR Summations (W/kg)	
					Case H13	Case H14
Band		LTE Band 25	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	WIFI 2.4 GHz + LTE Band 25	WIFI 5GHz + LTE Band 25
Power Condition or Reduced Limit		MAX	10 dBm	11 dBm		
Position	Left Head Cheek	1.43	0.04	0.08	1.47	1.51
	Right Head Cheek	0.58	0.13	0.12	0.71	0.7
	Left Head 15° Tilt	0.32	0.02	0.09	0.34	0.41
	Right Head 15° Tilt	0.35	0.05	0.08	0.4	0.43

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

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)				
						Case H1	Case H3	Case H4	Case H15	Case H16
Band		1x CDMA 800	LTE Band 25	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	1x CDMA 800 + LTE Band 25	1x CDMA 800 + Wi-Fi 2.4 GHz	1x CDMA 800 + Wi-Fi 5 GHz	1x CDMA 800 + LTE Band 25 +Wi-Fi 2.4 GHz	1x CDMA 800 + LTE Band 25 +Wi-Fi 5 GHz
Power Condition or Reduced Limit		MAX	18 dBm	10 dBm	11 dBm					
Position	Left Head Cheek	0.66	0.31	0.04	0.08	0.97	0.7	0.74	1.01	1.05
	Right Head Cheek	0.71	0.17	0.13	0.12	0.88	0.84	0.83	1.01	1
	Left Head 15° Tilt	0.40	0.08	0.02	0.09	0.48	0.42	0.49	0.5	0.57
	Right Head 15° Tilt	0.43	0.10	0.05	0.08	0.53	0.48	0.51	0.58	0.61

Table 4-16: SAR summations for simultaneous evaluation in Head Positions (1x CDMA 800 evaluation)

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)				
						Case H5	Case H7	Case H8	Case H17	Case H18
Band		1x CDMA BC10	LTE Band 25	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	1x CDMA BC10 + LTE Band 25	1x CDMA BC10 + Wi-Fi 2.4 GHz	1x CDMA BC10 + Wi-Fi 5 GHz	1x CDMA BC10 + LTE Band 25 +Wi-Fi 2.4 GHz	1x CDMA BC10 + LTE Band 25 +Wi-Fi 5 GHz
Power Condition or Reduced Limit		MAX	18 dBm	10 dBm	11 dBm					
Position	Left Head Cheek	0.57	0.31	0.04	0.08	0.88	0.61	0.65	0.92	0.96
	Right Head Cheek	0.67	0.17	0.13	0.12	0.84	0.8	0.79	0.97	0.96
	Left Head 15° Tilt	0.36	0.08	0.02	0.09	0.44	0.38	0.45	0.46	0.53
	Right Head 15° Tilt	0.40	0.10	0.05	0.08	0.5	0.45	0.48	0.55	0.58

Table 4-17: SAR summations for simultaneous evaluation in Head Positions (1x CDMA BC10 evaluation)

		Transmitter Stand-Alone 1 g SAR Values (W/kg)					1 g SAR Summations (W/kg)				
							Case H9	Case H11	Case H12	Case H19	Case H20
Band		1x CDMA 1900	1x CDMA 1900	LTE Band 25	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	1x CDMA 1900+ LTE Band 25	1x CDMA 1900+ Wi-Fi 2.4 GHz	1x CDMA 1900+ Wi-Fi 5 GHz	1x CDMA 1900 + LTE Band 25 +Wi-Fi 2.4 GHz	1x CDMA 1900 + LTE Band 25 +Wi-Fi 5 GHz
Power Condition or Reduced Limit		MAX	18 dBm	18 dBm	10 dBm	11 dBm					
Position	Left Head Cheek	0.55	0.15	0.31	0.04	0.08	0.86	0.59	0.63	0.5	0.54
	Right Head Cheek	1.16	0.37	0.17	0.13	0.12	1.33	1.29	1.28	0.67	0.66
	Left Head 15° Tilt	0.53	0.13	0.08	0.02	0.09	0.61	0.55	0.62	0.23	0.3
	Right Head 15° Tilt	0.47	0.13	0.10	0.05	0.08	0.57	0.52	0.55	0.28	0.31

Table 4-18: SAR summations for simultaneous evaluation in Head Positions (1x CDMA 1900 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	CDMA 800	>18	LTE B25 (Data)	18			SVLTE
	CDMA 800	<18	LTE B25 (Data)	MAX			SVLTE
B2	CDMA 800	MAX	Wi-Fi 2.4 GHz (Data)	10			Voice + Background Data
B3	CDMA 800	MAX	Wi-Fi 5 GHz (Data)	11			Voice + Background Data
B4	CDMA BC10	>18	LTE B25 (Data)	18			SVLTE
	CDMA BC10	<18	LTE B25 (Data)	MAX			SVLTE
B5	CDMA BC10	MAX	Wi-Fi 2.4 GHz (Data)	10			Voice + Background Data
B6	CDMA BC10	MAX	Wi-Fi 5 GHz (Data)	11			Voice + Background Data
B7	CDMA 1900	>18	LTE B25 (Data)	18			SVLTE
	CDMA 1900	<18	LTE B25 (Data)	MAX			SVLTE
B8	CDMA 1900	MAX	Wi-Fi 2.4 GHz (Data)	10			Voice + Background Data
B9	CDMA 1900	MAX	Wi-Fi 5 GHz (Data)	11			Voice + Background Data
B10	CDMA 800	24	LTE B25 (Data)	18	Wi-Fi 2.4 GHz (Data)	10	SVLTE during Mobile Hotspot
B11	CDMA 800	24	LTE B25 (Data)	18	Wi-Fi 5 GHz (Data)	11	SVLTE during Mobile Hotspot
B12	CDMA BC10	MAX	LTE B25 (Data)	18	Wi-Fi 2.4 GHz (Data)	10	SVLTE during Mobile Hotspot
B13	CDMA BC10	MAX	LTE B25 (Data)	18	Wi-Fi 5 GHz (Data)	11	SVLTE during Mobile Hotspot
B14	CDMA 1900	18	LTE B25 (Data)	18	Wi-Fi 2.4 GHz (Data)	10	SVLTE during Mobile Hotspot
B15	CDMA 1900	18	LTE B25 (Data)	18	Wi-Fi 5 GHz (Data)	11	SVLTE during Mobile Hotspot
B16	CDMA 800	MAX	Bluetooth	MAX			Voice + BT (Estimated)
B17	CDMA BC10	MAX	Bluetooth	MAX			Voice + BT (Estimated)
B18	CDMA 1900	MAX	Bluetooth	MAX			Voice + 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 B10	Case B11
Band		1x CDMA 800	LTE Band 25	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	1x CDMA 800 + LTE Band 25	1x CDMA 800 + Wi-Fi 2.4 GHz	1x CDMA 800 + Wi-Fi 5 GHz	1x CDMA 800 + LTE Band 25 +Wi-Fi 2.4 GHz	1x CDMA 800 + LTE Band 25 +Wi-Fi 5 GHz
Power Condition or Reduced Limit		MAX	MAX	MAX	MAX					
Position	Front of Phone 25mm away from phantom	0.31	0.25	0.02	0.10	0.56	0.33	0.41	0.58	0.66
	Back of Phone 25mm away from phantom	0.34	0.25	0.05	0.30	0.59	0.39	0.64	0.64	0.89

Table 4-19: SAR summations for simultaneous evaluation – 1x CDMA 800 in Body-Worn Accessory Positions

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)				
						Case B4	Case B5	Case B6	Case B12	Case B13
Band		1x CDMA BC10	LTE Band 25	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	1x CDMA BC10 + LTE Band 25	1x CDMA BC10 + Wi-Fi 2.4 GHz	1x CDMA BC10 + Wi-Fi 5 GHz	1x CDMA BC10 + LTE Band 25 +Wi-Fi 2.4 GHz	1x CDMA BC10 + LTE Band 25 +Wi-Fi 5 GHz
Power Condition or Reduced Limit		MAX	MAX	MAX	MAX					
Position	Front of Phone 25mm away from phantom	0.20	0.25	0.02	0.10	0.45	0.22	0.3	0.47	0.55
	Back of Phone 25mm away from phantom	0.24	0.25	0.05	0.30	0.49	0.29	0.54	0.54	0.79

Table 4-20: SAR summations for simultaneous evaluation – 1x CDMA BC10 in Body-Worn Accessory Positions

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)				
						Case B7	Case B8	Case B9	Case B14	Case B15
Band		1x CDMA 1900	LTE Band 25	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	1x CDMA 1900 + LTE Band 25	1x CDMA 1900 + Wi-Fi 2.4 GHz	1x CDMA 1900 + Wi-Fi 5 GHz	1x CDMA 1900 + LTE Band 25 +Wi-Fi 2.4 GHz	1x CDMA 1900 + LTE Band 25 +Wi-Fi 5 GHz
Power Condition or Reduced Limit		MAX	MAX	MAX	MAX					
Position	Front of Phone 25mm away from phantom	0.24	0.25	0.02	0.10	0.49	0.26	0.34	0.51	0.59
	Back of Phone 25mm away from phantom	0.29	0.25	0.05	0.30	0.54	0.34	0.59	0.59	0.84

Table 4-21: SAR summations for simultaneous evaluation – 1x CDMA 1900 in Body-Worn Accessory Positions

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)		
						Case B16	Case B17	Case B18
Band		1x CDMA 800	1x CDMA BC10	1x CDMA 1900	Bluetooth	CDMA 800 + Bluetooth	CDMA BC10 + Bluetooth	CDMA 1900 + Bluetooth
Power Condition or Reduced Limit		MAX	MAX	MAX	MAX			
Position	Front of Phone 25mm away from phantom	0.31	0.20	0.24	0.1	0.41	0.30	0.34
	Back of Phone 25mm away from phantom	0.34	0.24	0.29	0.1	0.44	0.34	0.39

Table 4-22: SAR summations for simultaneous evaluation – Bluetooth (Estimated) in Body-Worn Accessory Positions

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	
	EVDO 800 (Data)	24	Wi-Fi 2.4 GHz (Data)	10			Mobile Hotspot
	EVDO 800 (Data)	24	Wi-Fi 5 GHz (Data)	11			Mobile Hotspot
	EVDO BC10 (Data)	MAX	Wi-Fi 2.4 GHz (Data)	10			Mobile Hotspot
	EVDO BC10 (Data)	MAX	Wi-Fi 5 GHz (Data)	11			Mobile Hotspot
	EVDO 1900 (Data)	18	Wi-Fi 2.4 GHz (Data)	10			Mobile Hotspot
	EVDO 1900 (Data)	18	Wi-Fi 5 GHz (Data)	11			Mobile Hotspot
	LTE B25 (Data)	18	Wi-Fi 2.4 GHz (Data)	10			Mobile Hotspot
	LTE B25 (Data)	18	Wi-Fi 5 GHz (Data)	11			Mobile Hotspot
M1	1x CDMA 800 (Voice)	24	LTE B25 (Data)	18	Wi-Fi 2.4 GHz (Data)	10	SVLTE during Mobile Hotspot
M2	1x CDMA 800 (Voice)	24	LTE B25 (Data)	18	Wi-Fi 5 GHz (Data)	11	SVLTE during Mobile Hotspot
M3	1x CDMA BC10 (Voice)	MAX	LTE B25 (Data)	18	Wi-Fi 2.4 GHz (Data)	10	SVLTE during Mobile Hotspot
M4	1x CDMA BC10 (Voice)	MAX	LTE B25 (Data)	18	Wi-Fi 5 GHz (Data)	11	SVLTE during Mobile Hotspot
M5	1x CDMA 1900 (Voice)	18	LTE B25 (Data)	18	Wi-Fi 2.4 GHz (Data)	10	SVLTE during Mobile Hotspot
M6	1x CDMA 1900 (Voice)	18	LTE B25 (Data)	18	Wi-Fi 5 GHz (Data)	11	SVLTE during Mobile Hotspot

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)	
						Case M1	Case M2
Band		CDMA 800	LTE Band 25	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	CDMA 800 + LTE Band 25 +Wi-Fi 2.4 GHz	CDMA 800 + LTE Band 25 +Wi-Fi 5.785 GHz
Power Condition or Reduced Limit		24 dBm	18 dBm	10 dBm	11 dBm		
Position	Front of Phone 10 mm from Phantom	0.86	0.22	0.02	0.02	1.1	1.1
	Back of Phone 10 mm from Phantom	0.81	0.22	0.05	0.04	1.08	1.07
	Left Edge of Phone 10 mm from Phantom	0.62	0.16	0.07	0.05	0.85	0.83

Table 4-23: SAR summations for simultaneous evaluation – Positions during a Mobile Hotspot session (CDMA 800)

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)	
						Case M3	Case M4
Band		CDMA BC10	LTE Band 25	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	CDMA BC10 + LTE Band 25 +Wi-Fi 2.4 GHz	CDMA BC10 + LTE Band 25 +Wi-Fi 5.785 GHz
Power Condition or Reduced Limit		MAX	18 dBm	10 dBm	11 dBm		
Position	Front of Phone 10 mm from Phantom	0.97	0.22	0.02	0.02	1.21	1.21
	Back of Phone 10 mm from Phantom	1.03	0.22	0.05	0.04	1.3	1.29
	Left Edge of Phone 10 mm from Phantom	0.61	0.16	0.07	0.05	0.84	0.82

Table 4-24: SAR summations for simultaneous evaluation – Positions during a Mobile Hotspot session (CDMA BC10)

		Transmitter Stand-Alone 1 g SAR Values (W/kg)				1 g SAR Summations (W/kg)	
						Case M5	Case M6
Band		CDMA 1900	LTE Band 25	Wi-Fi 2.4 GHz	Wi-Fi 5 GHz	CDMA 1900+ LTE Band 25 +Wi-Fi 2.4 GHz	CDMA1900+ LTE Band 25 +Wi-Fi 5.785 GHz
Power Condition or Reduced Limit		18 dBm	18 dBm	10 dBm	11 dBm		
Position	Front of Phone 10 mm from Phantom	0.38	0.22	0.02	0.02	0.62	0.62
	Back of Phone 10 mm from Phantom	0.39	0.22	0.05	0.04	0.66	0.65
	Left Edge of Phone 10 mm from Phantom	0.06	0.16	0.07	0.05	0.29	0.27

Table 4-25: SAR summations for simultaneous evaluation – Positions during a Mobile Hotspot session (CDMA 1900)

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 GMS/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: 3/31/2013 4:29:11 AM

DUT Serial: D835V2 - SN:436tr

DASY Configuration:

- Probe: ES3DV3 - SN3124; ConvF(6.01,6.01,6.01); Calibrated: 8/20/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/3/2012
- Phantom: R#2 Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1235
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

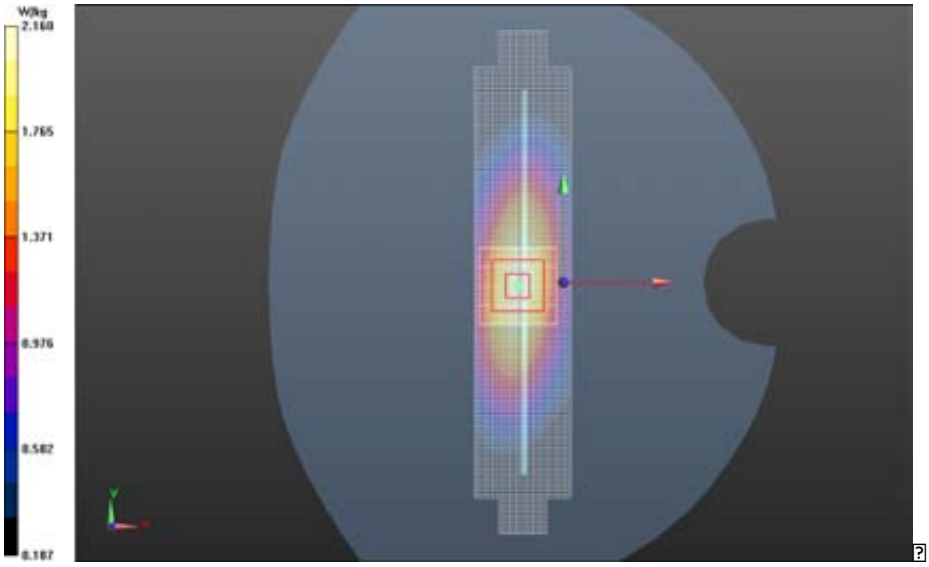
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 835.0 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=835 MHz; σ = 0.9146; ε_r = 41.07 mho/m; ρ = 1000 kg/m^3

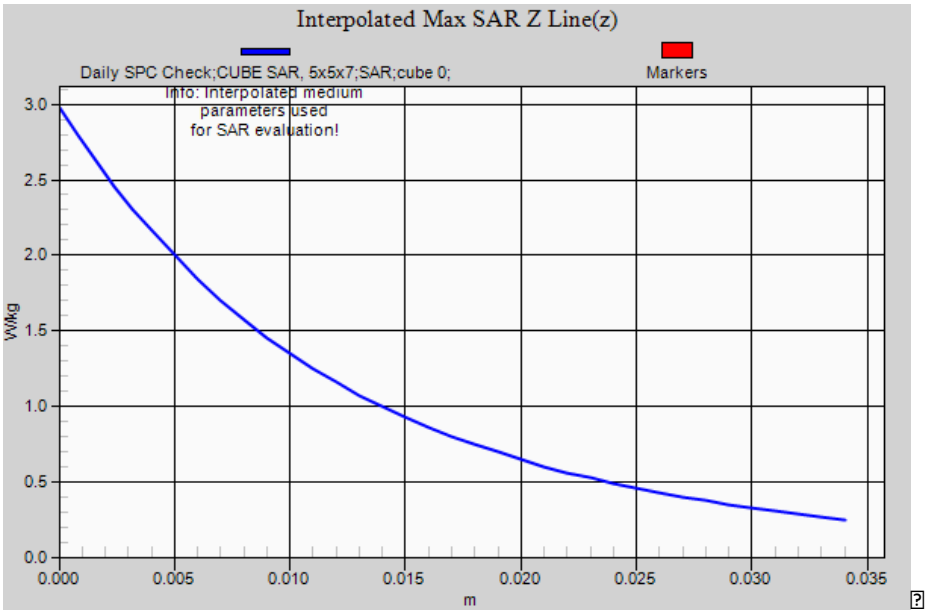
Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 1.98 W/kg; SAR(10g) = 1.32 W/kg

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 = 49.426 V/m, Power Drift = 0.00165 dB
Averaged SAR: SAR(1g) = 1.98 W/kg; SAR(10g) = 1.30 W/kg





Daily SPC Check

Date/Time: 4/1/2013 7:58:45 AM

DUT Serial: D1800V2 - SN:2d190

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)

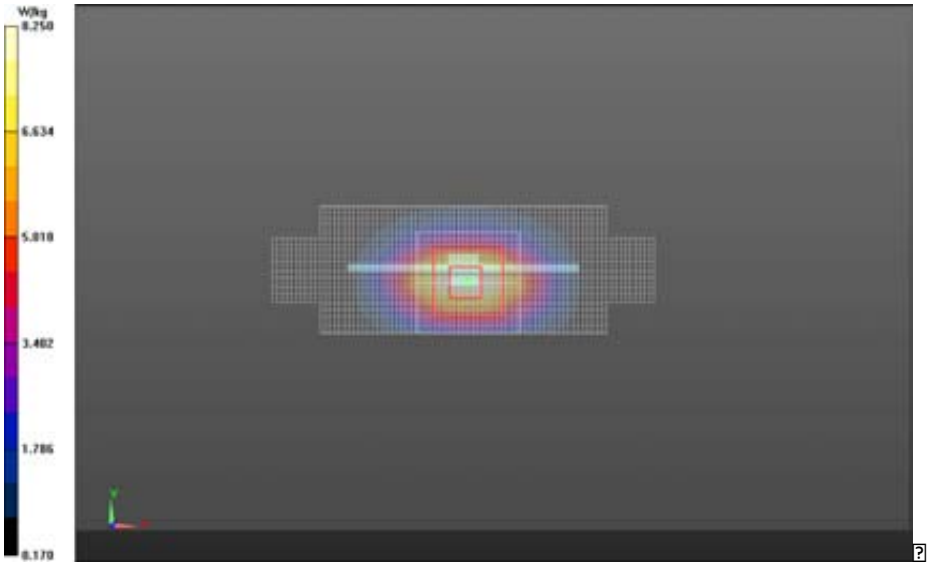
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 1800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=1800 MHz; σ = 1.355; ε_r = 37.42 mho/m; ρ = 1000 kg/m^3

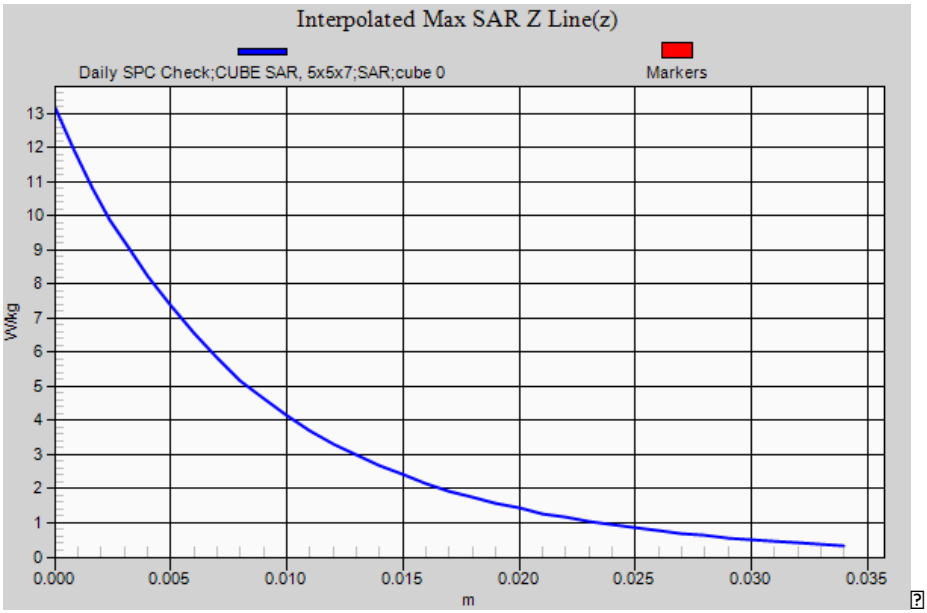
Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 7.47 W/kg; SAR(10g) = 4.06 W/kg

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 = 76.799 V/m, Power Drift = -0.011 dB
Averaged SAR: SAR(1g) = 7.37 W/kg; SAR(10g) = 3.90 W/kg





Daily SPC Check

Date/Time: 4/2/2013 7:07:32 AM

DUT Serial: D1800V2 - SN:2d190

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)

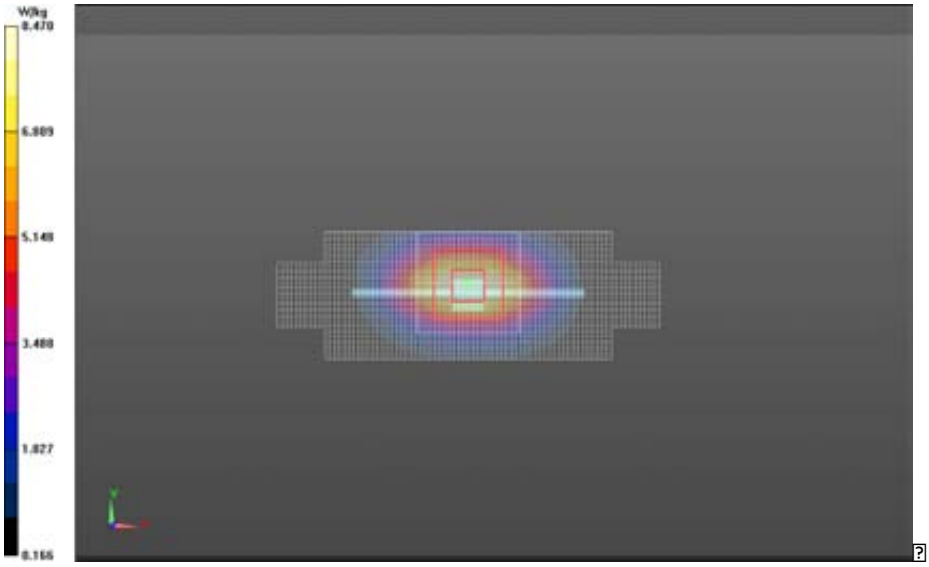
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 1800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=1800 MHz; σ = 1.351; ε_r = 36.69 mho/m; ρ = 1000 kg/m^3

