TEST REPORT

TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: D22CS1

To: OET Bulletin 65 Supplement C: (2001-01)

IEEE 1528: 2003

FCC ID: UCE112056A

Test Report Serial No:
RFI-SAR-RP89460JD03A V3.0

Version 3.0 Supersedes All Previous Versions

This Test Report Is Issued Under The Authority Of Chris Guy, Head of Global Approvals:	(APPROVED SIGNATORY)
Checked By: Richelieu Quoi	(APPROVED SIGNATORY)
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Test Dates:	**08 August to 10 August 2012**

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1. Customer Information

Company Name:	Panasonic Mobile Comms Dev of Europe Ltd
Address:	Panasonic House Willoughby Road Bracknell Berkshire RG12 8FP United Kingdom

2. Equipment Under Test (EUT)

2.1. Identification of Equipment Under Test (EUT)

Description:	Single Mode UMTS Mobile Phone
Brand Name:	NTT docomo
Model Name or Number:	D22CS1
Serial Number:	None Stated
IMEI Number:	353008050015094
Hardware Version Number:	Rev C
Software Version Number:	ACPU: B-D22CS1-01.02.001 CCPU: D22CS1_Cv18102002
Hardware Revision of GSM Module:	Not Applicable
Software Revision of GSM Module:	Not Applicable
FCC ID Number:	UCE112056A
Country of Manufacture:	Japan
Date of Receipt:	05 August 2012

Note(s):

This sample was used to perform WWAN 3G SAR evaluation only.

Description:	Single Mode UMTS Mobile Phone
Brand Name:	NTT docomo
Model Name or Number:	D22CS1
Serial Number:	None Stated
IMEI Number:	353008050015102
Hardware Version Number:	Rev C
Software Version Number:	ACPU: B-D22CS1-01.02.001 CCPU: D22CS1_Cv18102002
Hardware Revision of GSM Module:	Not Applicable
Software Revision of GSM Module:	Not Applicable
FCC ID Number:	UCE112056A
Country of Manufacture:	Japan
Date of Receipt:	05 August 2012

Note(s):

This Sample was used to perform WWAN 3G conducted power measurements only. The build of the sample is identical to the sample used for SAR testing.

2.2. Description of EUT

The equipment under test is a single mode mobile handset operating in the UMTS FDD 850 with HSDPA release 5 and HSUPA release 6 support capabilities.

2.3. Modifications Incorporated in the EUT

EUT (IMEI: 353008050015094) was setup for WWAN 3G SAR test only
EUT (IMEI: 353008050015102) was used for WWAN 3G conducted power measurements only

2.4. Accessories

The following accessories were supplied with the EUT during testing:

Description:	Battery
Brand Name:	NTT docomo
Model Name or Number:	P23
Serial Number:	None Stated
Cable Length and Type:	Not Applicable
Country of Manufacture:	None Stated
Connected to Port	3 point contact

Description:	Stereo Personal Hands-Free (PHF Kit)
Brand Name:	NTT docomo
Model Name or Number:	P01
Serial Number:	None Stated
Cable Length and Type:	~1.5m / multi-core
Country of Manufacture:	None Stated
Connected to Port	AV Out Port Unique to Manufacturer

Description:	2GB Micro-SD Memory Card
Brand Name:	Generic
Model Name or Number:	None Stated
Serial Number:	None Stated
Cable Length and Type:	Not applicable
Country of Manufacture:	None Stated
Connected to Port	Dedicated micro-SD card port

2.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Wireless Communication Test Set
Brand Name:	Agilent
Model Name or Number:	8960 Series 10
Serial Number:	GB46311280
Cable Length and Type:	~4.0m Utiflex Cable
Connected to Port:	RF (Input / Output) Air Link

2.6. Additional Information Related to Testing

Equipment Category	UMTS FDD V		
Type of Unit	Portable Transceiver		
Intended Operating Environment:	Within UMTS Coverage		
Transmitter Maximum Output Power Characteristics:	UMTS Band V	Communication Test Set configured to allow to EUT to transmit at a maximum power as per KDB 941225 D01.	
Transmitter Frequency Range:	UMTS Band V	826 to 847 MHz	
Transmitter Frequency Allocation of EUT When Under Test:	**Channel Number**	**Channel Description**	**Frequency (MHz)**
	4132	Low	826.4
	4183	Middle	836.6
	4233	High	846.6
Modulation(s):	QPSK(UMTS / HSDPA/HSPA):0Hz		
Modulation Scheme (Crest Factor):	QPSK(UMTS FDD / HSDPA): 1		
Antenna Type:	Internal integral		
Antenna Length:	Unknown		
Number of Antenna Positions:	1 integral antenna		
Power Supply Requirement:	3.7V		
Battery Type(s):	Li-ion		

3. Test Specification, Methods and Procedures

3.1. Test Specification

Reference:	OET Bulletin 65 Supplement C: (2001-01)
Title:	Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.
Purpose of Test:	To determine whether the equipment met the basic restrictions as defined in OET Bulletin 65 Supplement C: (2001-01) using the SAR averaging method as described in the test specification above.

3.2. Methods and Procedures Reference Documentation

The methods and procedures used were as detailed in:

Federal Communications Commission, “Evaluating compliance with FCC Guidelines for human exposure to radio frequency electromagnetic fields”, OET Bulletin 65 Supplement C, FCC, Washington, D.C, 20554, 2001.

Thomas Schmid, Oliver Egger and Neils Kuster, “Automated E-field scanning system for dosimetric assessments”, IEEE Transaction on microwave theory and techniques,
Vol. 44, pp. 105-113, January 1996.

Neils Kuster, Ralph Kastle and Thomas Schmid, “Dosimetric evaluation of mobile communications equipment with know precision”, IEICE Transactions of communications, Vol. E80-B, No.5, pp. 645-652, May 1997.

KDB 447498 D01 “Mobile Portable RF Exposure v04”

KDB 450824 D01 ‘’SAR Prob Cal and Ver Meas v01r01’’

KDB 941225 D01 "SAR test for 3G v02"

The version of DASY system used by RFI for SAR measurements is v4.7.

The SAR probe for the DASY v4.4 and higher has a validity of +/- 100 MHz from the spot frequency at which the system is calibrated.

The system validation performed at 900 MHz is valid for 800 MHz to 1000 MHz which covers the 850 MHz band. The probe calibration for SN3814 was performed at the spot frequencies of 750 MHz and 900 MHz. The SAR software selects the conversion factor based on the following attributes; 1. The operating frequency 2. The measured permittivity imported to the software and 3. The measured conductivity imported to the software.

The 900 MHz system check is applicable for the 850 band as this is within 100 MHz of the of the 850 MHz spot frequency.

As per FCC KDB pub 450824 for SAR probe calibration; The following procedures are recommended for DUT measurements at 150 MHz to 3 GHz to minimize probe calibration and tissue dielectric parameter discrepancies. Measurements exceeding 50 % of these intervals, in this case +/- 50 MHz, EUT frequency greater than or equal to 300 MHz, shall apply method 1 of the steps.
1) When the actual tissue dielectric parameters used for probe calibration are available the differences for relative permittivity and conductivity between probe calibration and routine measurements should each be less than or equal to 5 % while also satisfying the required +/- 5 % tolerances in target dielectric parameters.

The simulation liquid used satisfies both 835 MHz and 900 MHz target values for all channels in the GSM850 band. The SAR probe coverage and conversion factor has been calibrated to ensure this condition is met and the appropriate conversion factor is used in the frequency range for up to +/- 100 MHz.

3.3. Definition of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the methods & procedures section above. Appendix 1 contains a list of the test equipment used.

4. Deviations from the Test Specification

Test was performed as per “KDB 447498 D01 Mobile Portable RF Exposure v04”, KDB 941225 D01 "SAR test for 3G v02" and according to the handset procedures in IEEE Std 1528-2003, OET Bulletin 65 Supplement C 01-01 and the specific FCC test procedures.

SAR test was performed in the middle channel only for WWAN as the measured levels were < 50% of the SAR limit as stated in the FCC Public Notice DA 02-1438 by the SCC-34/SC-2.

Some points in the ‘Touch Right’ position could not be fully evaluated therefore the zoom scan was unable to fully enclose the peak SAR location as required by IEEE 1528 and OET Bulletin 65 Supplement C. This scan is repeated in the Mouth/Jaw configuration on the flat section of the ‘SAM’ phantom.

The phone was positioned with the hinge against a smooth edge of the flat phantom where the upper half of the phone was unfolded and extended beyond the phantom side wall. The lower half of the phone was secured in the test device holder at a fixed distance.

5. Operation and Configuration of the EUT during Testing

5.1. Operating Modes

The EUT was tested in the following operating mode(s) unless otherwise stated:

- SAR test and conducted power measurements was performed: UMTS FDD V Call allocated mode with Communication Test Set configured to allow the EUT to transmit at a maximum as per KDB 941225 D01.
- Conducted power measurements was performed: UMTS FDD V - RMC 12.2kbps + HSUPA with Test loop mode 1 and TPC bits configured to all "1's", Sub-test 1 to Sub-test 5, AG Index set as per KDB 941225 D01 with Communication Test Set configured to allow to EUT to transmit at a maximum power.
- Conducted power measurements was performed: UMTS FDD V - RMC 12.2kbps + HSDPA with Test loop mode 1 and TPC bits configured to all "1's", Sub-test 1 to Sub-test 4 with Communication Test Set configured to allow to EUT to transmit at a maximum power as per KDB 941225 D01.
- Wireless Personal Hotspot mode is not supported by this EUT.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration(s) unless otherwise stated:

- Test performed with the EUT in a Standalone Battery Powered configuration.
- The applied configurations for body-worn orientations where the corresponding edge(s) is closest to the user with the most conservative exposure condition were all evaluated at 15 mm from the body.

Head Configuration

a) The handset was placed in a normal operating position with the centre of the ear-piece aligned with the ear canal on the phantom.

b) With the ear-piece touching the phantom the centre line of the handset was aligned with an imaginary plane (X and Y axis) consisting of three lines connecting both ears and the mouth.

c) For the cheek position the handset was gradually moved towards the cheek until any point of the mouth-piece or keypad touched the cheek.

d) For the tilted position the EUT was positioned as for the cheek position, and then the horizontal angle was increased by fifteen degrees (the phone keypad was moved away from the cheek by fifteen degrees).

e) SAR measurements were evaluated at maximum power and the unit was operated for an appropriate period prior to the evaluation in order to minimise the drift.

f) The device was keyed to operate continuously in the transmit mode for the duration of the test.

g) The location of the maximum spatial SAR distribution (hot spot) was determined relative to the handset and its antenna.

h) The EUT was transmitting at full power throughout the duration of the test powered by a fully charged battery.

Body Configuration

a) The EUT was placed in a normal operating position where the centre of EUT was aligned with the centre reference point on the flat section of the ‘SAM’ phantom.

b) With the EUT touching the phantom at an imaginary centre line. The EUT was aligned with a marked plane (X and Y axis) consisting of two lines.

c) For the touch-safe position the handset was gradually moved towards the flat section of the ‘SAM’ phantom until any point of the EUT touched the phantom.

d) For position(s) greater then 0mm separation the EUT was positioned as per the touch-safe position, and then the vertical height was decreased/adjusted as required.

e) SAR measurements were evaluated at maximum power and the unit was operated for an appropriate period prior to the evaluation in order to minimise the drift.

f) The device was keyed to operate continuously in the transmit mode for the duration of the test.

g) The location of the maximum spatial SAR distribution (hot spot) was determined relative to the handset and its antenna.

h) The EUT was transmitting at full power throughout the duration of the test powered by a fully charged battery

6. Summary of Test Results

Test Name	Specification Reference	Result
Specific Absorption Rate-UMTS-FDD V Head Configuration 1g	OET Bulletin 65 Supplement C: (2001-01)	Complied
Specific Absorption Rate-UMTS-FDD V Body-Worn Configuration 1g	OET Bulletin 65 Supplement C: (2001-01)	Complied

Note(s):

Simultaneous transmission was not evaluated as the EUT does not support this feature.

Wireless Personal Hotspot mode is not supported by this EUT.

Summary of Test Results Measured and Scaled value to maximum tolerance

SAR Scale-Up Worst case Configuration Measurements per mode:

1g SAR

Technology Mode	Configuration	Channel Number	Mode	Meas output power [1] [mW]	Max Rated Power[2] [mW]	Measured SAR(W/kg)	**Calculated Scaled SAR(W/kg)**
						1g mass	**1g mass**
UMTS FDD V	Head	4183	Data	199.5	281.8	0.492	**0.695**
	Body	4183	Data	199.5	281.8	0.535	**0.756**

*Maximum tolerance:
UMTS FDD V:（ +0.5dB）

*Maximum rated power:
UMTS FDD V:24.0 dBm (~ 281.8 mW)

Note(s):

1. Meas output power (Source Base average power) level measured by RFI.
2. Max Rated power (Source Base average power) level supplied by manufacturer plus tolerance.
3. Measured SAR value measured by RFI.
4. The “Maximum Rated Power’’ was provided by the customer.

6.1. Location of Tests

All the measurements described in this report were performed at the premises of
RFI Global Services Ltd, Pavilion A, Ashwood Park, Ashwood Way, Basingstoke, Hampshire, RG23 8BG United Kingdom

7. Measurements, Examinations and Derived Results

7.1. General Comments

This section contains test results only.

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to section 8 for details of measurement uncertainties.

7.2. Test Results

For All SAR measurement in this report the SAR limit tested to is 1.6 W/kg

7.2.1.Specific Absorption Rate - UMTS-FDD V Head Configuration 1g

Test Summary:

Tissue Volume:	1g
Maximum Level (W/kg):	0.492

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	24.0 to 24.0

Results:

EUT Position	Phantom Configuration	Channel Number	Meas. Avg. Power (dBm)	Power Back Off (dB)	Meas. Level (W/Kg)	Note(s)	Mod.
Touch	Left	4183	23.0	N/A	0.492	1	QPSK
Tilt	Left	4183	23.0	N/A	0.198	1	QPSK
Mouth/ Jaw	Flat (SAM)	4183	23.0	N/A	0.429	1, 2, 3	QPSK
Tilt	Right	4183	23.0	N/A	0.190	1	QPSK

Note(s):

1. Circuit Switch (CS) - RMC 12.2kbps with Test loop mode 1 and TPC bits configured to All "1's"
2. Some points in the ‘Touch Right’ position could not be fully evaluated therefore the zoom scan was unable to fully enclose the peak SAR location as required by IEEE 1528 and OET Bulletin 65 Supplement C. This scan is repeated in the Mouth/Jaw configuration on the flat section of the ‘SAM’ phantom.
3. The phone was positioned with the hinge against a smooth edge of the flat phantom where the upper half of the phone was unfolded and extended beyond the phantom side wall. The lower half of the phone was secured in the test device holder at a fixed distance.

