Class II Permissive Change SAR Test Report

Test Report #: 19893-1F

Date of Report: 12/28/2006

Date of Test: 12/26/2006 to 12/27/2006

FCC ID #: **IHDT56GH1**

Laboratory: Motorola Mobile Devices Business Product Safety & Compliance Laboratory
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Accreditation:

This laboratory is accredited to ISO/IEC 17025-1999 to perform the following tests:

<u>Tests</u>:	<u>Procedures</u>:
Electromagnetic Specific Absorption Rate (SAR)	ANSI / IEEE C95.1-1992, 1999 IEEE C95.3-1991 IEEE 1528, IEC 62209-1 FCC OET Bulletin 65 (*including Supplements A, B, C*) Australian Communications Authority Radio Communications (Electromagnetic Radiation – Human Exposure) Standard 2003 CENELEC EN 50361 (2001)
Simulated Tissue Preparation	APP-0247
RF Power Measurement	DOI-0876, 0900, 0902, 0904, 0915

<u>On the following products or types of products:</u>
Wireless Communications Devices (Examples): Two Way Radios; Portable Phones (including Cellular, Licensed Non-Broadcast and PCS); Low Frequency Readers; and Pagers

A2LA certificate #1651-01

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 CENELEC en50361:2001, IEEE 1528, as well as other appropriate measurement standards, guidelines and recommended practices. Any deviations from these standards, guidelines and recommended practices are noted below:

(none)

The results and statements contained herein relate only to the items tested. The names of individuals involved may be mentioned only in connection with the statements or results from this report.

Motorola encourages all feedback, both positive and negative, on this test report.

Table of Contents

1. Introduction

The Motorola Mobile Devices Business Product Safety 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] and [5]. The SAR values measured for the portable cellular phone are below the maximum recommended levels of 1.6 W/kg in a 1g average set in [3] and 2.0W/kg in a 10g average set in [2].

For ANSI / IEEE C95.1 (1g), the final SAR reading for this phone is 1.04W/kg for body worn use. These measurements were performed using a Dasy4™ v4.6 system manufactured by Schmid & Partner Engineering AG (SPEAG), of Zurich Switzerland.

2. Description of the Device Under Test

2.1 Antenna description

Type	Internal	
Location	Bottom of the Transceiver	
Dimensions	Length	92.6 mm
	Width	1.4 mm
Configuration	FJA	

2.2 Device description

Serial number	**52744A07**		
Mode(s) of Operation	800 CDMA	1900 CDMA	Bluetooth
Modulation Mode(s)	QPSK	QPSK	GMSK
Maximum Output Power Setting	25.00 dBm	25.00 dBm	4.00 dBm
Duty Cycle	1:1	1:1	1:1
Transmitting Frequency Rang(s)	824.70 – 848.31 MHz	1851.25 – 1908.75 MHz	2400.0 - 2483.5 MHz
Production Unit or Identical Prototype (47 CFR §2..908)	Identical Prototype		
Device Category	Portable		
RF Exposure Limits	General Population / Uncontrolled		

3. Test Equipment Used

3.1 Dosimetric System

The Motorola Mobile Devices Business Product Safety & Compliance Laboratory utilizes a Dosimetric Assessment System (Dasy4™ v4.6) manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All the SAR measurements are taken within a shielded enclosure. The overall 10g RSS uncertainty of the measurement system is ±10.8% (K=1) with an expanded uncertainty of ±21.6% (K=2). The overall 1g RSS uncertainty of the measurement system is ±11.1% (K=1) with an expanded uncertainty of ±22.2% (K=2). The measurement uncertainty budget is given in Appendix 6. Per IEEE 1528, this uncertainty budget is applicable to the SAR range of 0.4W/kg to 10W/kg.

The list of calibrated equipment used for the measurements is shown in the following table.

Description	Serial Number	Cal Due Date
DASY4™ DAE3	437	7/18/2007
E-Field Probe ET3DV6	1514	7/17/2007
Dipole Validation Kit, DV900V2	96	
S.A.M. Phantom used for 800/900MHz	TP-1131	
Dipole Validation Kit, DV1800V2	272TR	

3.2 Additional Equipment

Description	Serial Number	Cal Due Date
Signal Generator HP8648C	3847A04633	7/7/2007
Power Meter E4419B	GB39511087	7/5/2007
Power Sensor #1 – E9301A	MY41495336	6/28/2007
Power Sensor #2 - E9301A	US39210918	8/17/2007
Network Analyzer HP8753ES	US39171846	9/25/2007
Dielectric Probe Kit HP85070B	US99360070	

4. Electrical parameters of the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity, ε_r, and the conductivity, σ, of the tissue simulating liquids were measured with a HP85070 Dielectric Probe Kit These values, along with the temperature of the simulated tissue are shown in the table below. The recommended limits for permittivity and conductivity are also shown. A mass density of ρ=1g/cm3 was entered into the system in all the cases. It can be seen that the measured parameters are within tolerance of the recommended limits specified in [1] and [5].

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			ε_r	σ (S/m)	Temp (°C)
835	**Body**	**Measured,** 12/27/2006	53.5	0.97	18.2
		Recommended Limits	55.2 ±5%	0.97 ±5%	18-25
1880	**Body**	**Measured,** 12/26/2006	52.6	1.59	17.9
		Recommended Limits	53.3 ±5%	1.52 ±5%	18-25

The list of ingredients and the percent composition used for the tissue simulates are indicated in the table below.

Ingredient	**835MHz / 900 MHz Head**	**835MHz / 900 MHz Body**	**1800MHz / 1900 MHz Head**	**1800 MHz / 1900 MHz Body**	**2450MHz Head**	**2450 MHz Body**
Sugar	57	44.9	--	--	--	--
DGBE	--	--	47	30.8	--	30
Diacetin	--	--	--	--	51	
Water	40.45	53.06	52.62	68.8	48.75	70
Salt	1.45	0.94	0.38	0.4	0.15	--
HEC	1	1	--	--	--	--
Bact.	0.1	0.1	--	--	0.1	--

5. System Accuracy Verification

A system accuracy verification of the DASY4™ was performed using the measurement equipment listed in Section 3.1. The daily system accuracy verification 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 Section 8.3.7 Reference SAR Values in [5] or Appendix 7 for the 900Mhz target reference SAR value. These tests were done at 900MHz and 1800MHz. These frequencies are within ±10% of the compliance test mid-band frequency as required in [1] and [5]. The test was conducted on the same days as the measurement of the DUT. 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 1W 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). The tissue stimulant depth was verified to be 15.0cm ±0.5cm. Z-axis scans showing the SAR penetration are also included in Appendix 1.

f (MHz)	Description	SAR (W/kg), 1gram	Dielectric Parameters		Ambient Temp (°C)	Tissue Temp (°C)
			ε_r	σ (S/m)		
900	**Measured,** 12/27/2006	11.1	40.8	0.97	20.5	19.4
	Recommended Limits	11.3	41.5 ±5%	0.97 ±5%	18-25	18-25
1800	**Measured,** 12/26/2006	38.5	38.5	1.38	20.4	19.6
	Recommended Limits	38.1	40.0 ±5%	1.4 ±5%	18-25	18-25

The following probe conversion factors were used on the E-Field probe(s) used for the system accuracy verification measurements:

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ET3DV6	1514	900	5.99	8 of 9
		1810	5.05	8 of 9

6. Test Results

The test sample was operated using an actual transmission through a base station simulator. The base station simulator was setup to the proper channel, transmitter power level and transmit mode of operation. The phone was tested in the configurations stipulated in [1], [4] and [5]. The phone was positioned into these configurations using the device holder supplied with the DASY4™ SAR measurement system The measured dielectric constant of the material used for the device holder is less than 2.9 and the loss tangent is less than 0.02 (± 30%) at 850MHz. The default settings for the "coarse" and "cube" scans were chosen and used for measurements. The grid spacing of the course scan was set to 15cm as shown in the SAR plots included in Appendix 2 and 3. Please refer to the DASY manual for additional information on SAR scanning procedures and algorithms used.