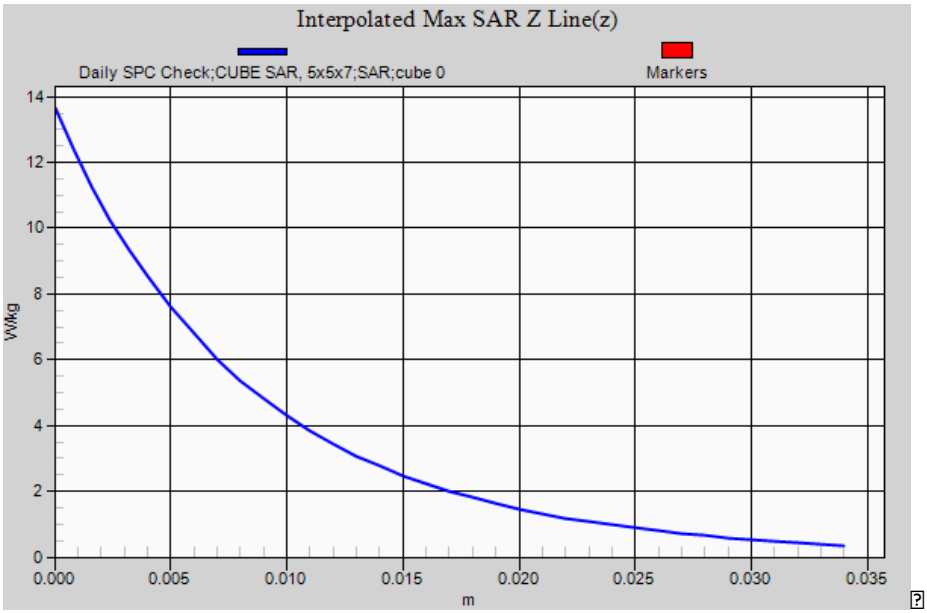
Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 7.67 W/kg; SAR(10g) = 4.18 W/kg

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 = 79.678 V/m, Power Drift = -0.023 dB
Averaged SAR: SAR(1g) = 7.60 W/kg; SAR(10g) = 4.02 W/kg





Daily SPC Check

Date/Time: 4/23/2013 11:10:19 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 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)

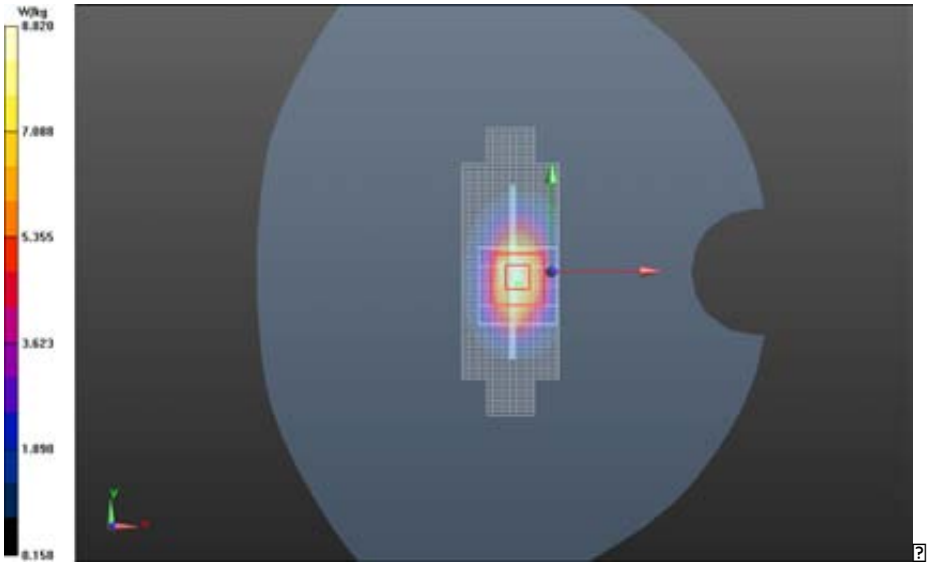
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 1800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=1800 MHz; σ = 1.368; ε_r = 38.20 mho/m; ρ = 1000 kg/m^3

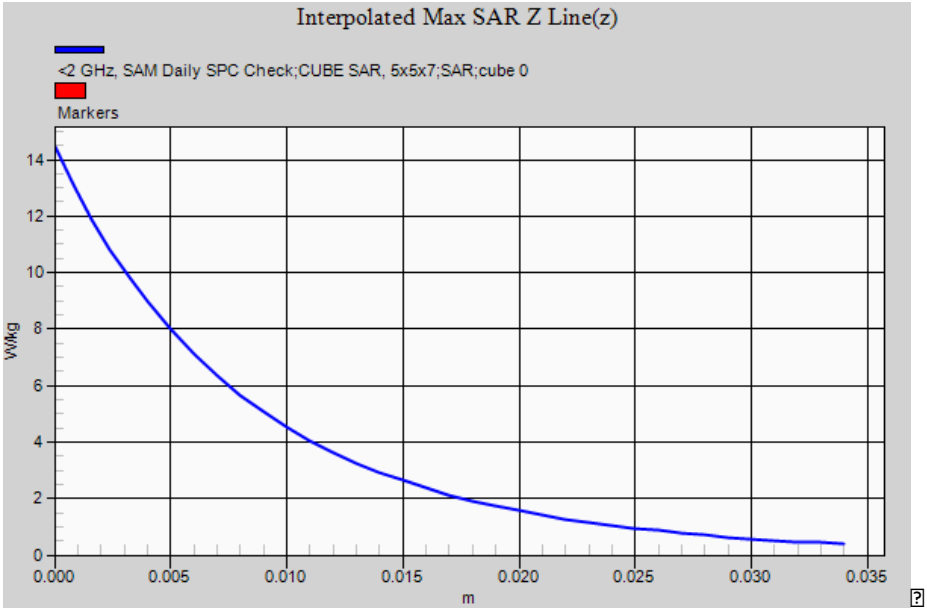
<2 GHz, SAM Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 8.10 W/kg; SAR(10g) = 4.36 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 = 79.254 V/m, Power Drift = -0.012 dB
Averaged SAR: SAR(1g) = 7.99 W/kg; SAR(10g) = 4.21 W/kg





<2 GHz, SAM Daily SPC Check

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

DUT Serial: D2450V2 - SN:740

DASY Configuration:

- Probe: EX3DV4 - SN3730; ConvF(6.90,6.90,6.90); 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)

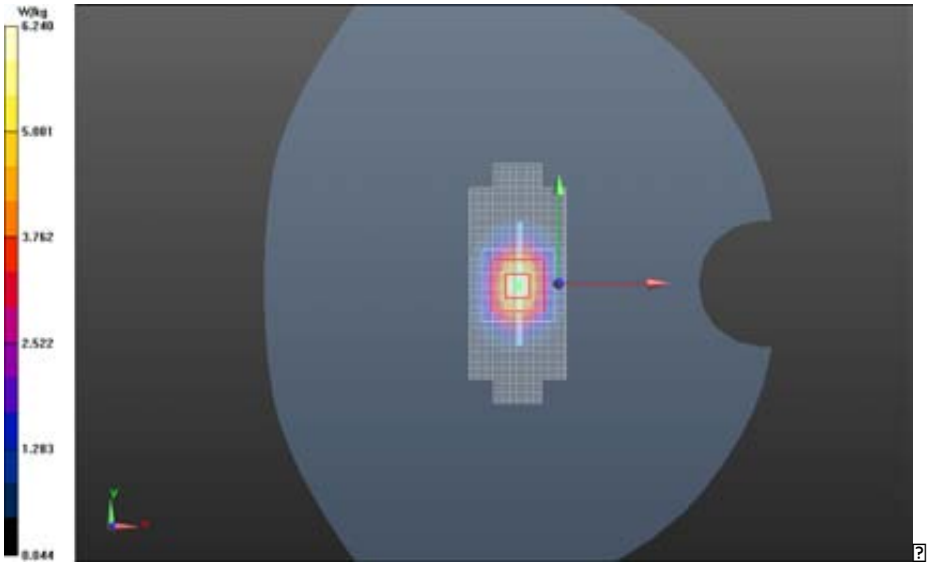
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 2450 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=2450 MHz; σ = 1.788; ε_r = 37.69 mho/m; ρ = 1000 kg/m^3

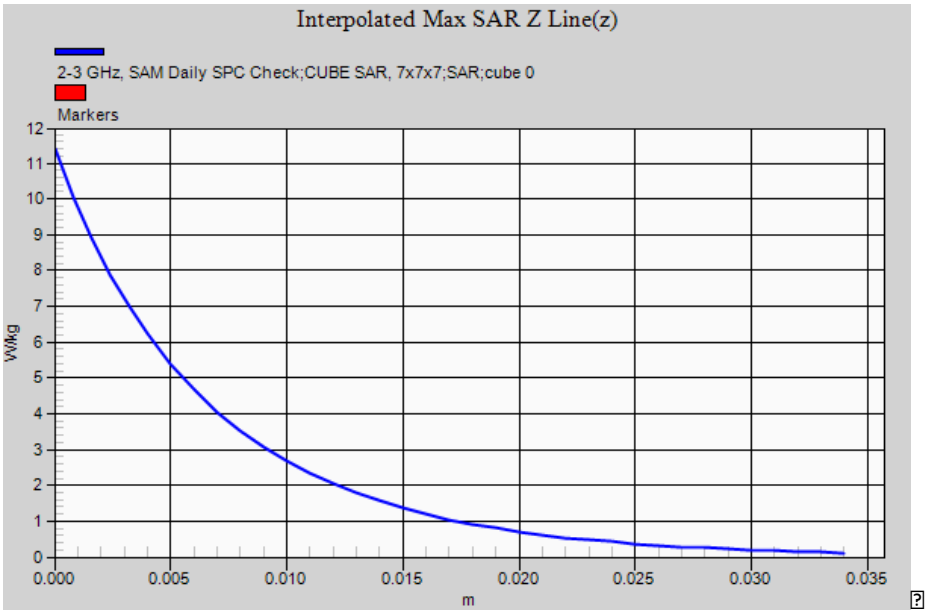
2-3 GHz, SAM Daily SPC Check/fastSAR, Dipole Area Scan (41x221x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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(4.90,4.90,4.90); 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)

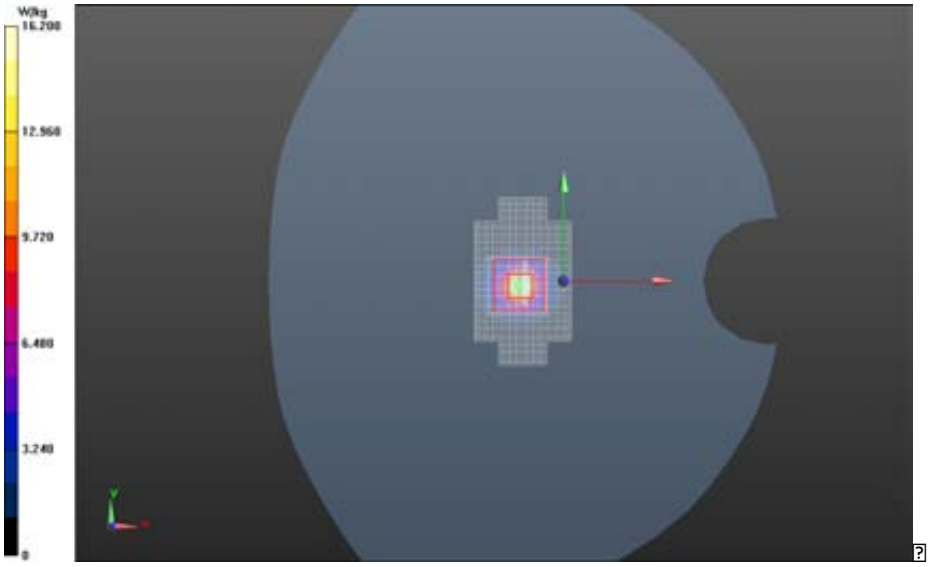
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 5200 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=5200 MHz; σ = 4.636; ε_r = 35.52 mho/m; ρ = 1000 kg/m^3

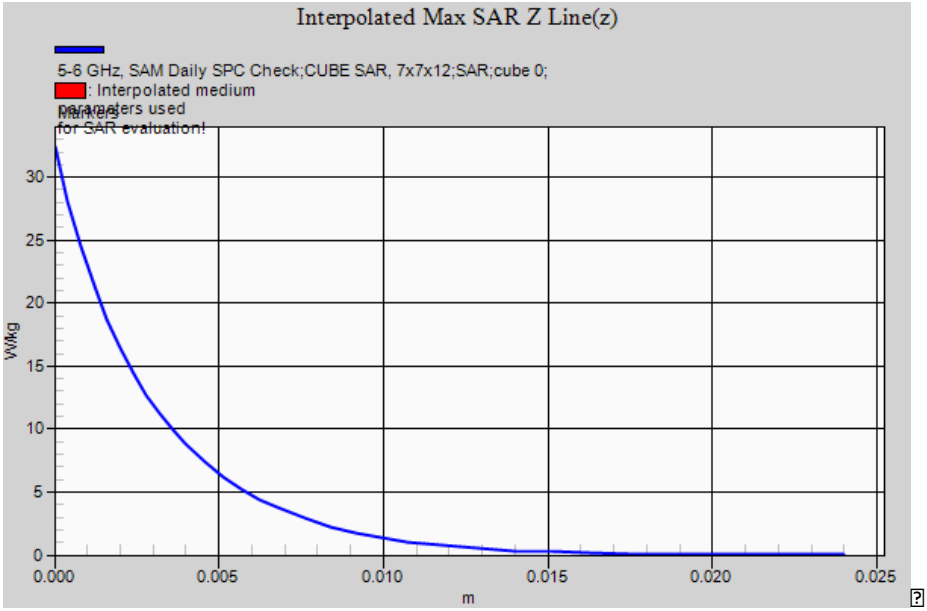
5-6 GHz, SAM Daily SPC Check/fastSAR, Dipole Area Scan (41x211x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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(4.24,4.24,4.24); 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)

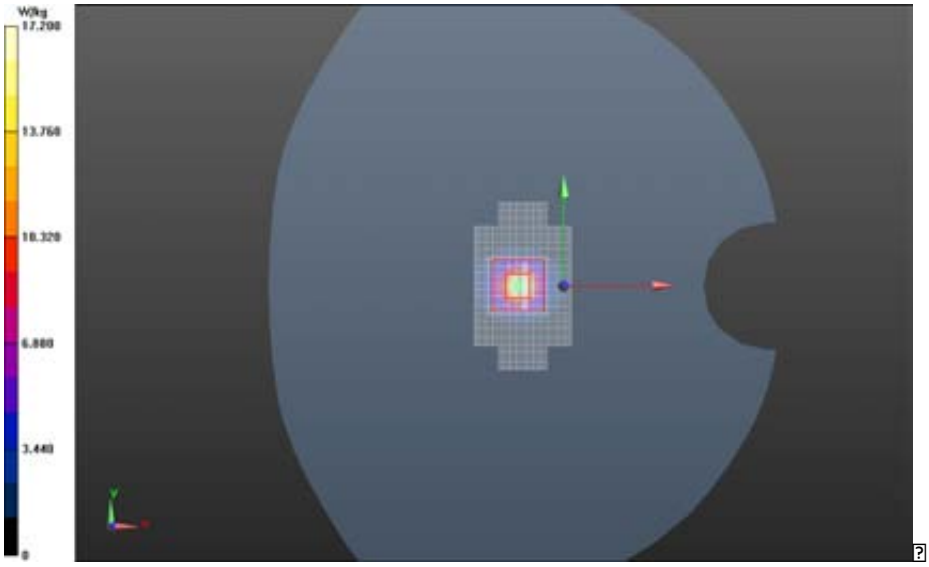
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 5800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=5800 MHz; σ = 5.324; ε_r = 34.15 mho/m; ρ = 1000 kg/m^3

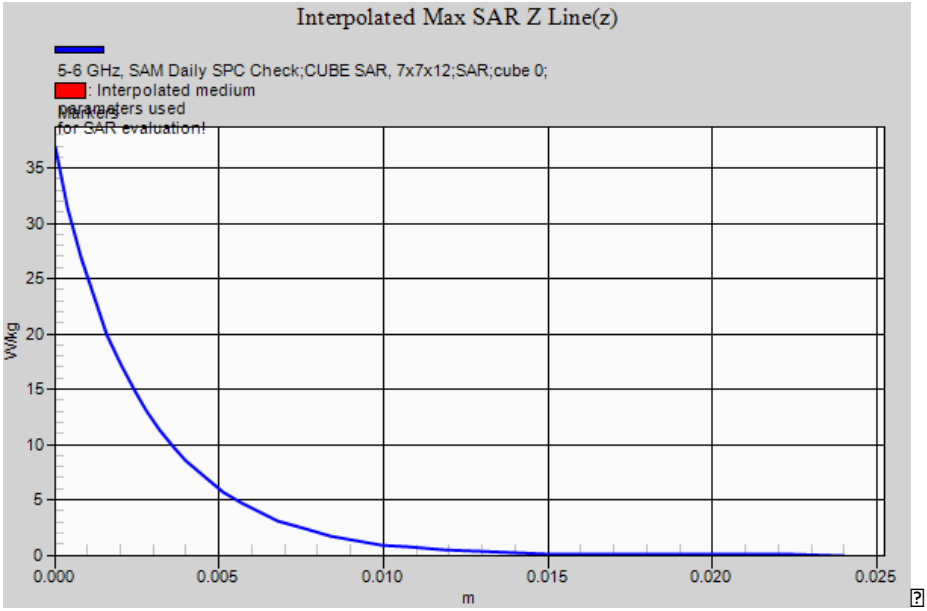
5-6 GHz, SAM Daily SPC Check/fastSAR, Dipole Area Scan (41x211x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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: 3/31/2013 7:25:18 AM

DUT Serial: D835V2 - SN:436tr

DASY Configuration:

- Probe: ES3DV3 - SN3124; ConvF(6.02,6.02,6.02); 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)

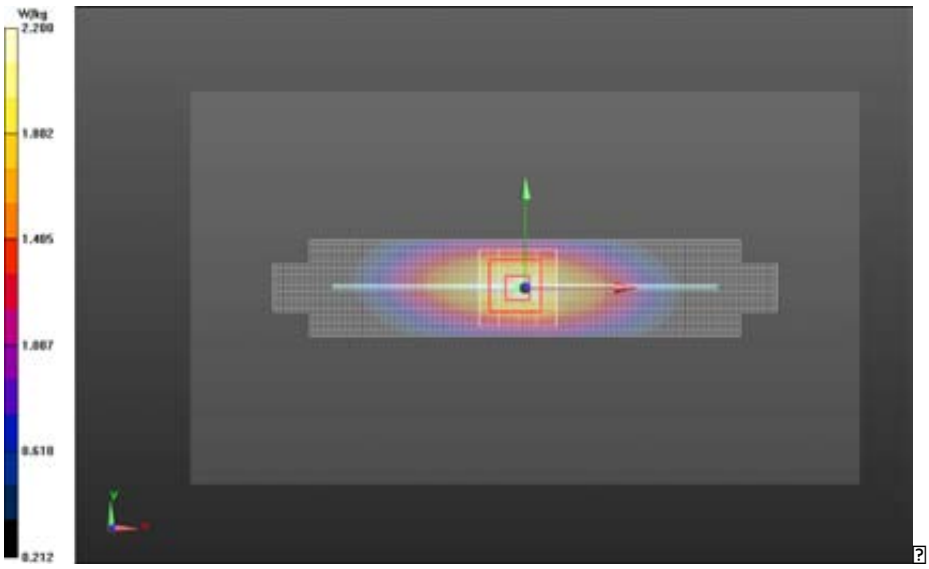
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 835.0 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=835 MHz; σ = 0.9985; ε_r = 54.30 mho/m; ρ = 1000 kg/m^3

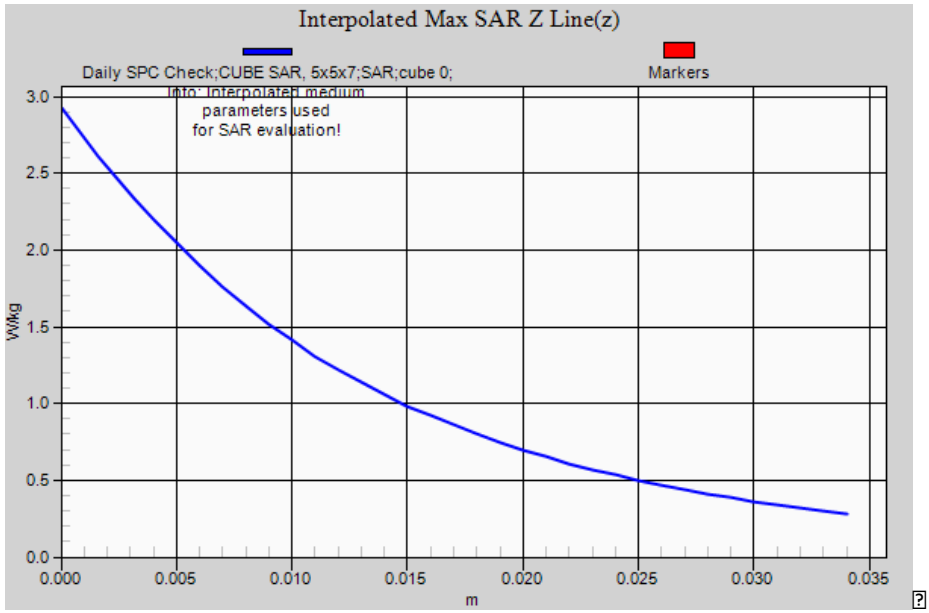
Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 1.98 W/kg; SAR(10g) = 1.32 W/kg

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 = 47.693 V/m, Power Drift = -0.072 dB
Averaged SAR: SAR(1g) = 1.98 W/kg; SAR(10g) = 1.32 W/kg





Daily SPC Check

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

DUT Serial: D835V2 - SN:422tr

DASY Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.05,6.05,6.05); 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)

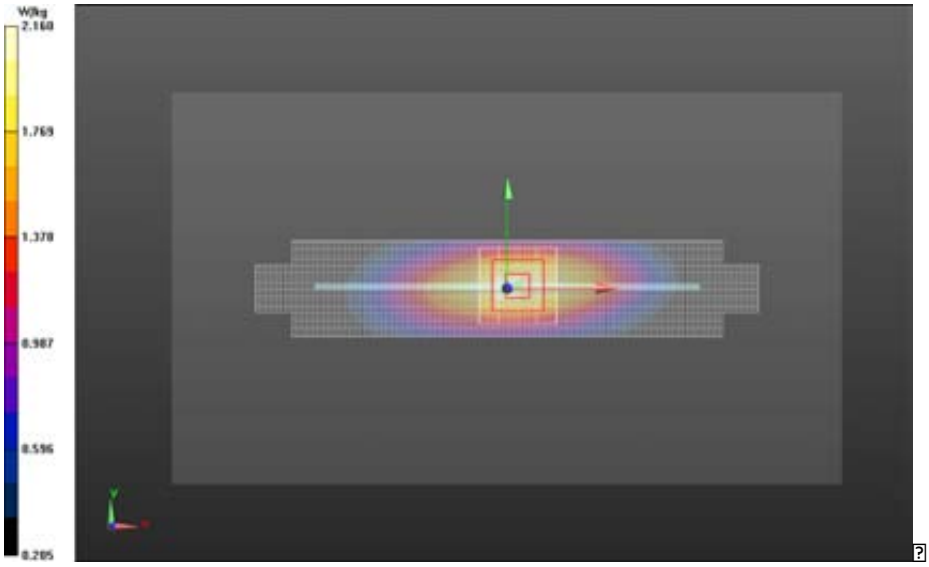
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 835.0 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=835 MHz; σ = 1.004; ε_r = 53.69 mho/m; ρ = 1000 kg/m^3

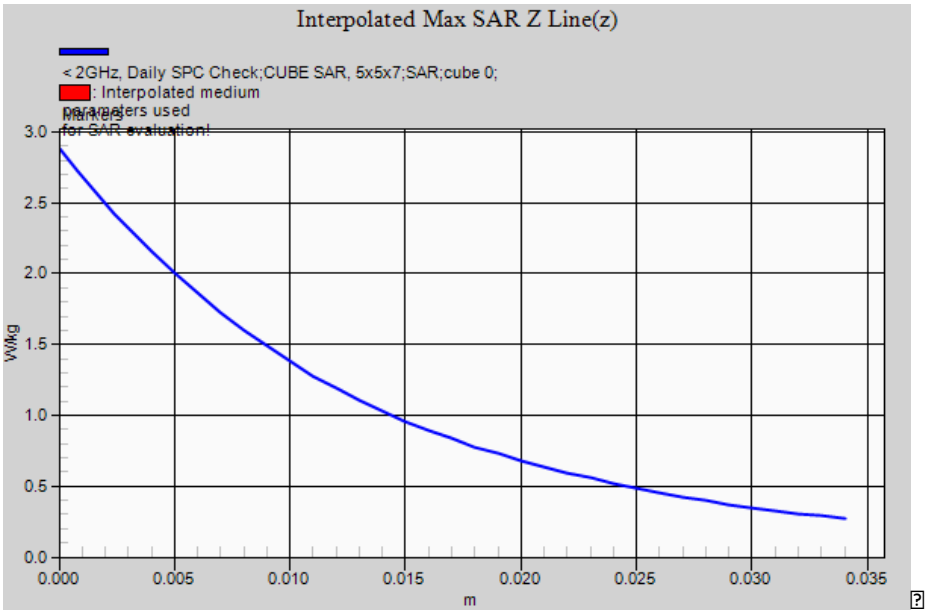
< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

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: 4/25/2013 5:26:18 PM

DUT Serial: D835V2 - SN:423tr

DASY Configuration:

- Probe: ES3DV3 - SN3037; ConvF(6.16,6.16,6.16); 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)

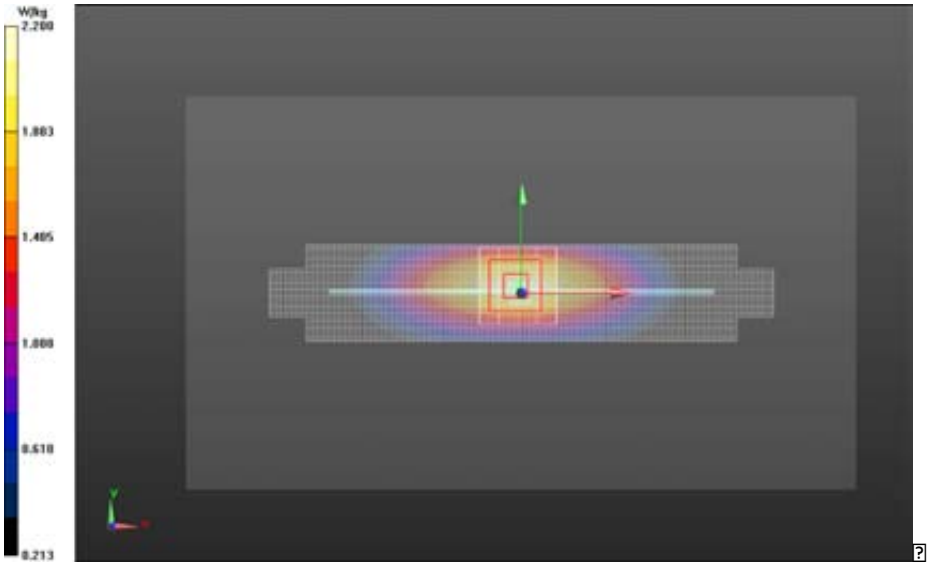
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 835.0 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=835 MHz; σ = 1.017; ε_r = 54.47 mho/m; ρ = 1000 kg/m^3

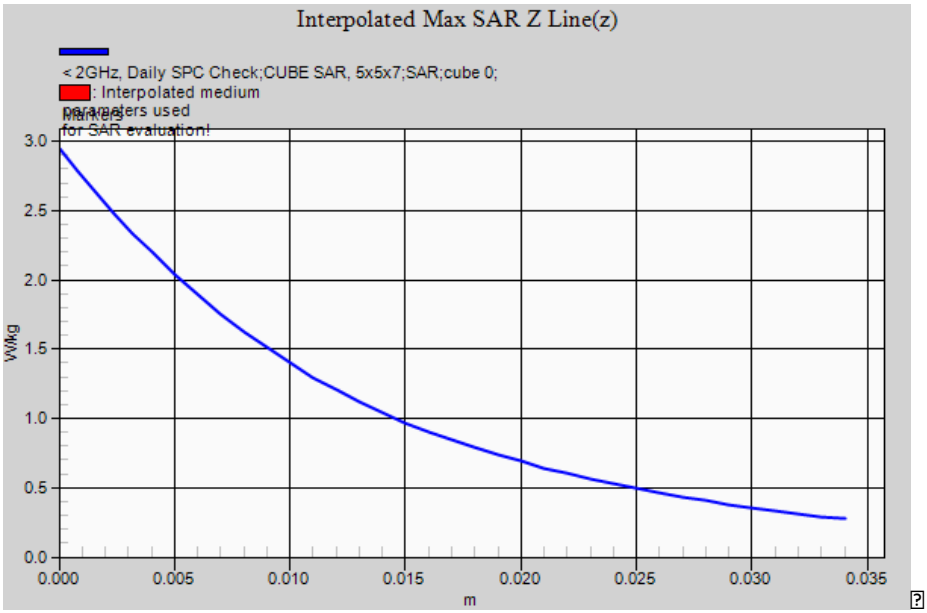
< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 1.96 W/kg; SAR(10g) = 1.31 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 = 47.219 V/m, Power Drift = -0.020 dB
Averaged SAR: SAR(1g) = 1.96 W/kg; SAR(10g) = 1.30 W/kg





< 2GHz, Daily SPC Check

Date/Time: 4/1/2013 8:19:23 AM

DUT Serial: D1800V2 - SN:2d190

DASY Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.76,4.76,4.76); 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)

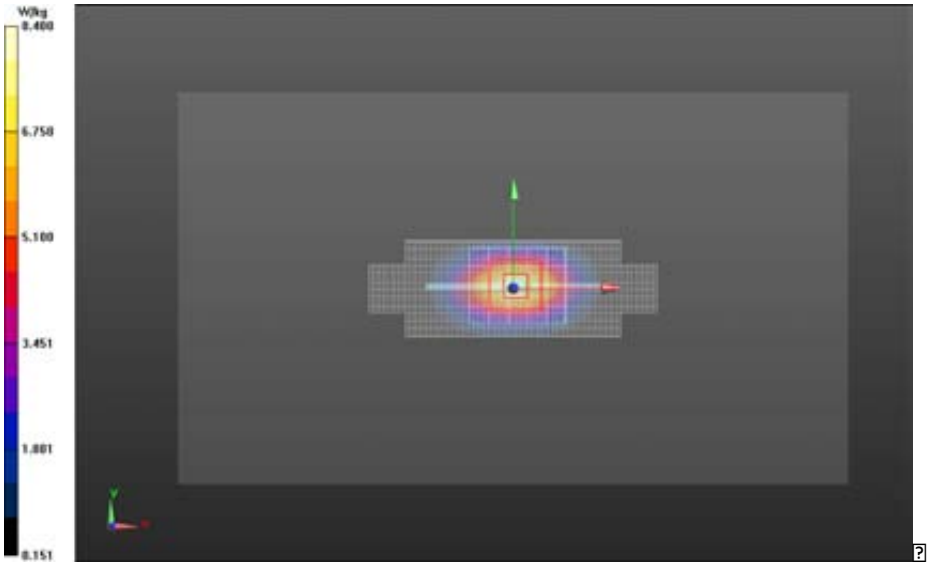
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 1800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=1800 MHz; σ = 1.443; ε_r = 49.31 mho/m; ρ = 1000 kg/m^3

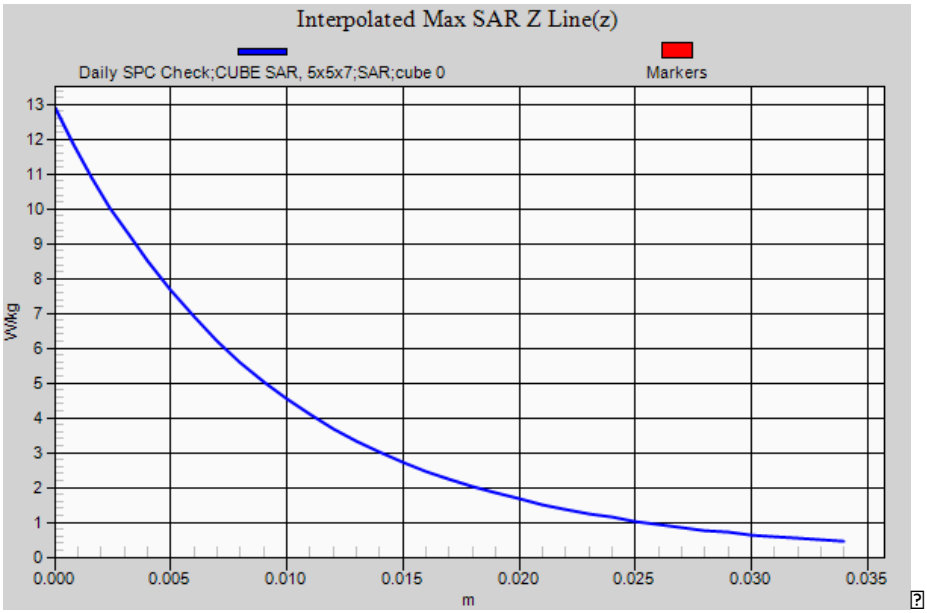
Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 7.74 W/kg; SAR(10g) = 4.12 W/kg

Daily SPC Check/CUBE SAR, 5x5x7 (21x26x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 77.978 V/m, Power Drift = -0.022 dB
Averaged SAR: SAR(1g) = 7.62 W/kg; SAR(10g) = 4.08 W/kg





Daily SPC Check

Date/Time: 4/16/2013 11:27:17 AM

DUT Serial: D1800V2 - SN:2d190

DASY Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.76,4.76,4.76); 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)

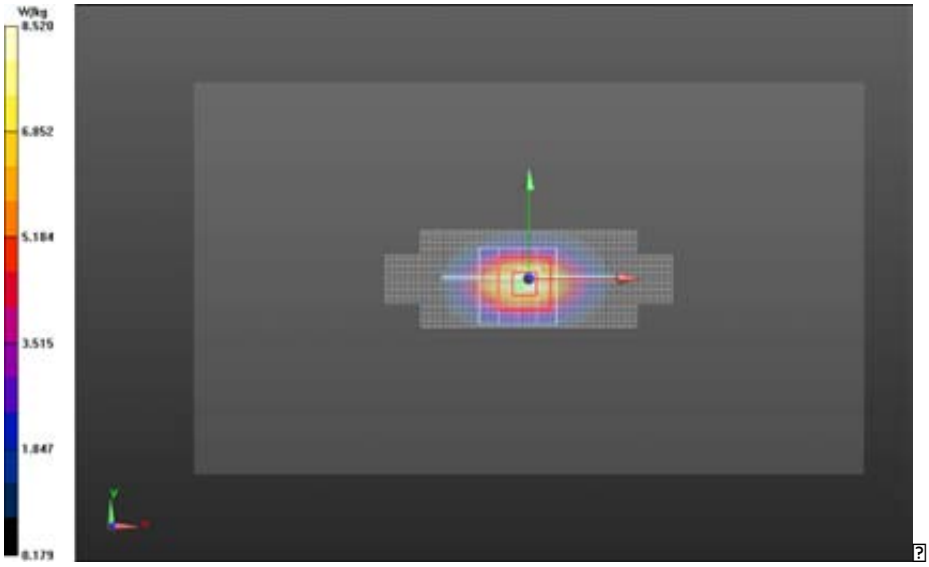
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 1800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=1800 MHz; σ = 1.458; ε_r = 49.37 mho/m; ρ = 1000 kg/m^3

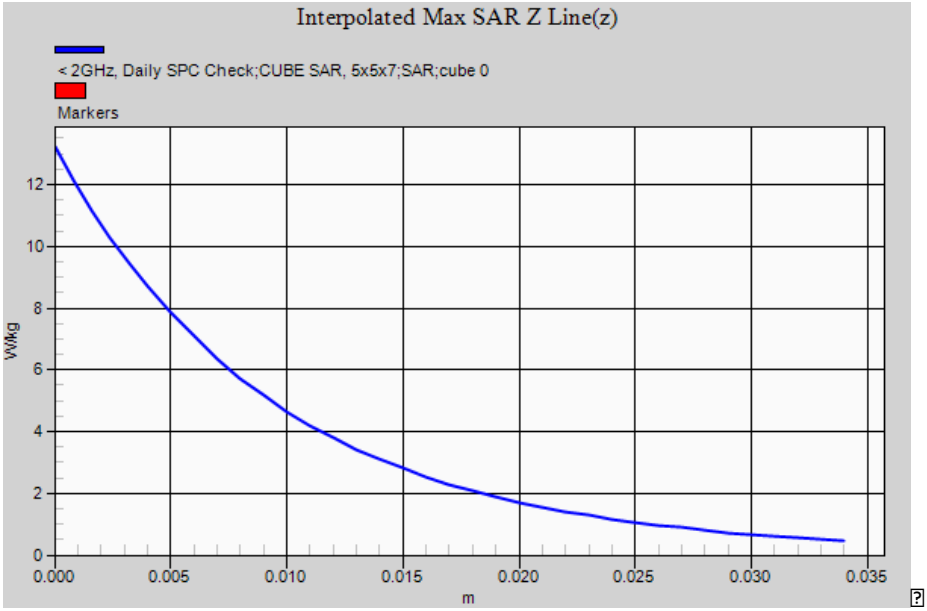
< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 7.90 W/kg; SAR(10g) = 4.21 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 = 77.791 V/m, Power Drift = 0.00147 dB
Averaged SAR: SAR(1g) = 7.77 W/kg; SAR(10g) = 4.17 W/kg





< 2GHz, Daily SPC Check

Date/Time: 4/23/2013 7:20:14 AM

DUT Serial: D1800V2 - SN:2d191

DASY Configuration:

- Probe: ES3DV3 - SN3037; ConvF(4.83,4.83,4.83); 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)

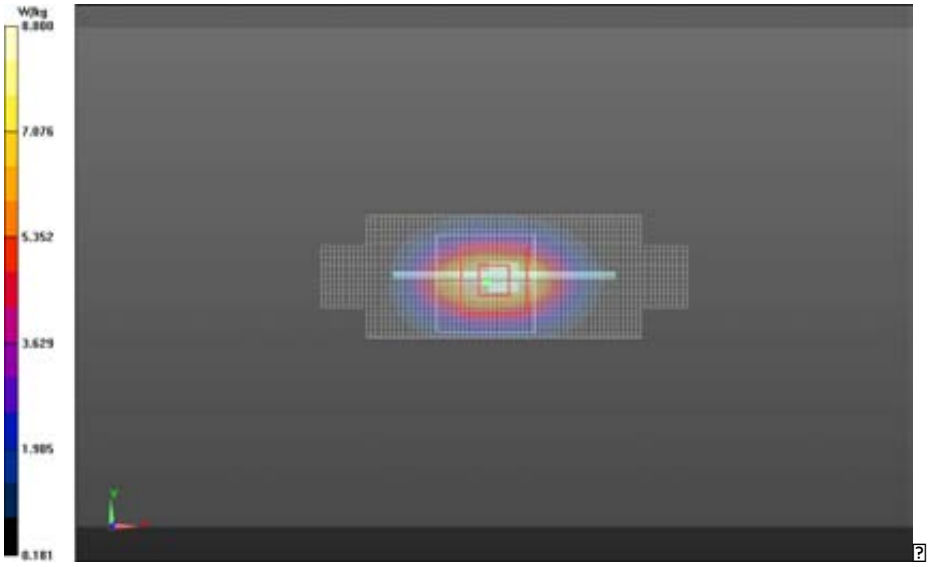
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 1800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=1800 MHz; σ = 1.439; ε_r = 49.33 mho/m; ρ = 1000 kg/m^3

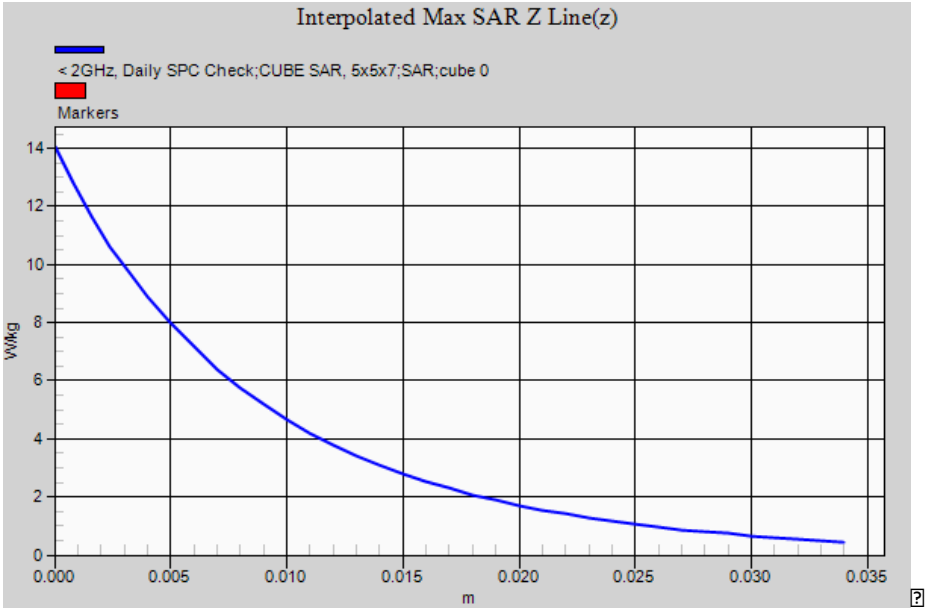
< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 8.21 W/kg; SAR(10g) = 4.33 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 = 80.072 V/m, Power Drift = 0.00218 dB
Averaged SAR: SAR(1g) = 8.04 W/kg; SAR(10g) = 4.26 W/kg





< 2GHz, Daily SPC Check

Date/Time: 4/25/2013 4:55:38 PM

DUT Serial: D1800V2 - SN:2d191

DASY Configuration:

- Probe: ES3DV3 - SN3037; ConvF(4.83,4.83,4.83); 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)

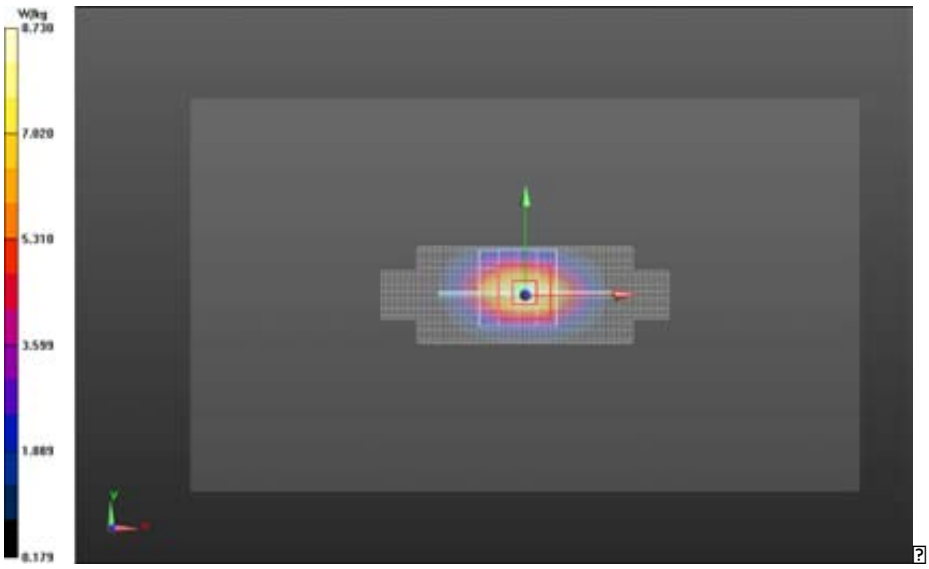
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 1800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=1800 MHz; σ = 1.458; ε_r = 48.67 mho/m; ρ = 1000 kg/m^3

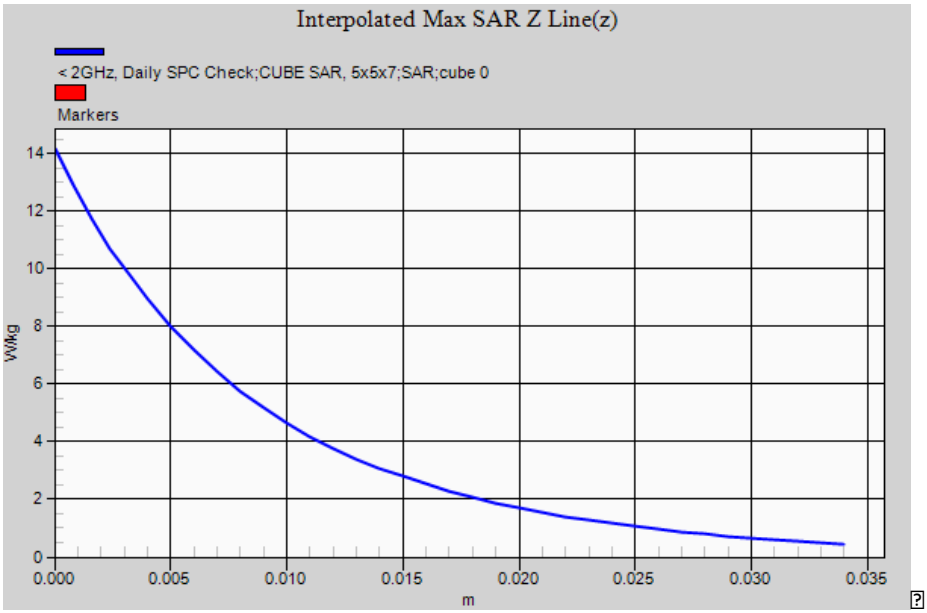
< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 8.07 W/kg; SAR(10g) = 4.32 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 = 79.581 V/m, Power Drift = -0.013 dB
Averaged SAR: SAR(1g) = 7.97 W/kg; SAR(10g) = 4.24 W/kg





< 2GHz, Daily SPC Check

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

DUT Serial: D2450V2 - SN:740

DASY Configuration:

- Probe: EX3DV4 - SN3730; ConvF(6.86,6.86,6.86); 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)

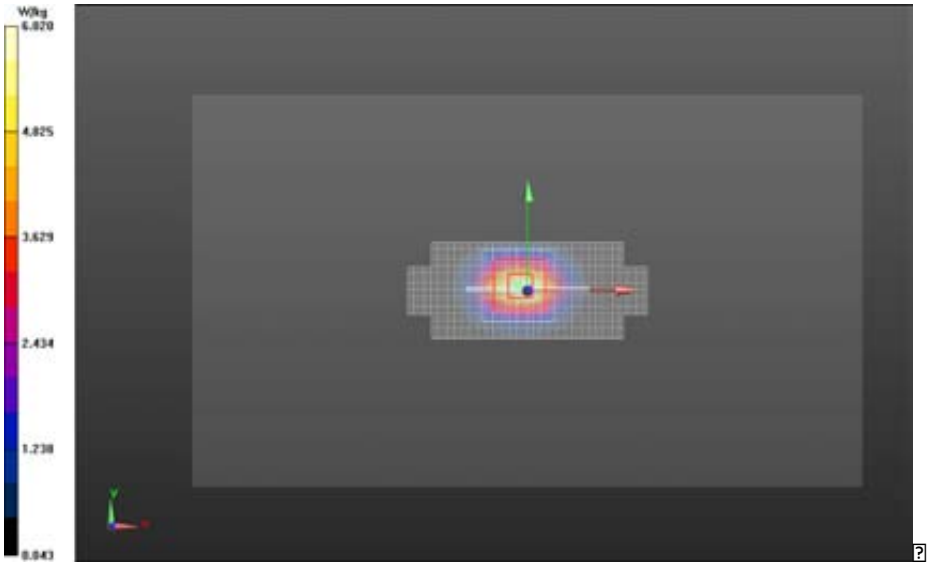
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 2450 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=2450 MHz; σ = 1.990; ε_r = 50.29 mho/m; ρ = 1000 kg/m^3

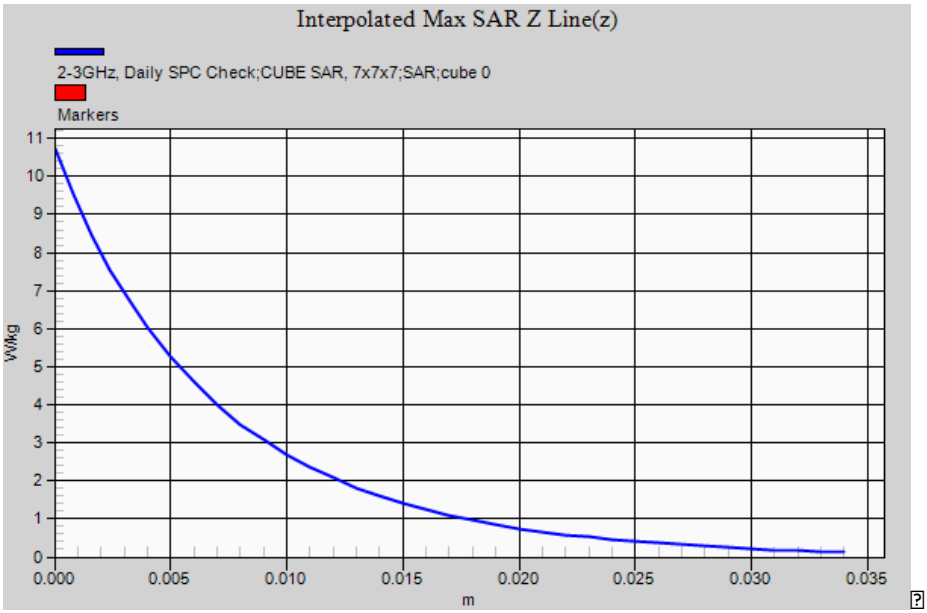
2-3GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x221x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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: 4/21/2013 8:44:47 AM

DUT Serial: D2450V2 - SN:740

DASY Configuration:

- Probe: EX3DV4 - SN3730; ConvF(6.86,6.86,6.86); 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)