*KDB 941225 - SAR is not required for RMC+HSPA (HSDPA/HSUPA) channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding RMC channels.

7.2.2.Specific Absorption Rate - UMTS-FDD V Body-Worn Configuration 1g Test Summary:

Tissue Volume:	1g
Maximum Level (W/kg):	0.535
Environmental Conditions:	
Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.4 to 23.4

Results:

EUT Position	Phantom Configuration	Channel Number	Meas. Avg. Power (dBm)	Power Back Off (dB)	Meas. Level (W/Kg)	Note(s)	Mod.
Front of EUT Open Facing Phantom	Flat (SAM)	4183	23.0	N/A	0.327	1, 2	QPSK
Front of EUT Close Facing Phantom	Flat (SAM)	4183	23.0	N/A	0.249	1, 2	QPSK
Rear of EUT Open Facing Phantom	Flat (SAM)	4183	23.0	N/A	0.535	1, 2	QPSK
Rear of EUT Close Facing Phantom	Flat (SAM)	4183	23.0	N/A	0.512	1, 2	QPSK
Rear of EUT Open Facing Phantom With PHF	Flat (SAM)	4183	23.0	N/A	0.460	1, 2, 3	QPSK

Note(s):

1. Packet Switch (PS) - RMC 12.2kbps with Test loop mode 1 and TPC bits configured to All "1's"
2. SAR measurements were performed with the closest edge of the EUT at a separation distance of 15mm from the 'SAM' phantom flat section.
3. Personal Hands-Free Kit attached, using the worst-case configuration acquired.

   *KDB 941225 - SAR is not required for RMC+HSPA (HSDPA/HSUPA) channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding RMC channels.

7.2.3.Conducted Average Power Measurement 3G:

Manufacturer Maximum Rated Average Power + Upper Tolerance = 24.5 dBm

Device has been setup in test mode to allow it to transmit up to the maximum rate tolerance level. Maximum SAR level will be scaled to maximum tolerance level if test mode measured level is out of range.

Modes		HSDPA				HSPA					WCDMA
Sets		1	2	3	4	1	2	3	4	5	Voice / RMC 12.2kbps
Band	Channel	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]
850 (Band V)	4132 4357	22.9	22.9	22.8	22.9	21.0	21.0	21.0	21.0	21.0	23.0
	4183 4408	23.0	23.0	22.9	22.9	21.1	21.1	21.1	21.1	21.1	23.0
	4233 4458	23.1	23.0	23.0	23.0	21.2	21.2	21.2	21.2	21.2	23.1
Modes		HSDPA				HSPA					WCDMA
Sets		1	2	3	4	1	2	3	4	5	Voice / RMC 12.2kbps
ßc		2	12	15	15	11	6	15	2	15	
ßd		15	15	8	4	15	15	9	15	15	
ΔACK, ΔNACK, ΔCQI		8	8	8	8	8	8	8	8	8	
AGV		-	-	-	-	20	12	15	17	21	

The module power levels were measured in both HSPA and 3G RMC 12.2kbps modes and compared to ensure the correct mode of operation had been established.

The following tables taken from FCC 3G SAR procedures (KDB 941225 D01 SAR test for 3G devices v02) below were applied using an Agilent 8960 series 10 wireless communications test set which supports 3G / HSDPA release 5 / HSPA release 6.

Sub-test Setup for Release 5 HSDPA

Sub-test	β_c	β_d	B_d *(SF)*	β_c/β_d	β_{hs} (1)	SM (dB) (2)
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15 (3)	15/15 (3)	64	12/15 (3)	24/15	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $B_{hs}/\beta_c = 24/15$

Note 3: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$

Sub-test Setup for Release 6 HSPA

Sub-test	β_c	β_d	B_d *(SF)*	β_c/β_d	β_{hs} (1)	B_{oc}	B_{od}	B_{od} *(SF)*	B_{od} *(codes)*	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	31/15	B_{al1}: 47/15 B_{al2}: 47/15	4	1	2.0	1.0	15	92
4	2/15	15/15	64	2/15	2/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (4)	15/15 (4)	64	15/15 (4)	24/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $B_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH AND E-DPCCH for the MPR is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$.

Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$.

Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Tavle 5.1g.

Note 6: B_{od} can not be set directly; it is set by Absolute Grant Value.

8. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Test Name	Confidence Level	Calculated Uncertainty
Specific Absorption Rate- UMTS FDD V Head Configuration 1g	95%	19.38
Specific Absorption Rate- UMTS FDD V / HSPA Body Configuration 1g	95%	19.51

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

8.1. Specific Absorption Rate- UMTS FDD V Head Configuration 1g

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	$c_{i\ (10g)}$	Standard Uncertainty		υ_i or υ_{eff}
							+ u (%)	- u (%)	
B	Probe calibration	5.500	5.500	normal (k=1)	1.0000	1.0000	5.500	5.500	∞
B	Axial Isotropy	0.250	0.250	normal (k=1)	1.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	1.300	1.300	normal (k=1)	1.0000	1.0000	1.300	1.300	∞
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	∞
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	∞
B	Linearity	0.600	0.600	Rectangular	1.7321	1.0000	0.346	0.346	∞
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	∞
B	Readout Electronics	0.160	0.160	normal (k=1)	1.0000	1.0000	0.160	0.160	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	1.730	1.730	Rectangular	1.7321	1.0000	0.999	0.999	∞
B	RF Ambient conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	∞
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Probe Positioning with regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	∞
B	Extrapolation and integration / Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	∞
A	Test Sample Positioning	2.400	2.400	normal (k=1)	1.0000	1.0000	2.400	2.400	10
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Drift of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	0.6400	1.848	1.848	∞
A	Liquid Conductivity (measured value)	4.920	4.920	normal (k=1)	1.0000	0.6400	3.149	3.149	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	4.970	4.970	normal (k=1)	1.0000	0.6000	2.982	2.982	5
	Combined standard uncertainty			t-distribution			9.89	9.89	>200
	Expanded uncertainty			k = 1.96			19.38	19.38	>200

8.2. Specific Absorption Rate- UMTS FDD V / HSPA Body Configuration 1g

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	$c_{i\ (10g)}$	Standard Uncertainty		υ_i or υ_{eff}
							+ u (%)	- u (%)	
B	Probe calibration	5.500	5.500	normal (k=1)	1.0000	1.0000	5.500	5.500	∞
B	Axial Isotropy	0.250	0.250	normal (k=1)	1.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	1.300	1.300	normal (k=1)	1.0000	1.0000	1.300	1.300	∞
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	∞
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	∞
B	Linearity	0.600	0.600	Rectangular	1.7321	1.0000	0.346	0.346	∞
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	∞
B	Readout Electronics	0.160	0.160	normal (k=1)	1.0000	1.0000	0.160	0.160	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	1.730	1.730	Rectangular	1.7321	1.0000	0.999	0.999	∞
B	RF Ambient conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	∞
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Probe Positioning with regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	∞
B	Extrapolation and integration /Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	∞
A	Test Sample Positioning	2.900	2.900	normal (k=1)	1.0000	1.0000	2.900	2.900	10
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Drift of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	0.6400	1.848	1.848	∞
A	Liquid Conductivity (measured value)	4.690	4.690	normal (k=1)	1.0000	0.6400	3.002	3.002	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	4.860	4.860	normal (k=1)	1.0000	0.6000	2.916	2.916	5
	Combined standard uncertainty			t-distribution			9.96	9.96	>250
	Expanded uncertainty			k = 1.96			19.51	19.51	>250

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A034	Narda 20W Termination	Narda	374BNM	8706	Calibrated as part of system	-
A1097	SMA Directional Coupler	MiDISCO	MDC6223-30	None	Calibrated as part of system	-
A1137	3dB Attenuator	Narda	779	04690	Calibrated as part of system	-
A1174	Dielectric Probe Kit	Agilent Technologies	85070C	Us99360072	Calibrated before use	-
A1328	Handset Positioner	Schmid & Partner Engineering AG	Modification	SD 000 H01 DA	-	-
A1182	Handset Positioner	Schmid & Partner Engineering AG	V3.0	None	-	-
A2111	Data Acquisition Electronics	Schmid & Partner Engineering AG	DAE3	432	02 May 2012	12
A2077	Probe	Schmid & Partner Engineering AG	EX3 DV4	3814	22 Sep 2011	12
A1235	900 MHz Dipole Kit	Schmid & Partner Engineering AG	D900V2	124	09 Feb 2011	24
A1497	Amplifier	Mini-Circuits	zhl-42w (sma)	e020105	Calibrated as part of system	-
A1566	SAM Phantom	Schmid & Partner Engineering AG	SAM a (Site 56)	002	Calibrated before use	-
A1238	SAM Phantom	Schmid & Partner Engineering AG	SAM b (Site 56)	001	Calibrated before use	-
A2125	SAM Phantom	Schmid & Partner Engineering AG	SAM b (Site 57)	TP-1031	Calibrated before use	-
A2124	SAM Phantom	Schmid & Partner Engineering AG	SAM a (Site 57)	TP-1030	Calibrated before use	-
A215	20 dB Attenuator	Narda	766-20	9402	Calibrated as part of system	-
A1531	Antenna	AARONIA AG	7025	02458	-	-
M1015	Network Analyser	Agilent Technologies	8753ES	US39172406	27 Sept 2011	12
C1145	Cable	Rosenberger MICRO-COAX	FA147A F003003030	41843-1	Calibrated as part of system	-
C1146	Cable	Rosenberger MICRO-COAX	FA147A F030003030	41752-1	Calibrated as part of system	-
G0528	Robot Power Supply	Schmid & Partner Engineering AG	DASY4	None	Calibrated before use	-

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
G087	PSU	Thurlby Thandar	CPX200	100701	Calibrated before use	-
M1047	Robot Arm	Staubli	RX908 L	F00/SD8 9A1/A/01	Calibrated before use	-
M1653	Robot Arm	Staubli	RX908 L	F01/5J8 6A1/C/01	Calibrated before use	-
M1159	Signal Generator	Agilent Technologies	E8241A	US42110332	Internal Checked 14 Apr 2012	4
M1071	Spectrum Analyzer	Agilent	HP8590E	3647U00514	(Monitoring use only)	-
M1270	Digital Thermometer	RS	N/A	N/A	Internal Checked 13 May 2012	12
S256	SAR Lab	RFI	Site 56	N/A	Calibrated before use	-

Note: All the assets were in calibration during the course of testing.

A.1.1. Calibration Certificates

This section contains the calibration certificates and data for the Probe(s) and Dipole(s) used, which are not included in the total number of pages for this report.

The following information is justification to why the listed dipoles calibration period has been extended. This address FCC KDB 450824 D02

Cal Date	Dipole Calibration History									
	Dipole SN: 124, Frequency 900 MHz									
	Head Parameters					Body Parameters				
	1g (W/Kg)	10g (W/Kg)	Return loss (dB)	Real (Ω)	Imaginary (Ω)	1g (W/Kg)	10g (W/Kg)	Return loss (dB)	Real (Ω)	Imaginary (Ω)
27-Jun-12	Lab Annual Check of dipole		-24.73	49.56	-7.4	Lab Annual Check of dipole		-21.92	48.18	-8.03
09-Feb-11	11.00	7.01	-21.60	48.90	-8.20	11.10	7.14	-20.20	46.10	-8.60
23-Aug-07	10.20	6.56	-21.20	48.60	-8.50	10.50	6.89	-20.20	45.40	-8.10
31-Aug-05	10.60	6.78	-24.70	49.10	-5.70	10.50	6.77	-18.90	44.90	-8.90
13-May-03	10.60	6.76	-24.00	50.30	-6.40	11.00	7.12	-20.60	46.20	-8.20
03-Aug-01	11.28	7.16	-25.40	50.80	-5.60	Dipole calibrated for Head only				
Standard Deviation	**0.42**	**0.23**	**1.77**	**0.85**	**1.25**	**0.32**	**0.18**	**1.08**	**1.25**	**0.37**
|Mean Value|	**10.74**	**6.85**	**23.61**			**10.78**	**6.98**	**20.36**		
Relative standard deviation %	**3.87%**	**3.41%**	**7.49%**			**2.97%**	**2.58%**	**5.31%**		

Note:

1. SAR lab has more than one dipole, the 900 MHz calibration gap is 24 months from 2007 and a second dipole was use after this period.
2. The dipole history shows that the measured SAR relative standard deviation was all less than 10% for the calibration period. The return loss relative standard deviation was all less than 10 %. And the real and imaginary impedance standard deviation is within 5 **(Ω).**

27-SEPT-2011 Checked by K. [illegible]

ASSET: A2077

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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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 RFI

Certificate No: EX3-3814_Sep11

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3814

Calibration procedure(s): QA CAL-01.v8, QA CAL-12.v7, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: September 22, 2011

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	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Fin Bomholt	R&D Director	

Issued: September 22, 2011

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

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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:3814

Manufactured: September 2, 2011
Calibrated: September 22, 2011

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3814

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.52	0.51	0.44	± 10.1 %
DCP (mV)[B]	100.8	96.5	101.1	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	121.7	±2.7 %
			Y	0.00	0.00	1.00	115.0	
			Z	0.00	0.00	1.00	105.3	

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:3814

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)
450	43.5	0.87	9.55	9.55	9.55	0.12	1.00	± 13.4 %
750	41.9	0.89	9.26	9.26	9.26	0.80	0.67	± 12.0 %
900	41.5	0.97	8.75	8.75	8.75	0.71	0.73	± 12.0 %
1750	40.1	1.37	8.13	8.13	8.13	0.80	0.62	± 12.0 %
1900	40.0	1.40	7.78	7.78	7.78	0.80	0.61	± 12.0 %
2450	39.2	1.80	7.02	7.02	7.02	0.80	0.60	± 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.