The Cellular Phone model covered by this report has the following battery options:
Model #1 – SNN5765A 1640 mAH Battery
Model #2 – SNN5762A 850 mAH Battery

The battery with the highest capacity is the Model SNN5765A. This battery was used to do most of the SAR testing. The phone was placed in the SAR measurement system with a fully charged battery. The configuration that resulted in the highest SAR values were tested using the other battery listed above.

NOTE: This pouch is not functional against the head. Therefore, no head testing is required.

6.1 Body Worn Test Results

The SAR results shown in tables 1 through 4 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 the [6]. Also shown are the measured conducted output powers, the temperature of the test facility during the test, the temperature of the tissue simulate after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is New SAR = Old SAR * 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4™ 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 800MHz digital mode SAR measurements were performed in accordance with [4].

The test conditions that produced the highest SAR values in each band are indicated as bold numbers in the following tables and are included in Appendix 3. All other test conditions measured lower SAR values than those included in Appendix 3.

A "flat" phantom was for the body-worn tests. This "flat" phantom is made out of 1" thick natural High Density Polyethylene with a thickness at the bottom equal to 2.0mm. It measures 52.7cm(long) x 26.7cm(wide) x 21.2cm(tall). The measured dielectric constant of the material used is less than 2.3 and the loss tangent is less than 0.0046 all the way up to 2.184GHz.

The tissue stimulant depth was verified to be 15.0cm ±0.5cm. The same device holder described in section 6 was used for positioning the phone. The functional accessories were divided into two categories, the ones with metal components and the ones with non-metal components. For non-metallic component accessories', testing was performed on the accessory that displayed the closest proximity to the flat phantom. Each metallic component accessory, if any, was checked for uniqueness of metal component so that each is tested with the device. If multiple accessories shared an identical metal component, only the accessory that dictates the closest spacing to the body was tested. In addition to accessory testing, the cellular phone was tested with the front and back of the phone facing the phantom. For voice mode operation, the phone was placed as a distance of 15mm from the phantom. For data mode operation, the phone was placed as a distance of 25mm from the phantom. The cellular phone was tested with a headset connected to the device for all body-worn SAR measurements.

There are no Body-Worn Accessories available for this phone.

The following probe conversion factors were used on the E-Field probe(s) used for the body worn measurements:

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ET3DV6	1514	900	5.86	8 of 9
		1810	4.53	8 of 9

Body-Worn with SYN1531A Pouch and Bluetooth Mode; Front of Phone Towards Phantom using Battery SNN5765A								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	*10g SAR value*		*1g SAR value*	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
800 MHz	**Chan. 1013**	25.09	18.3	-0.06	0.43	0.44	0.61	0.62
	Chan. 384	24.99	18.3	-0.05	0.59	0.60	0.83	0.84
	Chan. 777	24.94	18.3	-0.04	0.58	0.59	0.82	0.83
1900 MHz	**Chan. 25**	25.05	17.9	-0.08	0.48	0.49	0.80	0.81
	Chan. 600	25.18	**17.9**	**-0.08**	**0.61**	**0.62**	**1.02**	**1.04**
	Chan. 1175	25.16	17.9	-0.07	0.46	0.47	0.78	0.79

Table 1: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

Body-Worn with SYN1531A Pouch and Bluetooth Mode; Back of Phone Towards Phantom using Battery SNN5765A								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	*10g SAR value*		*1g SAR value*	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
800 MHz	**Chan. 1013**	25.09						
	Chan. 384	24.99	18.3	-0.02	0.55	0.55	0.78	0.78
	Chan. 777	24.94						
1900 MHz	**Chan. 25**	25.05						
	Chan. 600	25.18	17.9	-0.06	0.32	0.32	0.51	0.51
	Chan. 1175	25.16						

Table 2: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

Body-Worn with SYN1531A Pouch and Bluetooth Mode; Front of Phone Towards Phantom using Battery SNN5762A								
f **(MHz)**	**Description**	**Conducted Output Power (dBm)**	**Temp (°C)**	**Drift (dB)**	***10g SAR value***		***1g SAR value***	
					Measured (W/kg)	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**
800 MHz	**Chan. 1013**	25.09						
	Chan. 384	24.99	18.3	0	0.57	0.57	0.79	0.79
	Chan. 777	24.94						
1900 MHz	**Chan. 25**	25.05	17.9	-0.07	0.54	0.55	0.89	0.91
	Chan. 600	25.18	17.9	-0.08	0.53	0.54	0.88	0.90
	Chan. 1175	25.16	17.9	-0.1	0.55	0.57	0.93	0.95

Table 3: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

Body-Worn with SYN1531A Pouch and Bluetooth Mode; Back of Phone Towards Phantom using Battery SNN5762A								
f **(MHz)**	**Description**	**Conducted Output Power (dBm)**	**Temp (°C)**	**Drift (dB)**	***10g SAR value***		***1g SAR value***	
					Measured (W/kg)	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**
800 MHz	**Chan. 1013**	25.09	18.5	0.01	0.60	0.60	0.87	0.87
	Chan. 384	24.99	19.1	-0.05	0.64	0.65	0.91	0.92
	Chan. 777	24.94	**18.2**	**-0.2**	**0.66**	**0.69**	**0.92**	**0.97**
1900 MHz	**Chan. 25**	25.05						
	Chan. 600	25.18	18.1	-0.2	0.43	0.45	0.70	0.73
	Chan. 1175	25.16						

Table 4: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

References

[1] CENELEC, en50361:2001 “Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300MHz – 3GHz)”

[2] CENELEC, en50360:2001 “Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300MHz – 3GHz)”.