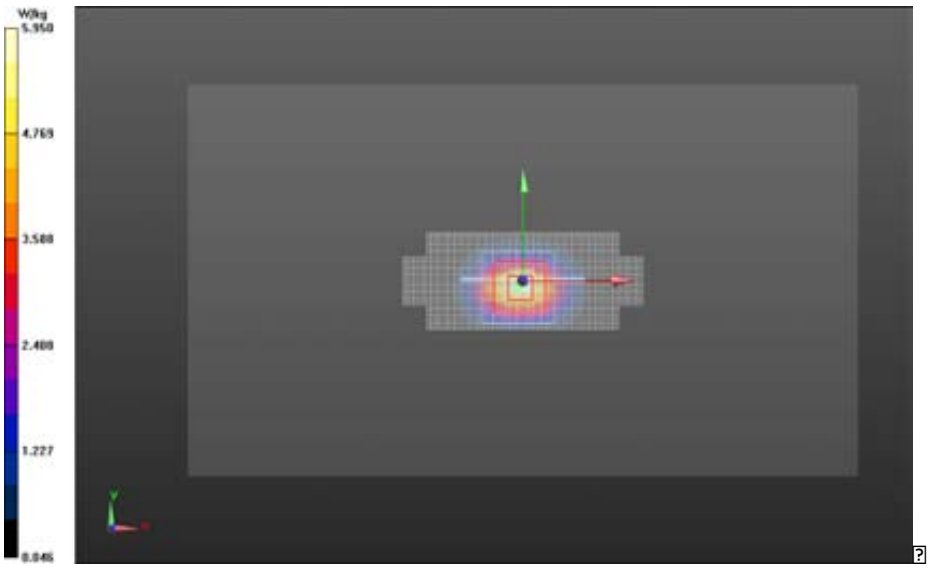
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 2450 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=2450 MHz; σ = 1.987; ε_r = 49.41 mho/m; ρ = 1000 kg/m^3

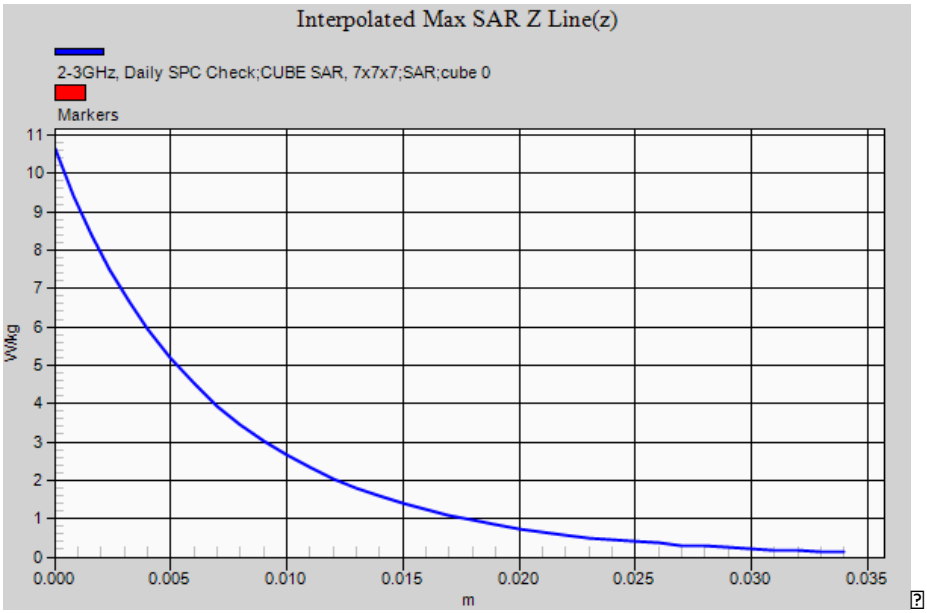
2-3GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x221x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Fast SAR: SAR(1g) = 5.10 W/kg; SAR(10g) = 2.38 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 = 51.624 V/m, Power Drift = -0.075 dB
Averaged SAR: SAR(1g) = 5.07 W/kg; SAR(10g) = 2.37 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(4.13,4.13,4.13); 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)

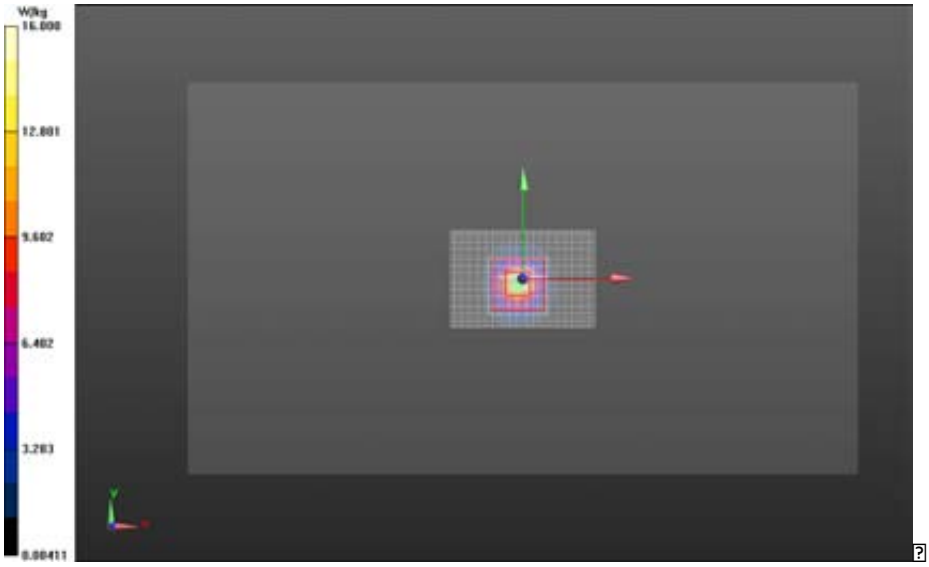
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 5200 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=5200 MHz; σ = 5.285; ε_r = 46.78 mho/m; ρ = 1000 kg/m^3

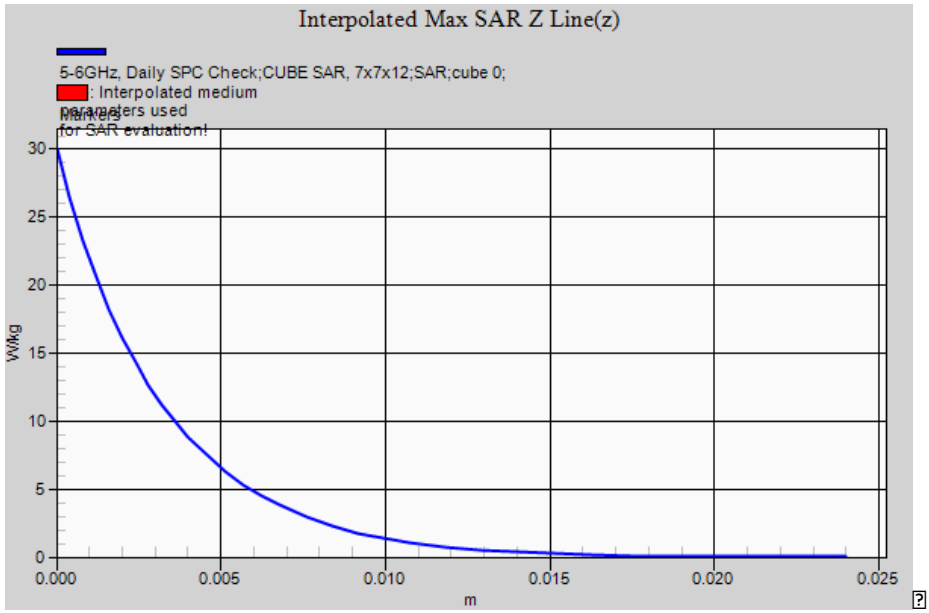
5-6GHz, Daily SPC Check/fastSAR, Dipole Area Scan (221x41x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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(3.81,3.81,3.81); 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)

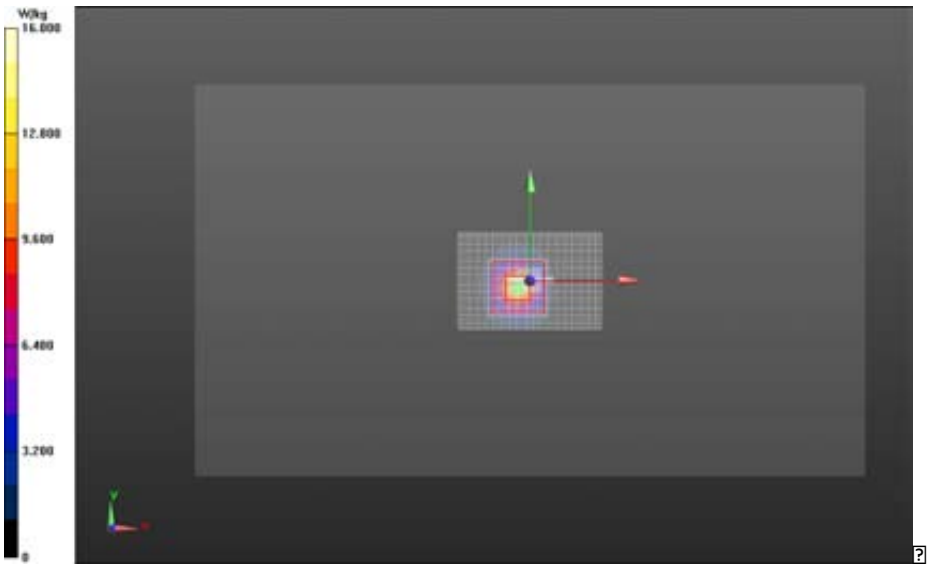
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 5800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=5800 MHz; σ = 6.183; ε_r = 45.32 mho/m; ρ = 1000 kg/m^3

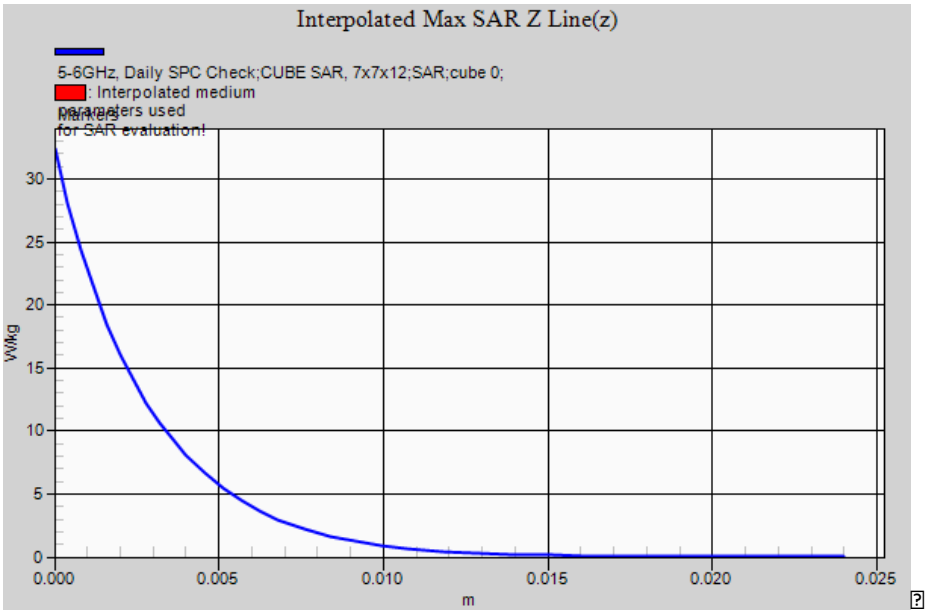
5-6GHz, Daily SPC Check/fastSAR, Dipole Area Scan (221x41x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Date/Time: 4/9/2013 6:49:39 PM

DUT Serial: D5GHzV2 - SN:1088

DASY Configuration:

- Probe: EX3DV4 - SN3730; ConvF(3.81,3.81,3.81); 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)

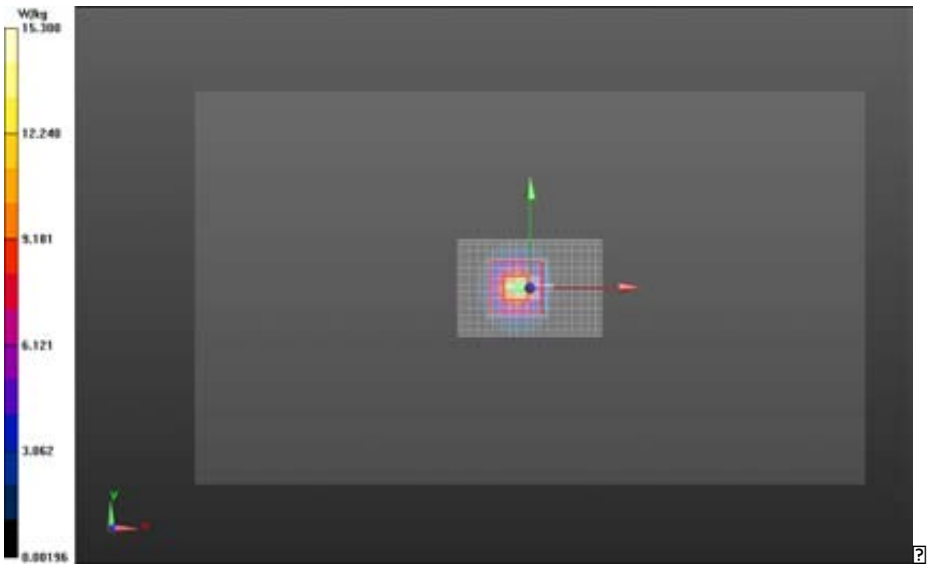
Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 5800 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=5800 MHz; σ = 5.987; ε_r = 44.11 mho/m; ρ = 1000 kg/m^3

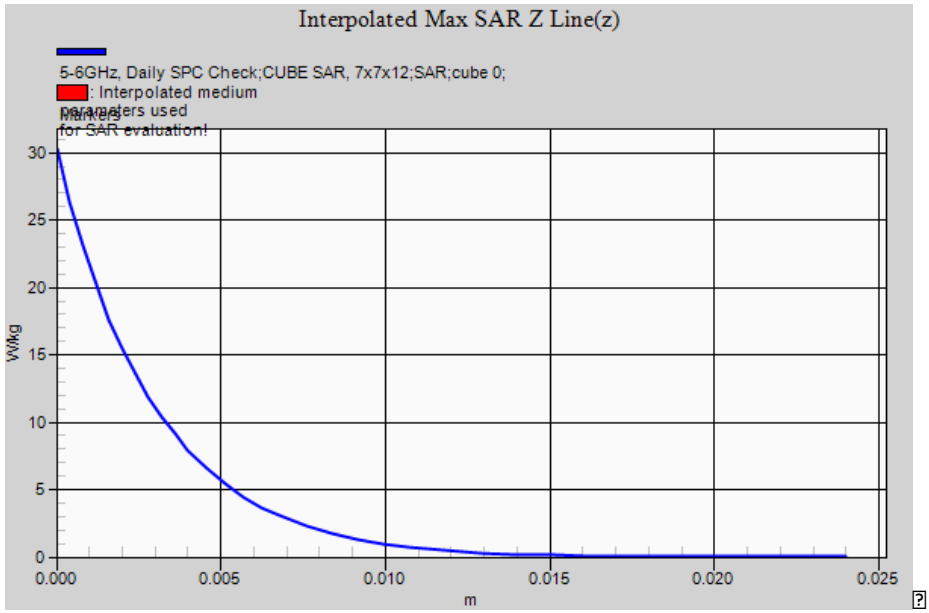
5-6GHz, Daily SPC Check/fastSAR, Dipole Area Scan (221x41x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Fast SAR: SAR(1g) = 5.96 W/kg; SAR(10g) = 1.78 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 = 46.905 V/m, Power Drift = -0.139 dB
Averaged SAR: SAR(1g) = 7.02 W/kg; SAR(10g) = 1.97 W/kg





5-6GHz, Daily SPC Check

Appendix 2

SAR Distribution Plots for Head-Adjacent Test Results

Date/Time: 4/23/2013 11:39:14 AM

DUT Serial: LXSZ1V0022

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)

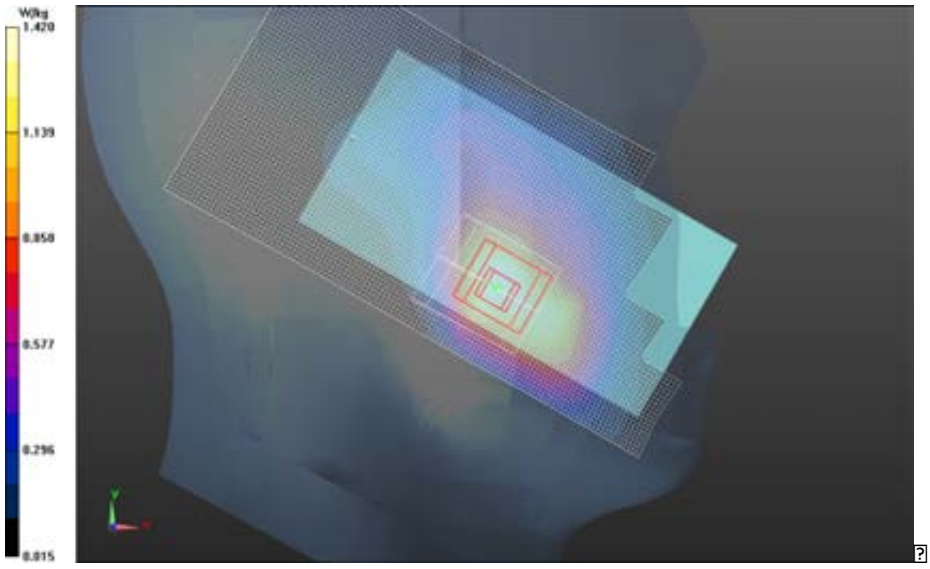
Communication System: _LTE Band 25; Communication System Band: Band 25: 20 MHz BW; Frequency: 1905 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=1905 MHz; σ = 1.480; ε_r = 37.65 mho/m; ρ = 1000 kg/m^3

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

Fast SAR: SAR(1g) = 1.30 W/kg; SAR(10g) = 0.780 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 = 27.363 V/m, Power Drift = -0.100 dB
Averaged SAR: SAR(1g) = 1.32 W/kg; SAR(10g) = 0.822 W/kg



Date/Time: 3/31/2013 7:04:12 AM

DUT Serial: LXSZ1V0005

DASY Configuration:

- Probe: ES3DV3 - SN3124; ConvF(6.01,6.01,6.01); Calibrated: 8/20/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/3/2012
- Phantom: R#2 Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1235
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

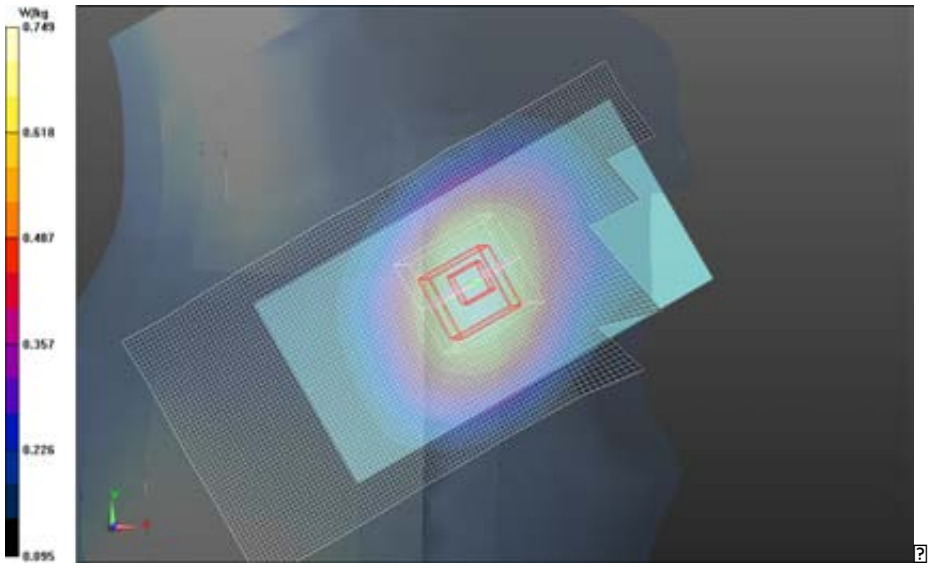
Communication System: _CDMA; Communication System Band: CDMA 800; Frequency: 836.5 MHz,
Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=836.52 MHz; σ = 0.9160; ε_r = 41.06 mho/m; ρ = 1000 kg/m^3

Right Head Template/15mm, Area Scan - Not for 2450 FCC TA... (61x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.711 W/kg; SAR(10g) = 0.486 W/kg

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 28.187 V/m, Power Drift = 0.00641 dB
Averaged SAR: SAR(1g) = 0.712 W/kg; SAR(10g) = 0.536 W/kg



Right Head Template

Date/Time: 3/31/2013 6:44:32 AM

DUT Serial: LXSZ1V0005

DASY Configuration:

- Probe: ES3DV3 - SN3124; ConvF(6.01,6.01,6.01); Calibrated: 8/20/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/3/2012
- Phantom: R#2 Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1235
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

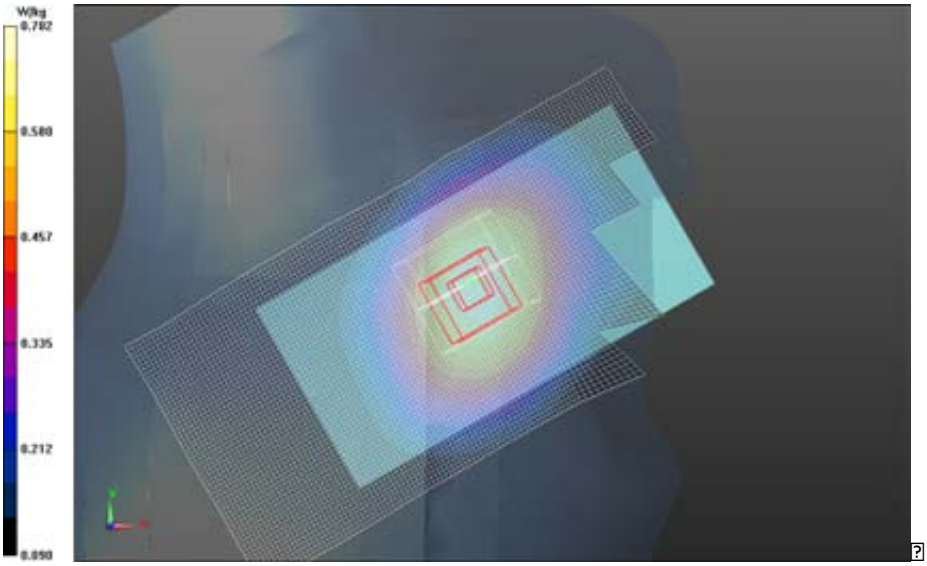
Communication System: _CDMA; Communication System Band: CDMA 820 (Band Class 10); Frequency: 820.1 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=820.1 MHz; σ = 0.9001; ε_r = 41.24 mho/m; ρ = 1000 kg/m^3

Right Head Template/15mm, Area Scan - Not for 2450 FCC TA... (61x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.662 W/kg; SAR(10g) = 0.455 W/kg

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 27.506 V/m, Power Drift = -0.015 dB
Averaged SAR: SAR(1g) = 0.667 W/kg; SAR(10g) = 0.506 W/kg



Date/Time: 4/1/2013 12:29:33 PM

DUT Serial: LXSZ1V0005

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)

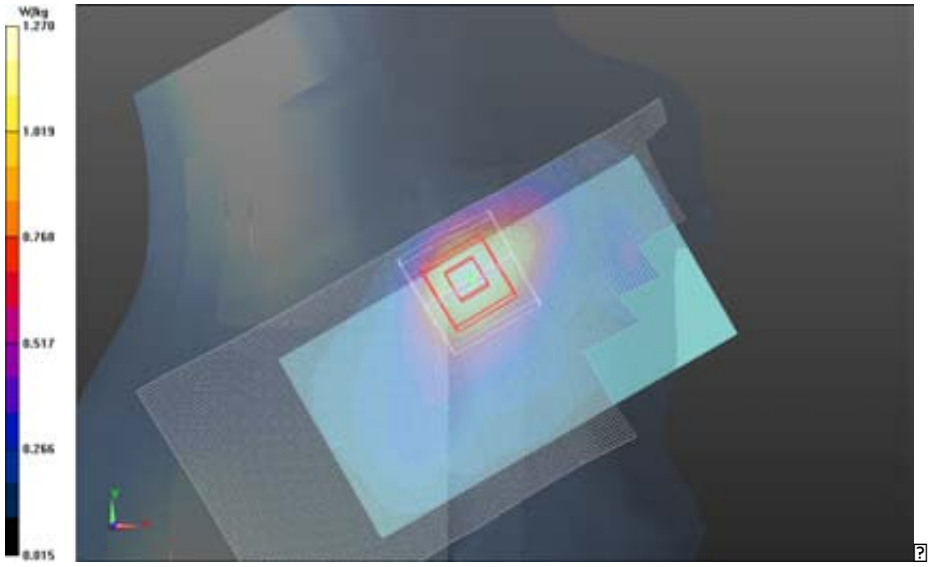
Communication System: _CDMA; Communication System Band: CDMA 1900; Frequency: 1880 MHz,
Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=1880 MHz; σ = 1.433; ε_r = 37.07 mho/m; ρ = 1000 kg/m^3

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

Fast SAR: SAR(1g) = 1.15 W/kg; SAR(10g) = 0.663 W/kg

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 21.982 V/m, Power Drift = 0.047 dB
Averaged SAR: SAR(1g) = 1.16 W/kg; SAR(10g) = 0.703 W/kg