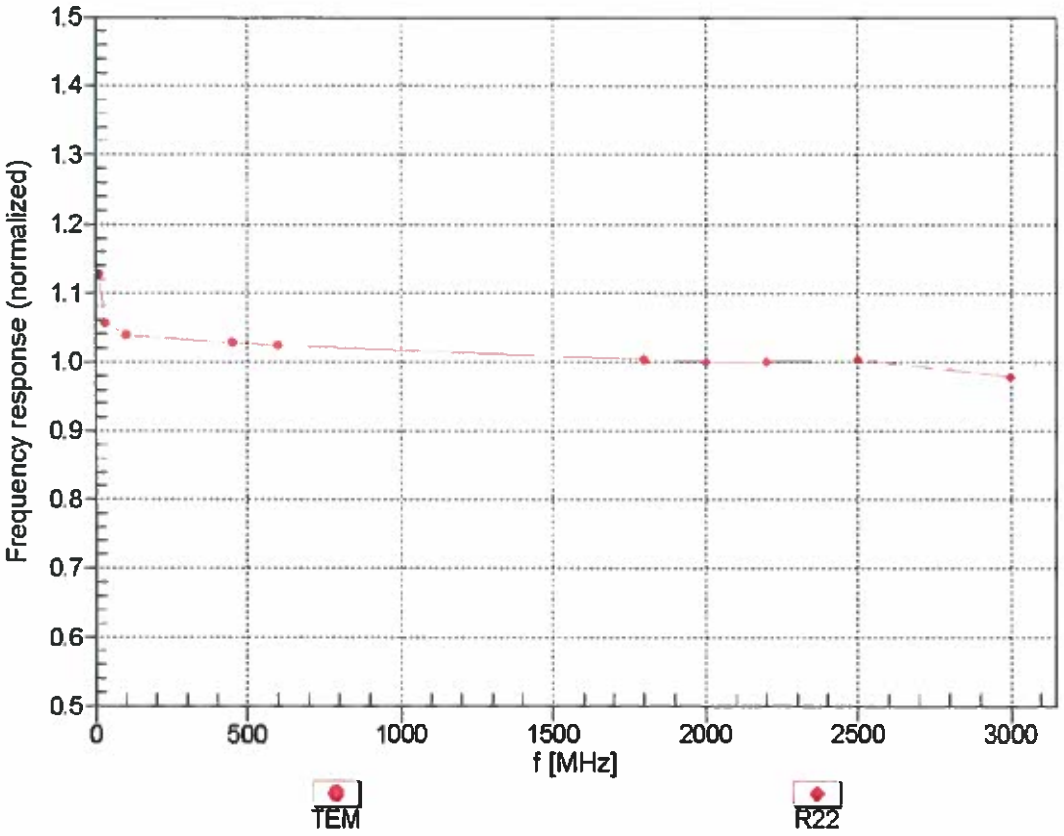
DASY/EASY - Parameters of Probe: EX3DV4 - SN:3814

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)
450	56.7	0.94	10.39	10.39	10.39	0.04	1.00	± 13.4 %
750	55.5	0.96	9.28	9.28	9.28	0.80	0.65	± 12.0 %
900	55.0	1.05	8.92	8.92	8.92	0.80	0.65	± 12.0 %
1750	53.4	1.49	7.58	7.58	7.58	0.80	0.67	± 12.0 %
1900	53.3	1.52	7.31	7.31	7.31	0.80	0.68	± 12.0 %
2150	53.1	1.66	7.38	7.38	7.38	0.80	0.65	± 12.0 %
2450	52.7	1.95	7.15	7.15	7.15	0.80	0.50	± 12.0 %
2600	52.5	2.16	7.02	7.02	7.02	0.80	0.50	± 12.0 %
3700	51.0	3.55	6.35	6.35	6.35	0.26	1.68	± 13.1 %
5200	49.0	5.30	4.19	4.19	4.19	0.60	1.95	± 13.1 %
5500	48.6	5.65	3.86	3.86	3.86	0.60	1.95	± 13.1 %
5800	48.2	6.00	3.94	3.94	3.94	0.60	1.95	± 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.

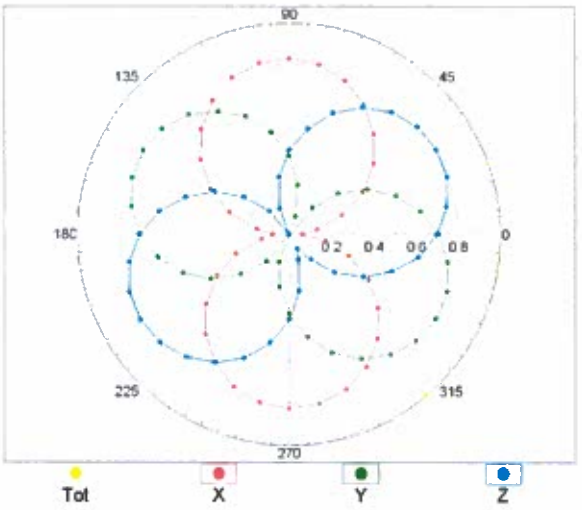
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



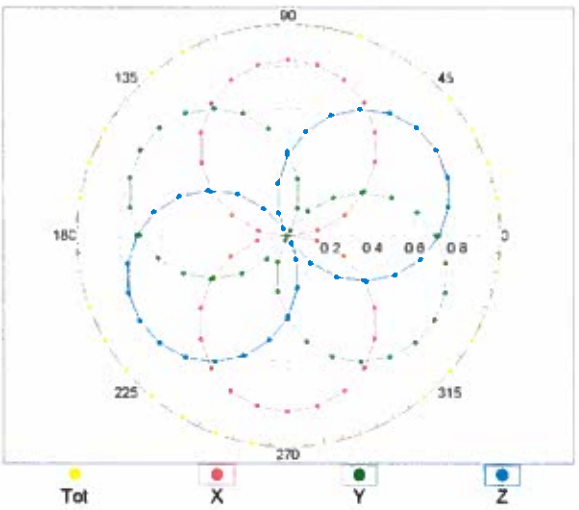
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

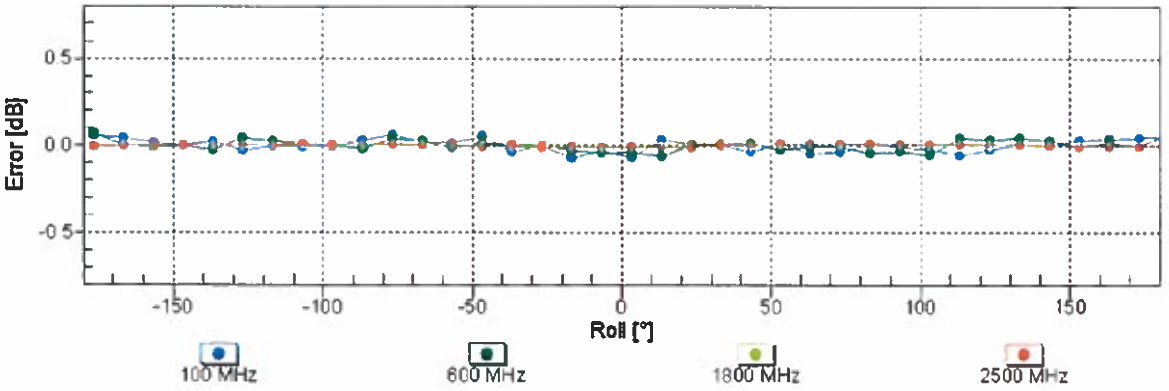
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



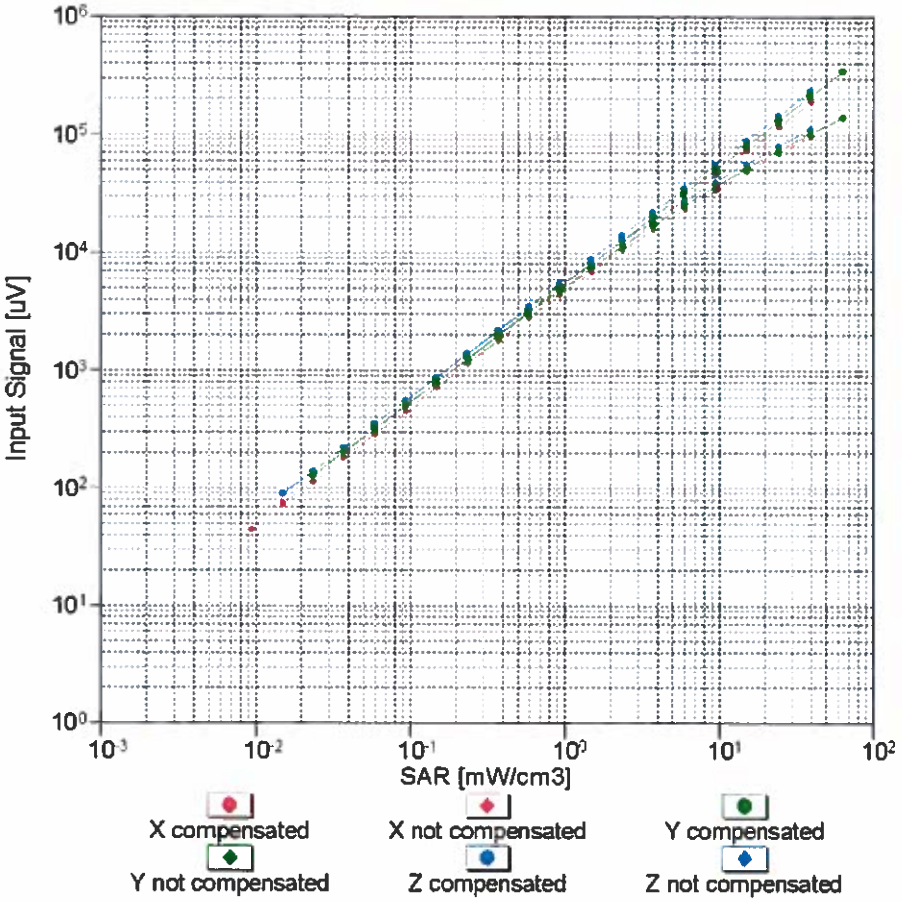
f=1800 MHz,R22

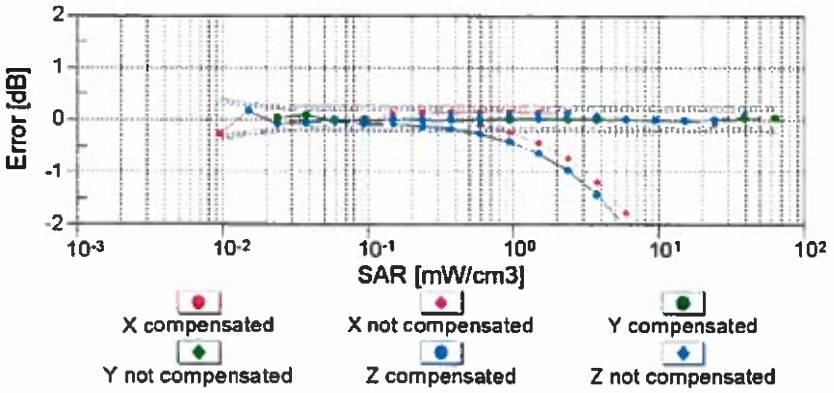




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

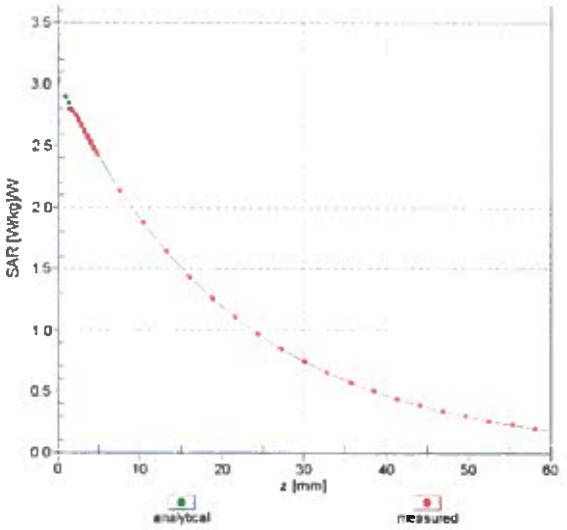




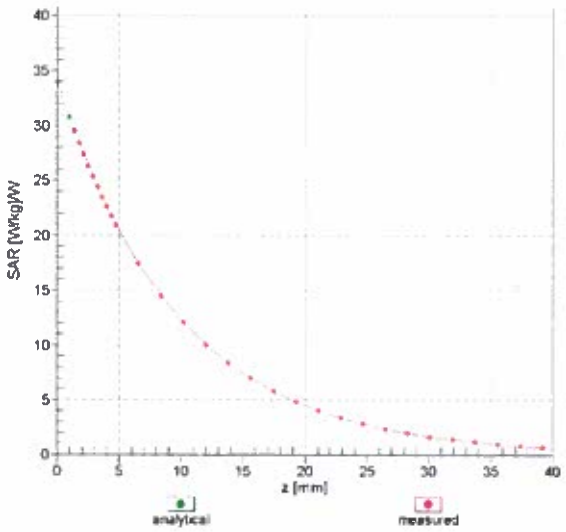
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 750 MHz,WGLS R9 (H_convF)