[3] ANSI / IEEE, C95.1 1999 Edition “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300GHz”

[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)”

Appendix 1

SAR distribution comparison for the system accuracy verification

Date/Time: 12/26/2006 11:59:07 AM

Test Laboratory: Motorola

122606 1800MHz Good at +1.1%

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:272TR
Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 272(TR) PM1 Power = 200mW

Sim.Temp@meas = 19*C Sim.Temp@SPC = 19.6*C Room Temp @ SPC = 20.4*C

Communication System: CW - Dipole; Frequency: 1800 MHz; Channel Number: 8; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 1800 MHz; σ = 1.38 mho/m; ε_r = 38.5; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ET3DV6 - SN1514; ConvF(5.05, 5.05, 5.05); Calibrated: 7/17/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 7/18/2006
- Phantom: R4 : Sect.2, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 160

Daily SPC Check/Dipole Area Scan (9x4x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 6.87 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 83.3 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 13.4 W/kg
SAR(1 g) = 7.68 mW/g; SAR(10 g) = 4.07 mW/g
Maximum value of SAR (measured) = 8.66 mW/g

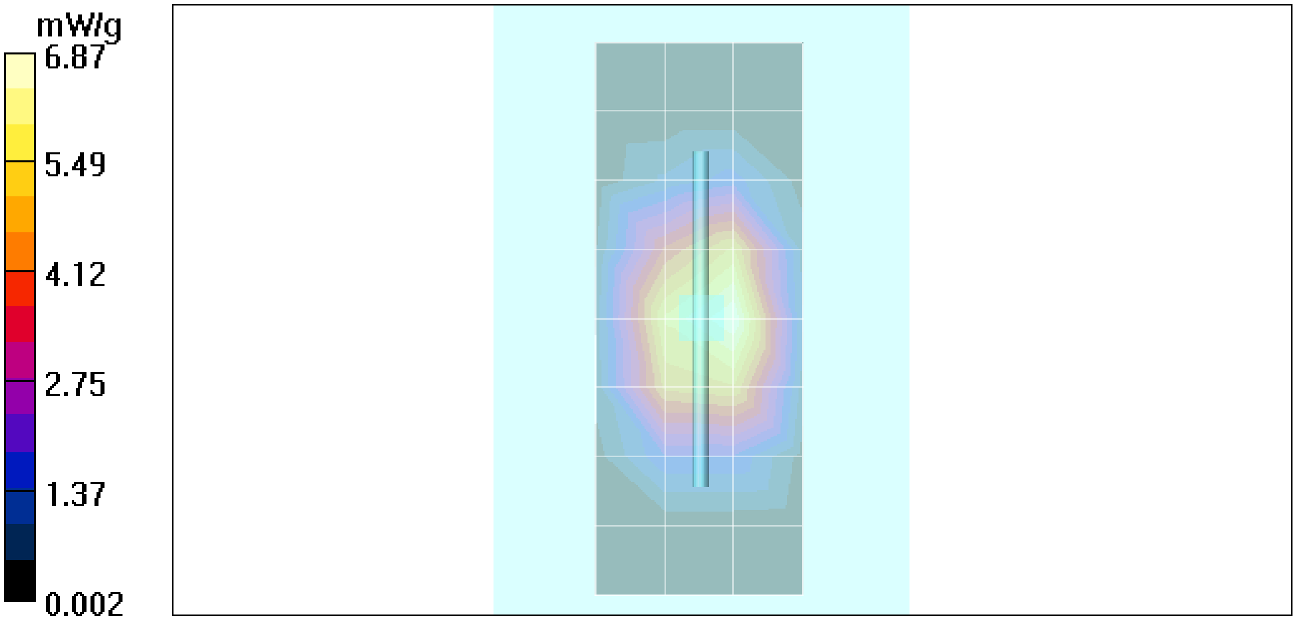
Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:

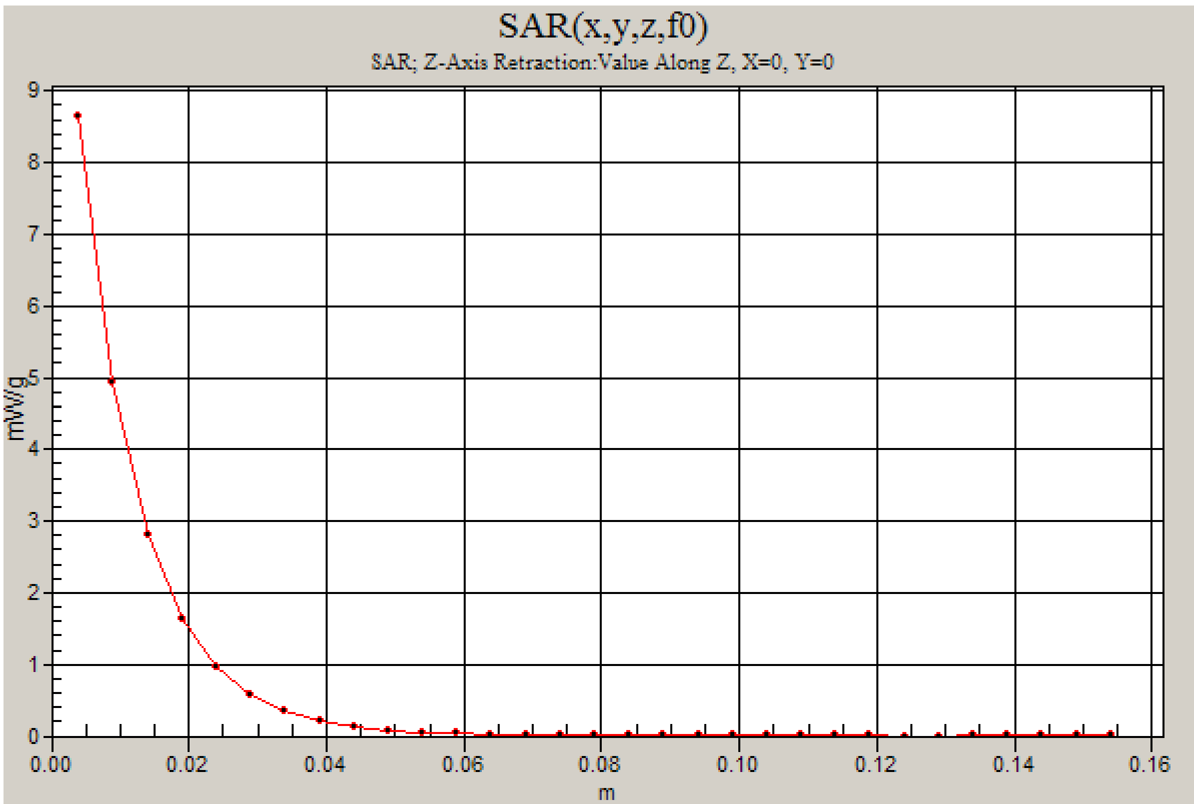
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 83.3 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 13.7 W/kg
SAR(1 g) = 7.73 mW/g; SAR(10 g) = 4.08 mW/g
Maximum value of SAR (measured) = 8.58 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31):

Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 8.65 mW/g

122606 1800MHz Good at +1.1%





Date/Time: 12/27/2006 9:41:02 AM

Test Laboratory: Motorola

122706 900MHz Good at -2.2%

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:96
Procedure Notes: 900 MHz System Performance Check / Dipole Sn# 096 PM1 Power =200mW

Sim.Temp@meas = 19.4*C   Sim.Temp@SPC =19.4*C   Room Temp @ SPC = 20.5*C

Communication System: CW - Dipole; Frequency: 900 MHz; Channel Number: 4; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 900 MHz; $\sigma = 0.97$ mho/m; $\varepsilon_r = 40.8$; $\rho = 1000$ kg/m^3