Right Head Template

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

DUT Serial: LXVE110019

DASY Configuration:

- Probe: EX3DV4 - SN3730; ConvF(6.90,6.90,6.90); 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)

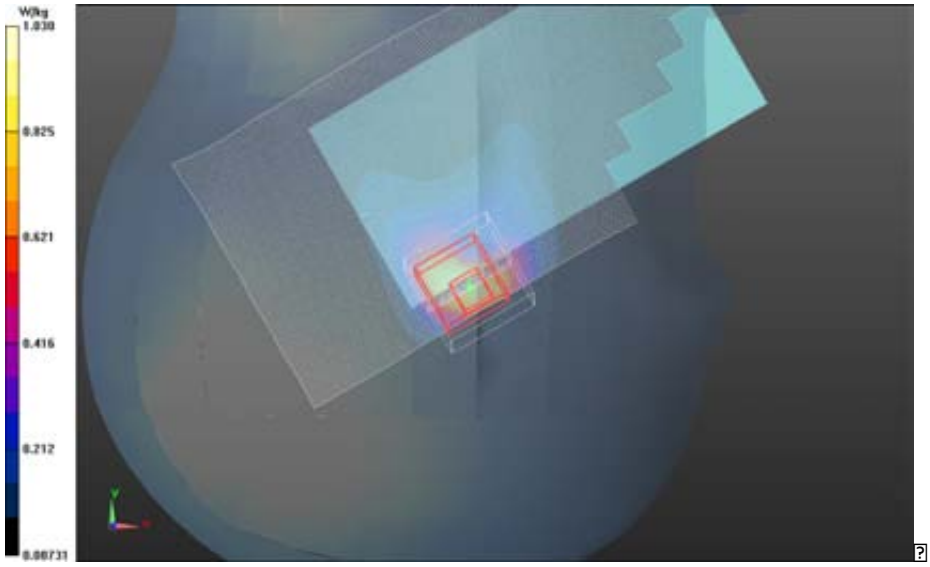
Communication System: _Wi-Fi 2450MHz; Communication System Band: 2450MHz WIFI; Frequency: 2462 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=2462 MHz; σ = 1.800; ε_r = 37.66 mho/m; ρ = 1000 kg/m^3

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



2-3GHz Right Head Template

Date/Time: 4/5/2013 11:01:41 PM

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

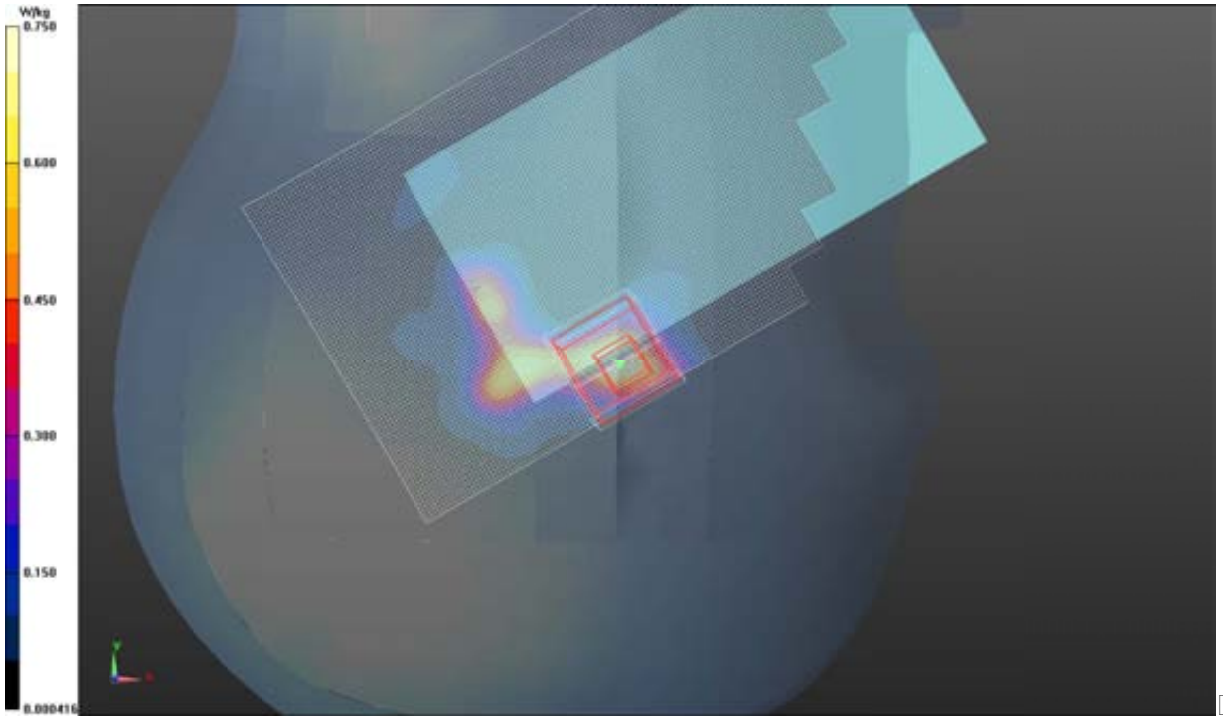
DASY Configuration:
- Probe: EX3DV4 - SN3730; ConvF(4.90,4.90,4.90); Calibrated: 8/24/2012;
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn784; Calibrated: 3/6/2013
- Phantom: R#3, 5GHz SAM, REV.2 (13nov12); Type: SAM; Serial: TP-1106
- DASY52 52.8.5(1059); SEMCAD X Version 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; $\sigma = 4.614$; $\varepsilon_r = 35.56$ mho/m; $\rho = 1000$ kg/m^3

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;

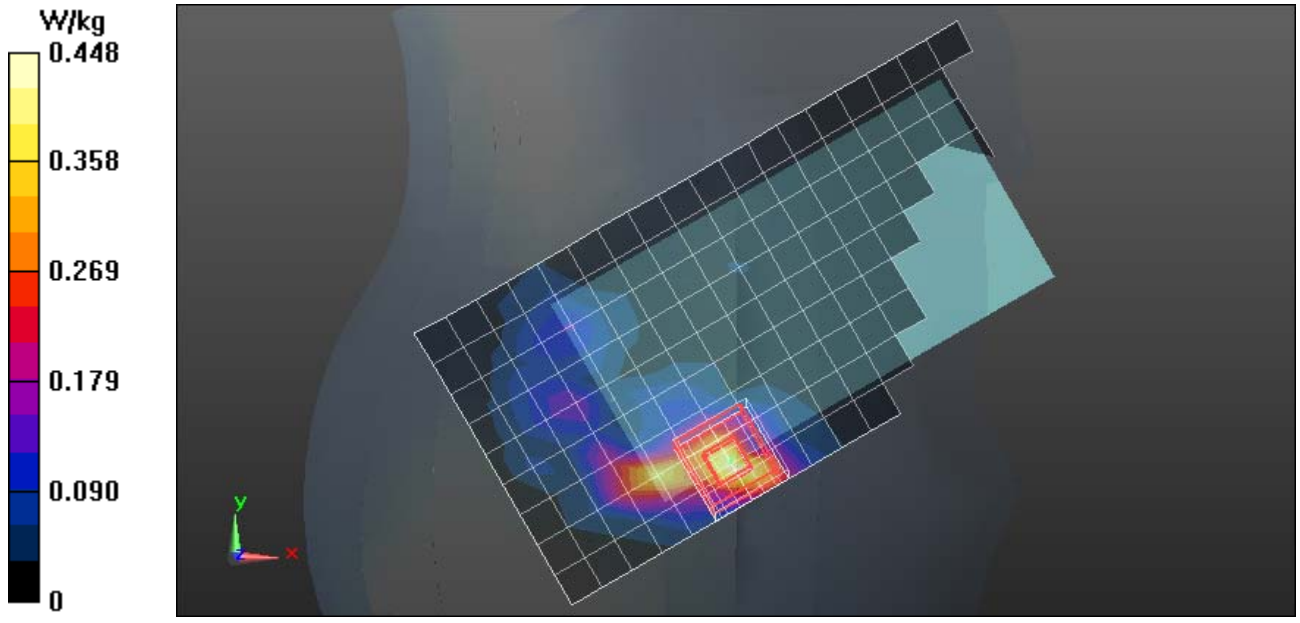
Communication System: _WIFI 5-6GHz; Frequency: 5785 MHz; Communication System Channel Number: 157; Duty Cycle: 1:1
Medium: HEAD tissue; Medium parameters used (interpolated): f = 5785 MHz; σ = 5.307 S/m; ε_r = 34.186; ρ = 1000 kg/m^3

DASY 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;
- DASY52 52.8.5(1059); 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: 4/23/2013 12:05:09 PM

DUT Serial: LXSZ1V0022

DASY Configuration:

- Probe: ES3DV3 - SN3037; ConvF(4.83,4.83,4.83); 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)

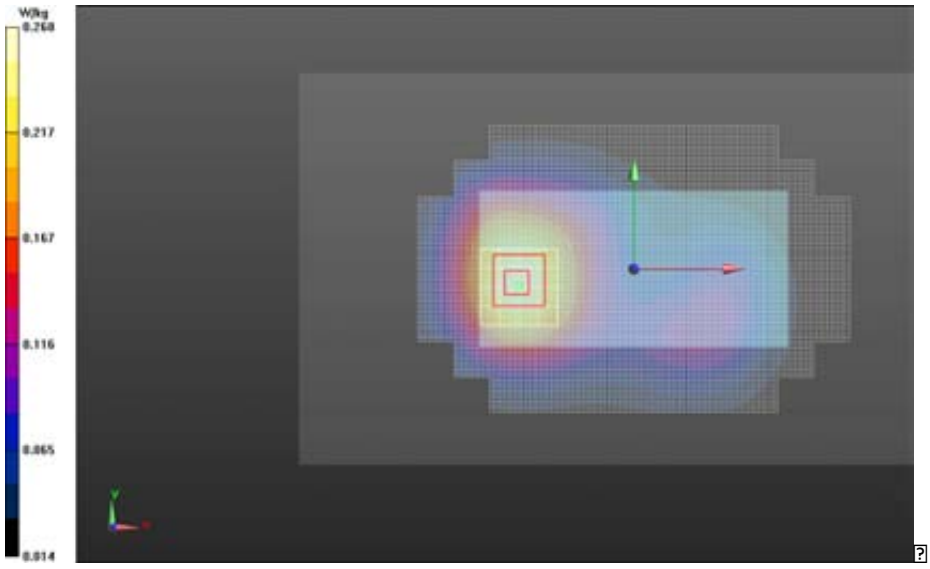
Communication System: _LTE Band 25; Communication System Band: Band 25: 20 MHz BW; Frequency: 1860 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=1860 MHz; σ = 1.512; ε_r = 49.05 mho/m; ρ = 1000 kg/m^3

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) = 0.251 W/kg; SAR(10g) = 0.157 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 = 13.312 V/m, Power Drift = 0.056 dB
Averaged SAR: SAR(1g) = 0.251 W/kg; SAR(10g) = 0.165 W/kg



0.6-2GHz Triple Flat Phone Template

Date/Time: 3/31/2013 9:59:54 AM

DUT Serial: LXSZ1V0005

DASY Configuration:

- Probe: ES3DV3 - SN3124; ConvF(6.02,6.02,6.02); 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)

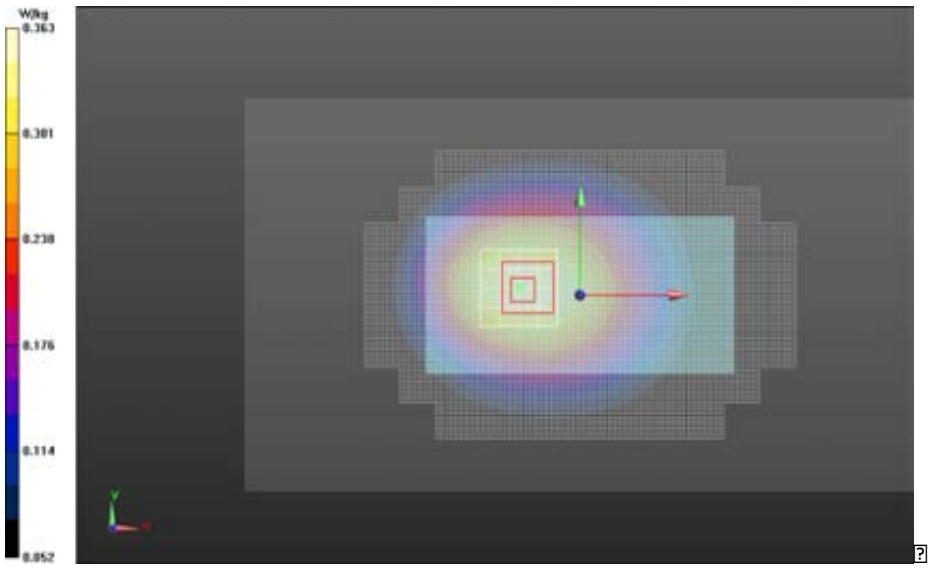
Communication System: _CDMA; Communication System Band: CDMA 800; Frequency: 836.5 MHz,
Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=836.52 MHz; σ = 1.000; ε_r = 54.29 mho/m; ρ = 1000 kg/m^3

Triple Flat Phone Template/Area Scan (15mm), not for EDGES, not for FCC 2450 TA... (181x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.346 W/kg; SAR(10g) = 0.241 W/kg

Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 19.085 V/m, Power Drift = 0.034 dB
Averaged SAR: SAR(1g) = 0.344 W/kg; SAR(10g) = 0.258 W/kg



Triple Flat Phone Template

Date/Time: 3/31/2013 10:18:39 AM

DUT Serial: LXSZ1V0005

DASY Configuration:

- Probe: ES3DV3 - SN3124; ConvF(6.02,6.02,6.02); 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)

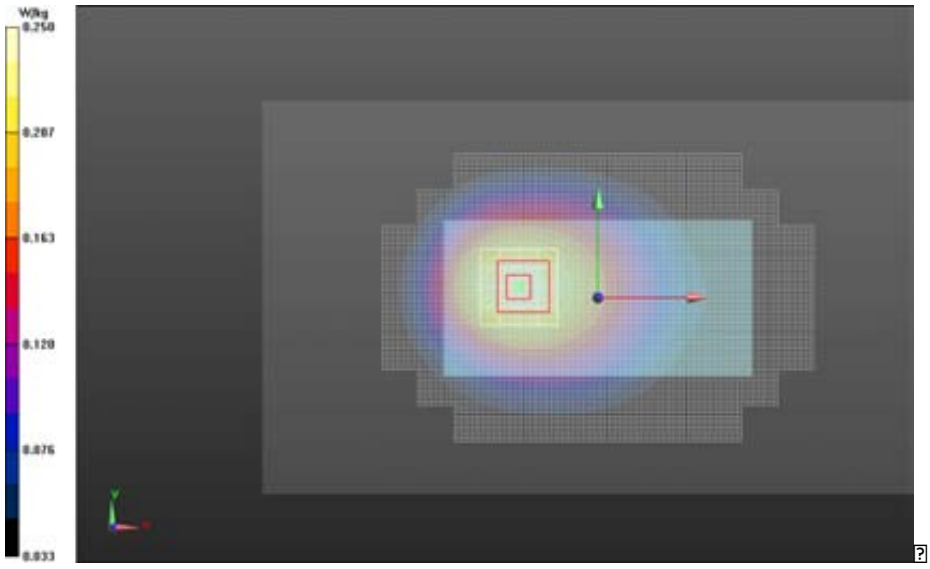
Communication System: _CDMA; Communication System Band: CDMA 820 (Band Class 10); Frequency: 820.1 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=820.1 MHz; σ = 0.9834; ε_r = 54.42 mho/m; ρ = 1000 kg/m^3

Triple Flat Phone Template/Area Scan (15mm), not for EDGES, not for FCC 2450 TA... (181x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.237 W/kg; SAR(10g) = 0.166 W/kg

Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 15.567 V/m, Power Drift = 0.066 dB
Averaged SAR: SAR(1g) = 0.238 W/kg; SAR(10g) = 0.175 W/kg



Triple Flat Phone Template

Date/Time: 4/1/2013 3:09:46 PM

DUT Serial: LXSZ1V0005

DASY Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.76,4.76,4.76); 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)

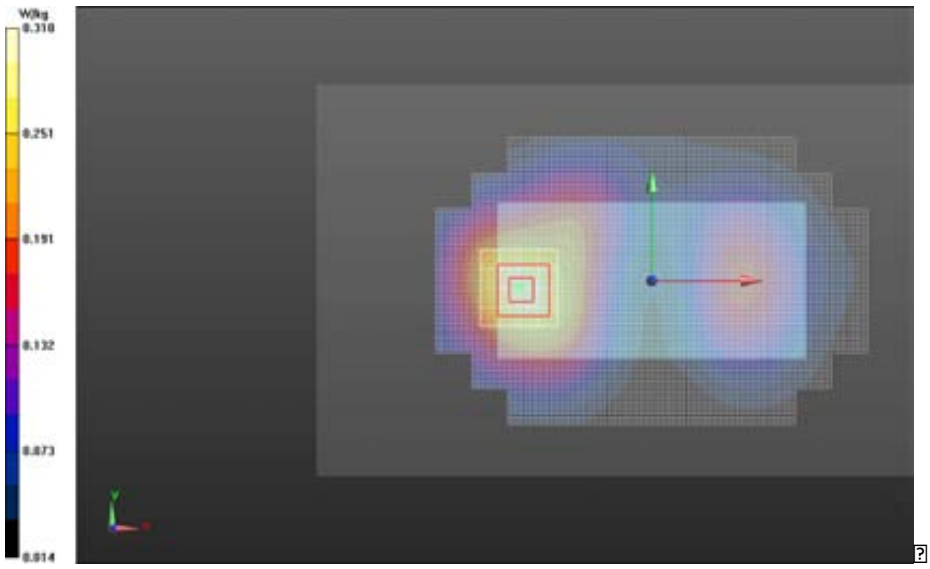
Communication System: _CDMA; Communication System Band: CDMA 1900; Frequency: 1880 MHz,
Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=1880 MHz; σ = 1.531; ε_r = 49.01 mho/m; ρ = 1000 kg/m^3

Triple Flat Phone Template/Area Scan (15mm), not for EDGES, not for FCC 2450 TA... (181x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.291 W/kg; SAR(10g) = 0.180 W/kg

Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 14.018 V/m, Power Drift = -0.029 dB
Averaged SAR: SAR(1g) = 0.289 W/kg; SAR(10g) = 0.185 W/kg



Triple Flat Phone Template

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

DUT Serial: LXVE110019

DASY Configuration:

- Probe: EX3DV4 - SN3730; ConvF(6.86,6.86,6.86); 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)

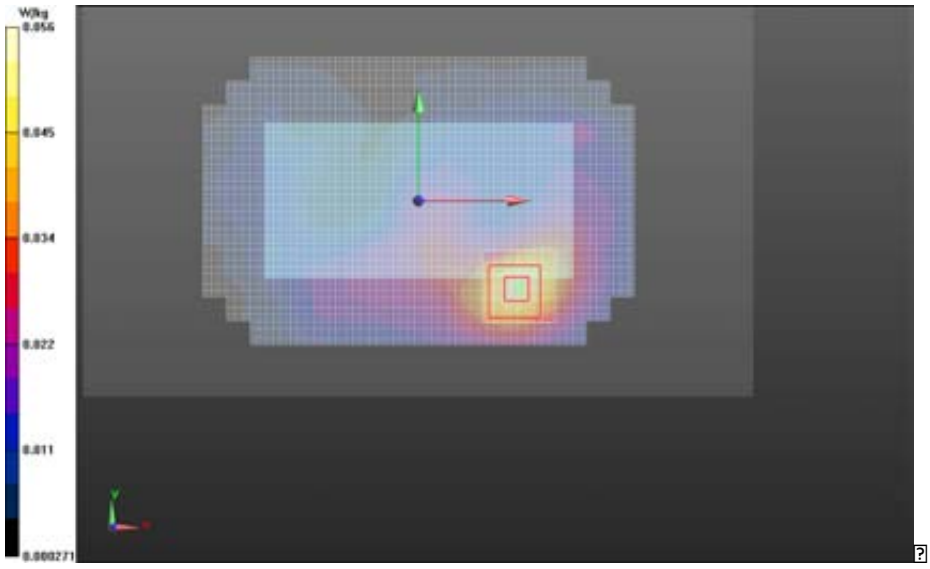
Communication System: _Wi-Fi 2450MHz; Communication System Band: 2450MHz WIFI; Frequency: 2437 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=2437 MHz; σ = 1.974; ε_r = 50.34 mho/m; ρ = 1000 kg/m^3

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

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: Back of Phone 25 mm from Phantom

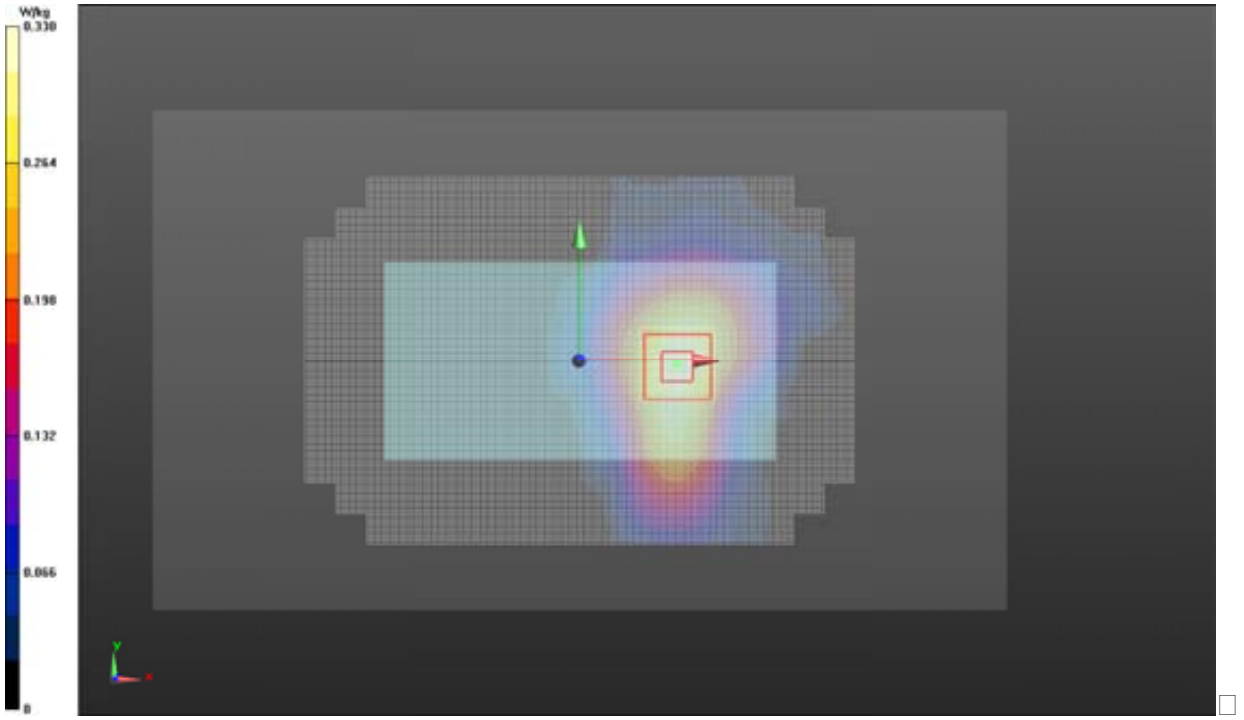
DASY Configuration:
- Probe: EX3DV4 - SN3730; ConvF(4.13,4.13,4.13); Calibrated: 8/24/2012;
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn784; Calibrated: 3/6/2013
- Phantom: R#-3, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: 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; $\sigma = 5.253$; $\varepsilon_r = 46.83$ mho/m; $\rho = 1000$ kg/m^3

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(3.81,3.81,3.81); 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)

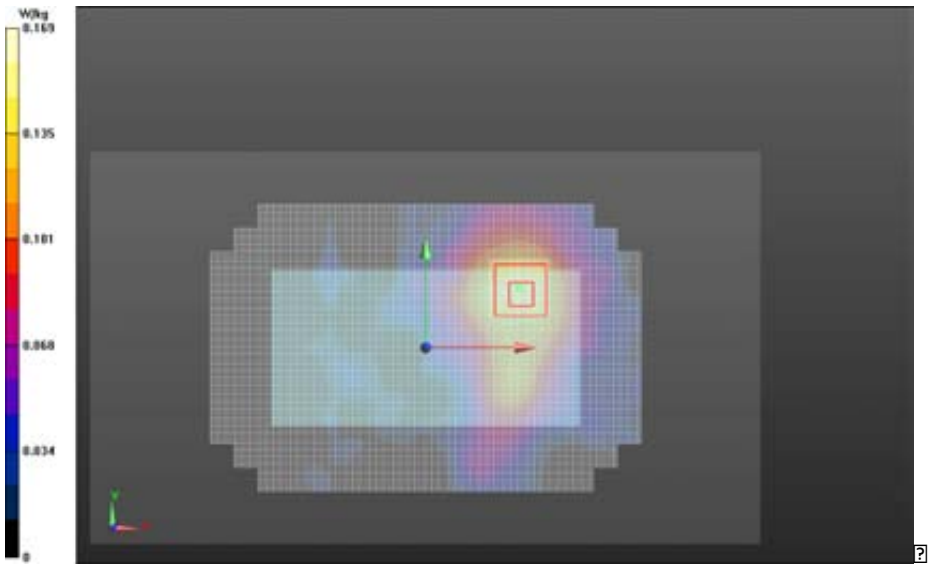
Communication System: _WIFI 5-6GHz; Communication System Band: 5785 MHz Sub-Band; Frequency: 5785 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=5785 MHz; σ = 6.209; ε_r = 44.80 mho/m; ρ = 1000 kg/m^3