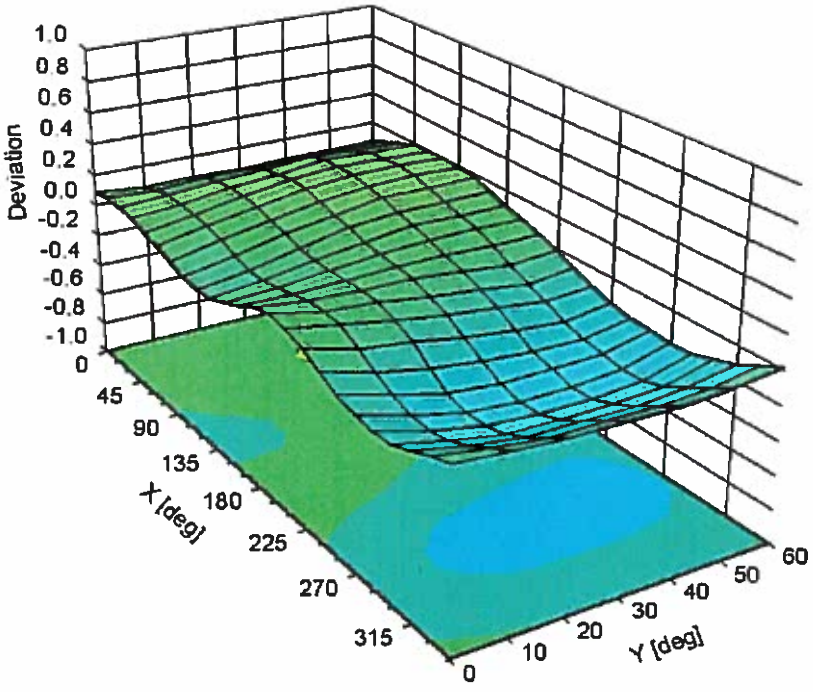


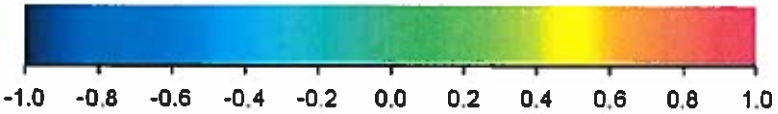
f = 2450 MHz,WGLS R22 (H_convF)



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:3814

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
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

ASSET: A1235 Checked by 21/02/2011

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Zeughausstrasse 43, 8004 Zurich, Switzerland

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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 RFI

Certificate No: D900V2-124_Feb11

CALIBRATION CERTIFICATE

Object: D900V2 - SN: 124

Calibration procedure(s): QA CAL-05.v8
Calibration procedure for dipole validation kits

Calibration date: February 09, 2011

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 EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	D. Iliev
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 9, 2011

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

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
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.2 °C	41.5	0.97 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.3 ± 6 %	0.95 mho/m ± 6 %
Head TSL temperature during test	(21.5 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.72 mW / g
SAR normalized	normalized to 1W	10.9 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**11.0 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.74 mW / g
SAR normalized	normalized to 1W	6.96 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**7.01 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.0	1.05 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.6 ± 6 %	1.05 mho/m ± 6 %
Body TSL temperature during test	(21.8 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.79 mW / g
SAR normalized	normalized to 1W	11.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**11.1 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.79 mW / g
SAR normalized	normalized to 1W	7.16 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**7.14 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.9 Ω - 8.2 jΩ
Return Loss	- 21.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.1 Ω - 8.6 jΩ
Return Loss	- 20.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.409 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 04, 2001

DASY5 Validation Report for Head TSL

Date/Time: 09.02.2011 11:44:15

Test Laboratory: SPEAG, Zurich, Switzerland

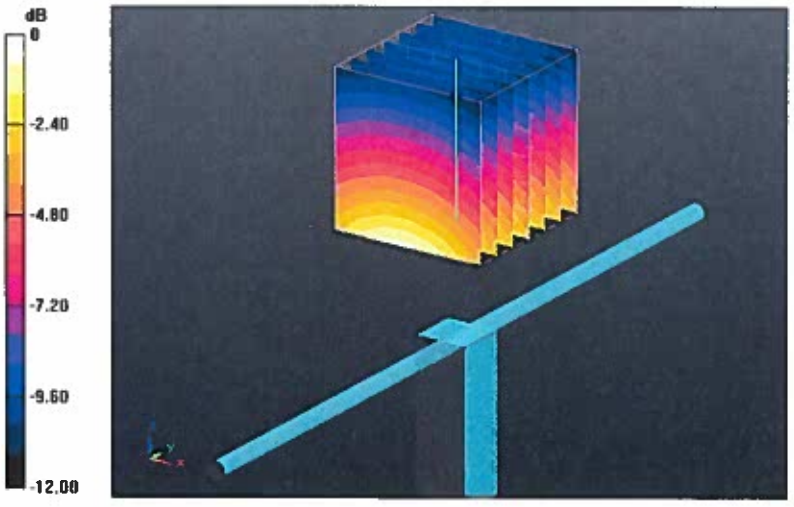
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:124

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium: HSL900
Medium parameters used: f = 900 MHz; σ = 0.95 mho/m; ε_r = 40.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

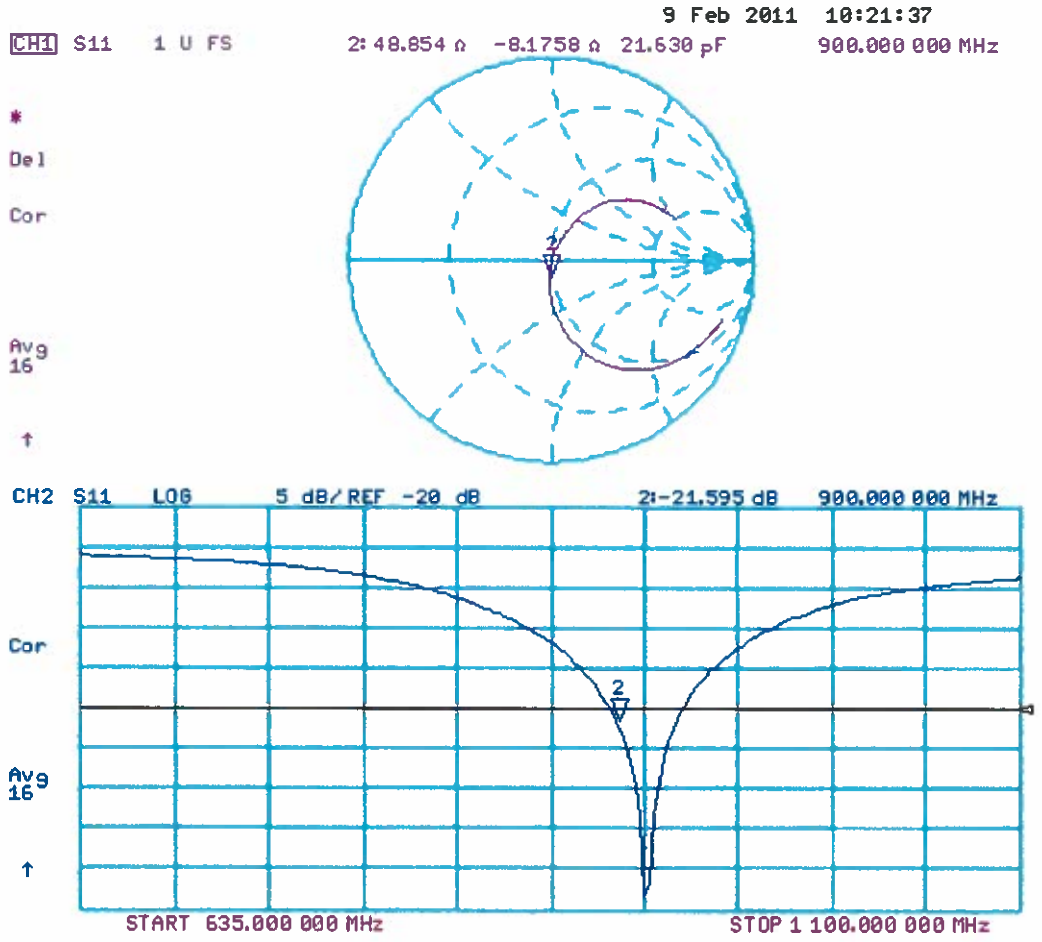
- Probe: ES3DV3 - SN3205; ConvF(5.88, 5.88, 5.88); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.560 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 4.135 W/kg
SAR(1 g) = 2.72 mW/g; SAR(10 g) = 1.74 mW/g
Maximum value of SAR (measured) = 3.183 mW/g



0 dB = 3.180mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date/Time: 09.02.2011 14:54:48

Test Laboratory: SPEAG, Zurich, Switzerland

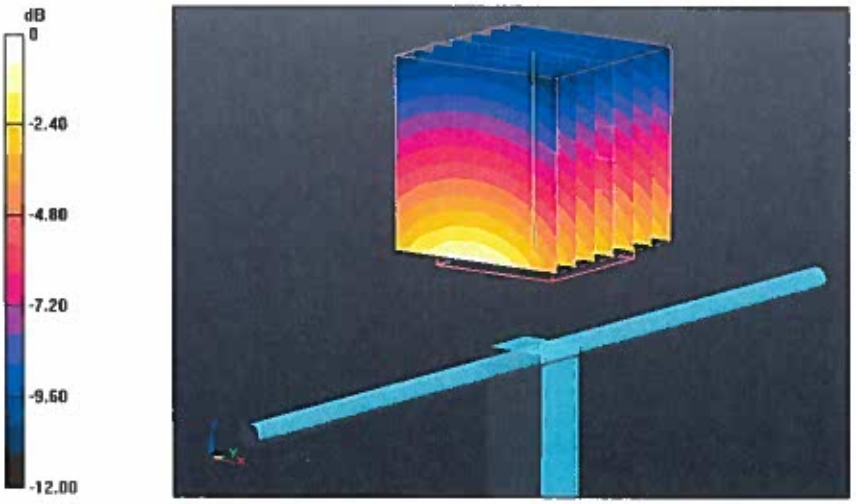
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:124

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium: M900
Medium parameters used: f = 900 MHz; σ = 1.05 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

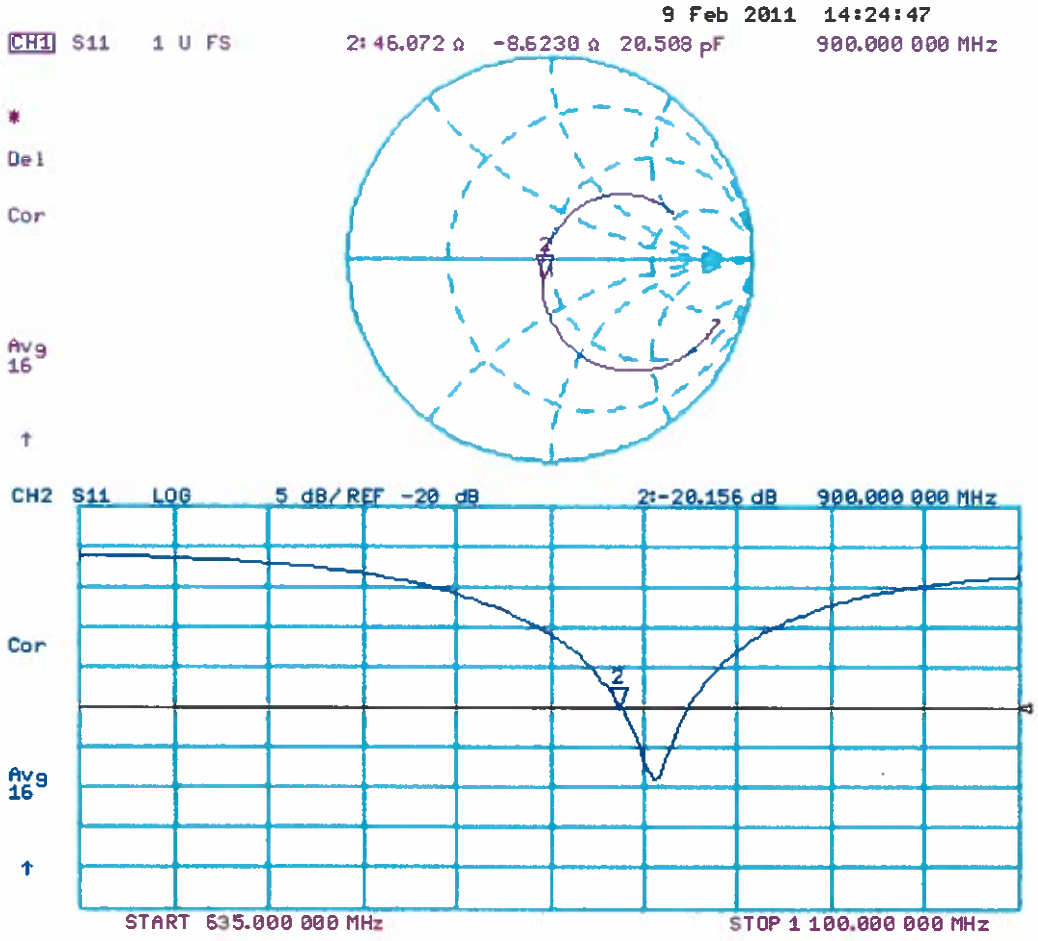
- Probe: ES3DV3 - SN3205; ConvF(5.81, 5.81, 5.81); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.520 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 4.203 W/kg
SAR(1 g) = 2.79 mW/g; SAR(10 g) = 1.79 mW/g
Maximum value of SAR (measured) = 3.271 mW/g



0 dB = 3.270mW/g

Impedance Measurement Plot for Body TSL



Appendix 2. Measurement Methods

A.2.1. Evaluation Procedure

The Specific Absorption Rate (SAR) evaluation was performed in the following manner:

a) (i) The evaluation was performed in an applicable area of the phantom depending on the type of device being tested. For devices worn about the ear during normal operation, both the left and right ear positions were evaluated at the centre frequency of the band at maximum power. The side, which produced the greatest SAR, determined which side of the phantom would be used for the entire evaluation. The positioning of the head worn device relative to the phantom was dictated by the test specification identified in section 3.1 of this report.

(ii) For body worn devices or devices which can be operated within 20 cm of the body, the flat section of the SAM phantom was used were the size of the device(s) is normal. for bigger devices and base station the 2mm Oval phantom is used for evaluation. The type of device being evaluated dictated the distance of the EUT to the outer surface of the phantom flat section.

b) The SAR was determined by a pre-defined procedure within the DASY4 software. The exposed region of the phantom was scanned near the inner surface with a grid spacing of 20mm x 20mm or appropriate resolution.

c) A 5x5x7 matrix was performed around the greatest spatial SAR distribution found during the area scan of the applicable exposed region. SAR values were then calculated using a 3-D spline interpolation algorithm and averaged over spatial volumes of 1 and 10 grams.

d) If the EUT had any appreciable drift over the course of the evaluation, then the EUT was re-evaluated. Any unusual anomalies over the course of the test also warranted a re-evaluation.

Appendix 3. Measurement Methods

A.3.2. Evaluation Procedure

The Specific Absorption Rate (SAR) evaluation was performed in the following manner:

b) (i) The evaluation was performed in an applicable area of the phantom depending on the type of device being tested. For devices worn about the ear during normal operation, both the left and right ear positions were evaluated at the centre frequency of the band at maximum power. The side, which produced the greatest SAR, determined which side of the phantom would be used for the entire evaluation. The positioning of the head worn device relative to the phantom was dictated by the test specification identified in section 3.1 of this report.

(ii) For body worn devices or devices which can be operated within 20 cm of the body, the flat section of the SAM phantom was used were the size of the device(s) is normal. for bigger devices and base station the 2mm Oval phantom is used for evaluation. The type of device being evaluated dictated the distance of the EUT to the outer surface of the phantom flat section.

b) The SAR was determined by a pre-defined procedure within the DASY4 software. The exposed region of the phantom was scanned near the inner surface with a grid spacing of 20mm x 20mm or appropriate resolution.

c) A 5x5x7 matrix was performed around the greatest spatial SAR distribution found during the area scan of the applicable exposed region. SAR values were then calculated using a 3-D spline interpolation algorithm and averaged over spatial volumes of 1 and 10 grams.

e) If the EUT had any appreciable drift over the course of the evaluation, then the EUT was re-evaluated. Any unusual anomalies over the course of the test also warranted a re-evaluation.

A.3.3. Specific Absorption Rate (SAR) Measurements to OET Bulletin 65 Supplement C: (2001-01)

Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields

SAR measurements were performed in accordance with Appendix D of the standard FCC OET Bulletin 65 Supplement C: 2001, IEEE 1528 and FCC KDB procedures, against appropriate limits for each measurement position in accordance with the standard. In some cases the FCC was contacted using a PBA or KDB process to ensure test is performed correctly.

The test was performed in a shielded enclosure with the temperature controlled to remain between +18.0ºC and +25.0ºC. The tissue equivalent material fluid temperature was controlled to give a maximum variation of ± 2.0ºC

Prior to any SAR measurements on the EUT, system validation and material dielectric property measurements were conducted. In the absence of a detailed procedure within the specification, system validation and material dielectric property measurements were performed in accordance with Appendix C and Appendix D of FCC OET Bulletin 65 Supplement C: 2001 and FCC KDB publication 450824.

Following the successful system validation and material dielectric property measurements, a SAR versus time sweep shall be performed within 10 mm of the phantom inner surface. If the EUT power output is stable after three minutes then the measurement probe will perform a coarse surface level scan at each test position in order to ascertain the location of the maximum local SAR level. Once this area had been established, a 5x5x7 cube of 175 points (5 mm spacing in each axis ≈ 27g) will be centred at the area of concern. Extrapolation and interpolation will then be carried out on the 27g of tissue and the highest averaged SAR over a 10g cube determined.

Once the maximum interpolated SAR measurement is complete; the coarse scan is visually assessed to check for secondary peaks within 50% of the maximum SAR level. If there are any further SAR measurements required, extra 5x5x7 cubes shall be centred on each of these extra local SAR maxima.

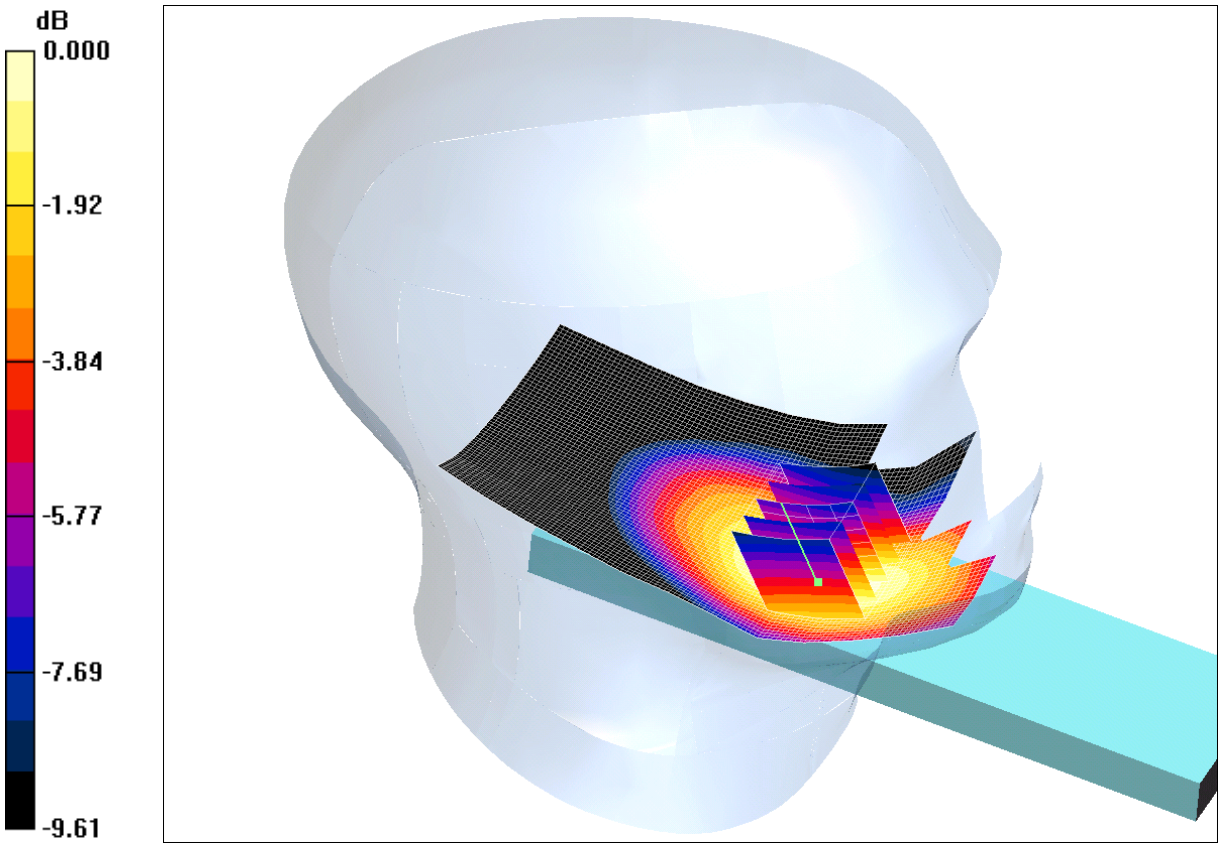
At the end of each position test case a second time sweep shall be performed to check whether the EUT has remained stable throughout the test.

Appendix 4. SAR Distribution Scans

This appendix contains SAR distribution scans which are not included in the total number of pages for this report.

Scan Reference Number	Title
SCN/89460/001	Touch Left UMTS FDD V CH4183
SCN/89460/002	Tilt Left UMTS FDD V CH4183
SCN/89460/003	Touch Right Using Flat Section UMTS FDD V CH4183
SCN/89460/004	Tilt Right UMTS FDD V CH4183
SCN/89460/005	Front of EUT Open Facing Phantom UMTS FDD V CH 4183
SCN/89460/006	Front of EUT Closed Facing Phantom UMTS FDD V CH 4183
SCN/89460/007	Rear of EUT Open Facing Phantom UMTS FDD V CH 4183
SCN/89460/008	Rear of EUT Closed Facing Phantom UMTS FDD V CH 4183
SCN/89460/009	Rear of EUT Open Facing Phantom with PHF UMTS FDD V CH 4183
SCN/89460/010	System Performance Check 900MHz Head 08 08 12
SCN/89460/011	System Performance Check 900MHz Head 10 08 12
SCN/89460/012	System Performance Check 900MHz Body 08 08 12

SCN/89460/001: Touch Left UMTS FDD V CH4183
Date: 08/08/2012
DUT: Panasonic D22CS1; Type: ; Serial: 353008050015094

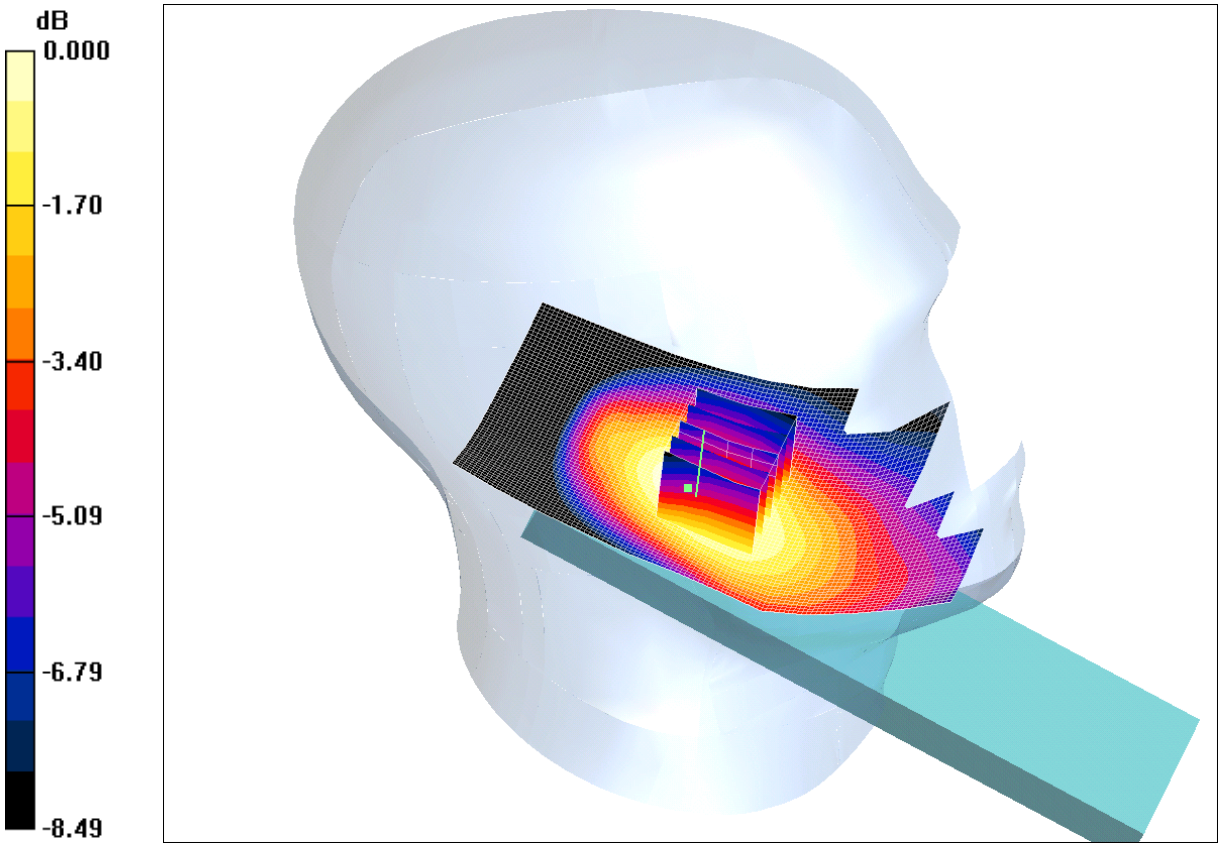


0 dB = 0.523mW/g

Communication System: UMTS-FDD V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 900 MHz HSL Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.933 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(8.75, 8.75, 8.75); Calibrated: 22/09/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 02/05/2012
- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1207
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Touch Left - Middle 2 2/Area Scan (61x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.533 mW/g
Touch Left - Middle 2 2/Zoom Scan (5x5x7) 2 2 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.91 V/m; Power Drift = -0.027 dB
Peak SAR (extrapolated) = 0.679 W/kg
SAR(1 g) = 0.492 mW/g; SAR(10 g) = 0.349 mW/g
Maximum value of SAR (measured) = 0.523 mW/g

SCN/89460/002: Tilt Left UMTS FDD V CH4183
Date: 08/08/2012
DUT: Panasonic D22CS1; Type: ; Serial: 353008050015094

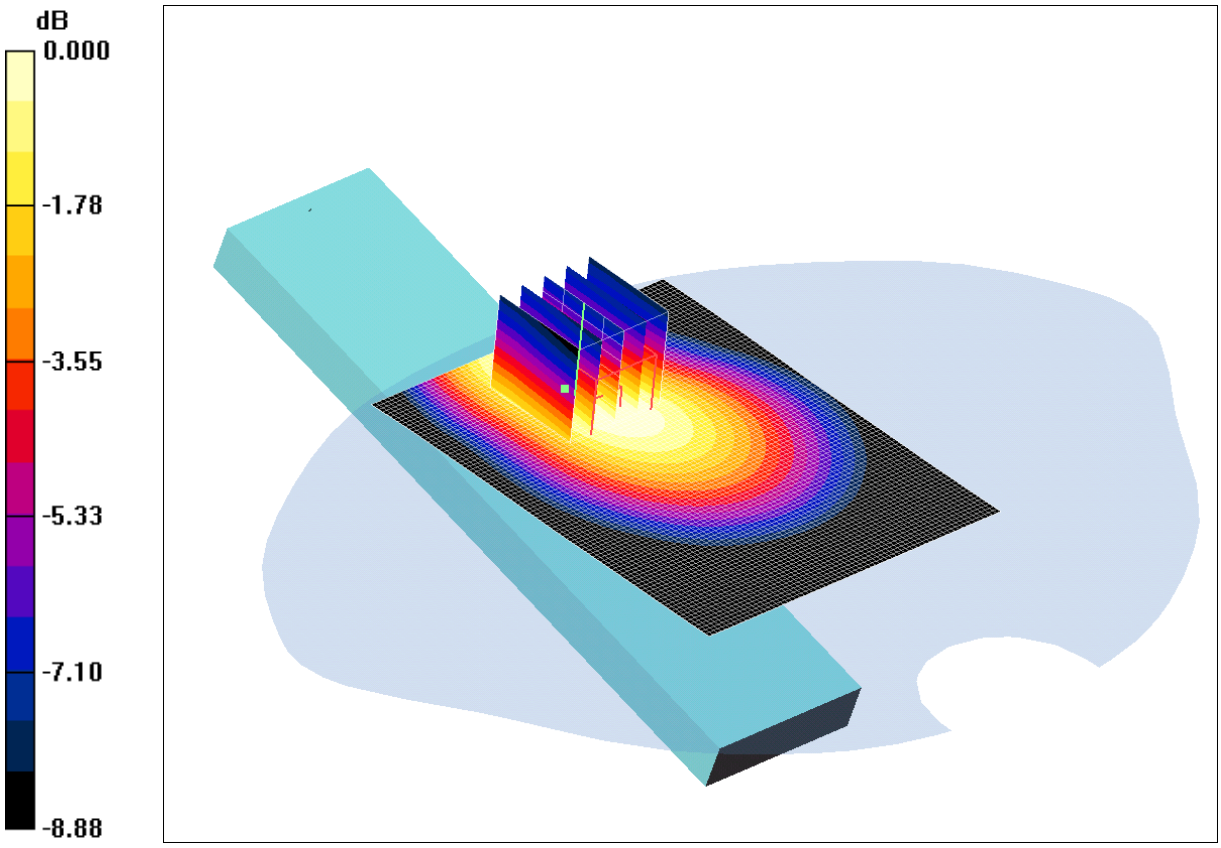


0 dB = 0.207mW/g

Communication System: UMTS-FDD V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 900 MHz HSL Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.933 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(8.75, 8.75, 8.75); Calibrated: 22/09/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 02/05/2012
- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1207
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Tilt Left - Middle 2/Area Scan 2 (61x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.212 mW/g
Tilt Left - Middle 2/Zoom Scan (5x5x7) 2 2 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.01 V/m; Power Drift = -0.029 dB
Peak SAR (extrapolated) = 0.250 W/kg
SAR(1 g) = 0.198 mW/g; SAR(10 g) = 0.150 mW/g
Maximum value of SAR (measured) = 0.207 mW/g