DASY4 Configuration:

- Probe: ET3DV6 - SN1514; ConvF(5.99, 5.99, 5.99); Calibrated: 7/17/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 7/18/2006
- Phantom: R4: Sugar Water SAM; Type: SAM; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 160

Daily SPC Check/Dipole Area Scan (4x9x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.12 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 51.7 V/m; Power Drift = -0.042 dB
Peak SAR (extrapolated) = 3.32 W/kg
SAR(1 g) = 2.2 mW/g; SAR(10 g) = 1.41 mW/g
Maximum value of SAR (measured) = 2.38 mW/g

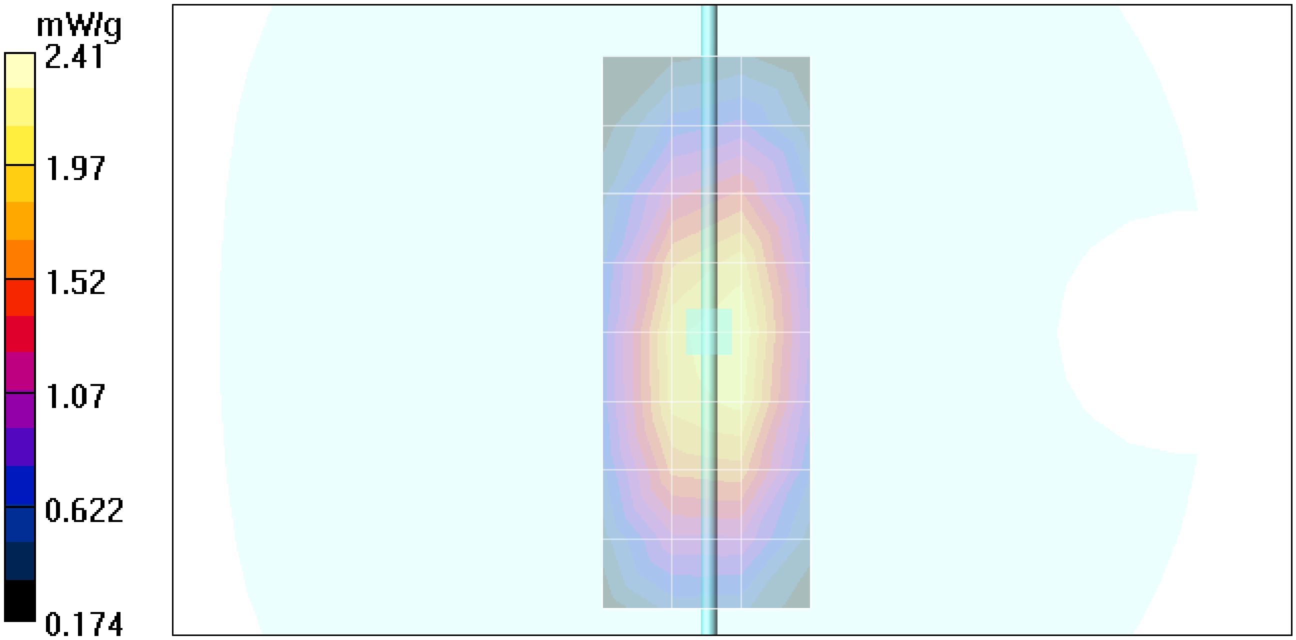
Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:

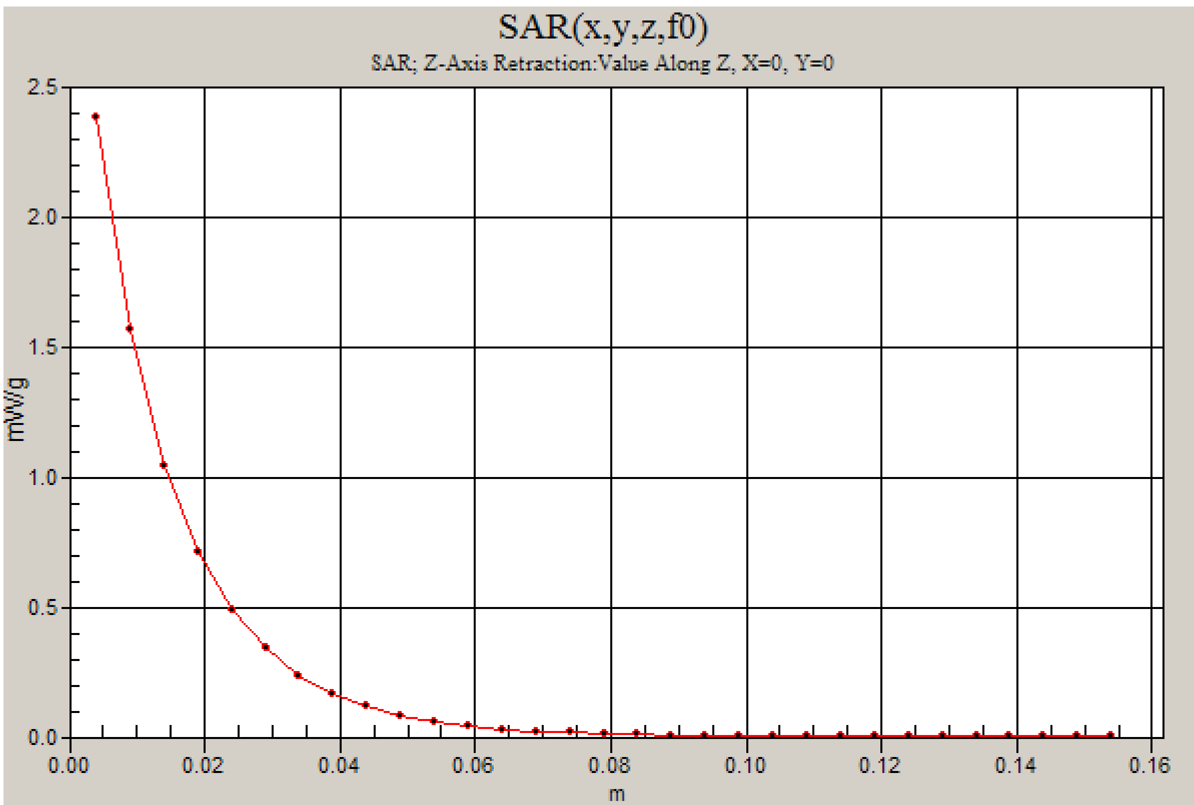
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 51.7 V/m; Power Drift = -0.042 dB
Peak SAR (extrapolated) = 3.36 W/kg
SAR(1 g) = 2.22 mW/g; SAR(10 g) = 1.41 mW/g
Maximum value of SAR (measured) = 2.41 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31):

Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 2.39 mW/g

122706 900MHz Good at -2.2%





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Appendix 2

SAR distribution plots for Body Worn Configuration

Date/Time: 12/27/2006 6:20:17 PM

Test Laboratory: Motorola

800 Bodyworn

Serial: 52744A07
Procedure Notes: Pwr Step: All Up Bits **Antenna Position: Internal**