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: 4/25/2013 10:36:43 PM

DUT Serial: LXSZ1V0022

DASY Configuration:

- Probe: ES3DV3 - SN3037; ConvF(4.83,4.83,4.83); 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)

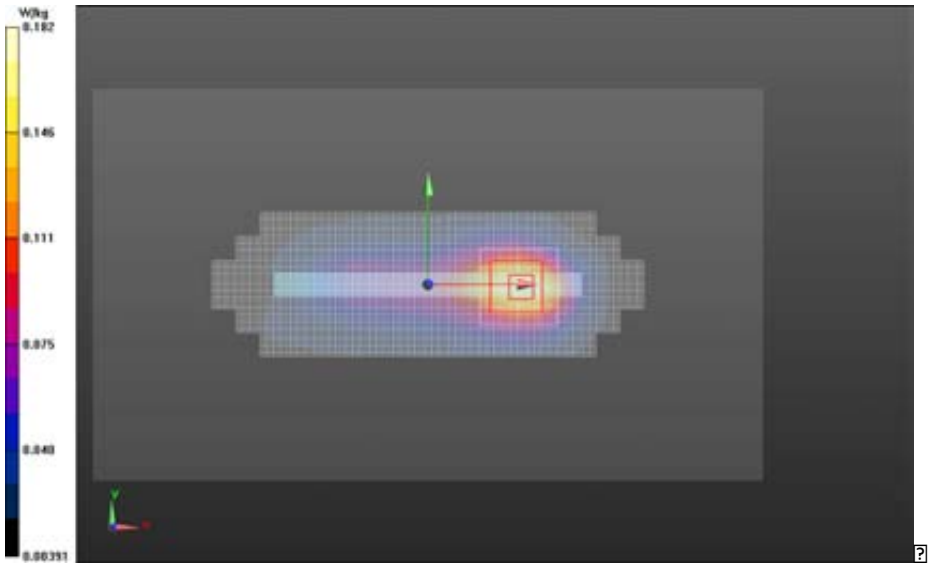
Communication System: _LTE Band 25; Communication System Band: Band 25: 20 MHz BW; Frequency: 1883 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=1882.5 MHz; σ = 1.556; ε_r = 48.34 mho/m; ρ = 1000 kg/m^3

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) = 0.169 W/kg; SAR(10g) = 0.0953 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 = 10.753 V/m, Power Drift = -0.195 dB
Averaged SAR: SAR(1g) = 0.165 W/kg; SAR(10g) = 0.0914 W/kg



0.6-2GHz Triple Flat Phone Template

Date/Time: 4/25/2013 7:27:31 PM

DUT Serial: LXSZ1V0005

DASY Configuration:

- Probe: ES3DV3 - SN3037; ConvF(6.16,6.16,6.16); 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)

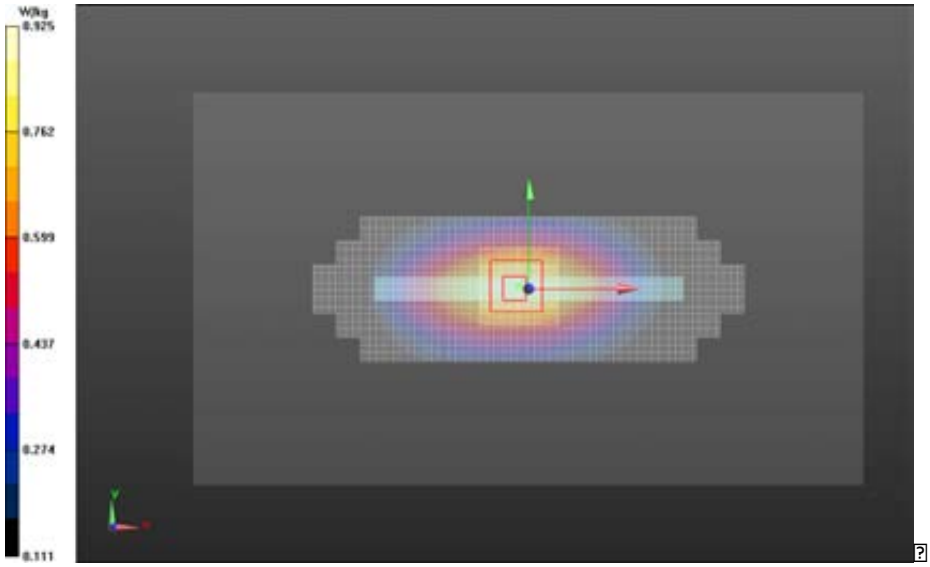
Communication System: _CDMA; Communication System Band: CDMA 800; Frequency: 836.5 MHz,
Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=836.52 MHz; σ = 1.018; ε_r = 54.45 mho/m; ρ = 1000 kg/m^3

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) = 0.871 W/kg; SAR(10g) = 0.589 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 = 30.251 V/m, Power Drift = 0.016 dB
Averaged SAR: SAR(1g) = 0.870 W/kg; SAR(10g) = 0.604 W/kg



Date/Time: 4/19/2013 7:56:03 PM

DUT Serial: LXSZ1V0005

DASY Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.05,6.05,6.05); 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)

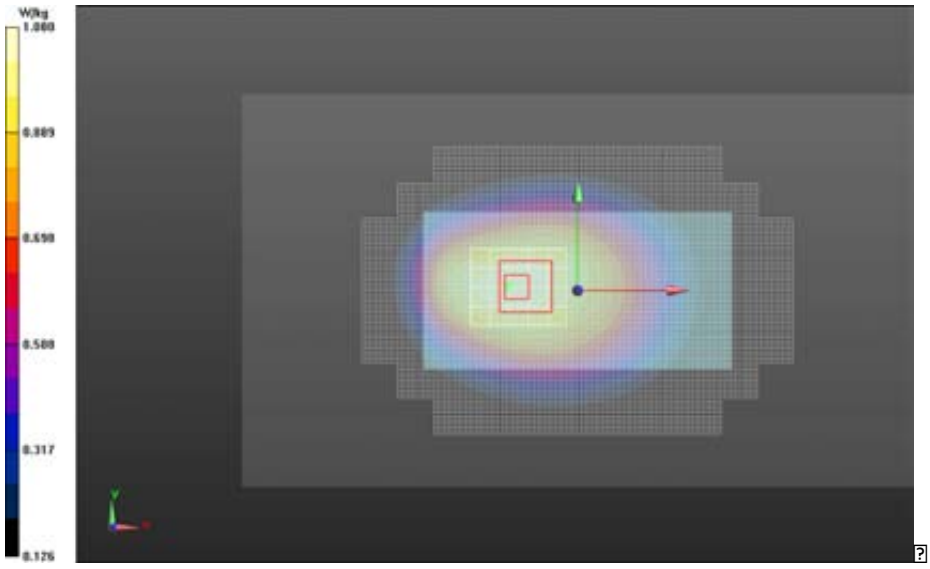
Communication System: _CDMA; Communication System Band: CDMA 820 (Band Class 10); Frequency: 820.1 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=820.1 MHz; σ = 0.9864; ε_r = 53.83 mho/m; ρ = 1000 kg/m^3

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) = 1.03 W/kg; SAR(10g) = 0.724 W/kg

0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (26x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 33.127 V/m, Power Drift = 0.025 dB
Averaged SAR: SAR(1g) = 1.03 W/kg; SAR(10g) = 0.780 W/kg



Date/Time: 4/16/2013 1:47:04 PM

DUT Serial: LXSZ1V0005

DASY Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.76,4.76,4.76); 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)

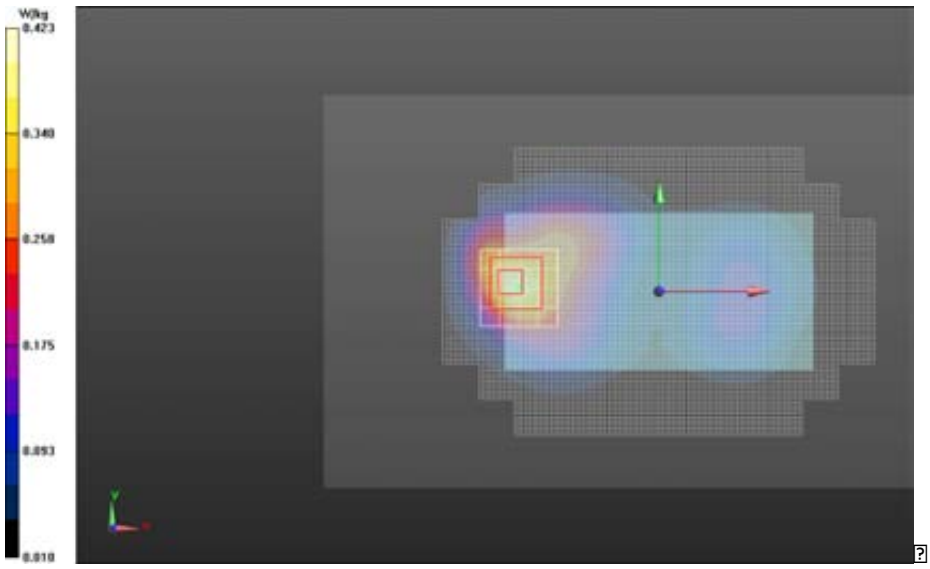
Communication System: _CDMA; Communication System Band: CDMA 1900; Frequency: 1880 MHz,
Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=1880 MHz; σ = 1.553; ε_r = 49.00 mho/m; ρ = 1000 kg/m^3

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) = 0.381 W/kg; SAR(10g) = 0.218 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 = 14.257 V/m, Power Drift = 0.023 dB
Averaged SAR: SAR(1g) = 0.394 W/kg; SAR(10g) = 0.221 W/kg



0.6-2GHz Triple Flat Phone Template

Date/Time: 4/21/2013 1:02:30 PM

DUT Serial: LXVE110019

DASY Configuration:

- Probe: EX3DV4 - SN3730; ConvF(6.86,6.86,6.86); 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)

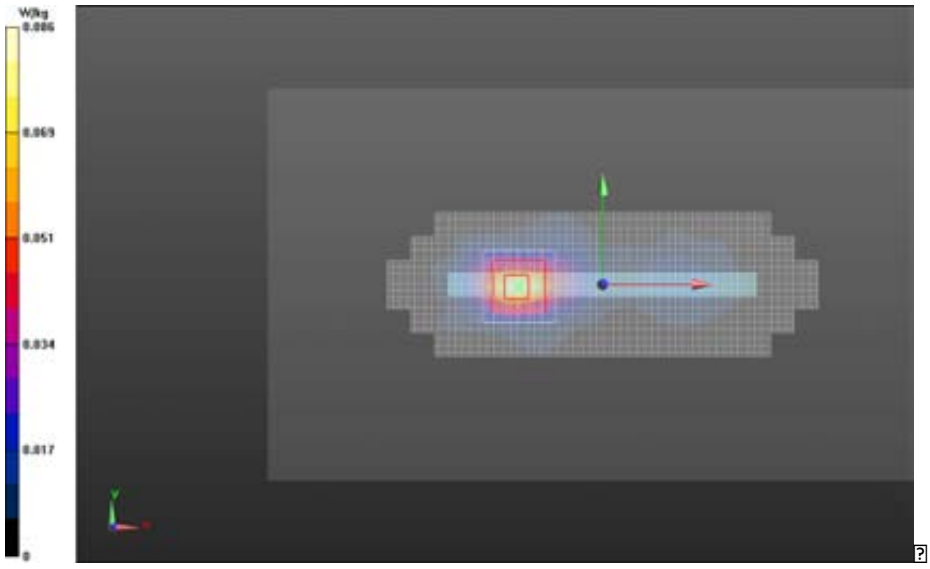
Communication System: _Wi-Fi 2450MHz; Communication System Band: 2450MHz WIFI; Frequency: 2437 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=2437 MHz; σ = 1.972; ε_r = 49.44 mho/m; ρ = 1000 kg/m^3

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

Fast SAR: SAR(1g) = 0.0710 W/kg; SAR(10g) = 0.0317 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 = 5.747 V/m, Power Drift = -0.00211 dB
Averaged SAR: SAR(1g) = 0.0731 W/kg; SAR(10g) = 0.0330 W/kg



2-3GHz Triple Flat Phone Template

DUT Serial: LXVE110019 Date/Time: 4/10/2013 1:56:52 PM

DASY Configuration:

- Probe: EX3DV4 - SN3730; ConvF(3.81,3.81,3.81); 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)

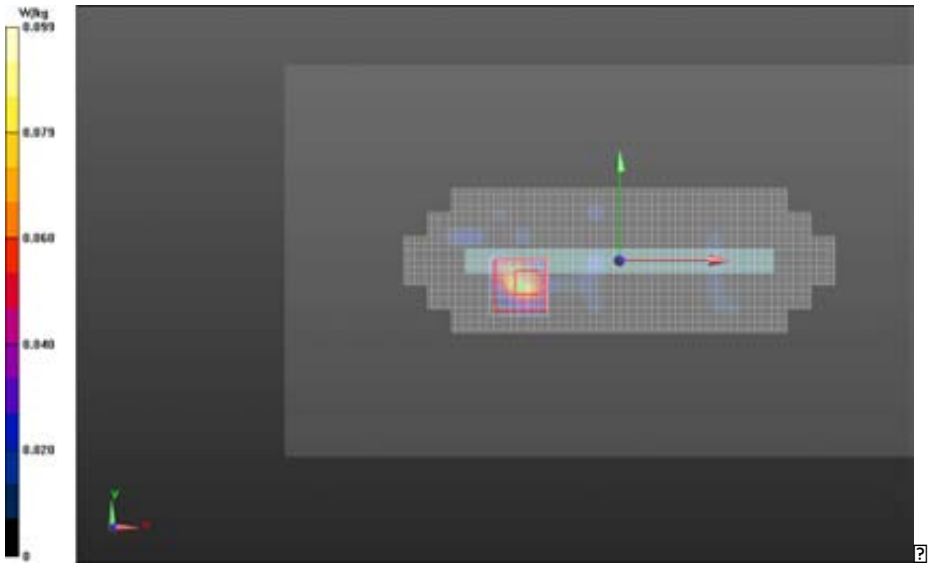
Communication System: _WIFI 5-6GHz; Communication System Band: 5785 MHz Sub-Band; Frequency: 5785 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: f=5785 MHz; σ = 5.970; ε_r = 44.14 mho/m; ρ = 1000 kg/m^3

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) = 0.0360 W/kg; SAR(10g) = 0.00744 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 = 3.270 V/m, Power Drift = -0.081 dB
Averaged SAR: SAR(1g) = 0.0452 W/kg; SAR(10g) = 0.00963 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

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	Description IEEE 1528(2003) / IEC 62209-1(2005)	**Tol. (± %)**	**Prob Dist**	**Div.**	**c_i (1 g)**	**c_i (10 g)**	**1 g u_i (±%)**	**10 g u_i (±%)**	**v_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

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	Description IEC 62209-2 (2010)	**Tol. (± %)**	**Prob Dist**	**Div.**	**c_i (1 g)**	**c_i (10 g)**	**1 g u_i (±%)**	**10 g u_i (±%)**	**v_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)			*k*=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: ES3-3180_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 ± 3)°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	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: March 5, 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
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

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,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., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) 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
b) 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:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,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*.
- *DCPx,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
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,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 ≤ 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 *NORMx,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 ($\mu V/(V/m)^2$)[A]	1.21	1.05	1.01	± 10.1 %
DCP (mV)[B]	103.4	103.9	101.9	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	110.8	±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.
[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: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

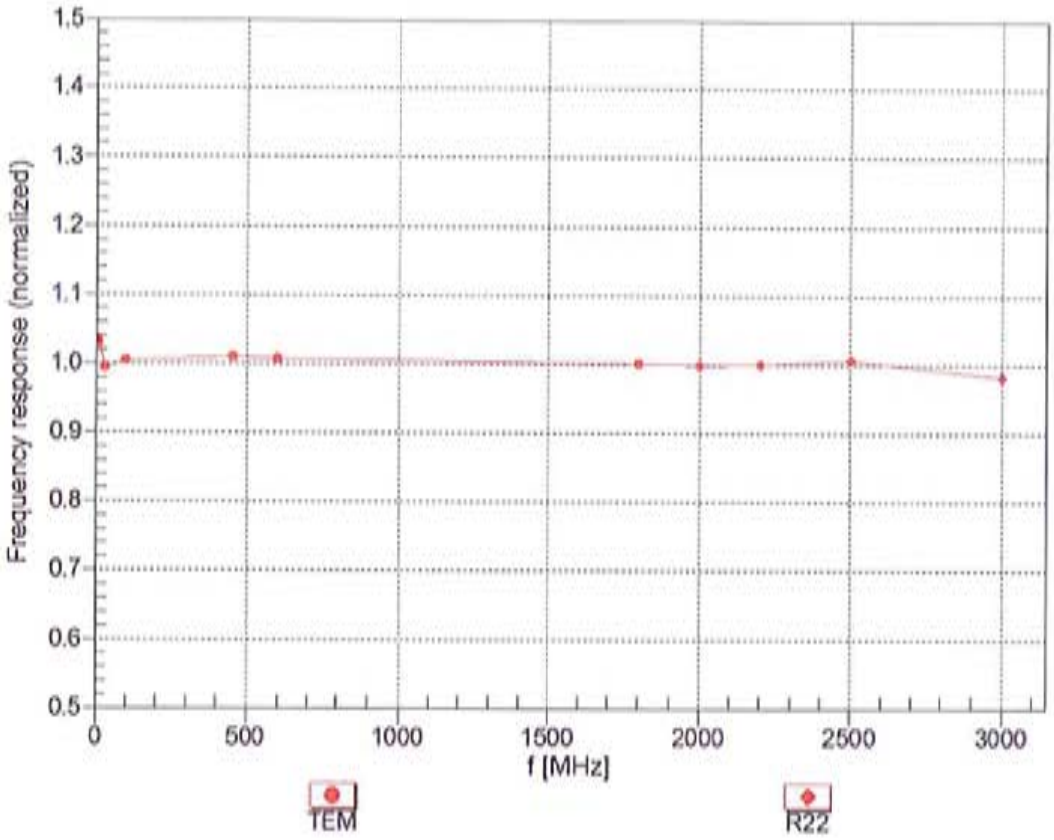
Calibration Parameter Determined in Body Tissue Simulating Media

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

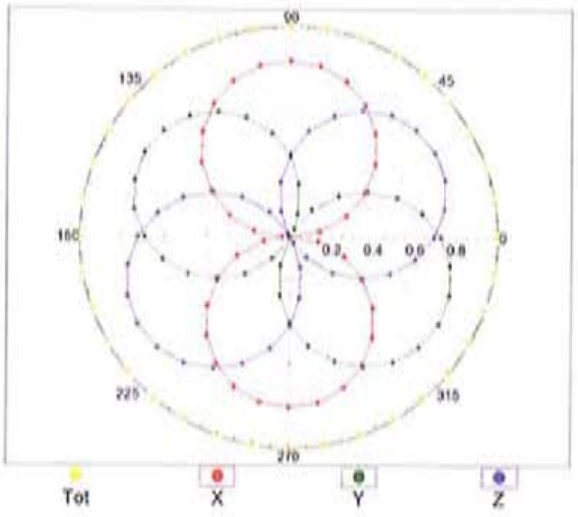
(TEM-Cell:ifi110 EXX, Waveguide: R22)



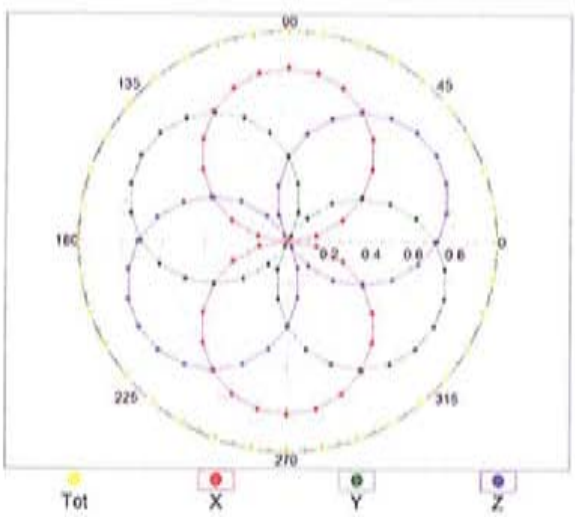
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

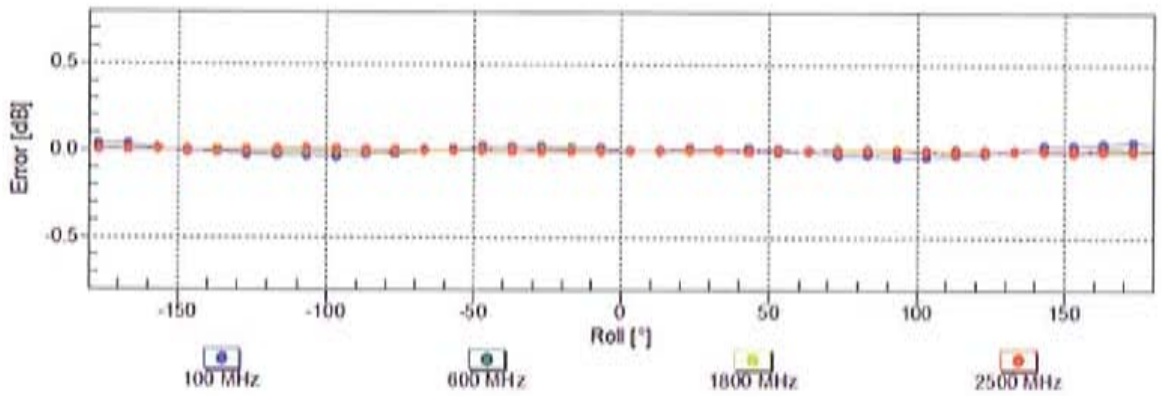
Receiving Pattern (ϕ), $\vartheta = 0°$

f=600 MHz,TEM



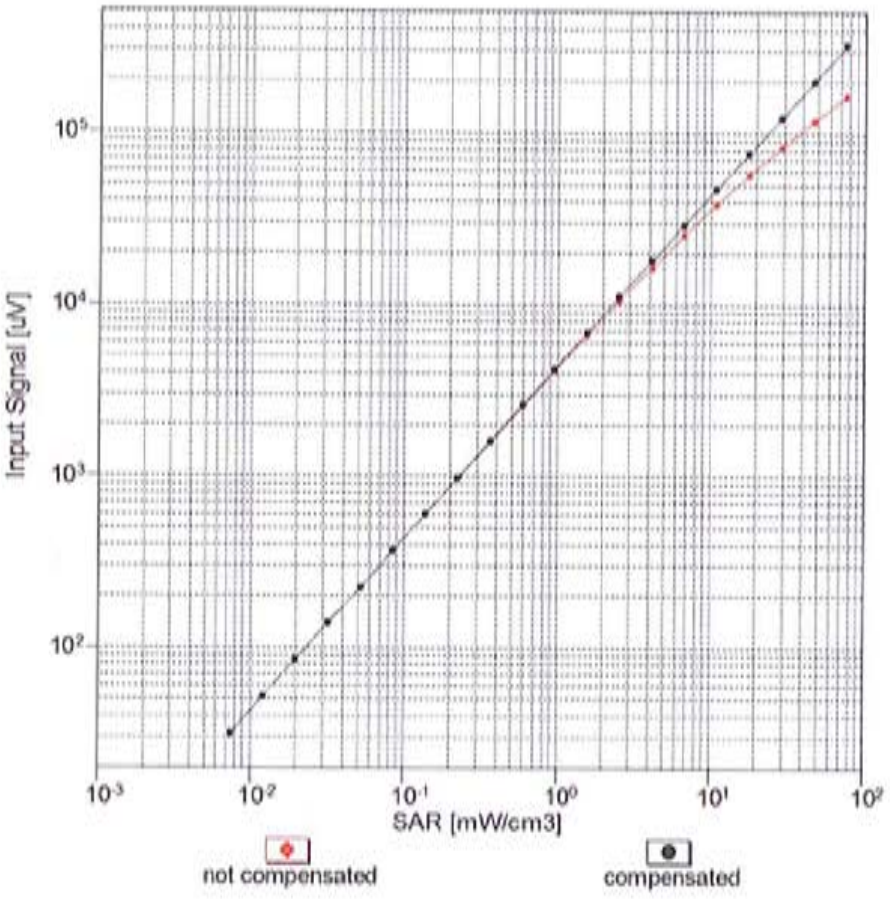
f=1800 MHz,R22

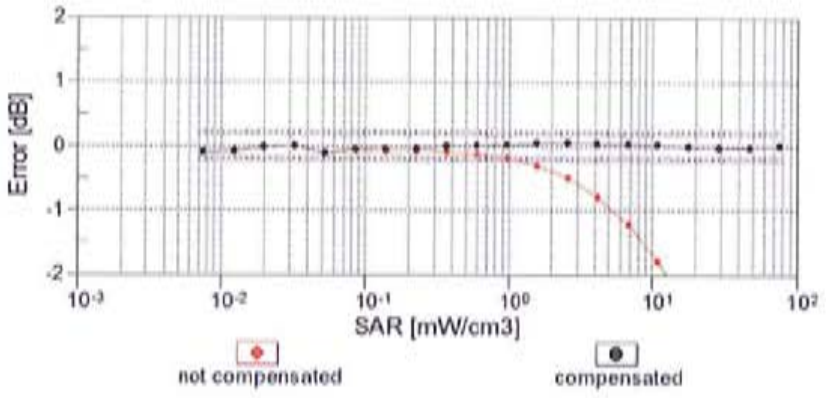




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

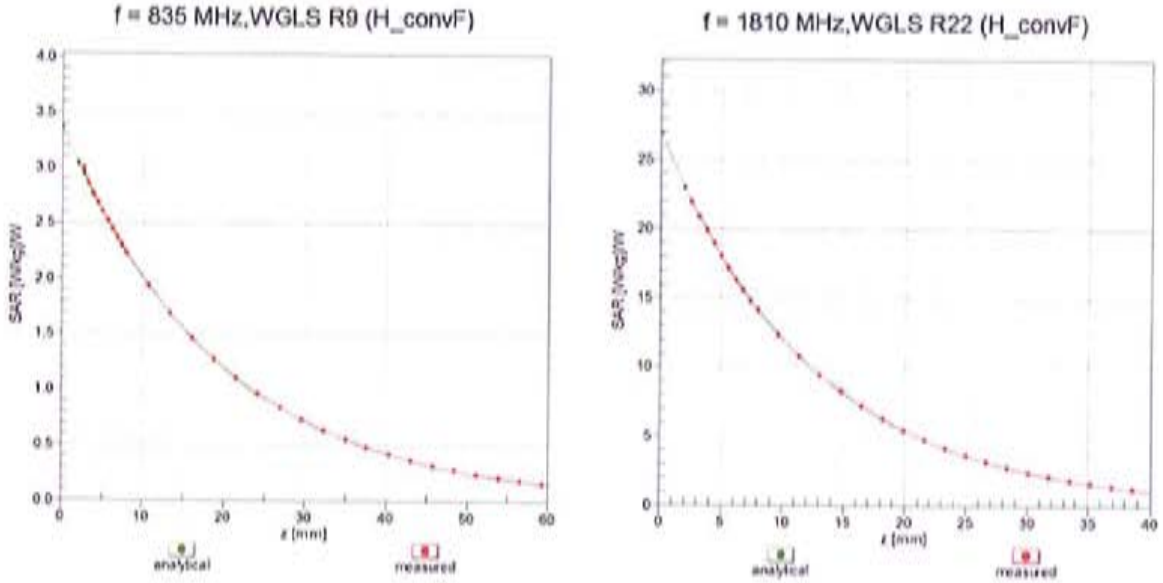
Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)