SCN/89460/003: Touch Right Using Flat Section UMTS FDD V CH4183
Date: 10/08/2012
DUT: Panasonic; Type: D22CS1; Serial: 353008050015094



0 dB = 0.454mW/g

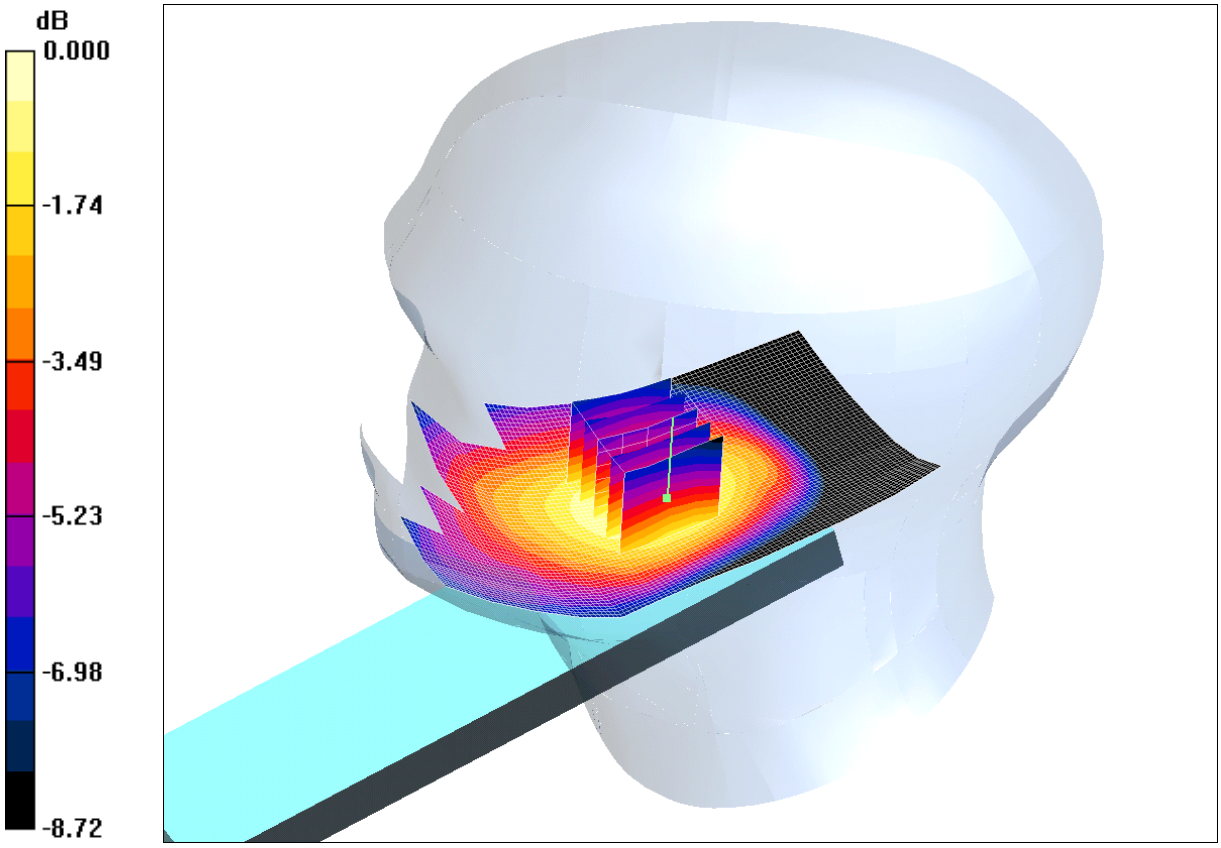
Communication System: UMTS-FDD V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 900 MHz HSL Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.904 mho/m; ε_r = 41.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(8.75, 8.75, 8.75); Calibrated: 22/09/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 02/05/2012
- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1207
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176
Touch Right - Middle 2/Area Scan (71x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.458 mW/g
Touch Right - Middle 2/Zoom Scan (5x5x7) 2 2 2 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.2 V/m; Power Drift = 0.042 dB
Peak SAR (extrapolated) = 0.583 W/kg
SAR(1 g) = 0.429 mW/g; SAR(10 g) = 0.306 mW/g
Maximum value of SAR (measured) = 0.454 mW/g

Note:

Some points in the 'Touch Right' position could not be fully evaluated therefore the zoom scan was unable to fully enclose the peak SAR location as required by IEEE 1528 and OET Bulletin 65 Supplement C. This scan is repeated in the Mouth/Jaw configuration on the flat section of the 'SAM' phantom.

The phone was positioned with the hinge against a smooth edge of the flat phantom where the upper half of the phone was unfolded and extended beyond the phantom side wall. The lower half of the phone was secured in the test device holder at a fixed distance.

SCN/89460/004: Tilt Right UMTS FDD V CH4183
Date: 08/08/2012
DUT: Panasonic; Type: D22CS1; Serial: 353008050015094

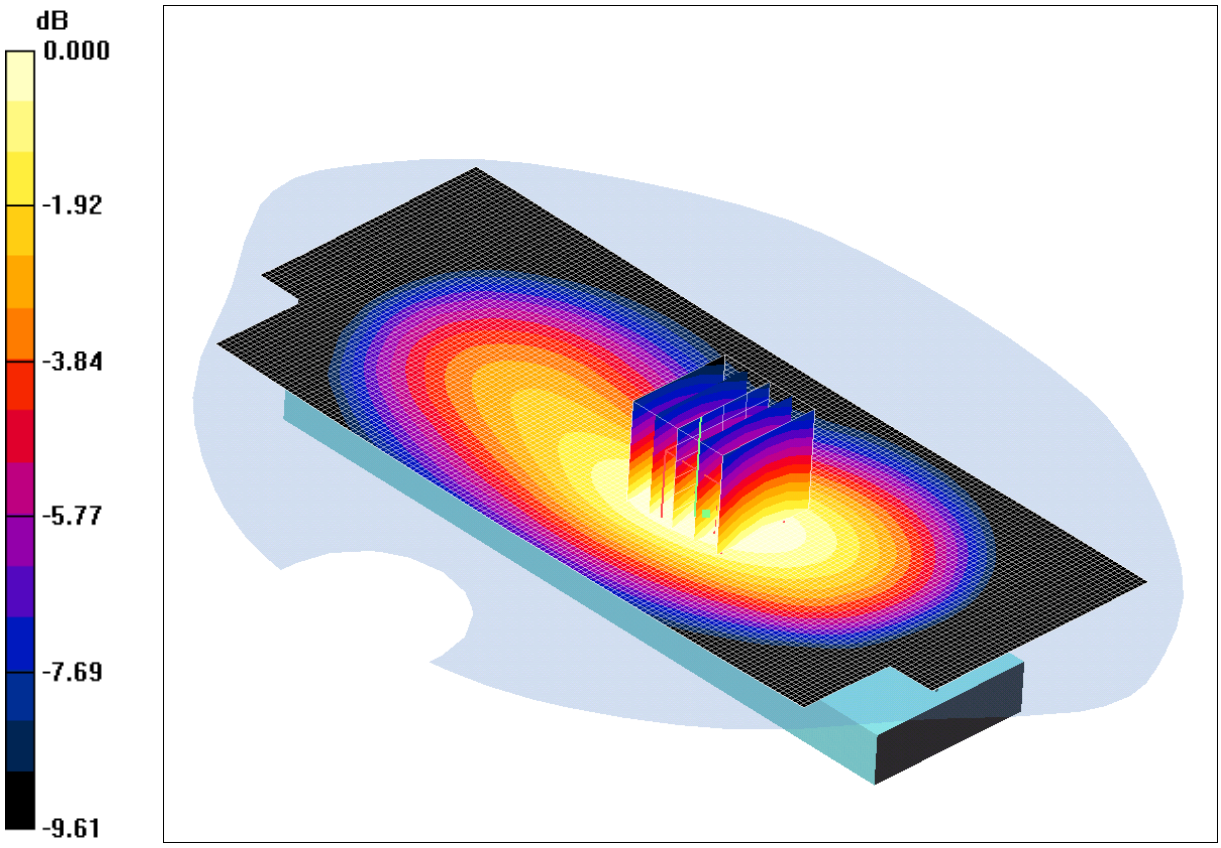


0 dB = 0.201mW/g

Communication System: UMTS-FDD V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 900 MHz HSL Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.933 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(8.75, 8.75, 8.75); Calibrated: 22/09/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 02/05/2012
- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1207
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Tilt Right - Middle/Area Scan (61x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.203 mW/g
Tilt Right - Middle/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.76 V/m; Power Drift = 0.026 dB
Peak SAR (extrapolated) = 0.242 W/kg
SAR(1 g) = 0.190 mW/g; SAR(10 g) = 0.142 mW/g
Maximum value of SAR (measured) = 0.201 mW/g

SCN/89460/005: Front of EUT Open Facing Phantom UMTS FDD V CH 4183
Date: 08/08/2012
DUT: Panasonic; Type: D22CS1; Serial: 353008050015094

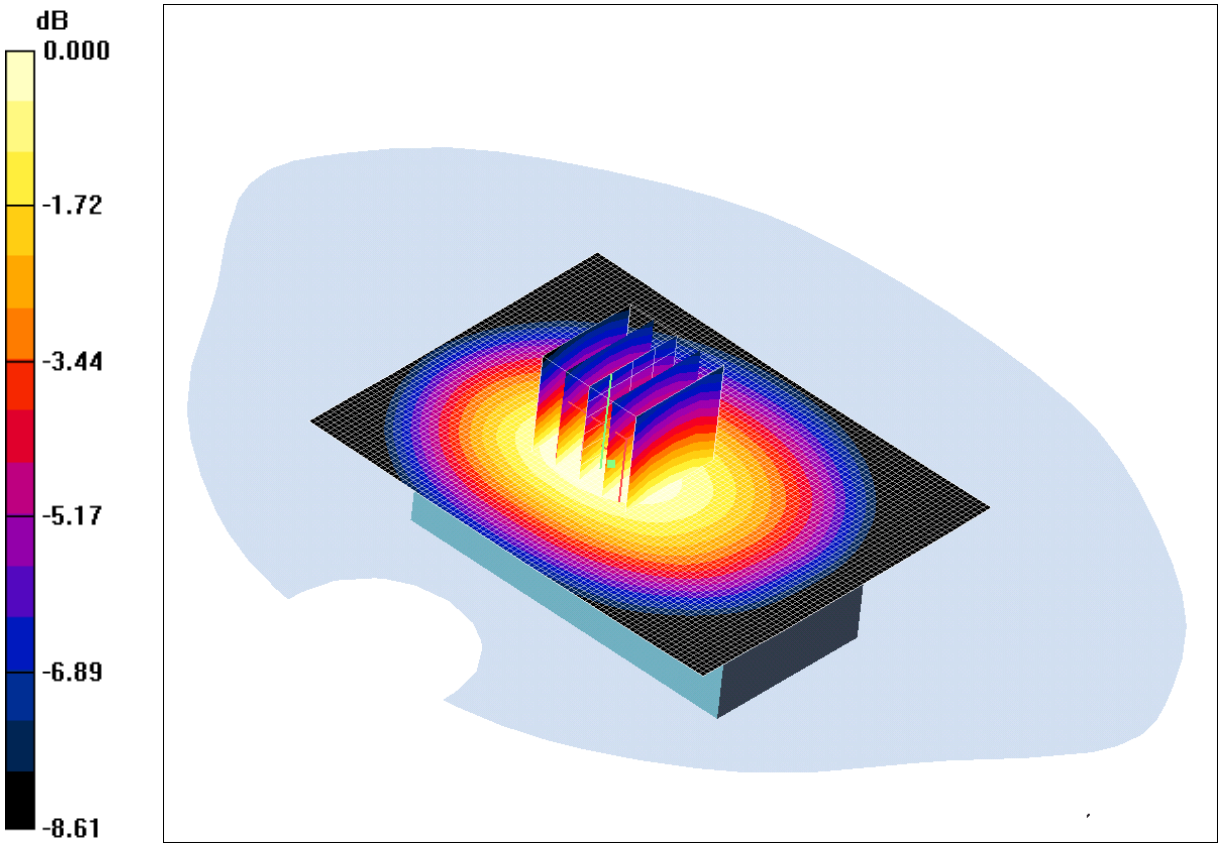


0 dB = 0.372mW/g

Communication System: UMTS-FDD V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 900 MHz MSL Medium parameters used (interpolated): f = 836.6 MHz; σ = 1 mho/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(8.92, 8.92, 8.92); Calibrated: 22/09/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 02/05/2012
- Phantom: SAM 12a; Type: SAM 4.0; Serial: TP:1193
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Front of EUT Open Facing Phantom - Middle/Area Scan (71x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.382 mW/g
Front of EUT Open Facing Phantom - Middle/Zoom Scan (5x5x7) 2 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.6 V/m; Power Drift = -0.032 dB
Peak SAR (extrapolated) = 0.439 W/kg
SAR(1 g) = 0.327 mW/g; SAR(10 g) = 0.235 mW/g
Maximum value of SAR (measured) = 0.372 mW/g