Battery Model #: SNN5762A

Accessory Model # = SYN1531A Bluetooth Device Used Back Towards the Phantom

Communication System: CDMA 835; Frequency: 848.31 MHz; Channel Number: 777; Duty Cycle: 1:1
Medium: Low Freq Body; Medium parameters used: f = 835 MHz; $\sigma = 0.97$ mho/m; $\varepsilon_r = 53.5$; $\rho = 1000$ kg/m^3

DASY4 Configuration:

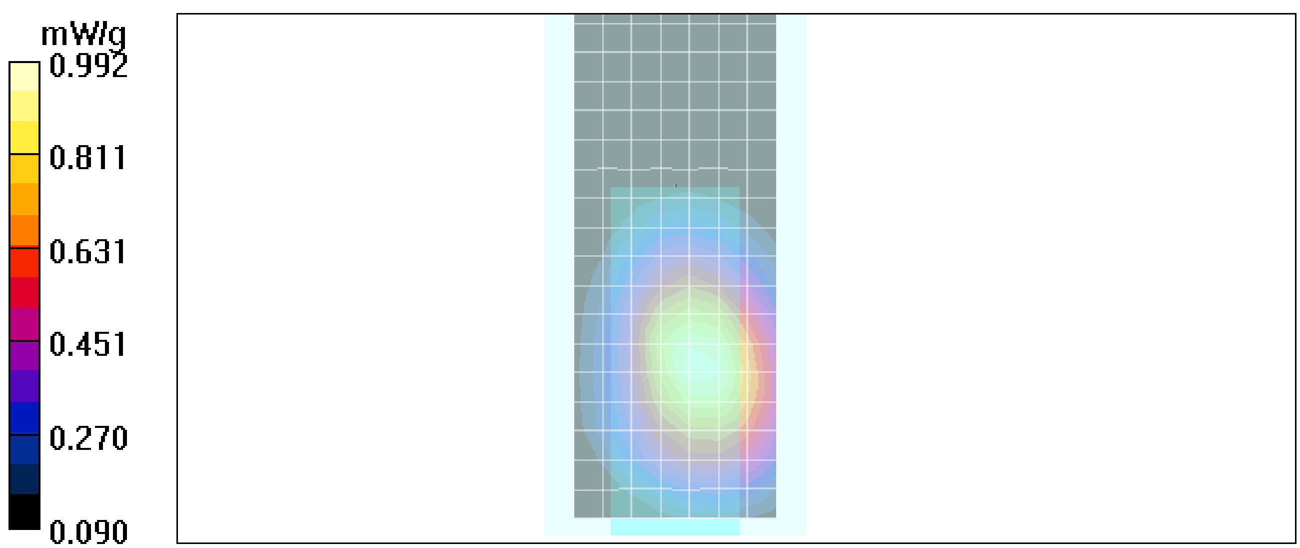
- Probe: ET3DV6 - SN1514; ConvF(5.86, 5.86, 5.86); Calibrated: 7/17/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 7/18/2006
- Phantom: R4 : Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 160

Amy Twin Phone Template/Area Scan - Normal Body (10mm) (19x10x1):

Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.974 mW/g

Amy Twin Phone Template/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 31.6 V/m; Power Drift = -0.198 dB
Peak SAR (extrapolated) = 1.20 W/kg
SAR(1 g) = 0.923 mW/g; SAR(10 g) = 0.656 mW/g
Maximum value of SAR (measured) = 0.992 mW/g



Date/Time: 12/26/2006 6:19:10 PM

Test Laboratory: Motorola

1900 Bodyworn

Serial: 52744A07
Procedure Notes: Pwr Step: all up bits **Antenna Position:internal**

Battery Model #: SNN5765A

Accessory Model # = BLUETOOTH IN SYN1531A POUCH (FRONT OF PHONE TOWARDS THE PHANTOM) USING SNN5765A

Communication System: CDMA 1900; Frequency: 1880 MHz; Channel Number: 600; Duty Cycle: 1:1
Medium: Regular Glycol Body; Medium parameters used: f = 1880 MHz; σ = 1.59 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3

DASY4 Configuration:

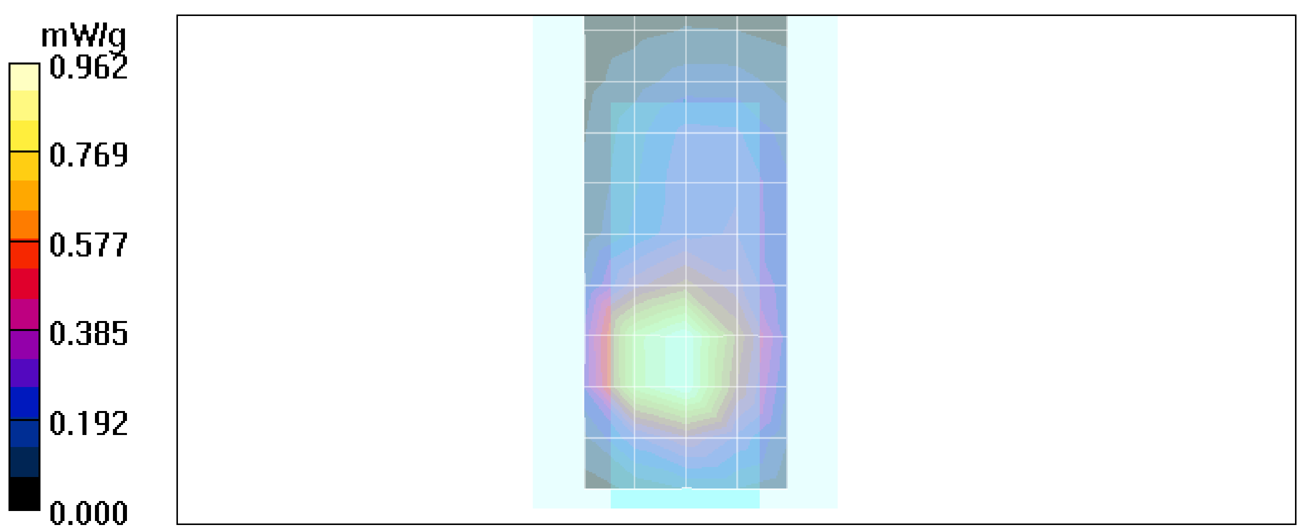
- Probe: ET3DV6 - SN1514; ConvF(4.53, 4.53, 4.53); Calibrated: 7/17/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 7/18/2006
- Phantom: R4 : Sect.2, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 160

Amy Twin Phone Template/Area Scan - Normal Body (15mm) (13x7x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.962 mW/g

Amy Twin Phone Template/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 27.4 V/m; Power Drift = -0.080 dB
Peak SAR (extrapolated) = 1.72 W/kg
SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.606 mW/g
Maximum value of SAR (measured) = 1.10 mW/g



Appendix 3

Probe Calibration Certificate

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

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Accreditation No.: SCS 108

Client **Motorola MDb**

Certificate No: ET3-1514_Jul06

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1514
Calibration procedure(s)	QA CAL-01.v5 Calibration procedure for dosimetric E-field probes
Calibration date:	July 17, 2006
Condition of the calibrated item	In Tolerance