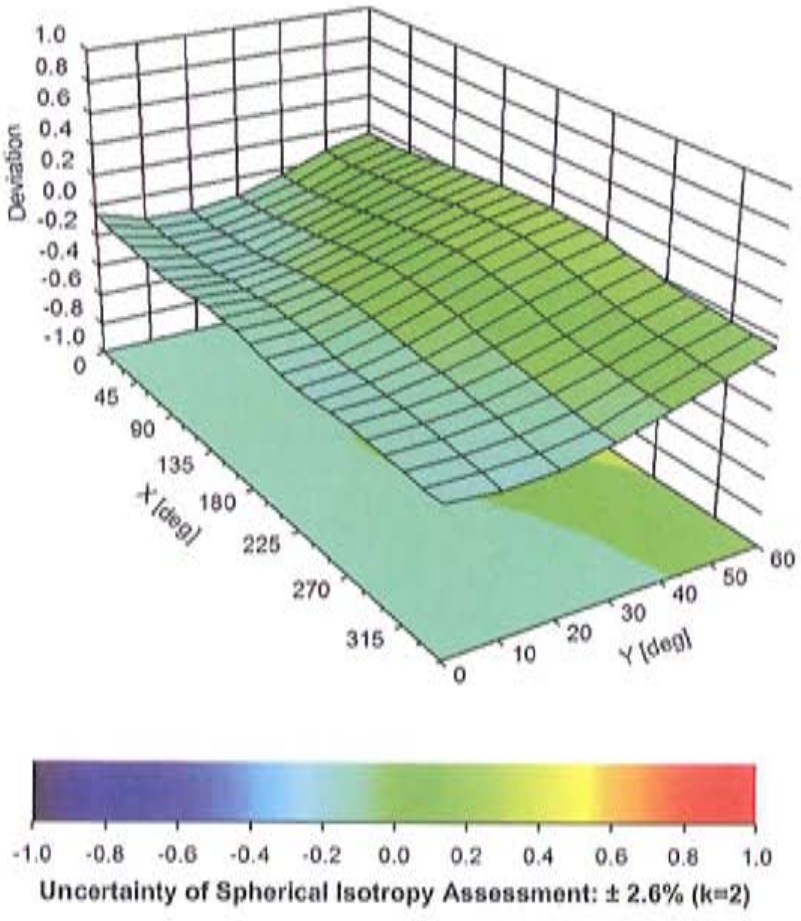
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

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: ES3-3124_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 ± 3)°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	

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
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,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., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) 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
b) 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:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,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*.
- *DCPx,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
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,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 ≤ 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 *NORMx,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 ($\mu V/(V/m)^2$)[A]	1.27	1.30	1.30	± 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	±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) [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	6.23	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 %

[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:3124

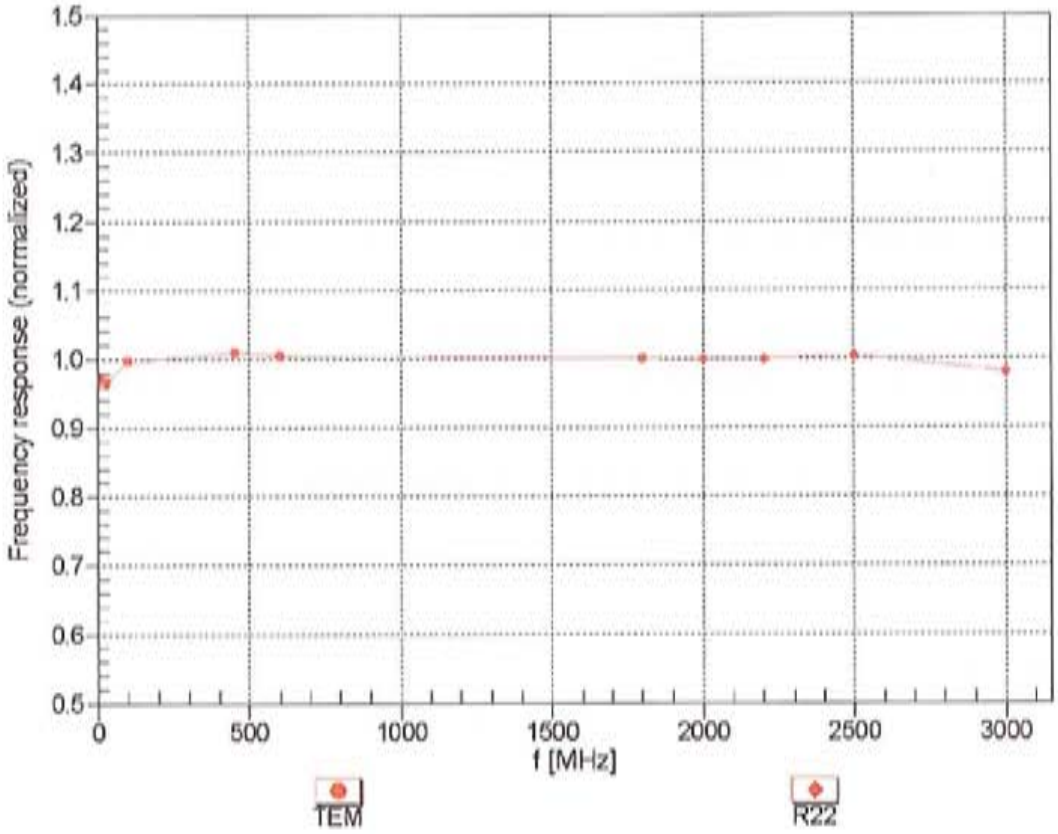
Calibration Parameter Determined in Body Tissue Simulating Media

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

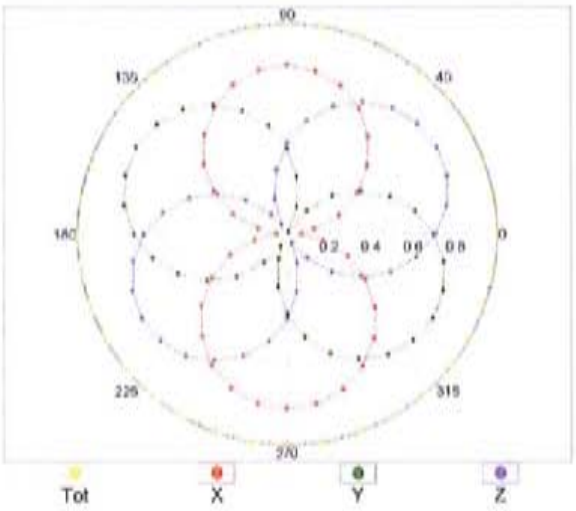
(TEM-Cell:ifi110 EXX, Waveguide: R22)



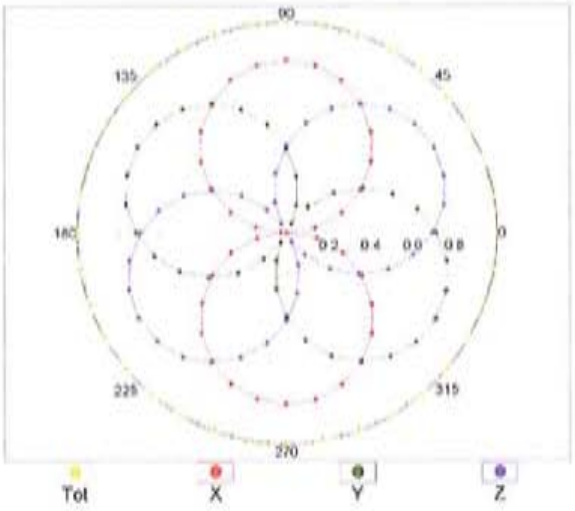
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

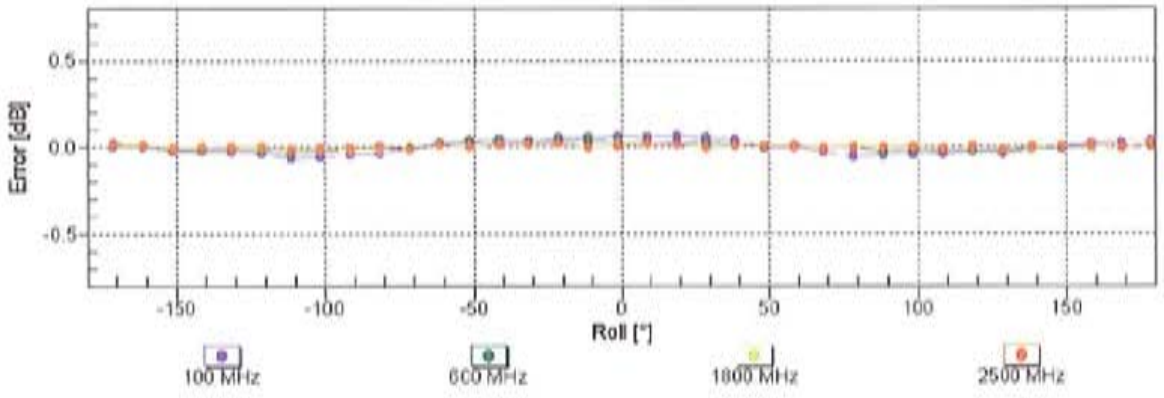
Receiving Pattern (ϕ), $\vartheta = 0°$

f=600 MHz,TEM



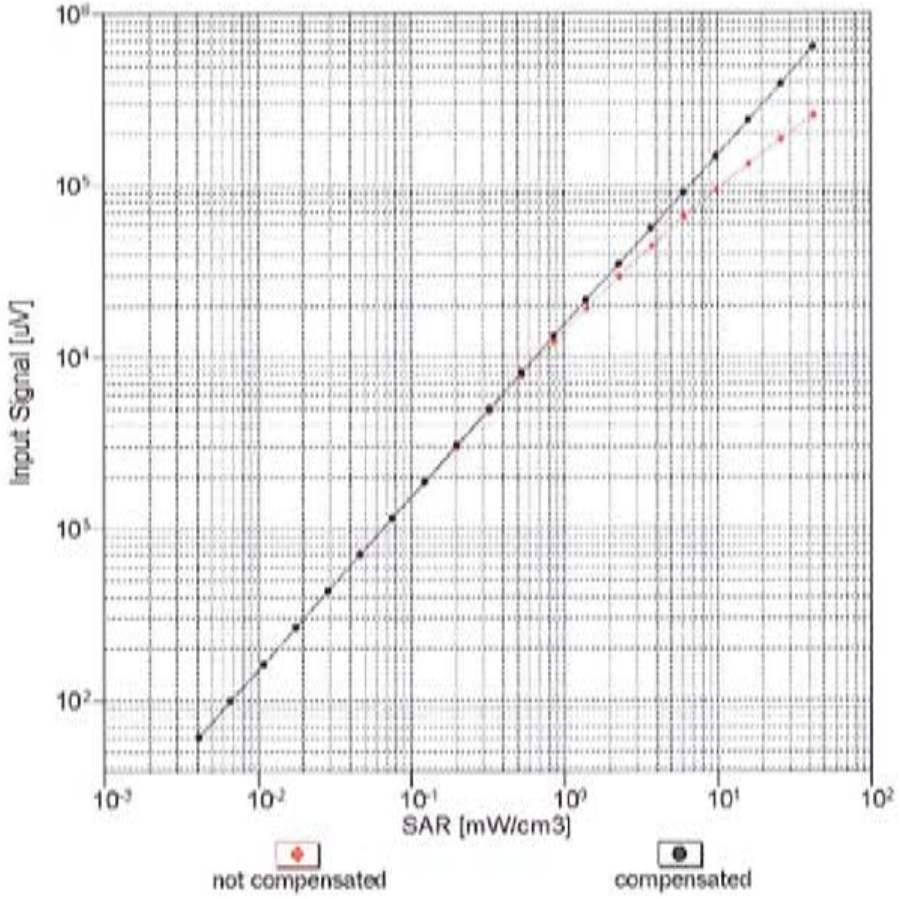
f=1800 MHz,R22

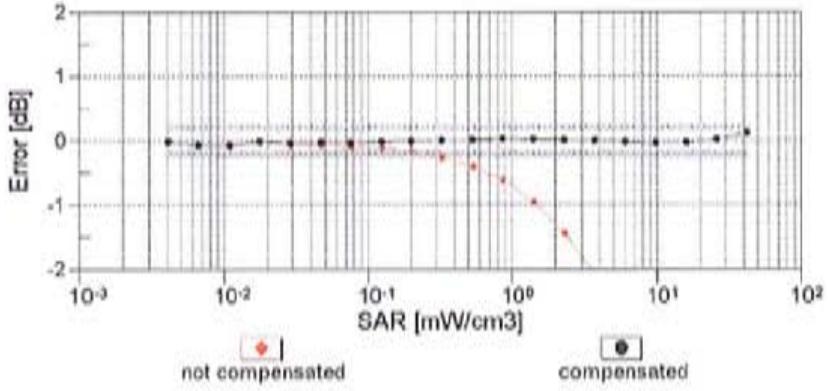




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

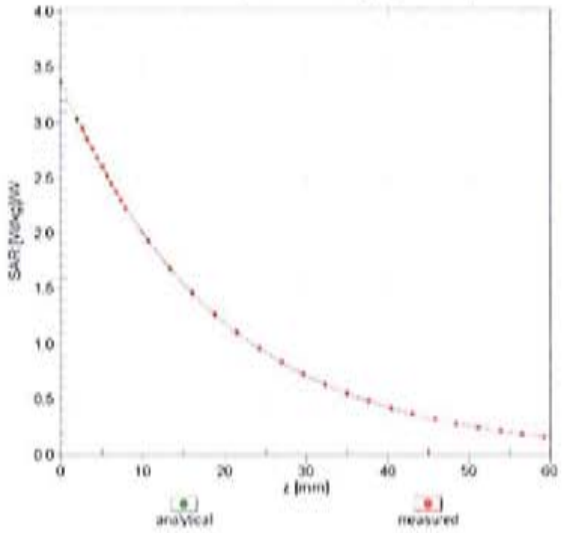




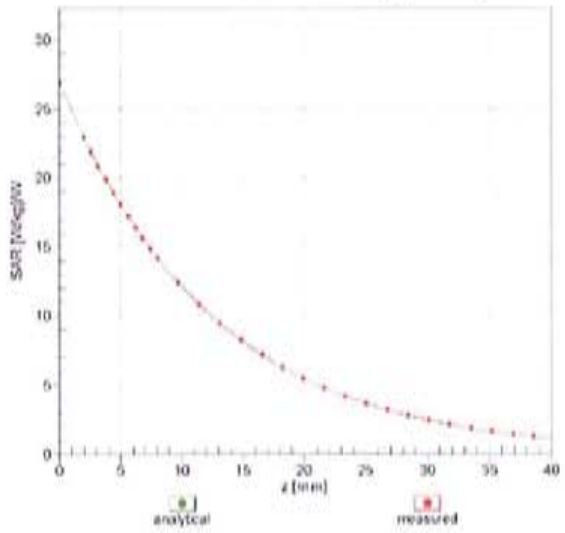
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

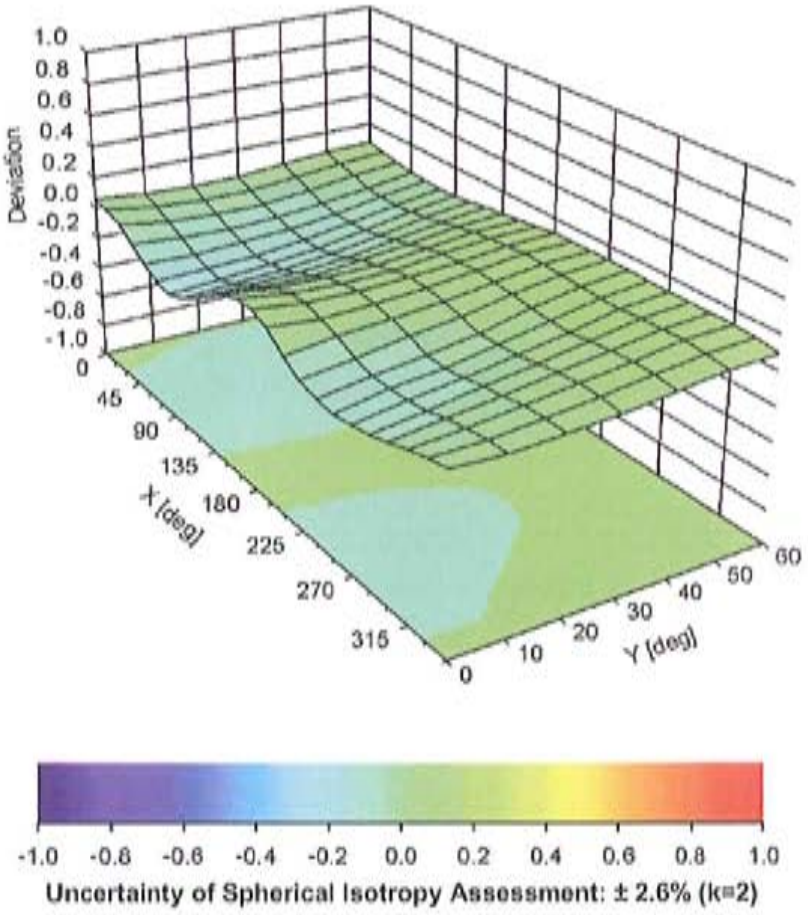


f = 1810 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 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
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 ± 3)°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:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 18, 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
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

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,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., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) 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
b) 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:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,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*.
- *DCPx,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
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,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 ≤ 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 *NORMx,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 ($\mu V/(V/m)^2$)[A]	1.13	0.84	0.97	± 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[E] (k=2)
0	CW	0.00	X	0.00	0.00	1.00	148.4	±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.
[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: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.

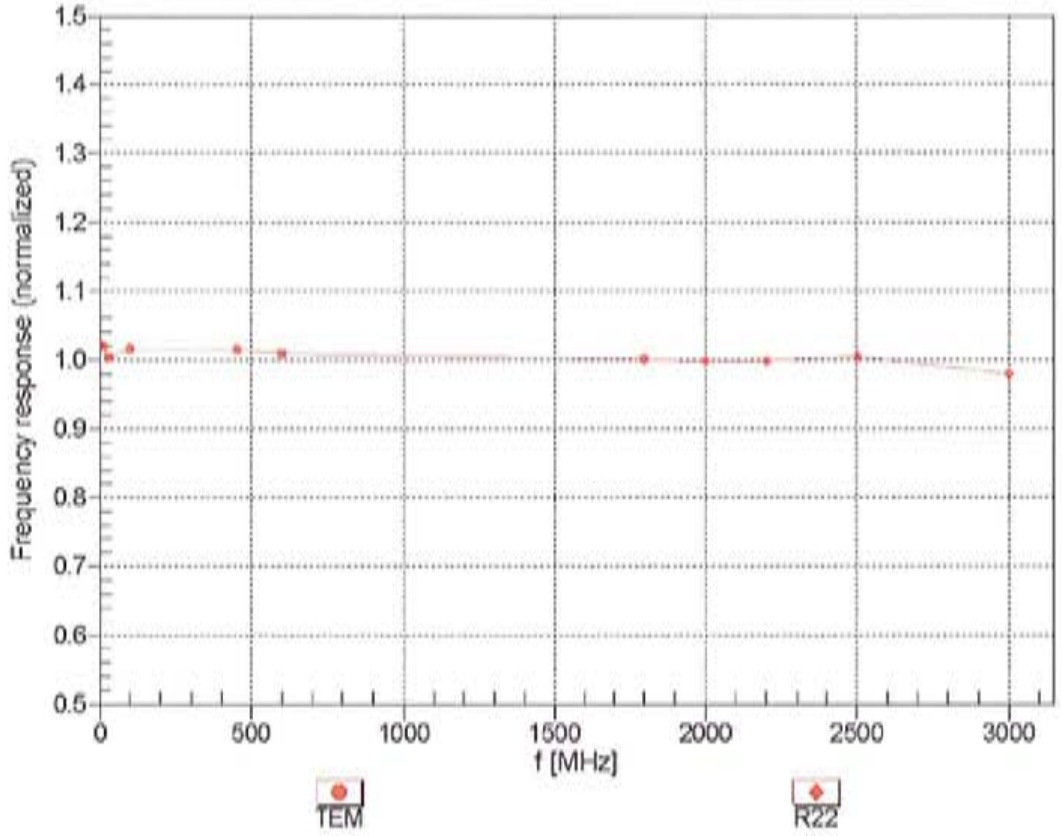
DASY/EASY - Parameters of Probe: ES3DV3 - SN:3037

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [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	6.22	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 %

[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.

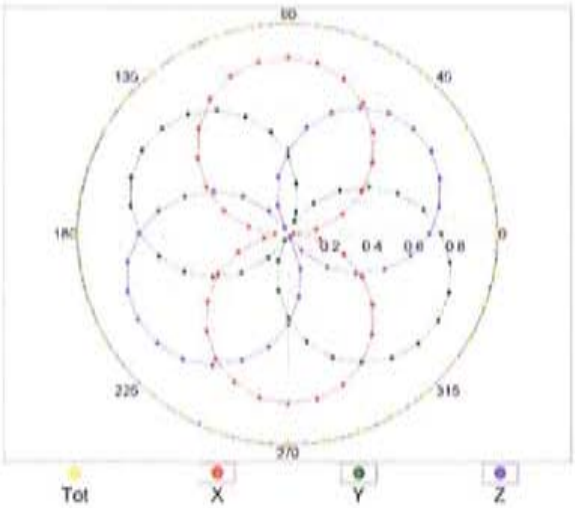
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



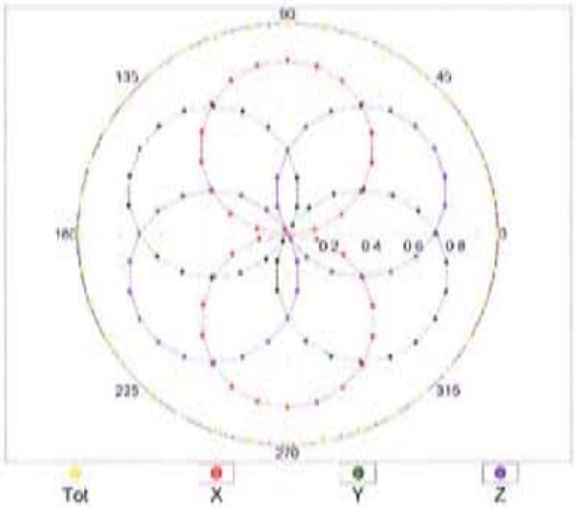
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

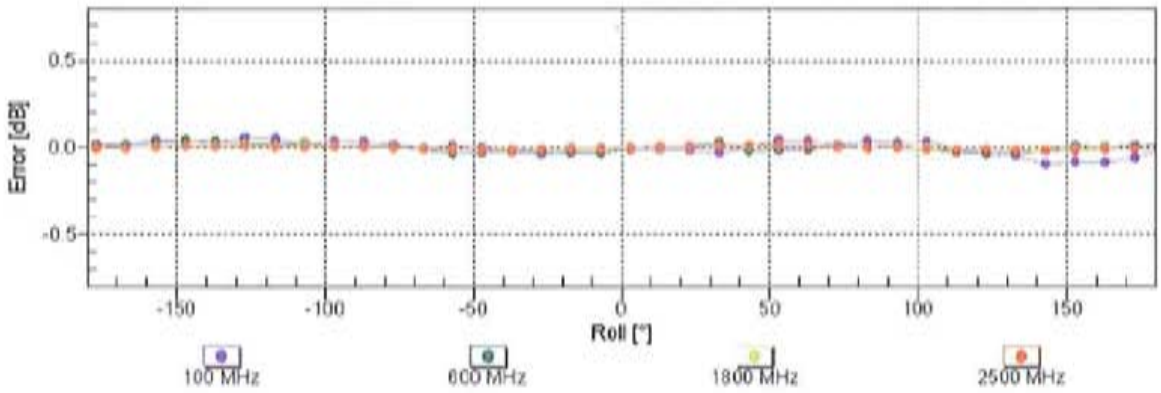
Receiving Pattern (ϕ), $\vartheta = 0°$

f=600 MHz,TEM



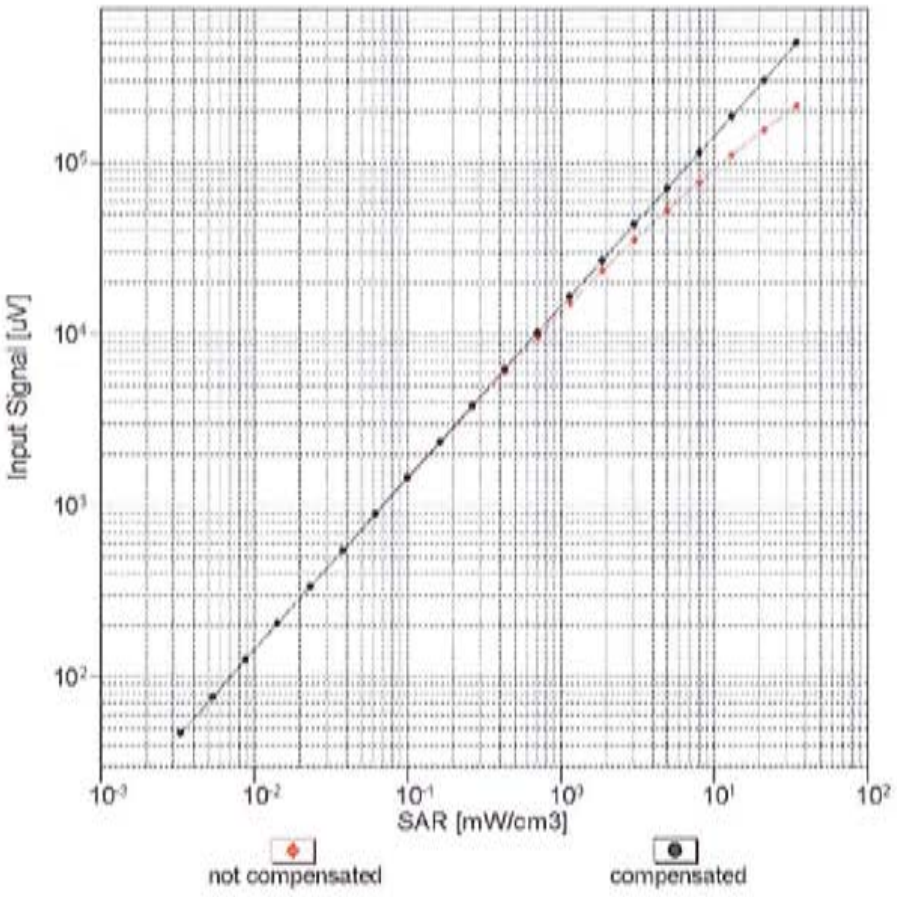
f=1800 MHz,R22

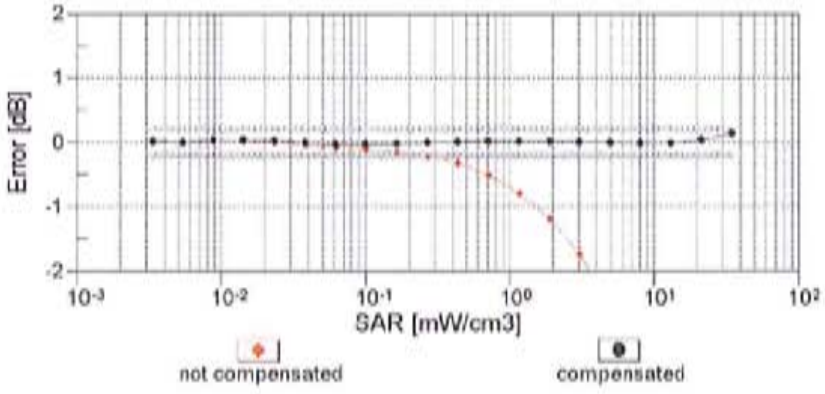




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

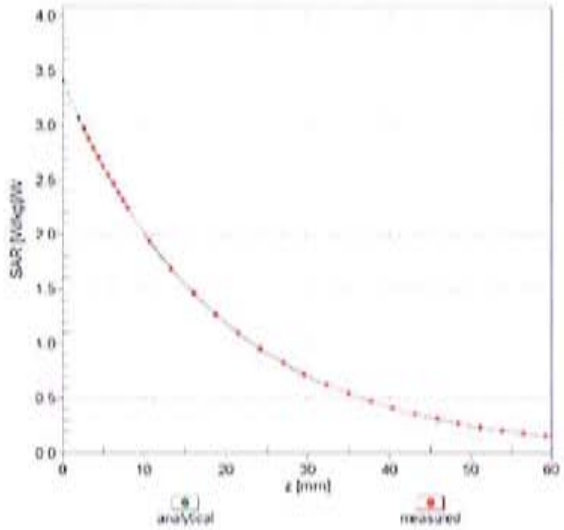




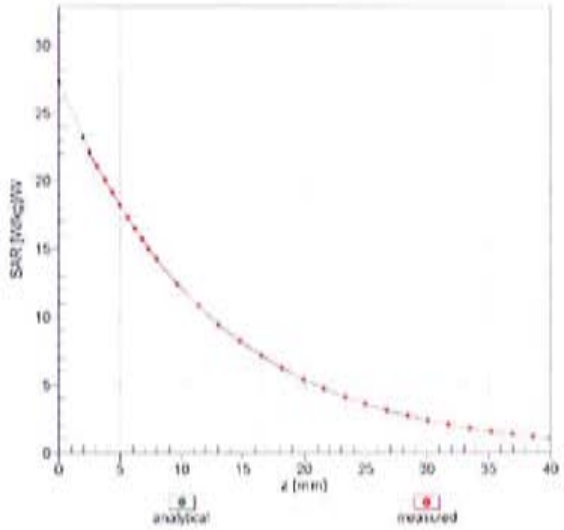
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

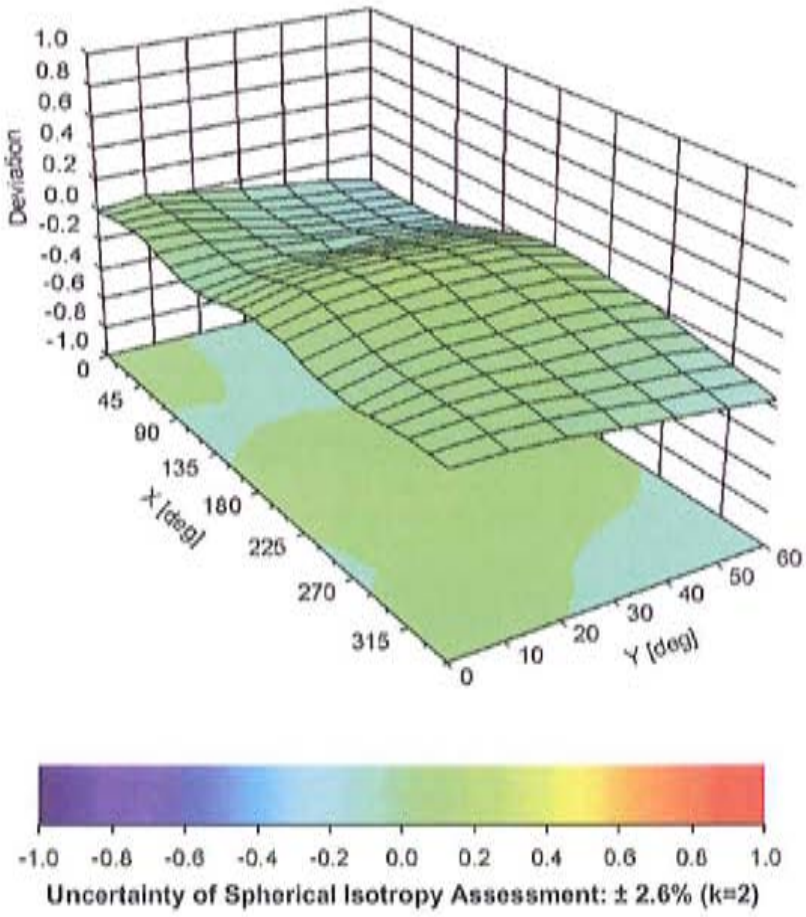


f = 1810 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

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: **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 ± 3)°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	

Issued: August 25, 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
S 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
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,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., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) 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
b) 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:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,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*.
- *DCPx,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
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,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 ≤ 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 *NORMx,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 ($\mu V/(V/m)^2$)[A]	0.41	0.52	0.49	± 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[E] (k=2)
0	CW	0.00	X	0.00	0.00	1.00	197.2	±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.
[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: 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

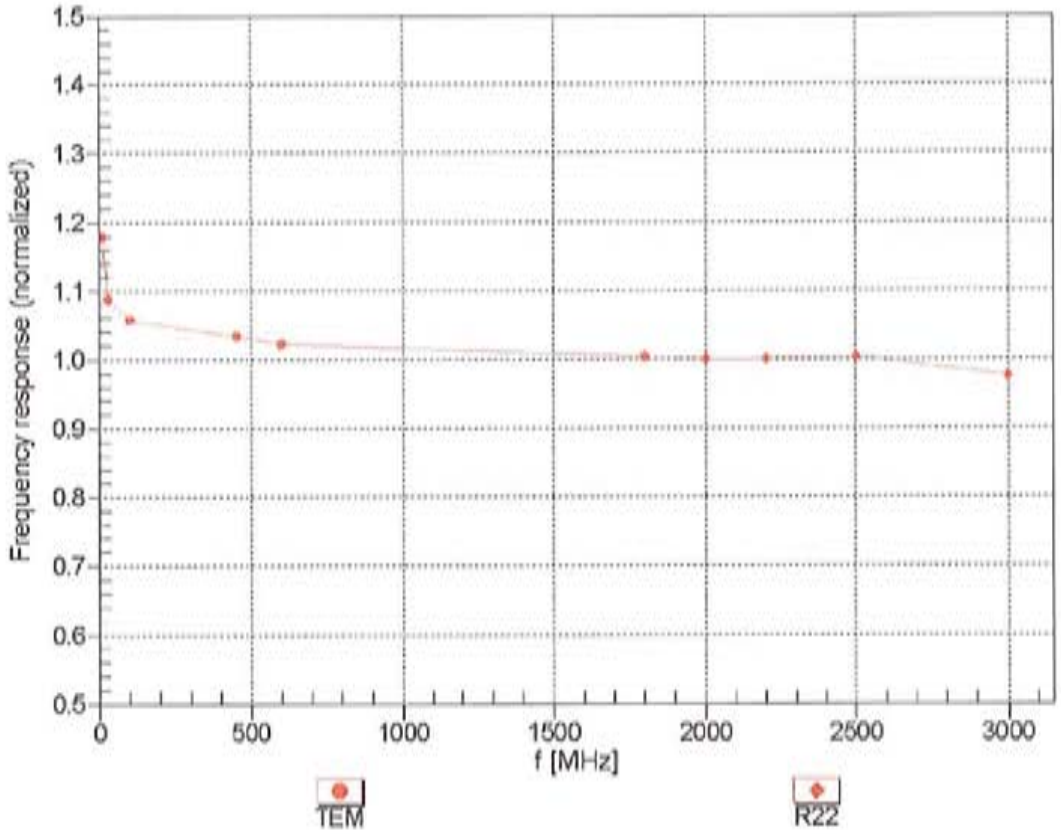
Calibration Parameter Determined in Body Tissue Simulating Media

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

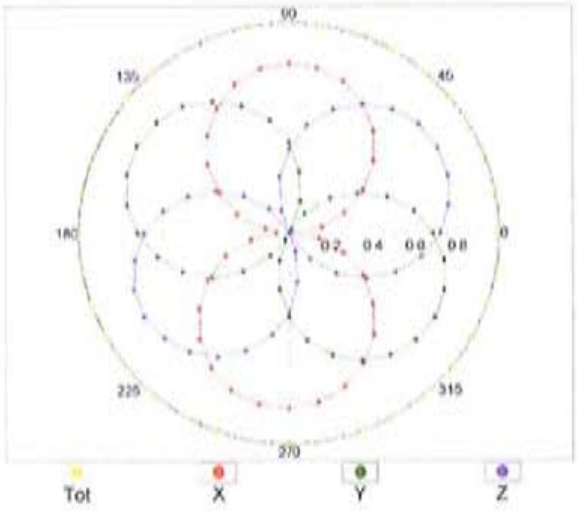
(TEM-Cell:ifi110 EXX, Waveguide: R22)



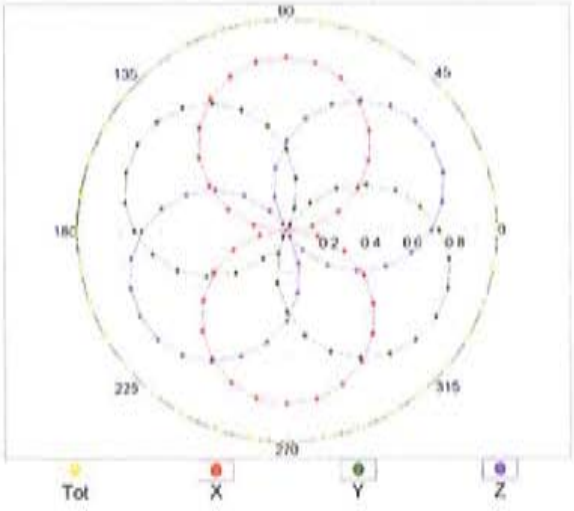
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

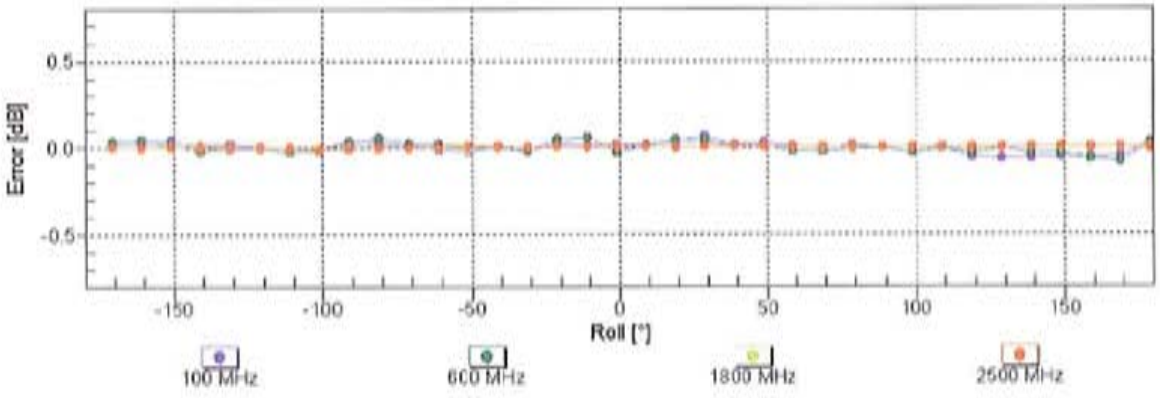
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



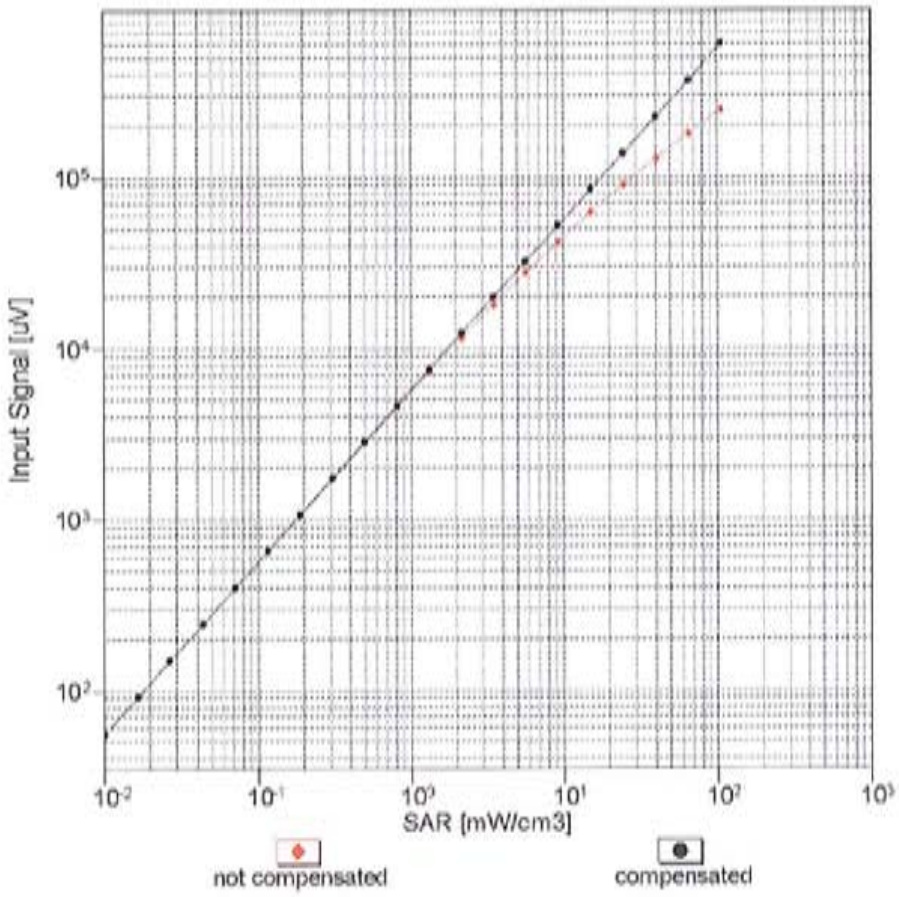
f=1800 MHz,R22

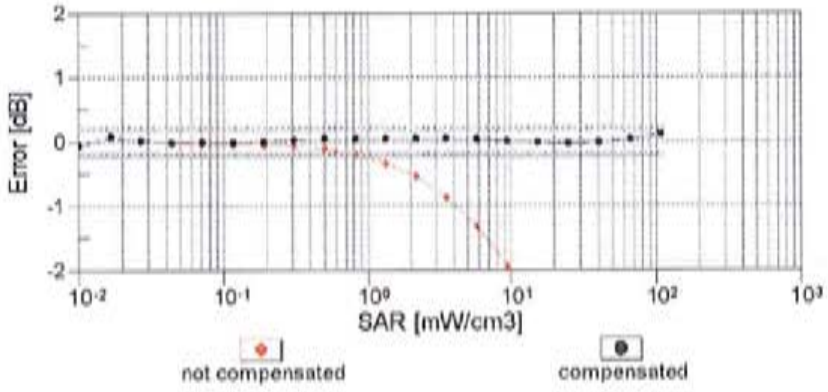




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

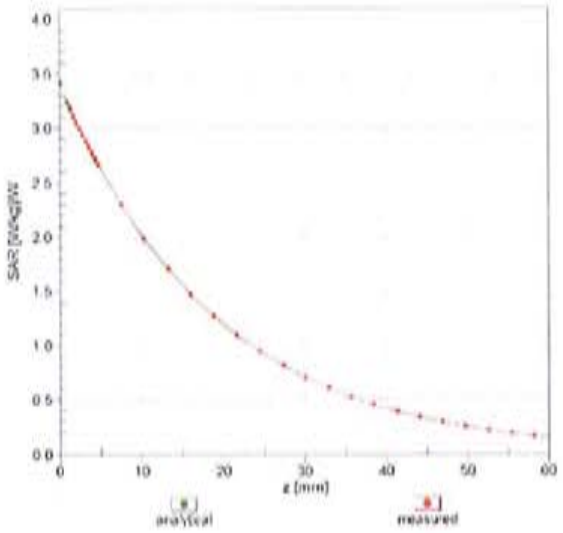




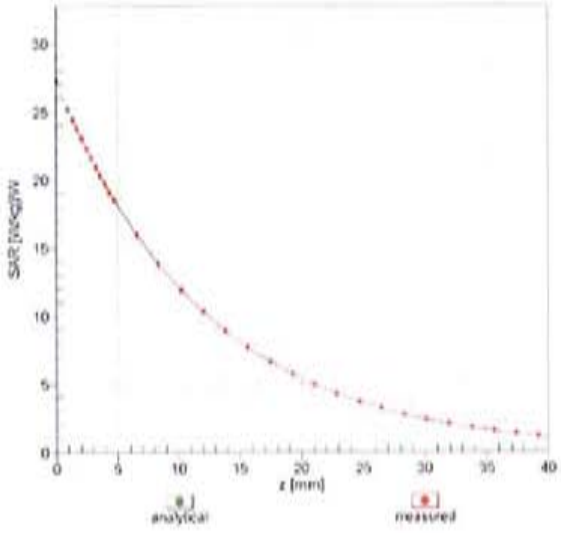
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

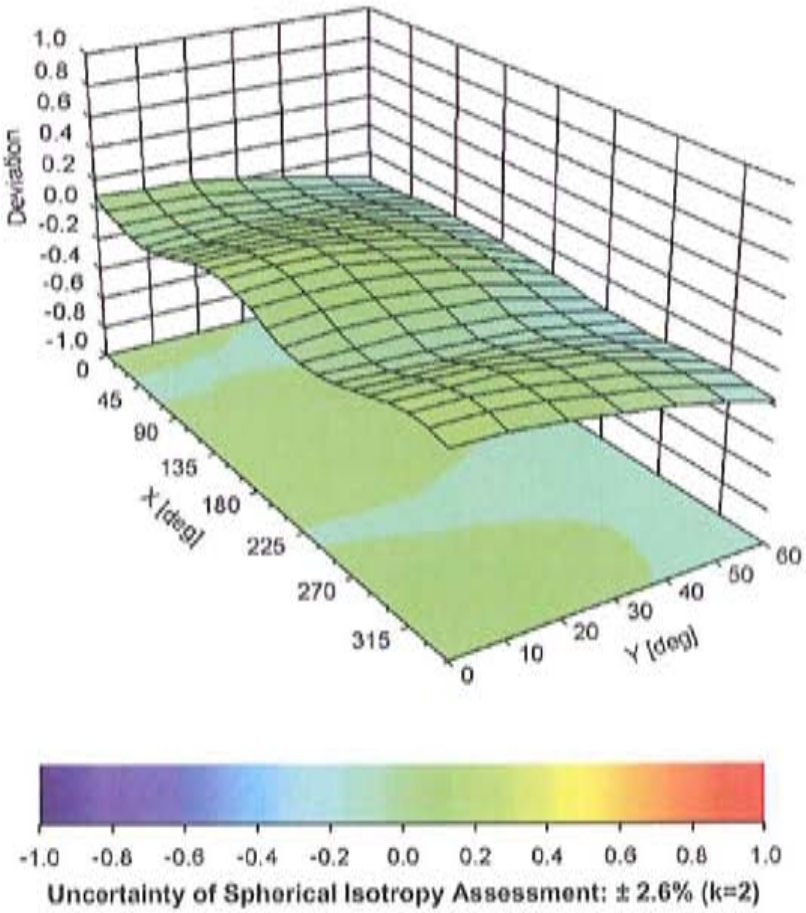


f = 1810 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

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