SCN/89460/006: Front of EUT Closed Facing Phantom UMTS FDD V CH 4183
Date: 08/08/2012
DUT: Panasonic; Type: D22CS1; Serial: 353008050015094

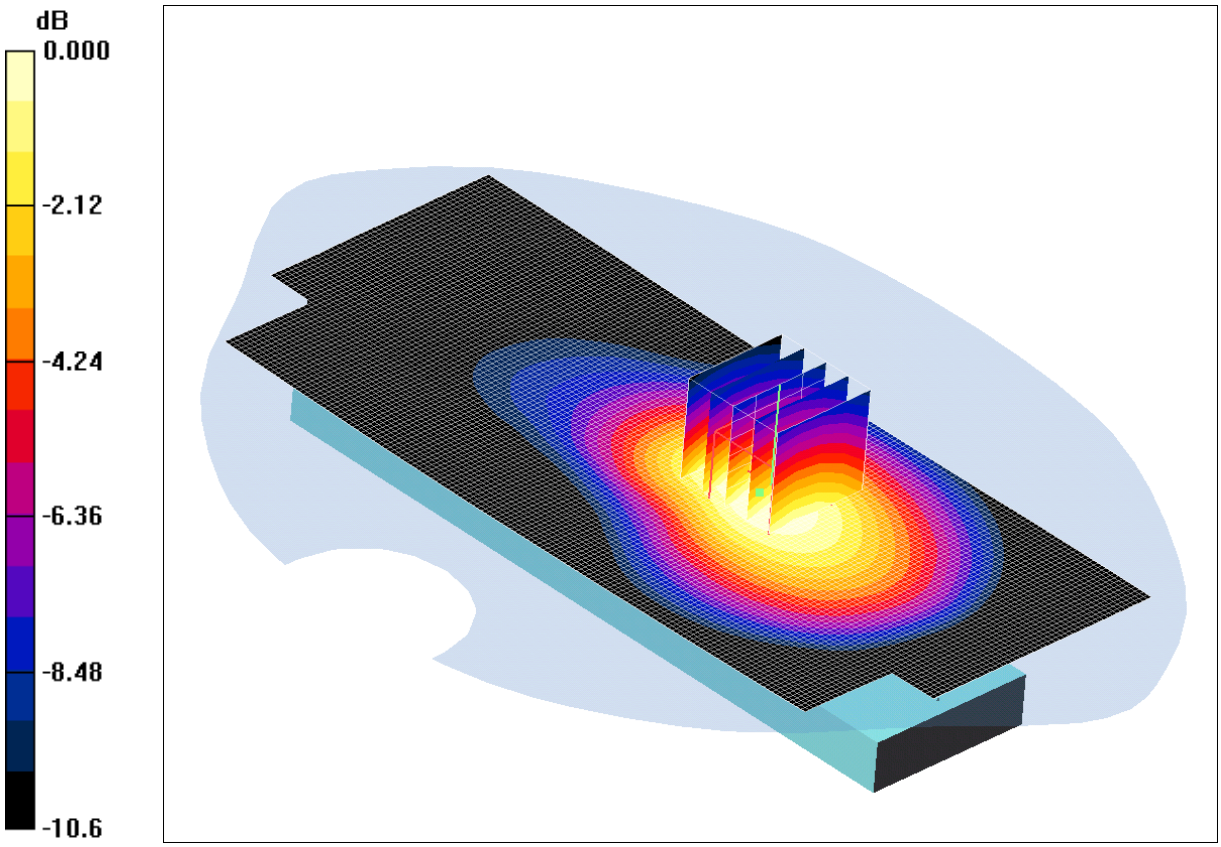


0 dB = 0.281mW/g

Communication System: UMTS-FDD V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 900 MHz MSL Medium parameters used (interpolated): f = 836.6 MHz; σ = 1 mho/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(8.92, 8.92, 8.92); Calibrated: 22/09/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 02/05/2012
- Phantom: SAM 12a; Type: SAM 4.0; Serial: TP:1193
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Front of EUT Closed Facing Phantom - Middle/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.285 mW/g
Front of EUT Closed Facing Phantom - Middle/Zoom Scan (5x5x7) 2 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.3 V/m; Power Drift = 0.050 dB
Peak SAR (extrapolated) = 0.325 W/kg
SAR(1 g) = 0.249 mW/g; SAR(10 g) = 0.185 mW/g
Maximum value of SAR (measured) = 0.281 mW/g

SCN/89460/007: Rear of EUT Open Facing Phantom UMTS FDD V CH 4183
Date: 08/08/2012
DUT: Panasonic; Type: D22CS1; Serial: 353008050015094

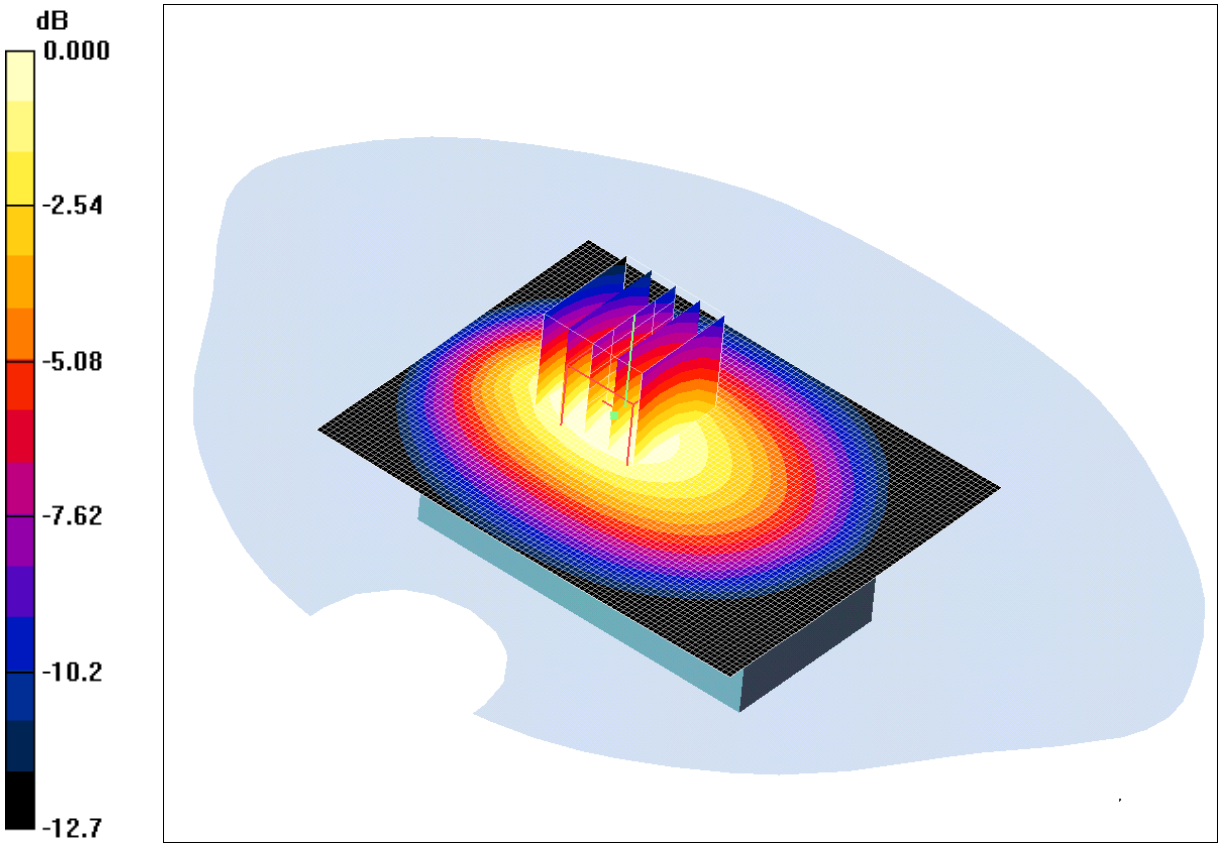


0 dB = 0.620mW/g

Communication System: UMTS-FDD V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 900 MHz MSL Medium parameters used (interpolated): f = 836.6 MHz; σ = 1 mho/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(8.92, 8.92, 8.92); Calibrated: 22/09/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 02/05/2012
- Phantom: SAM 12a; Type: SAM 4.0; Serial: TP:1193
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Rear of EUT Open Facing Phantom - Middle/Area Scan (71x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.631 mW/g
Rear of EUT Open Facing Phantom - Middle/Zoom Scan (5x5x7) 2 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.3 V/m; Power Drift = 0.007 dB
Peak SAR (extrapolated) = 0.749 W/kg
SAR(1 g) = 0.535 mW/g; SAR(10 g) = 0.374 mW/g
Maximum value of SAR (measured) = 0.620 mW/g

SCN/89460/008: Rear of EUT Closed Facing Phantom UMTS FDD V CH 4183
Date: 08/08/2012
DUT: Panasonic; Type: D22CS1; Serial: 353008050015094

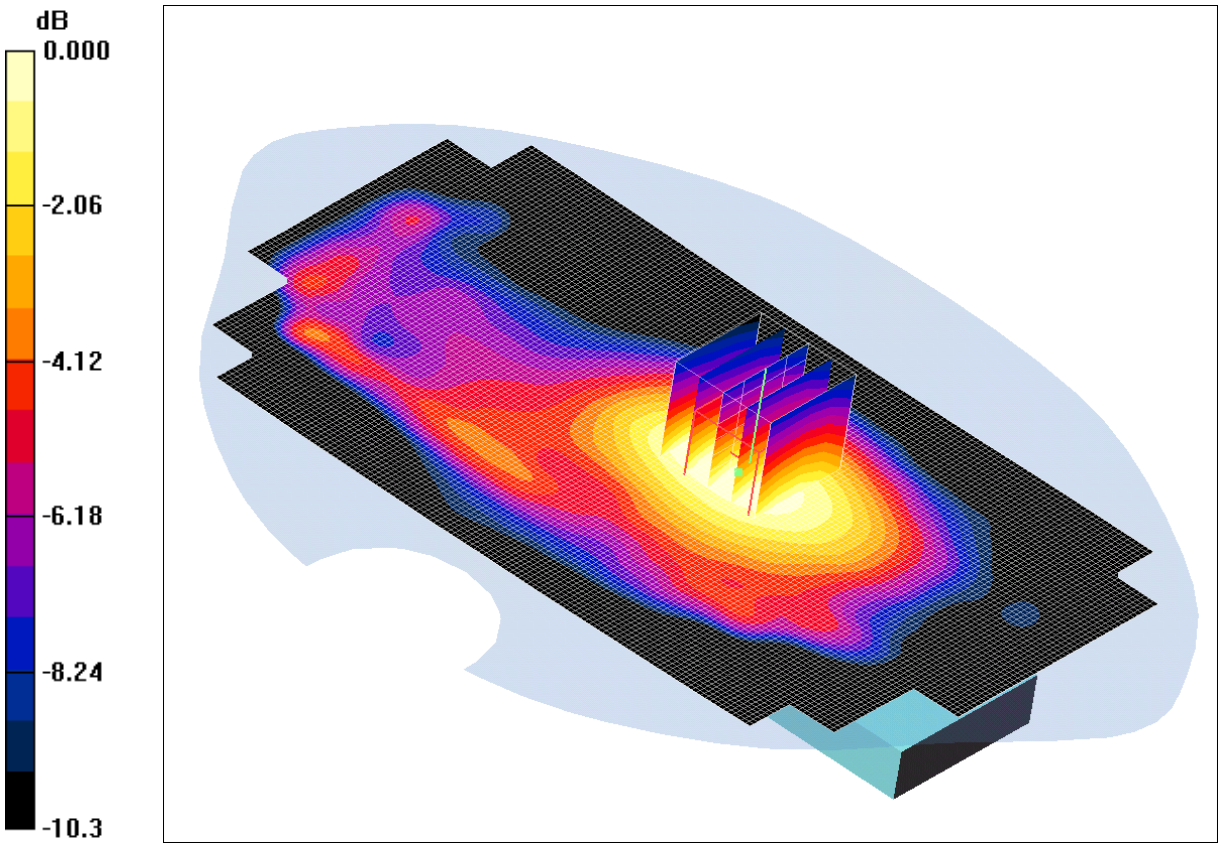


0 dB = 0.590mW/g

Communication System: UMTS-FDD V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 900 MHz MSL Medium parameters used (interpolated): f = 836.6 MHz; σ = 1 mho/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(8.92, 8.92, 8.92); Calibrated: 22/09/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 02/05/2012
- Phantom: SAM 12a; Type: SAM 4.0; Serial: TP:1193
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Rear of EUT Closed Facing Phantom - Middle/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.613 mW/g
Rear of EUT Closed Facing Phantom - Middle/Zoom Scan (5x5x7) 2 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.5 V/m; Power Drift = 0.022 dB
Peak SAR (extrapolated) = 0.715 W/kg
SAR(1 g) = 0.512 mW/g; SAR(10 g) = 0.357 mW/g
Maximum value of SAR (measured) = 0.590 mW/g

SCN/89460/009: Rear of EUT Open Facing Phantom with PHF UMTS FDD V CH 4183
Date: 08/08/2012
DUT: Panasonic; Type: D22CS1; Serial: 353008050015094