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 (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	21-Jun-06 (SPEAG, No. DAE4-654_Jun06)	Jun-07

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov 06

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: July 17, 2006

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
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) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

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 effect 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 (no uncertainty required). DCP does not depend on frequency nor media.
- *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 ET3DV6

SN:1514

Manufactured:	November 24, 1999
Last calibrated:	July 20, 2005
Recalibrated:	July 17, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1514

Sensitivity in Free Space[A]

NormX	**1.74** ± 10.1%	$\mu V/(V/m)^2$
NormY	**1.90** ± 10.1%	$\mu V/(V/m)^2$
NormZ	**1.87** ± 10.1%	$\mu V/(V/m)^2$

Diode Compression[B]

DCP X	**86** mV
DCP Y	**91** mV
DCP Z	**84** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL 900 MHz Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	9.7	5.0
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

TSL 1810 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	11.8	7.0
SAR_{be} [%]	With Correction Algorithm	0.2	0.4

Sensor Offset

Probe Tip to Sensor Center **2.7** mm

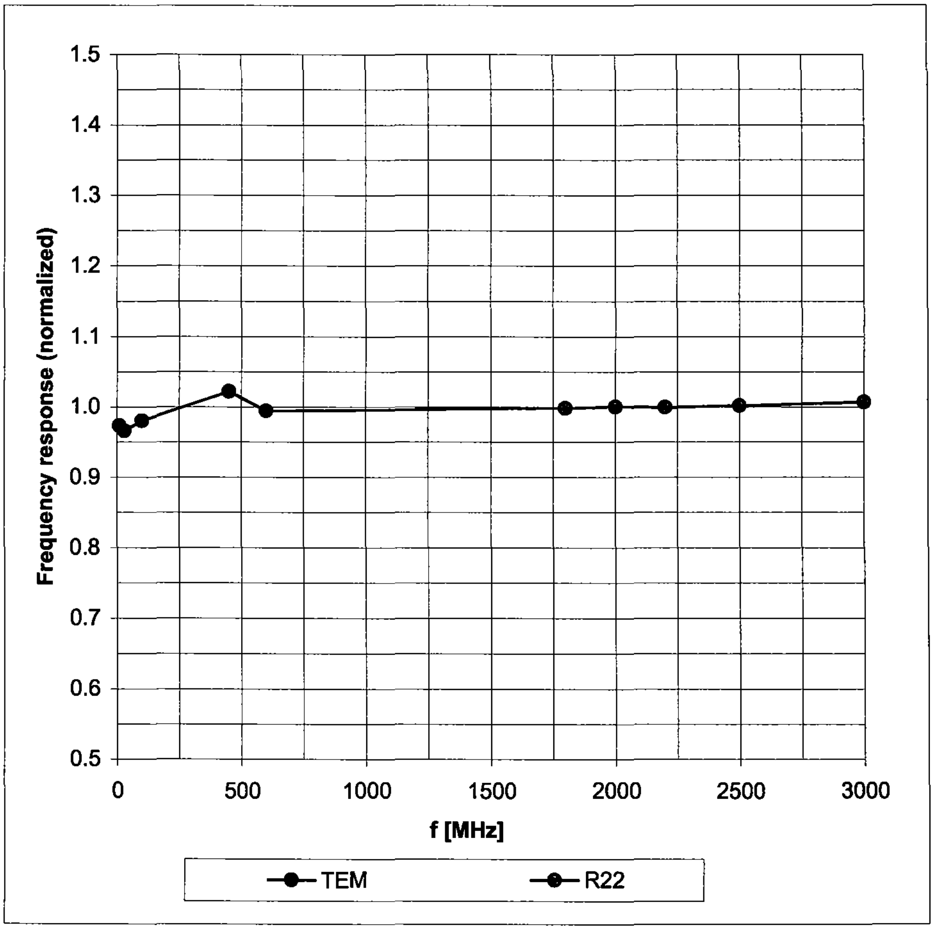
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

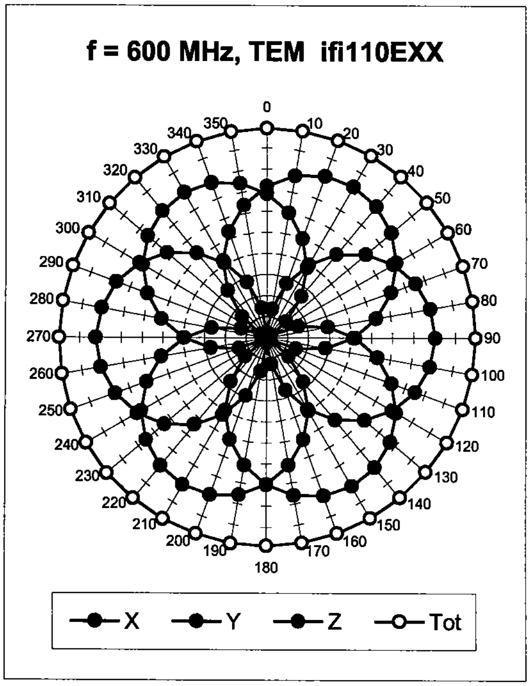
Frequency Response of E-Field

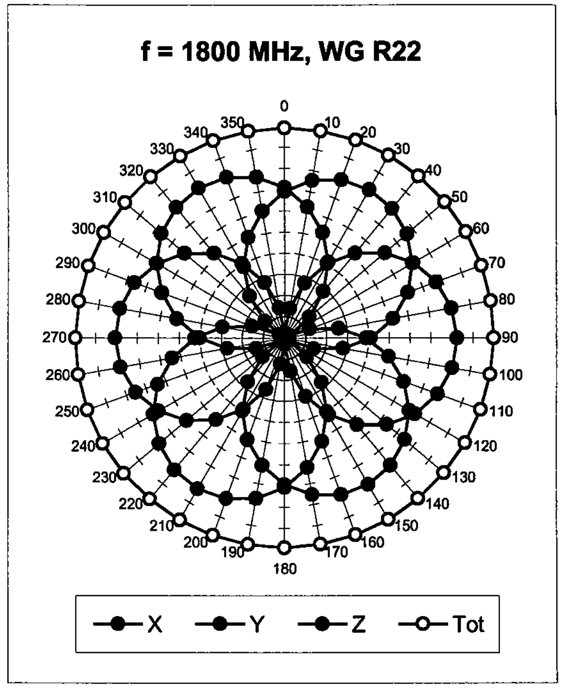
(TEM-Cell:ifi110 EXX, Waveguide: R22)

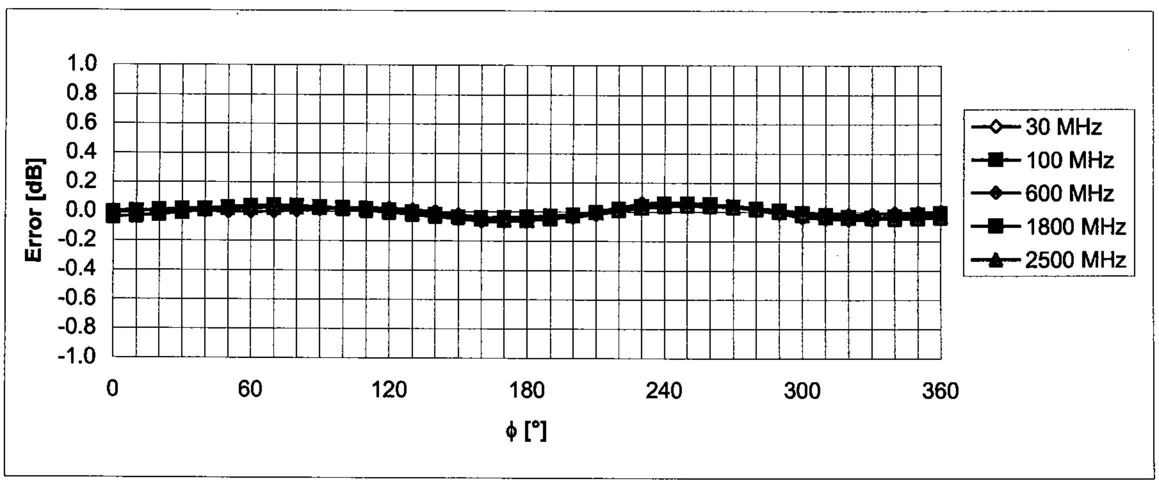


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



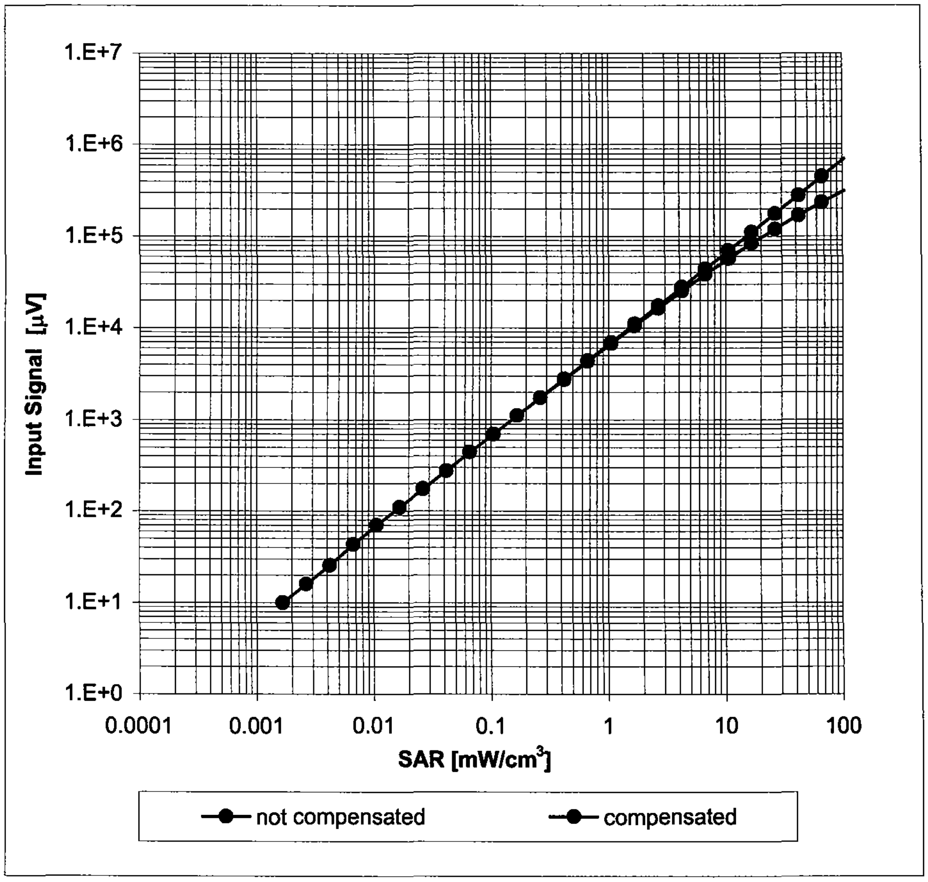


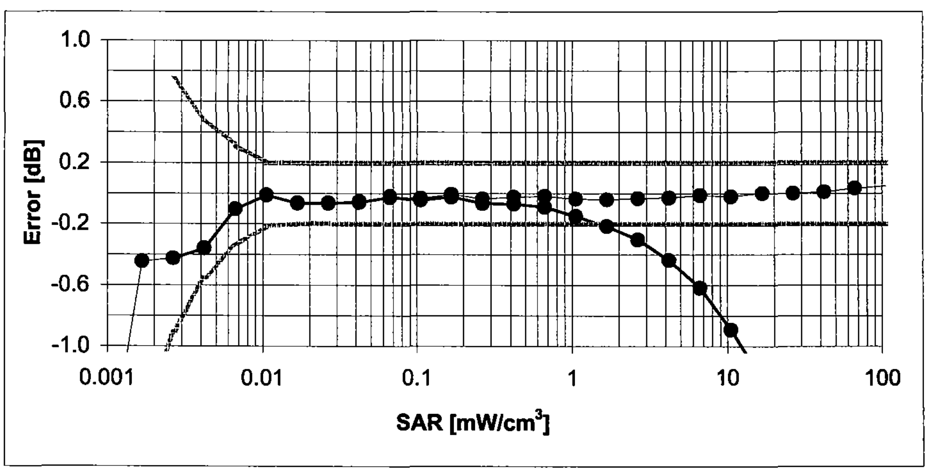


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

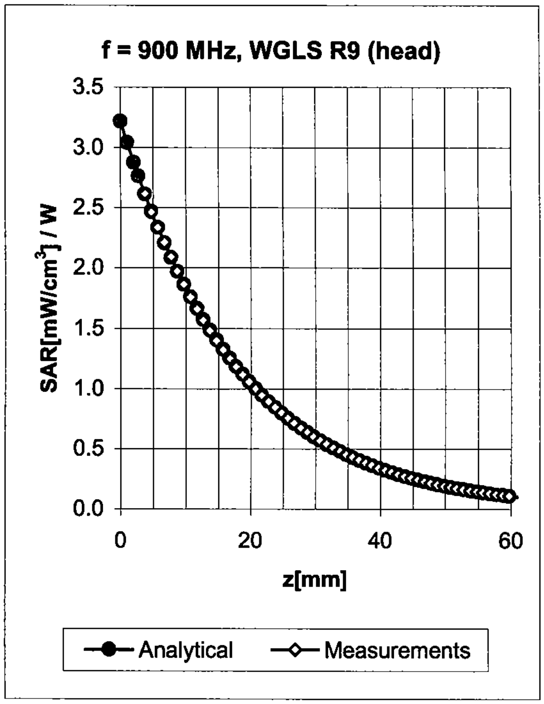
(Waveguide R22, f = 1800 MHz)