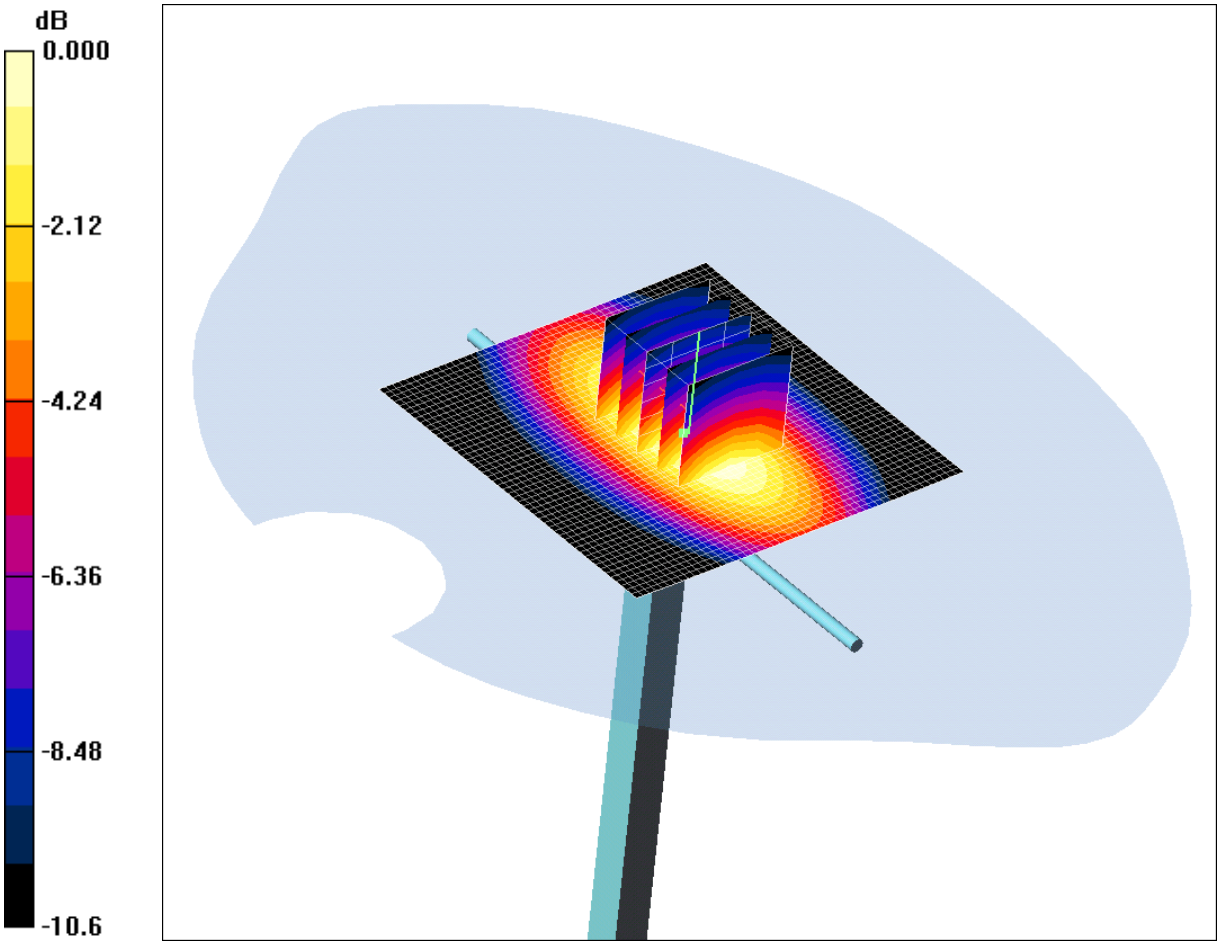


0 dB = 0.534mW/g

Communication System: UMTS-FDD V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 900 MHz MSL Medium parameters used (interpolated): f = 836.6 MHz; σ = 1 mho/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(8.92, 8.92, 8.92); Calibrated: 22/09/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 02/05/2012
- Phantom: SAM 12a; Type: SAM 4.0; Serial: TP:1193
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Rear of EUT Open Facing Phantom with PHF - Middle/Area Scan (91x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.541 mW/g
Rear of EUT Open Facing Phantom with PHF - Middle/Zoom Scan (5x5x7) 2 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.9 V/m; Power Drift = 0.020 dB
Peak SAR (extrapolated) = 0.662 W/kg
SAR(1 g) = 0.460 mW/g; SAR(10 g) = 0.324 mW/g
Maximum value of SAR (measured) = 0.534 mW/g

SCN/89460/010: System Performance Check 900MHz Head 08 08 12
Date: 08/08/2012
DUT: Dipole 900 MHz; SN: 124; Type: D900V2; Serial: SN124

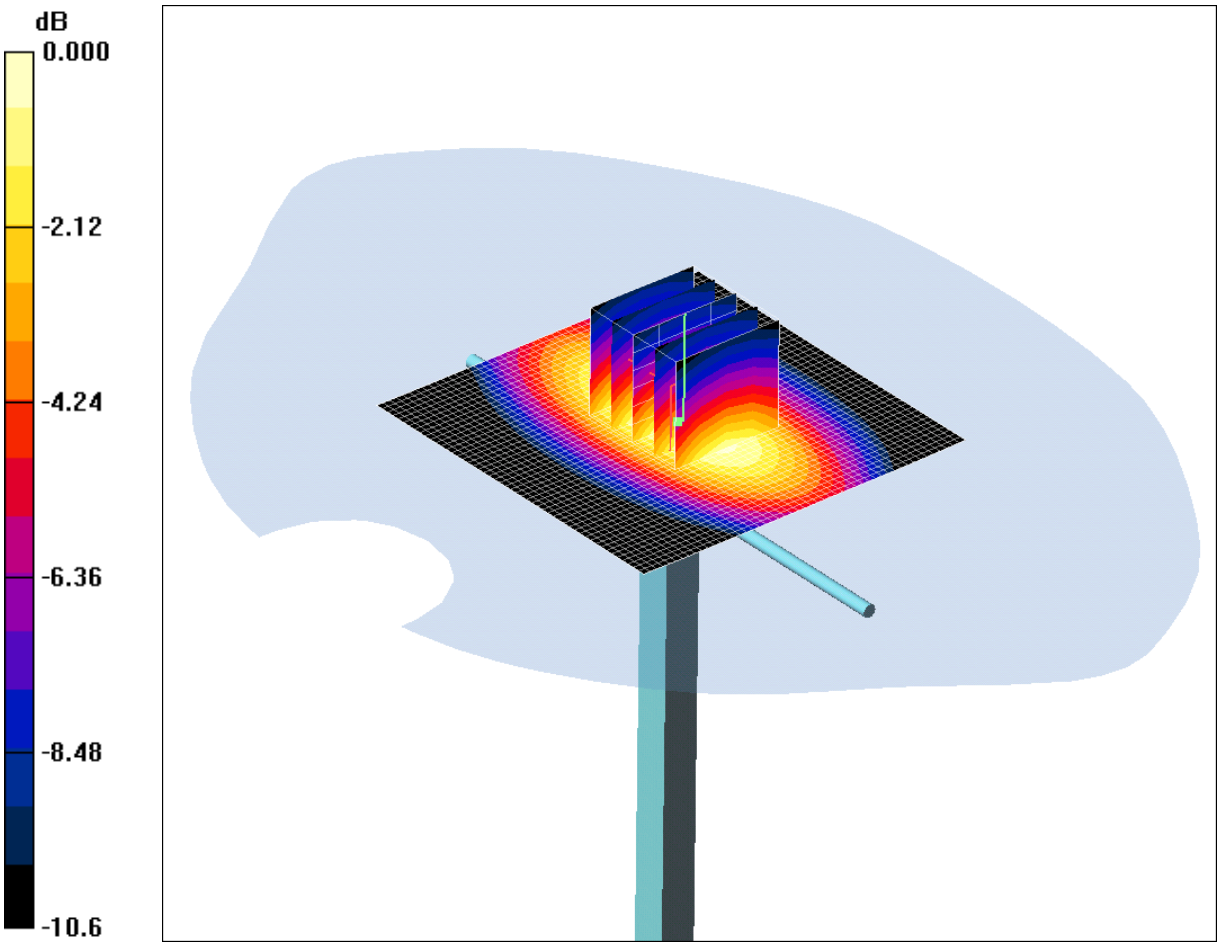


0 dB = 2.96mW/g

Communication System: CW; Frequency: 900 MHz;Duty Cycle: 1:1
Medium: 900 MHz HSL Medium parameters used: f = 900 MHz; σ = 0.976 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(8.75, 8.75, 8.75); Calibrated: 22/09/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 06/05/2011
- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1207
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

d=15mm, Pin=250mW 2/Area Scan (51x51x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 3.02 mW/g
d=15mm, Pin=250mW 2/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.1 V/m; Power Drift = -0.101 dB
Peak SAR (extrapolated) = 4.08 W/kg
SAR(1 g) = 2.74 mW/g; SAR(10 g) = 1.78 mW/g
Maximum value of SAR (measured) = 2.96 mW/g

SCN/89460/011: System Performance Check 900MHz Head 10 08 12
Date: 10/08/2012
DUT: Dipole 900 MHz; SN: 124; Type: D900V2; Serial: SN124

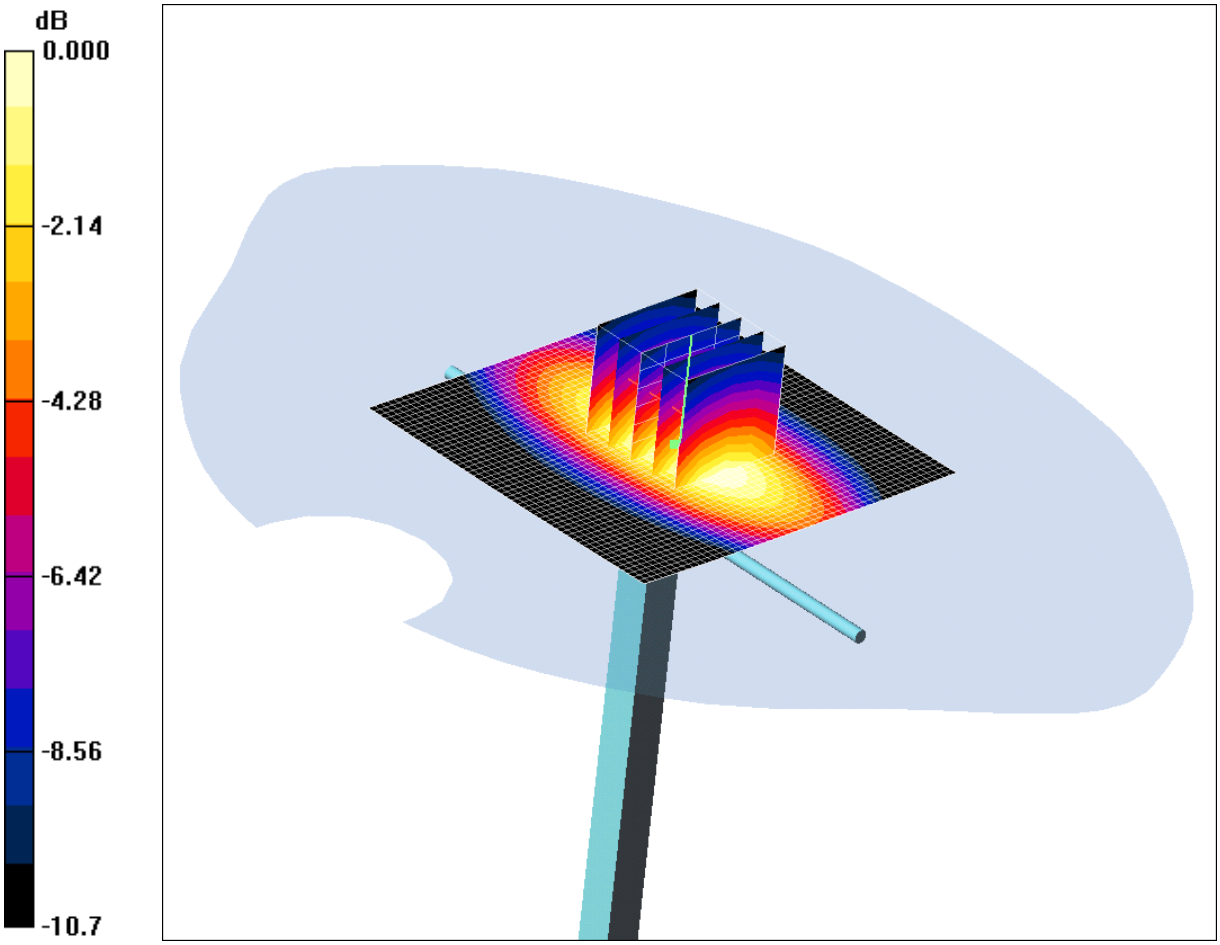


0 dB = 3.01mW/g

Communication System: CW; Frequency: 900 MHz;Duty Cycle: 1:1
Medium: 900 MHz HSL Medium parameters used: f = 900 MHz; σ = 0.946 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(8.75, 8.75, 8.75); Calibrated: 22/09/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 06/05/2011
- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1207
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

d=15mm, Pin=250mW 2/Area Scan (51x51x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 3.05 mW/g
d=15mm, Pin=250mW 2/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.6 V/m; Power Drift = 0.018 dB
Peak SAR (extrapolated) = 4.15 W/kg
SAR(1 g) = 2.8 mW/g; SAR(10 g) = 1.83 mW/g
Maximum value of SAR (measured) = 3.01 mW/g

SCN/89460/012: System Performance Check 900MHz Body 08 08 12
Date: 08/08/2012
DUT: Dipole 900 MHz; SN: 124; Type: D900V2; Serial: SN124



0 dB = 3.03mW/g

Communication System: CW; Frequency: 900 MHz;Duty Cycle: 1:1
Medium: 900 MHz MSL Medium parameters used: f = 900 MHz; σ = 1.04 mho/m; ε_r = 53.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(8.92, 8.92, 8.92); Calibrated: 22/09/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 06/05/2011
- Phantom: SAM 12a; Type: SAM 4.0; Serial: TP:1193
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176
d=15mm, Pin=250mW/Area Scan (51x51x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 3.19 mW/g
d=15mm, Pin=250mW/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 53.1 V/m; Power Drift = 0.035 dB
Peak SAR (extrapolated) = 4.15 W/kg
SAR(1 g) = 2.81 mW/g; SAR(10 g) = 1.84 mW/g
Maximum value of SAR (measured) = 3.03 mW/g