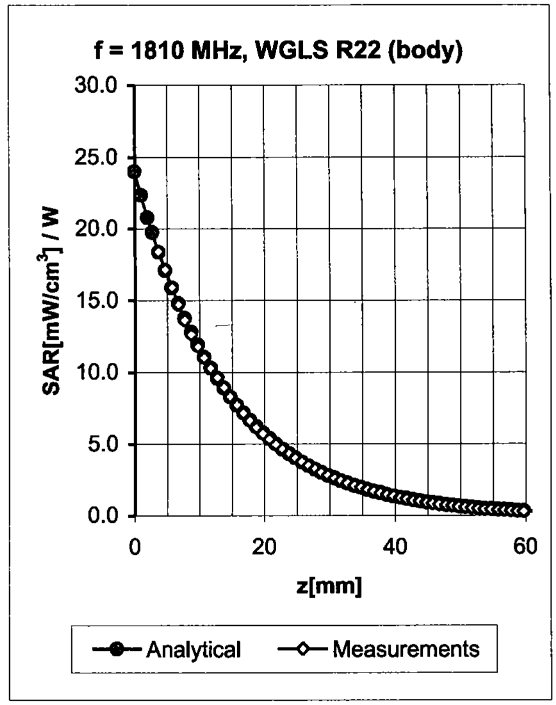




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



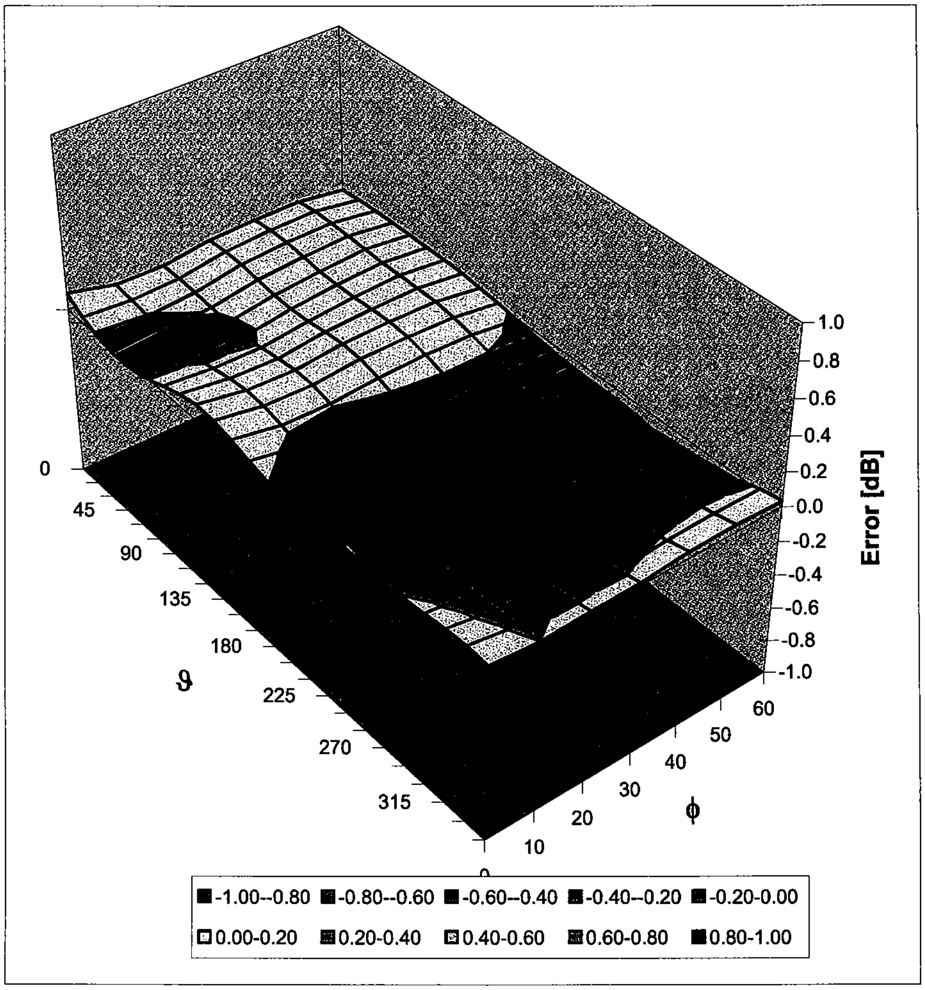


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.67	1.82	5.99	± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.57	2.46	5.05	± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.56	2.49	4.76	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.65	2.09	4.47	± 11.8% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.64	1.95	5.86	± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.61	2.53	4.53	± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.75	2.16	4.30	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.62	2.07	4.16	± 11.8% (k=2)

[C] **The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.**

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Appendix 4

Measurement Uncertainty Budget

a	b	c	d	e = f(d,k)	f	g	h = c x f / e	i = c x g / e	k
Uncertainty Component	IEEE 1528 section	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	E.2.1	5.9	N	1.00	1	1	5.9	5.9	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8	1.1	R	1.73	1	1	0.6	0.6	∞
RF Ambient Conditions - Noise	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	0.0	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mech. Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t Phantom	E.6.3	1.4	R	1.73	1	1	0.8	0.8	∞
Max. SAR Evaluation (ext., int., avg.)	E.5	3.4	R	1.73	1	1	2.0	2.0	∞
Test sample Related									
Test Sample Positioning	E.4.2	3.2	N	1.00	1	1	3.2	3.2	29
Device Holder Uncertainty	E.4.1	4.0	N	1.00	1	1	4.0	4.0	8
SAR drift	6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3	3.3	N	1.00	0.64	0.43	2.1	1.4	∞
Liquid Permittivity (target)	E.3.2	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	E.3.3	1.9	N	1.00	0.6	0.49	1.1	0.9	∞
Combined Standard Uncertainty			RSS				11.1	10.8	411
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				22.2	21.6	

Appendix 5

Photographs of the device under test

Figure 1 – Front of Pouch

Figure 2 – Back of Pouch

Figure 3 – Side View of Pouch

Figure 4 – Bodyworn Against Flat Phantom

Appendix 6

Dipole Characterization Certificate

Certification of System Performance Check Targets
Based on WI-0396

-Historical Data-

	900MHz	
IEEE1528 Target:	10.8	**(W/kg)**
Measurement Uncertainty (k=1):	9.0%	
Measurement Period:	*3-June-05 to 10-May-06*	
# of tests performed:	1571	
Grand Average:	11.3	**(W/kg)**
% Delta (Average - IEEE1528 Target)	4.3%	
Is % Delta <= Expanded Measurement Uncertainty (k=2)?	**Yes**	
Accept/Reject Average as new system performance check target?	**ACCEPT**	
	Applies to Dipole SN's: 55, 69, 77, 78, 79, 80, 91, 92, 93, 94, 95, 96, 97	

-New System Performance Check Targets- per WI-0396
(based on analysis of historical data)

Frequency	SAR Target (W/kg)	Permittivity	Conductivity (S/m)
900MHz	**11.3**	41.5 ± 5%	0.97 ± 5%

-Approvals-

Submitted by: Marge Kaunas Date: 12-May-06

Signed: Marge Kaunas

Comments: Spreadsheet detailing referenced historical measurements is available upon request.

Approved by: Mark Douglas **Date:** 22-May-06

Signed: Mark Douglas

Comments: