



**TEST REPORT  
FROM  
RFI GLOBAL SERVICES LTD**

Test of: P-01B

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

**Test Report Serial No:**  
RFI/SAR4/RP75983JD07A

**Supersedes Test Report Serial No:**  
RFI/SAR3/RP75983JD07A

<b>This Test Report Is Issued Under The Authority Of Scott D'Adamo, Group Service Manager Wireless and Cellular:</b>		
<b>Checked By: Scott D'Adamo</b> 	<b>Report Copy No: PDF01</b>	
<b>Issue Date: 15 October 2009</b>	<b>Test Dates: 10 September 2009 to 16 September 2009</b>	

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Registered in England and Wales. Company number: 2117901

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## **1. Customer Information**

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

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## **2. Equipment Under Test (EUT)**

### **2.1. Identification of Equipment Under Test (EUT)**

<b>Description:</b>	Mobile Handset
<b>Brand Name:</b>	Panasonic P-01B
<b>Model Name or Number:</b>	P-01B (Sample C2)
<b>Serial Number:</b>	None Stated
<b>IMEI Number:</b>	35 3152030012795
<b>Hardware Version Number:</b>	Rev C
<b>Software Version Number:</b>	B-D92WP1-01.03.001 D92WP1_Cv18121508
<b>Hardware Revision of GSM Module:</b>	Not Applicable
<b>Software Revision of GSM Module:</b>	Not Applicable
<b>FCC ID Number:</b>	UCE209021A
<b>Country of Manufacture:</b>	None Stated
<b>Date of Receipt:</b>	10 September 2009

### **2.2. Description of EUT**

The equipment under test was a Dual mode Cellular Mobile Telephone with PCS, UMTS FDD V and UMTS Release 5 HSDPA capabilities, incorporating *Bluetooth* and RFID. The Cellular Mobile Telephone operates on PCS/GPRS1900 MHz Band, UMTS/UMTS Release 5 HSDPA 850 MHz Band, *Bluetooth* 2400 MHz Band and RFID 13.5 MHz Band

### **2.3. Modifications Incorporated in the EUT**

There were no modifications Incorporated in the EUT.

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#### **2.4. Accessories**

The following accessories were supplied with the EUT during testing:

<b>Description:</b>	Personal Hands-free Kit
<b>Brand Name:</b>	Do Co Mo
<b>Model Name or Number:</b>	Stereo Earphone Set 01
<b>Serial Number:</b>	None Stated
<b>Cable Length and Type:</b>	~1.8m Multi-core Audio Cable
<b>Country of Manufacture:</b>	None Stated
<b>Connected to Port</b>	Port Unique to Manufacturer

<b>Description:</b>	Battery
<b>Brand Name:</b>	NTT
<b>Model Name or Number:</b>	P20
<b>Serial Number:</b>	None Stated
<b>Cable Length and Type:</b>	Not Applicable
<b>Country of Manufacture:</b>	None Stated
<b>Connected to Port</b>	3 Pin Contact Point

#### **2.5. Support Equipment**

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

<b>Description:</b>	Communication Test Set
<b>Brand Name:</b>	R&S
<b>Model Name or Number:</b>	CMU200
<b>Serial Number:</b>	101376
<b>Cable Length and Type:</b>	~2.0m Utiflex RF Cable
<b>Connected to Port:</b>	RF Input/ Output Port

<b>Description:</b>	GSM Communication Test Set
<b>Brand Name:</b>	Will'tek
<b>Model Name or Number:</b>	4202S
<b>Serial Number:</b>	513018
<b>Cable Length and Type:</b>	~2.0m Utiflex RF Cable
<b>Connected to Port:</b>	RF Input/ Output Port

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**2.6. Additional Information Related to Testing**

<b>Equipment Category</b>	PCS1900 / GPRS1900 / UMTS FDD V / <i>Bluetooth</i> / RFID		
<b>Type of Unit</b>	Portable Transceiver		
<b>Intended Operating Environment:</b>	Within GSM, UMTS, RFID and <i>Bluetooth</i> Coverage		
<b>Transmitter Maximum Output Power Characteristics:</b>	UMTS FDD V	3G communication test set setup to allow EUT to transmit up to a maximum power of: 24dBm	
	PCS1900	GSM communication test set setup to allow EUT to transmit up to a maximum power of: 30 dBm.	
<b>Transmitter Frequency Range:</b>	UMTS FDD V	826 to 847 MHz	
	PCS1900	1850 to 1910 MHz	
<b>Transmitter Frequency Allocation of EUT When Under Test:</b>	<b>Channel Number</b>	<b>Channel Description</b>	<b>Frequency (MHz)</b>
	4132	Low	826.4
	4183	Middle	836.6
	4233	High	846.6
	512	Low	1850.2
	660	Middle	1879.8
	810	High	1909.8
<b>Modulation(s):</b>	GMSK(GSM / GPRS): 217 Hz, QPSK(UMTS / HSDPA): 0 Hz		
<b>Modulation Scheme (Crest Factor):</b>	GMSK(GSM): 8.3, GMSK(GPRS):4, QPSK(UMTS FDD / HSDPA):1		
<b>Antenna Type:</b>	Internal		
<b>Antenna Length:</b>	Unknown		
<b>Number of Antenna Positions:</b>	1 fixed		
<b>Power Supply Requirement:</b>	3.7v		
<b>Battery Type(s):</b>	Li-ion		

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### **3. Test Specification, Methods and Procedures**

#### **3.1. Test Specification**

<b>Reference:</b>	OET Bulletin 65 Supplement C: (2001-01)
<b>Title:</b>	Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.
<b>Purpose of Test:</b>	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 v03.

KDB 648474 D01 SAR Handsets Multi Xmitter and Ant v01r05.

KDB 941225 D01 SAR test for 3G devices v02.

#### **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.

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#### **4. Deviations from the Test Specification**

Test was performed as per "KDB 447498 D01 Mobile Portable RF Exposure v03", "KDB 648474 D01 SAR Handsets Multi Xmitter and Ant v01r05" and "KDB 941225 D01 SAR test for 3G devices v02", according to the handset procedures in IEEE Std 1528-2003, OET Bulletin 65 Supplement C 01-01 and the specific FCC test procedures.

2G SAR test was performed in the middle channel only as the measured levels were < 50% of the SAR limit as stated in OET Bulletin 65 Supplement C: (2001-01) Public Notice DA 02-1438 by the SCC-34/SC-2.

3G Body SAR test was performed in the middle channel.

The Touch Right position was evaluated on the 'SAM' phantom flat section as per KDB 648474 D01 SAR Handsets Multi Xmitter and Ant v01r05, for point that that could not be fully evaluated, as the zoom scan was unable to fully enclose the peak SAR location as required by IEEE 1528 and OET Bulletin 65 Supplement C.

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## **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:

- UMTS FDD - RMC 12.2kbps with Test loop mode 1 and TPC bits configured to All "1's"
  - UMTS FDD - RMC 12.2kbps with Test loop mode 1 and TPC bits configured to All "1's" with HSDPA enabled with Beta –C/D ratio set to 2/15.
  - PCS1900 Call allocated mode – with GSM communication test set setup to allow EUT to transmit up to a maximum power of 30 dBm.
  - GPRS1900 Data allocated mode GPRS communication test set setup to allow EUT to transmit up to a maximum power of 30 dBm on 2 uplink channel.
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## **5.2. Configuration and Peripherals**

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

- Standalone Battery
- EUT tested in Head and Body-worn configuration. The applied configurations for body-worn orientations where the corresponding edge(s) is closest to the user with the most conservative exposure condition
- Some point in this position could not be fully evaluated in the 'Right Touch' configuration 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 was overcome by the scan being repeated in the Mouth / Jaw configuration on the flat section.
- For the 'Touch Right' configuration 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 below the flat phantom determined by the minimum separation along the lower edge of the phone in the 'Touch Right' position using the SAM head region.

### **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.
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### **Configuration and Peripherals (continued)**

#### **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 than 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.
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## 6. Summary of Test Results

Test Name	Specification Reference	Results
Specific Absorption Rate-UMTS Head Configuration 1g	OET Bulletin 65 Supplement C: 2001	Complied
Specific Absorption Rate-UMTS Body Configuration 1g	OET Bulletin 65 Supplement C: 2001	Complied
Specific Absorption Rate-UMTS + HSDPA Body Configuration 1g	OET Bulletin 65 Supplement C: 2001	Complied
Specific Absorption Rate-PCS1900 Head Configuration 1g	OET Bulletin 65 Supplement C: 2001	Complied
Specific Absorption Rate-PCS1900 Body Configuration 1g	OET Bulletin 65 Supplement C: 2001	Complied
Specific Absorption Rate-GPRS1900 Body Configuration 1g	OET Bulletin 65 Supplement C: 2001	Complied

### SAR Individual Transmitter Evaluation

device, mode	Frequency, (MHz)	P <sub>x</sub> (mW)	P <sub>REF</sub> (mW)	single SAR, W/kg	remarks
WWAN, GSM	1900	513	-	0.627	Routine Evaluation
BT, <i>Bluetooth</i>	2410	2	12	:=0	$\{P_{BT} \leq 2P_{REF}\} \{d_{UMTS, BT} > 5cm\} \{d_{gsm, BT} > 5cm\}$

### SAR Simultaneous Transmitter Evaluation

(x,y)	D(x,y) cm	L(x,y) cm	SPLSR <sub>xy</sub>	Sim-Tx SAR	remarks
(WWAN <sub>GSM</sub> , BT)	8	n/a	n/a	n/a	{no stand-alone SAR for BT}

### Note(s):

1. Simultaneous transmission evaluation was not required as the output power for *Bluetooth* was < (60/f) and the Sum of all antenna < 1.6w/kg.
2. *Bluetooth* transmitter thresholds output power "P<sub>Ref</sub> = 12 as listed in KDB 648474.
3. P<sub>x</sub>: power level measured by RFI.
4. Single SAR value was measured by RFI.
5. The "Antenna-to-Antenna distance and Antenna-to-User distance were 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

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## **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.

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**7.2. Test Results****7.2.1. Specific Absorption Rate - UMTS FDD V Head Configuration 1g****Test Summary:**

Tissue Volume:	1g
Maximum Level (W/kg):	0.627

**Environmental Conditions:**

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	22.9 to 22.9

**Results:**

EUT Position	Phantom Configuration	Channel Number	Level (W/kg)	Limit (W/kg)	Margin (W/kg)	Note(s)	Result
Touch	Left	4183	0.594	1.600	1.006	1, 3	Complied
Touch	Left	4183	0.627	1.600	0.973	2, 3	Complied
Tilt	Left	4183	0.092	1.600	1.508	1, 3	Complied
Tilt	Left	4183	0.110	1.600	1.490	2, 3	Complied
Mouth / Jaw	Flat (SAM)	4183	0.426	1.600	1.174	1, 3, 4	Complied
Mouth / Jaw	Flat (SAM)	4183	0.435	1.600	1.165	2, 3, 4	Complied
Tilt	Right	4183	0.089	1.600	1.511	1, 3	Complied
Tilt	Right	4183	0.128	1.600	1.472	2, 3	Complied

**Note(s):**

- ' With Antenna Retracted "
- ' With Antenna Extended"
- SAR test was performed in the middle channel only 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.
- 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

\* Some points in the 'Right Touch' 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.

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

Tissue Volume:	1g
Maximum Level (W/kg):	0.319

**Environmental Conditions:**

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.1 to 23.1

**Results:**

EUT Position	Phantom Configuration	Channel Number	Level (W/kg)	Limit (W/kg)	Margin (W/kg)	Note(s)	Result
Front of EUT Facing Phantom	Flat (SAM)	4183	0.318	1.600	1.282	1, 2, 4	Complied
Front of EUT Facing Phantom	Flat (SAM)	4183	0.319	1.600	1.281	1, 3, 4	Complied
Rear of EUT Facing Phantom	Flat (SAM)	4183	0.234	1.600	1.366	1, 2, 4	Complied
Rear of EUT Facing Phantom	Flat (SAM)	4183	0.223	1.600	1.377	1, 3, 4	Complied

**Note(s):**

1. SAR measurements were performed with the EUT at a separation distance of 15mm from the 'SAM' phantom flat section
2. ' With Antenna Retracted "
3. ' With Antenna Extended"
4. SAR test was performed in the middle channel only 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.



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**7.2.3.Specific Absorption Rate - UMTS FDD V + HSDPA Body Configuration 1g****Test Summary:**

Tissue Volume:	1g
Maximum Level (W/kg):	0.339

**Environmental Conditions:**

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.1 to 23.1

**Results:**

EUT Position	Phantom Configuration	Channel Number	Level (W/kg)	Limit (W/kg)	Margin (W/kg)	Note(s)	Result
Front of EUT Facing Phantom	Flat (SAM)	4183	0.339	1.600	1.261	1, 2, 4	Complied
Front of EUT Facing Phantom	Flat (SAM)	4183	0.313	1.600	1.287	1, 3, 4	Complied
Rear of EUT Facing Phantom	Flat (SAM)	4183	0.225	1.600	1.375	1, 2, 4	Complied
Rear of EUT Facing Phantom	Flat (SAM)	4183	0.223	1.600	1.377	1, 3, 4	Complied
Front of EUT Facing Phantom With PHF	Flat (SAM)	4183	0.250	1.600	1.350	1, 2, 4	Complied

**Note(s):**

1. SAR measurements were performed with the EUT at a separation distance of 15mm from the 'SAM' phantom flat section
2. ' With Antenna Retracted "
3. ' With Antenna Extended"
4. SAR test was performed in the middle channel only 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.

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**7.2.4. Specific Absorption Rate - PCS1900 Head Configuration 1g****Test Summary:**

Tissue Volume:	1g
Maximum Level (W/kg):	0.468

**Environmental Conditions:**

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.0 to 23.0

**Results:**

EUT Position	Phantom Configuration	Channel Number	Level (W/kg)	Limit (W/kg)	Margin (W/kg)	Note(s)	Result
Touch	Left	660	0.462	1.600	1.138	1, 3	Complied
Touch	Left	660	0.468	1.600	1.132	2, 3	Complied
Tilt	Left	660	0.082	1.600	1.518	1, 3	Complied
Tilt	Left	660	0.088	1.600	1.512	2, 3	Complied
Mouth / Jaw	Flat (SAM)	660	0.142	1.600	1.458	1, 3 ,4	Complied
Touch	Right	660	0.268	1.600	1.332	2, 3	Complied
Tilt	Right	660	0.081	1.600	1.519	1, 3	Complied
Tilt	Right	660	0.076	1.600	1.525	2, 3	Complied

**Note(s):**

1. ' With Antenna Retracted "
2. ' With Antenna Extended"
3. SAR test was performed in the middle channel only 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.
4. 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

\* Some points in this 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.

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**7.2.5. Specific Absorption Rate - PCS1900 Body Configuration 1g****Test Summary:**

Tissue Volume:	1g
Maximum Level (W/kg):	0.094

**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	Level (W/kg)	Limit (W/kg)	Margin (W/kg)	Note(s)	Result
Front of EUT Facing Phantom	Flat (SAM)	660	0.087	1.600	1.513	1, 2, 4	Complied
Front of EUT Facing Phantom	Flat (SAM)	660	0.094	1.600	1.506	1, 3, 4	Complied

**Note(s):**

1. SAR measurements were performed with the EUT at a separation distance of 15mm from the 'SAM' phantom flat section
2. ' With Antenna Retracted "
3. ' With Antenna Extended"
4. SAR test was performed in the middle channel only 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.

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**7.2.6.Specific Absorption Rate - GPRS1900 Body Configuration 1g****Test Summary:**

Tissue Volume:	1g
Maximum Level (W/kg):	0.123

**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	Level (W/kg)	Limit (W/kg)	Margin (W/kg)	Note(s)	Result
Front of EUT Facing Phantom	Flat (SAM)	660	0.095	1.600	1.505	1, 2, 4	Complied
Front of EUT Facing Phantom	Flat (SAM)	660	0.123	1.600	1.477	1, 3, 4	Complied
Rear of EUT Facing Phantom	Flat (SAM)	660	0.092	1.600	1.508	1, 2, 4	Complied
Rear of EUT Facing Phantom	Flat (SAM)	660	0.088	1.600	1.512	1, 3, 4	Complied
Front of EUT Facing Phantom With PHF	Flat (SAM)	660	0.121	1.600	1.479	1, 3, 4	Complied

**Note(s):**

1. SAR measurements were performed with the EUT at a separation distance of 15mm from the 'SAM' phantom flat section
2. ' With Antenna Retracted "
3. ' With Antenna Extended"
4. SAR test was performed in the middle channel only 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.

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**7.2.7. EIRP/ERP Measurement****EIRP Measurement: PCS1900**

Channel Number	Frequency (MHz)	GSM – TX Power (dBm)	GPRS – TX Power (dBm)	Note
512	1850.2	29.0	27.4	EIRP
660	1879.8	29.3	27.5	EIRP
810	1909.8	30.4	28.0	EIRP

**ERP Measurement: FDD V Date**

Modes		HSDPA				WCDMA
Sets		1	2	3	4	Voice / RMC12.2kbps
Band	Channel	Average Power [dBm]	Average Power [dBm]	Average Power [dBm]	Average Power [dBm]	Average Power [dBm]
850	4132	21.8	22.0	22.5	22.0	21.4
	4183	21.5	22.2	22.4	22.3	21.3
	4233	20.8	21.3	21.8	21.3	20.5
$\beta_c$		2	12	15	15	
$\beta_d$		15	15	8	4	
$\Delta_{ACK}, \Delta_{NACK}, \Delta_{CQI}$		8	8	8	8	

**Sub-test 1 Setup for Release 5 HSDPA**

Sub-test	$\beta_c$	$\beta_d$	$B_d$ (SF)	$\beta_c / \beta_d$	$\beta_{hs}^{(1)}$	SM (dB) <sup>(2)</sup>
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15 <sup>(3)</sup>	15/15 <sup>(3)</sup>	64	12/15 <sup>(3)</sup>	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:  $\Delta_{ACK}, \Delta_{NACK}$  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  $\beta_c / \beta_d$  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  $\beta_d = 15/15$

Test of: P-01B

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## 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-PCS1900 Head Configuration 1g	95%	18.44%
Specific Absorption Rate- PCS1900 Body Configuration 1g	95%	18.30%
Specific Absorption Rate- UMTS850 Head Configuration 1g	95%	17.91%
Specific Absorption Rate- UMTS850 Body Configuration 1g	95%	17.93%

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.

Test of: P-01B

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

**Measurement Uncertainty (Continued)****8.1. Specific Absorption Rate Uncertainty at 1900 MHz Head 1g, PCS Modulation Scheme calculated in accordance with IEC 62209-1 & IEEE 1528**

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	C <sub>i</sub> (10g)	Standard Uncertainty		v <sub>i</sub> or v <sub>eff</sub>
							+ u (%)	- u (%)	
B	Probe calibration	11.000	11.000	normal (k=2)	2.0000	1.0000	5.500	5.500	∞
B	Axial Isotropy	0.500	0.500	normal (k=2)	2.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	2.600	2.600	normal (k=2)	2.0000	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	0.560	0.560	normal (k=2)	2.0000	1.0000	0.280	0.280	∞
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	0.584	0.584	normal (k=1)	1.0000	1.0000	0.584	0.584	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)	4.370	4.370	normal (k=1)	1.0000	0.6400	2.797	2.797	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	4.450	4.450	normal (k=1)	1.0000	0.6000	2.670	2.670	5
	Combined standard uncertainty			t-distribution			9.41	9.41	>300
	Expanded uncertainty			k = 1.96			18.44	18.44	>300

Test of: P-01B

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

**Measurement Uncertainty (Continued)****8.2. Specific Absorption Rate Uncertainty at 1900 MHz Body 1g, GPRS Modulation Scheme calculated in accordance with IEC 62209-2 & IEEE 1528**

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	C <sub>i</sub> (10g)	Standard Uncertainty		v <sub>i</sub> or v <sub>eff</sub>
							+ u (%)	- u (%)	
B	Probe calibration	11.000	11.000	normal (k=2)	2.0000	1.0000	5.500	5.500	∞
B	Axial Isotropy	0.500	0.500	normal (k=2)	2.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	2.600	2.600	normal (k=2)	2.0000	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	0.560	0.560	normal (k=2)	2.0000	1.0000	0.280	0.280	∞
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	0.584	0.584	normal (k=1)	1.0000	1.0000	0.584	0.584	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)	4.170	4.170	normal (k=1)	1.0000	0.6400	2.669	2.669	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	4.230	4.230	normal (k=1)	1.0000	0.6000	2.538	2.538	5
	Combined standard uncertainty			t-distribution			9.34	9.34	>400
	Expanded uncertainty			k = 1.96			18.30	18.30	>400



Test of: P-01B

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**8.3. Specific Absorption Rate Uncertainty at 850 MHz Head 1g, UMTS Modulation Scheme calculated in accordance with IEC 62209-1 & IEEE 1528**

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	C <sub>i</sub> (10g)	Standard Uncertainty		v <sub>i</sub> or v <sub>eff</sub>
							+ u (%)	- u (%)	
B	Probe calibration	11.000	11.000	normal (k=2)	2.0000	1.0000	5.500	5.500	∞
B	Axial Isotropy	0.500	0.500	normal (k=2)	2.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	2.600	2.600	normal (k=2)	2.0000	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	0.560	0.560	normal (k=2)	2.0000	1.0000	0.280	0.280	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
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	0.584	0.584	normal (k=1)	1.0000	1.0000	0.584	0.584	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)	3.410	3.410	normal (k=1)	1.0000	0.6400	2.182	2.182	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	4.140	4.140	normal (k=1)	1.0000	0.6000	2.484	2.484	5
	Combined standard uncertainty			t-distribution			9.14	9.14	>500
	Expanded uncertainty			k = 1.96			17.91	17.91	>500

Test of: P-01B

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

**8.4. Specific Absorption Rate Uncertainty at 850 MHz Body 1g, UMTS Modulation Scheme calculated in accordance with IEC 62209-2 & IEEE 1528**

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	C <sub>i</sub> (10g)	Standard Uncertainty		v <sub>i</sub> or v <sub>eff</sub>
							+ u (%)	- u (%)	
B	Probe calibration	11.000	11.000	normal (k=2)	2.0000	1.0000	5.500	5.500	∞
B	Axial Isotropy	0.500	0.500	normal (k=2)	2.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	2.600	2.600	normal (k=2)	2.0000	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	0.560	0.560	normal (k=2)	2.0000	1.0000	0.280	0.280	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
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	0.584	0.584	normal (k=1)	1.0000	1.0000	0.584	0.584	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)	3.600	3.600	normal (k=1)	1.0000	0.6400	2.304	2.304	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	4.000	4.000	normal (k=1)	1.0000	0.6000	2.400	2.400	5
	Combined standard uncertainty			t-distribution			9.15	9.15	>500
	Expanded uncertainty			k = 1.96			17.93	17.93	>500

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**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	-
A1094	Digital Camera	Sony	MVC - FD81	125805	-	-
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	-	-
A1234	Data Acquisition Electronics	Schmid & Partner Engineering AG	DAE3	450	30 April 2009	12
A1378	Probe	Schmid & Partner Engineering AG	EX3 DV3	3508	26 June 2009	12
A1498	Oval Phantom 3mm	MCL	OVAL 3mm	None	Calibrated before use	-
A1566	SAM Phantom	Schmid & Partner Engineering AG	SAM a	002	Calibrated before use	-
A1329	900 MHz Dipole Kit	Schmid & Partner Engineering AG	D900V2	185	18 Aug 2009	24
A1237	1900 MHz Dipole Kit	Schmid & Partner Engineering AG	D1900V2	540	26 June 2009	24
A1474	Amplifier	Mini-Circuits	ZVE-8G	638700305	Calibrated as part of system	-
A215	20 dB Attenuator	Narda	766-20	9402	Calibrated as part of system	-
A1531	Antenna	AARONIA AG	7025	02458	-	-
C1144	Cable	Rosenberger MICRO-COAX	FA147AF00 1503030	41842-1	Calibrated as part of system	-
C1145	Cable	Rosenberger MICRO-COAX	FA147AF00 3003030	41843-1	Calibrated as part of system	-
C1146	Cable	Rosenberger MICRO-COAX	FA147AF03 0003030	41752-1	Calibrated as part of system	-

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RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
C1092	Cable	RS Components	293-334	1087200-33402	Internal Calibration	-
G0528	Robot Power Supply	Schmid & Partner Engineering AG	DASY	None	Calibrated before use	-
G087	PSU	Thurlby Thandar	CPX200	100701	Calibrated before use	-
M1015	Network Analyser	Agilent Technologies	8753ES	US39172406	16 Sept 2008	12
M1047	Robot Arm	Staubli	RX908 L	F00/SD89A1/A/01	Calibrated before use	-
M1159	Signal Generator	Agilent Technologies	E8241A	US42110332	Internal Checked 05 August 2009	4
M1071	Spectrum Analyzer	Agilent	HP8590E	3647U00514	(Monitoring use only)	-
M1044	Diode Power Sensor	Rohde & Schwarz	NRV-Z1	893350/019	19 May 2009	12
M265	Diode Power Sensor	Rohde & Schwarz	NRV-Z1	893350/017	19 May 2009	12
M263	Dual Channel Power Meter	Rohde & Schwarz	NRVD	826558/004	20 May 2009	12
M1270	Temperature/ Humidity/ Pressure Meter	RS Components	None	None	June 2009 (Internal Calibration)	12
S256	SAR Lab	RFI	Site 56	N/A	Calibrated before use	-

Test of: P-01B

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#### **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.

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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

Client **RFI**

Certificate No: **EX3-3508\_Jun09**

## CALIBRATION CERTIFICATE

Object **EX3DV3 - SN:3508**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-12.v5 and QA CAL-23.v3**  
**Calibration procedure for dosimetric E-field probes**

Calibration date: **June 26, 2009**

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 ( $22 \pm 3$ )°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	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ES3DV2	SN: 3013	2-Jan-09 (No. ES3-3013_Jan09)	Jan-10
DAE4	SN: 660	9-Sep-08 (No. DAE4-660_Sep08)	Sep-09
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 26, 2009

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



## Glossary:

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

## Calibration is Performed According to the Following Standards:

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

## Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not effect the E<sup>2</sup>-field uncertainty inside TSL (see below *ConvF*).
- NORM(f)<sub>x,y,z</sub>** = NORM<sub>x,y,z</sub> \* *frequency\_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP<sub>x,y,z</sub>**: 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  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* *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  $\pm 50$  MHz to  $\pm 100$  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 EX3DV3

## SN:3508

Manufactured:	December 19, 2003
Last calibrated:	June 24, 2008
Recalibrated:	June 26, 2009

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)



## DASY - Parameters of Probe: EX3DV3 SN:3508

### Sensitivity in Free Space<sup>A</sup>

### Diode Compression<sup>B</sup>

NormX	<b>0.76</b> ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	<b>95</b> mV
NormY	<b>0.63</b> ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	<b>97</b> mV
NormZ	<b>0.66</b> ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	<b>94</b> 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		<b>2.0 mm</b>	<b>3.0 mm</b>
SAR <sub>be</sub> [%]	Without Correction Algorithm	7.8	4.6
SAR <sub>be</sub> [%]	With Correction Algorithm	0.5	0.3

**TSL**                      **1750 MHz**      **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		<b>2.0 mm</b>	<b>3.0 mm</b>
SAR <sub>be</sub> [%]	Without Correction Algorithm	5.8	2.7
SAR <sub>be</sub> [%]	With Correction Algorithm	0.7	0.5

### Sensor Offset

Probe Tip to Sensor Center                      **1.0 mm**

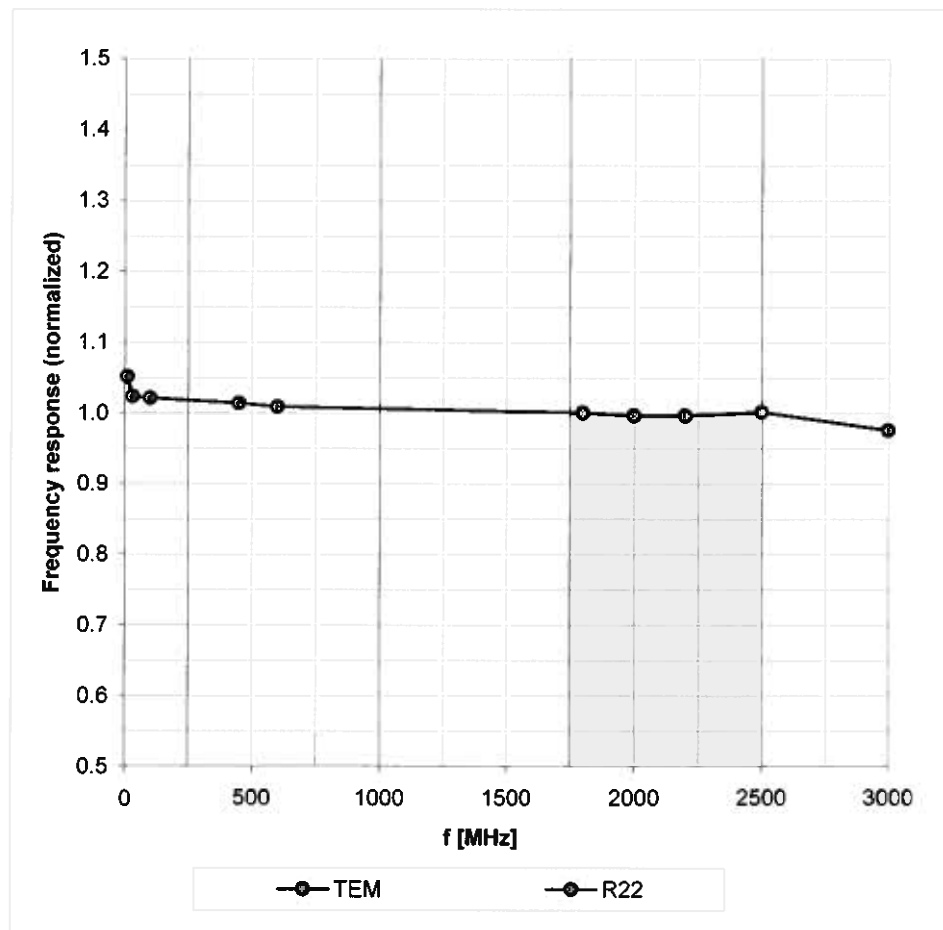
**The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.**

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Page 8).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

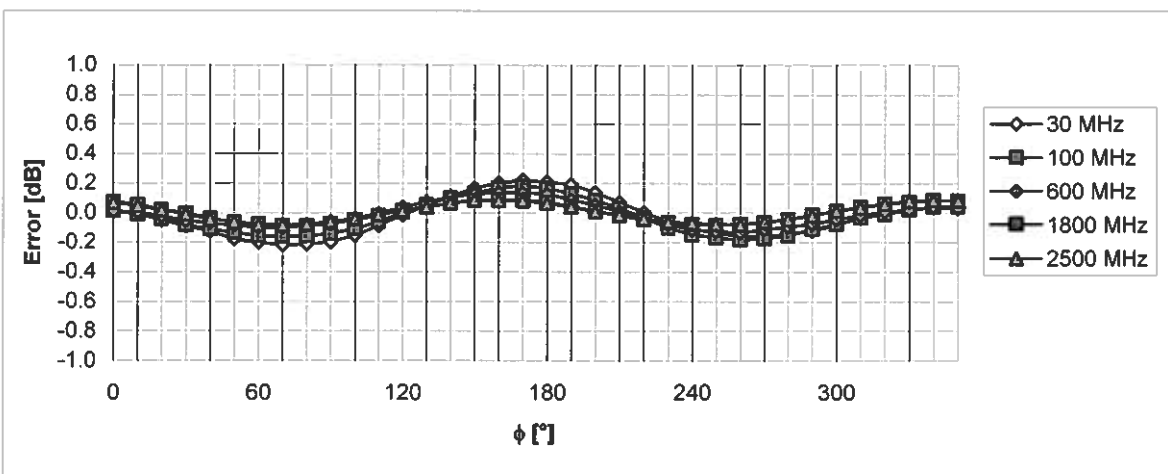
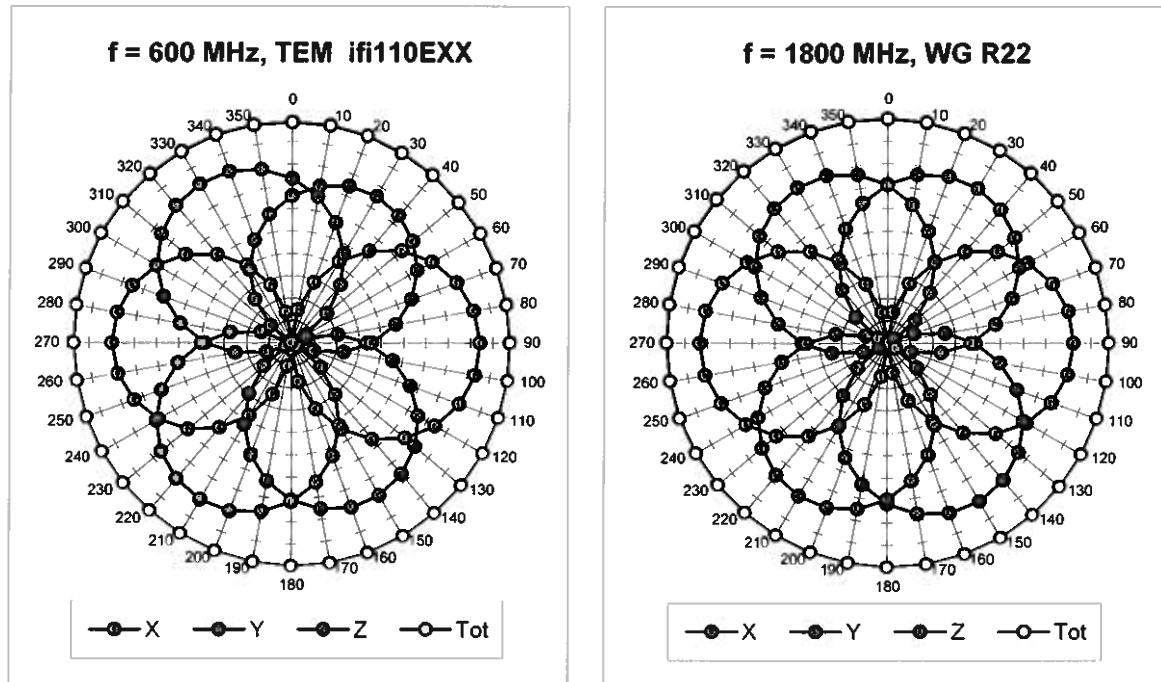
## Frequency Response of E-Field

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



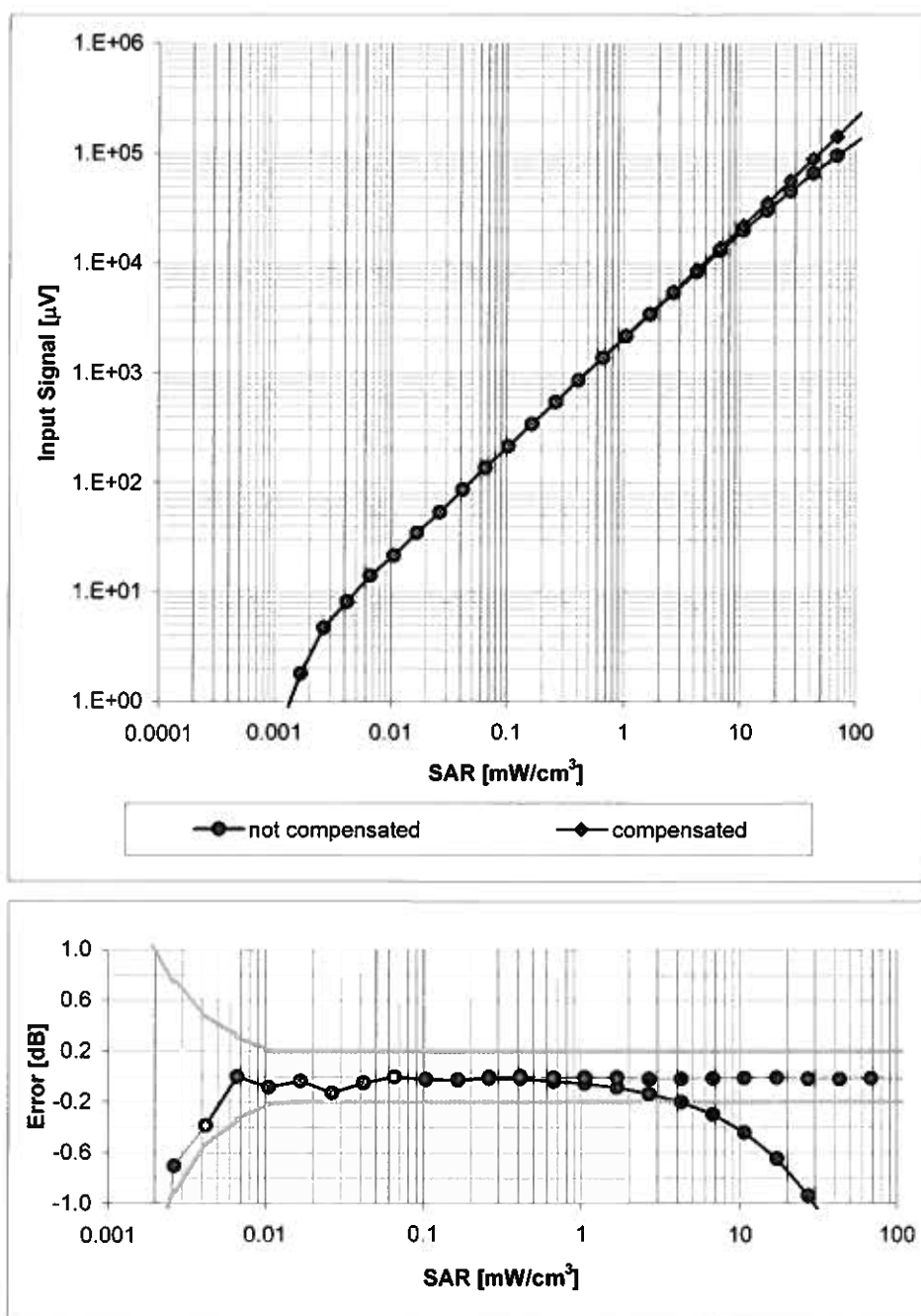
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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



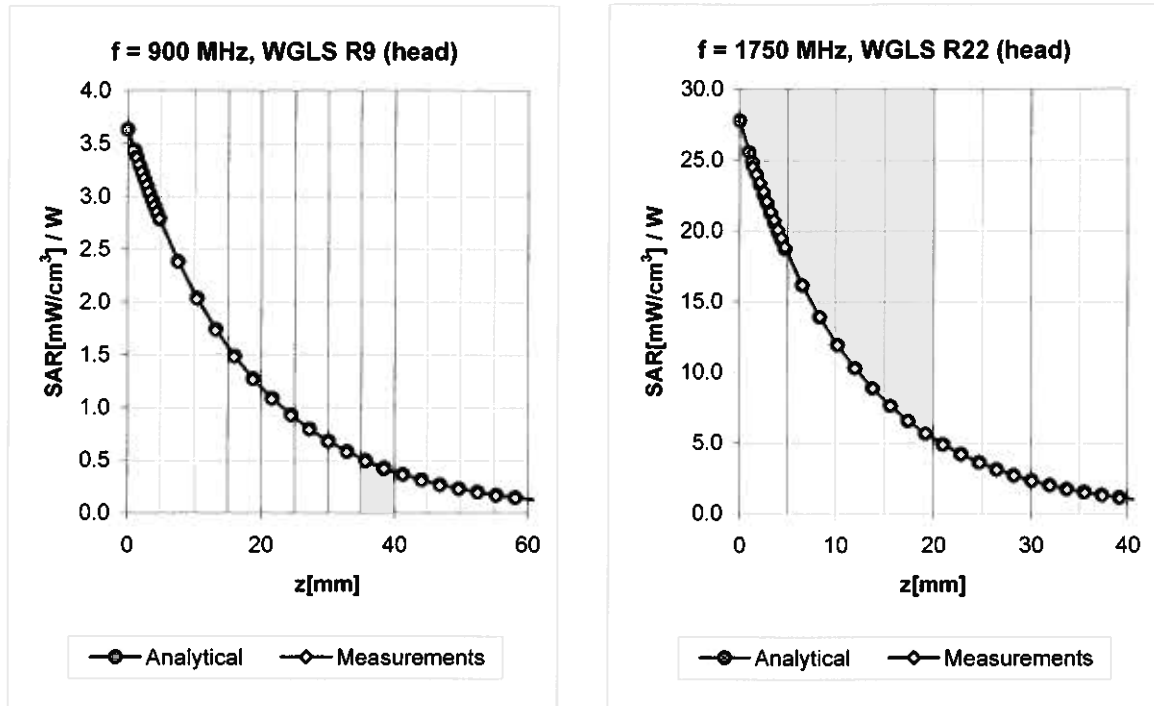
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

# Dynamic Range $f(\text{SAR}_{\text{head}})$ (Waveguide R22, $f = 1800 \text{ MHz}$ )



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

## Conversion Factor Assessment

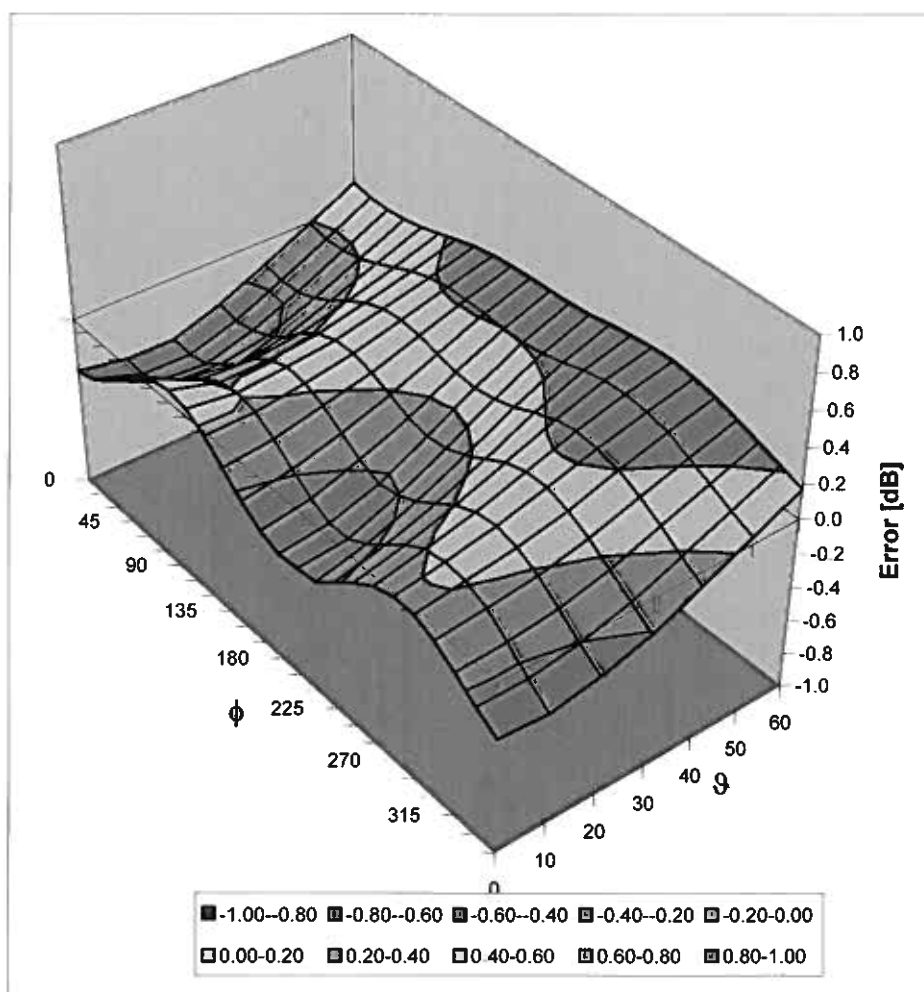


f [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.23	1.00	10.49 ± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.48	0.72	9.76 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.57	0.63	8.82 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.53	0.65	8.58 ± 11.0% (k=2)
2150	± 50 / ± 101	Head	39.7 ± 5%	1.53 ± 5%	0.36	0.69	8.33 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.36	0.75	7.77 ± 11.0% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.30	0.51	11.32 ± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.45	0.75	9.99 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.55	0.63	8.59 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.48	0.68	8.23 ± 11.0% (k=2)
2150	± 50 / ± 100	Body	53.0 ± 5%	1.75 ± 5%	0.30	0.92	8.27 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.25	1.02	8.06 ± 11.0% (k=2)

<sup>c</sup> 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 ( $\phi$ ,  $\theta$ ),  $f = 900$  MHz



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



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Accreditation No.: **SCS 108**

Client **RFI**

Certificate No: **D900V2-185\_Aug09**

## CALIBRATION CERTIFICATE

Object **D900V2 - SN: 185**

Calibration procedure(s) **QA CAL-05.v7**  
**Calibration procedure for dipole validation kits**

Calibration date: **August 18, 2009**

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 ( $22 \pm 3$ )°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	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV3	SN: 3205	26-Jun-09 (No. ES3-3205_Jun09)	Jun-10
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 18, 2009

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

**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	V5.0
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 $\pm$ 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.97 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.4 $\pm$ 6 %	0.96 mho/m $\pm$ 6 %
Head TSL temperature during test	(22.4 $\pm$ 0.2) °C	----	----

## SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.75 mW / g
SAR normalized	normalized to 1W	11.0 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>11.0 mW / g <math>\pm</math> 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.76 mW / g
SAR normalized	normalized to 1W	7.04 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>7.06 mW / g <math>\pm</math> 16.5 % (k=2)</b>

<sup>1</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

## 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	52.7 ± 6 %	1.06 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

## SAR result with Body TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b>	Condition	
SAR measured	250 mW input power	2.80 mW / g
SAR normalized	normalized to 1W	11.2 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>11.0 mW / g ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b>	condition	
SAR measured	250 mW input power	1.81 mW / g
SAR normalized	normalized to 1W	7.24 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>7.16 mW / g ± 16.5 % (k=2)</b>

---

<sup>2</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

## Appendix

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.5 $\Omega$ - 10.3 j $\Omega$
Return Loss	- 19.7 dB

### Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.5 $\Omega$ - 11.2 j $\Omega$
Return Loss	- 18.0 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.403 ns
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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	May 27, 2003

## DASY5 Validation Report for Head TSL

Date/Time: 18.08.2009 08:57:04

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:185**

Communication System: CW-900; Frequency: 900 MHz; Duty Cycle: 1:1

Medium: HSL 900 MHz

Medium parameters used:  $f = 900$  MHz;  $\sigma = 0.96$  mho/m;  $\epsilon_r = 40.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

### DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.88, 5.88, 5.88); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

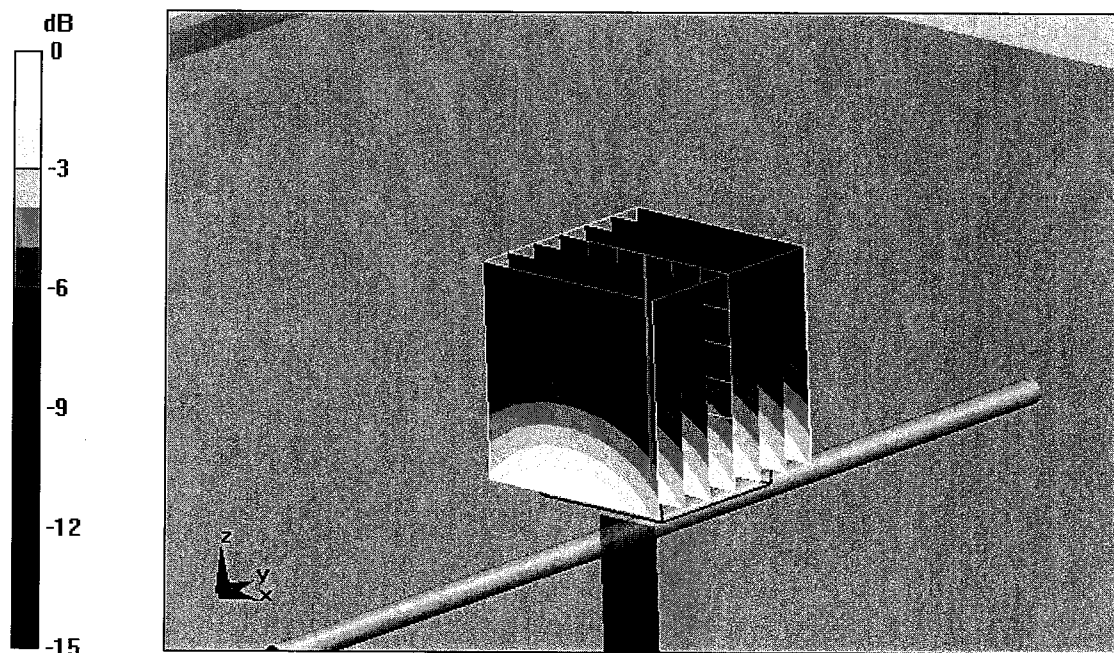
**Pin=250mW; dip=15mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 59.7 V/m; Power Drift = 0.015 dB

Peak SAR (extrapolated) = 4.17 W/kg

**SAR(1 g) = 2.75 mW/g; SAR(10 g) = 1.76 mW/g**

Maximum value of SAR (measured) = 3.23 mW/g



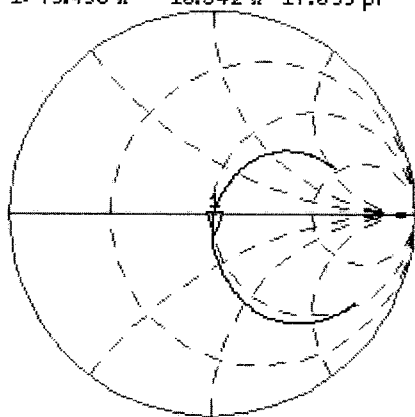
# Impedance Measurement Plot for Head TSL

18 Aug 2009 08:06:03  
 CH1 S11 1 U FS 1: 49.496  $\Omega$  -10.342  $\Omega$  17.099 pF 900.000 000 MHz

\*  
 Del  
 Cor

Avg  
 16

↑

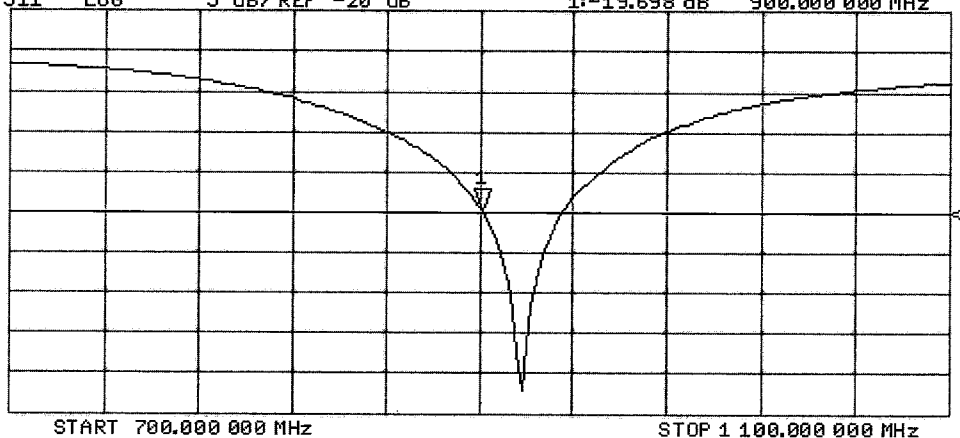


CH2 S11 LOG 5 dB/REF -20 dB 1:-19.698 dB 900.000 000 MHz

Cor

Avg  
 16

↑



## DASY5 Validation Report for Body

Date/Time: 17.08.2009 11:23:13

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:185**

Communication System: CW-900; Frequency: 900 MHz; Duty Cycle: 1:1

Medium: MSL900

Medium parameters used:  $f = 900 \text{ MHz}$ ;  $\sigma = 1.06 \text{ mho/m}$ ;  $\epsilon_r = 52.7$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

### DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.81, 5.81, 5.81); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

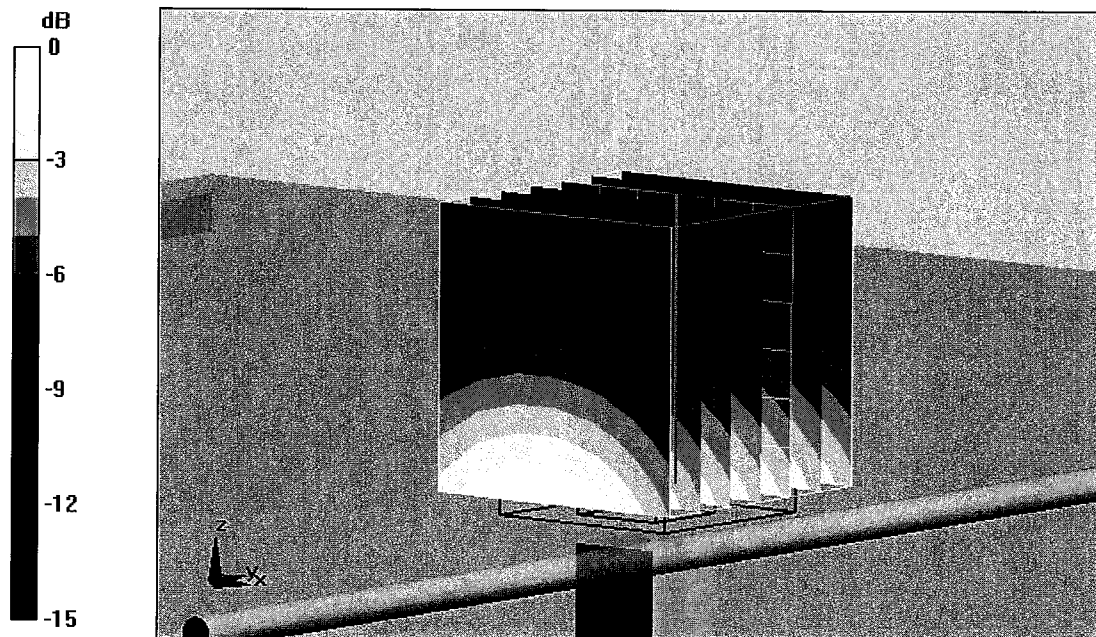
**Pin=250mW; dip=15mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 57.2 V/m; Power Drift = 0.00569 dB

Peak SAR (extrapolated) = 4.19 W/kg

**SAR(1 g) = 2.8 mW/g; SAR(10 g) = 1.81 mW/g**

Maximum value of SAR (measured) = 3.24 mW/g



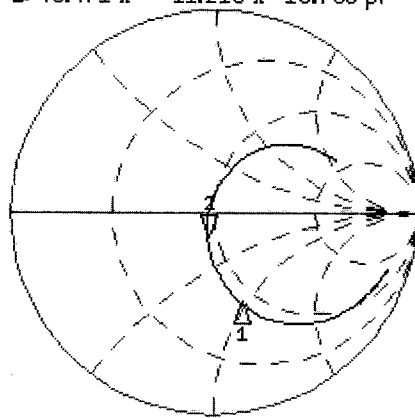
0 dB = 3.24mW/g

# Impedance Measurement Plot for Body TSL

17 Aug 2009 08:58:55  
 CH1 S11 1 U FS 2: 45.471  $\Omega$  -11.215  $\Omega$  15.768 pF 900.000 000 MHz

\*  
 De1  
 Cor

Avg  
 16

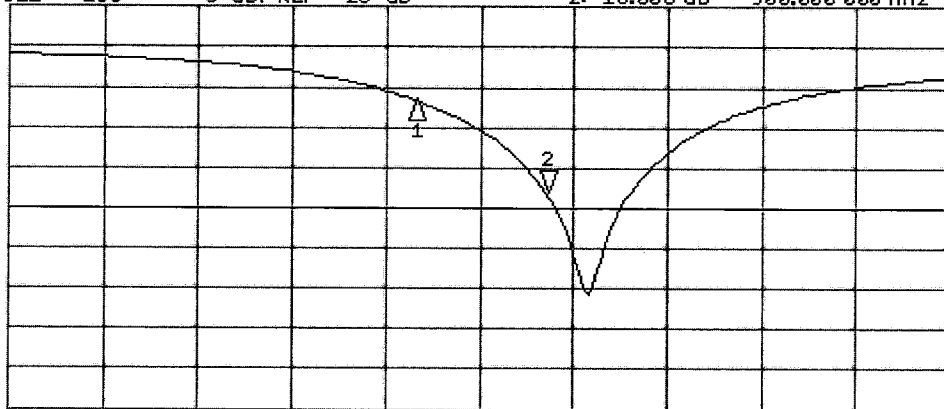


CH1 Markers  
 1: 41.352  $\Omega$   
 -46.815  $\Omega$   
 835.000 MHz

CH2 S11 LOG 5 dB/REF -20 dB 2: -18.006 dB 900.000 000 MHz

Cor

Avg  
 16



CH2 Markers  
 1: -6.6738 dB  
 835.000 MHz



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Accreditation No.: **SCS 108**

Client **RFI**

Certificate No: **D1900V2-540-Jun09**

## CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 540**

Calibration procedure(s) **QA CAL-05.v7  
Calibration procedure for dipole validation kits**

Calibration date: **June 26, 2009**

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  $(22 \pm 3)^\circ\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV2	SN: 3025	30-Apr-09 (No. ES3-3025_Apr09)	Apr-10
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

Calibrated by: **Jeton Kastrati** **Laboratory Technician** *[Signature]*

Approved by: **Katja Pokovic** **Technical Manager** *[Signature]*

Issued: June 29, 2009

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### 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:

- 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
- 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
- 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:

- 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.

<b>DASY Version</b>	DASY5	V5.0
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom V5.0	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	1900 MHz $\pm$ 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	40.0	1.40 mho/m
<b>Measured Head TSL parameters</b>	(22.0 $\pm$ 0.2) °C	41.0 $\pm$ 6 %	1.42 mho/m $\pm$ 6 %
<b>Head TSL temperature during test</b>	(22.0 $\pm$ 0.2) °C	---	---

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	10.1 mW / g
SAR normalized	normalized to 1W	40.4 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>40.3 mW / g <math>\pm</math> 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	5.29 mW / g
SAR normalized	normalized to 1W	21.2 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>21.1 mW / g <math>\pm</math> 16.5 % (k=2)</b>

<sup>1</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

## Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.9 ± 6 %	1.55 mho/m ± 6 %
Body TSL temperature during test	(21.2 ± 0.2) °C	---	---

## SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.3 mW / g
SAR normalized	normalized to 1W	41.2 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>40.9 mW / g ± 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.40 mW / g
SAR normalized	normalized to 1W	21.6 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>21.5 mW / g ± 16.5 % (k=2)</b>

---

<sup>2</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

## Appendix

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	$48.5 \Omega + 2.7 j\Omega$
Return Loss	- 30.0 dB

### Antenna Parameters with Body TSL

Impedance, transformed to feed point	$44.9 \Omega + 2.8 j\Omega$
Return Loss	- 24.3 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.198 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 26, 2001

## DASY5 Validation Report for Head TSL

Date/Time: 26.06.2009 12:43:03

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:540**

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL U11 BB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.42$  mho/m;  $\epsilon_r = 41$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

### DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.88, 4.88, 4.88); Calibrated: 30.04.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

**Pin = 250 mW; dip = 10 mm/Zoom Scan (dist=3.0 mm, probe 0deg) (7x7x7)/Cube 0:**

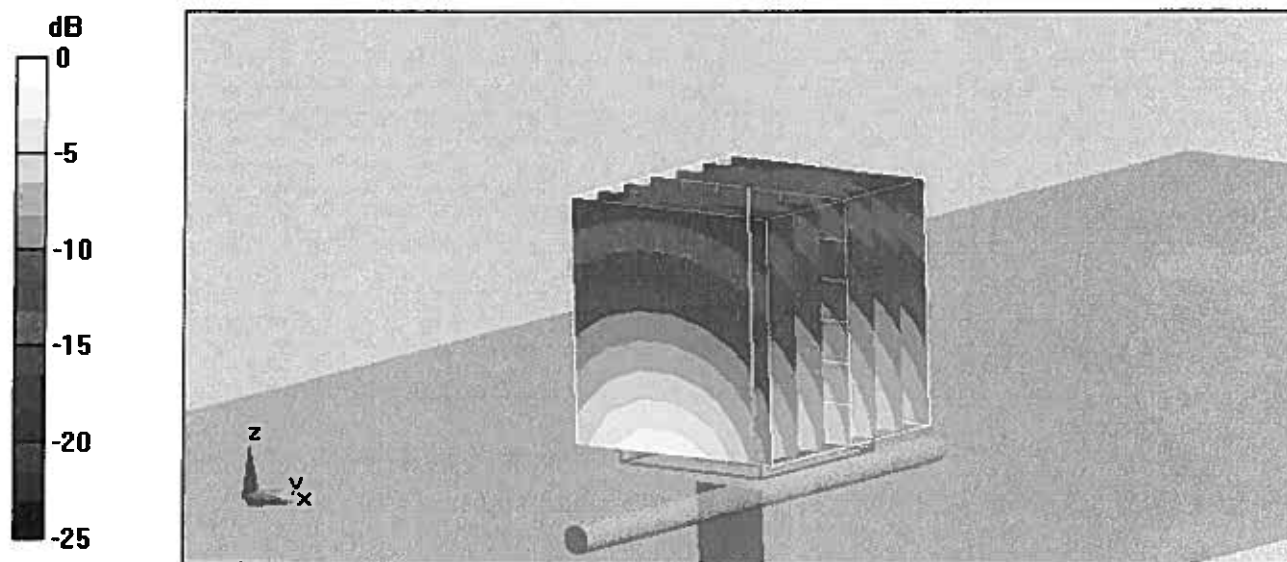
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.9 V/m; Power Drift = 0.037 dB

Peak SAR (extrapolated) = 18.4 W/kg

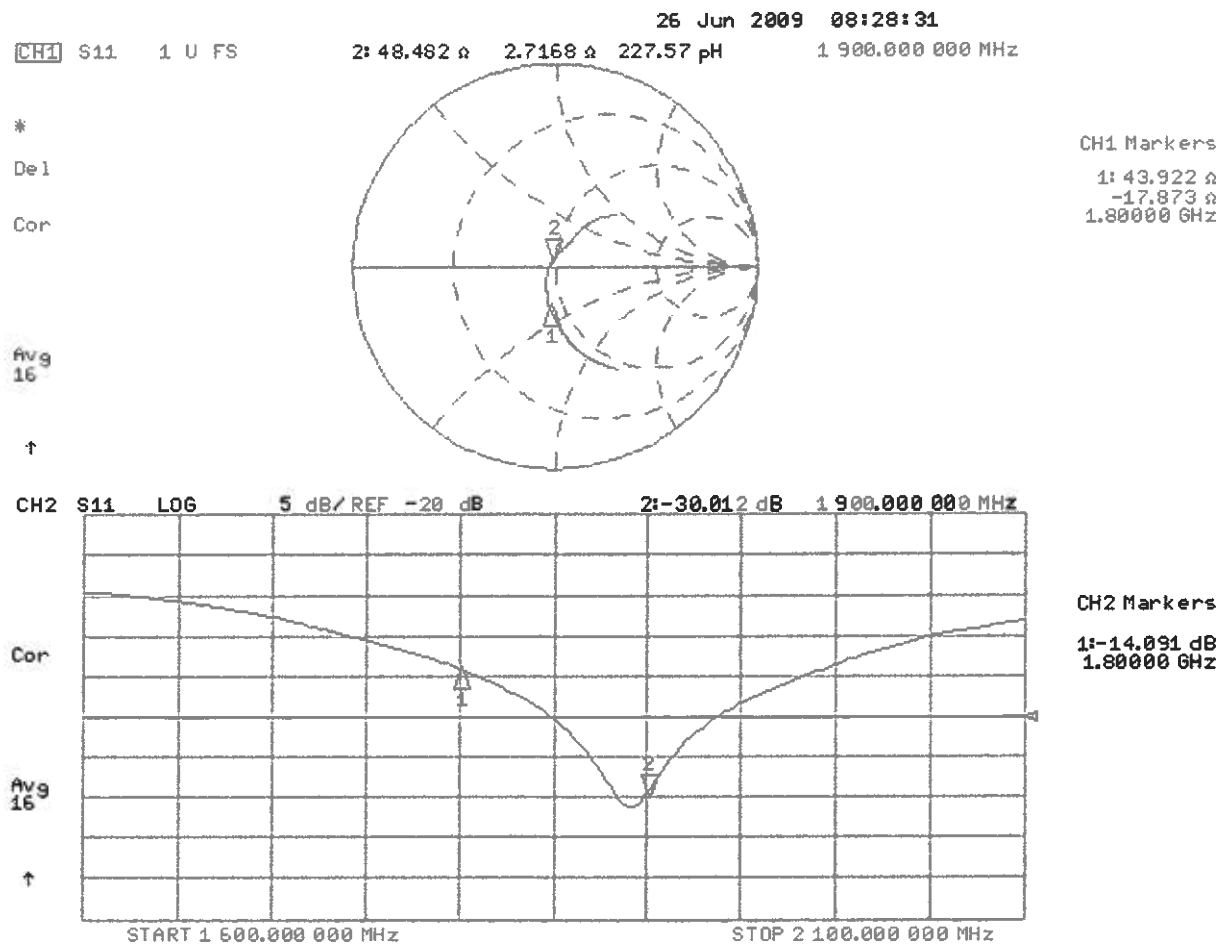
**SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.29 mW/g**

Maximum value of SAR (measured) = 12.5 mW/g



0 dB = 12.5mW/g

Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date/Time: 26.06.2009 14:10:45

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:540**

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: MSL U10 BB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.55$  mho/m;  $\epsilon_r = 54$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

### DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.46, 4.46, 4.46); Calibrated: 30.04.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

**Pin = 250 mW; dip = 10 mm/Zoom Scan (dist=3.0mm, probe 0deg) (7x7x7)/Cube 0:**

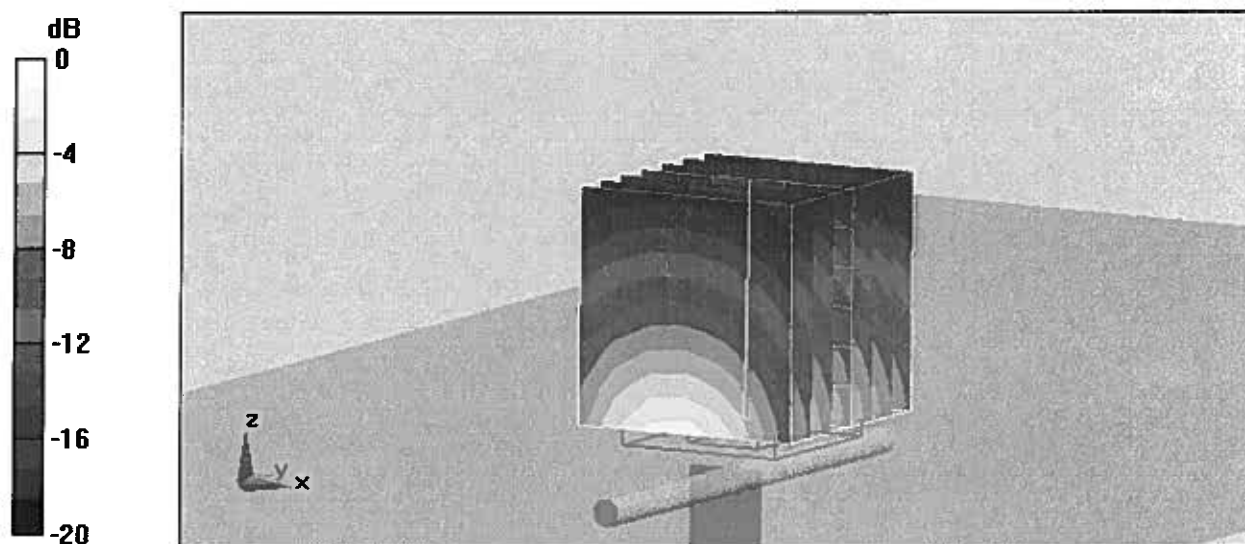
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.1 V/m; Power Drift = 0.011 dB

Peak SAR (extrapolated) = 18.1 W/kg

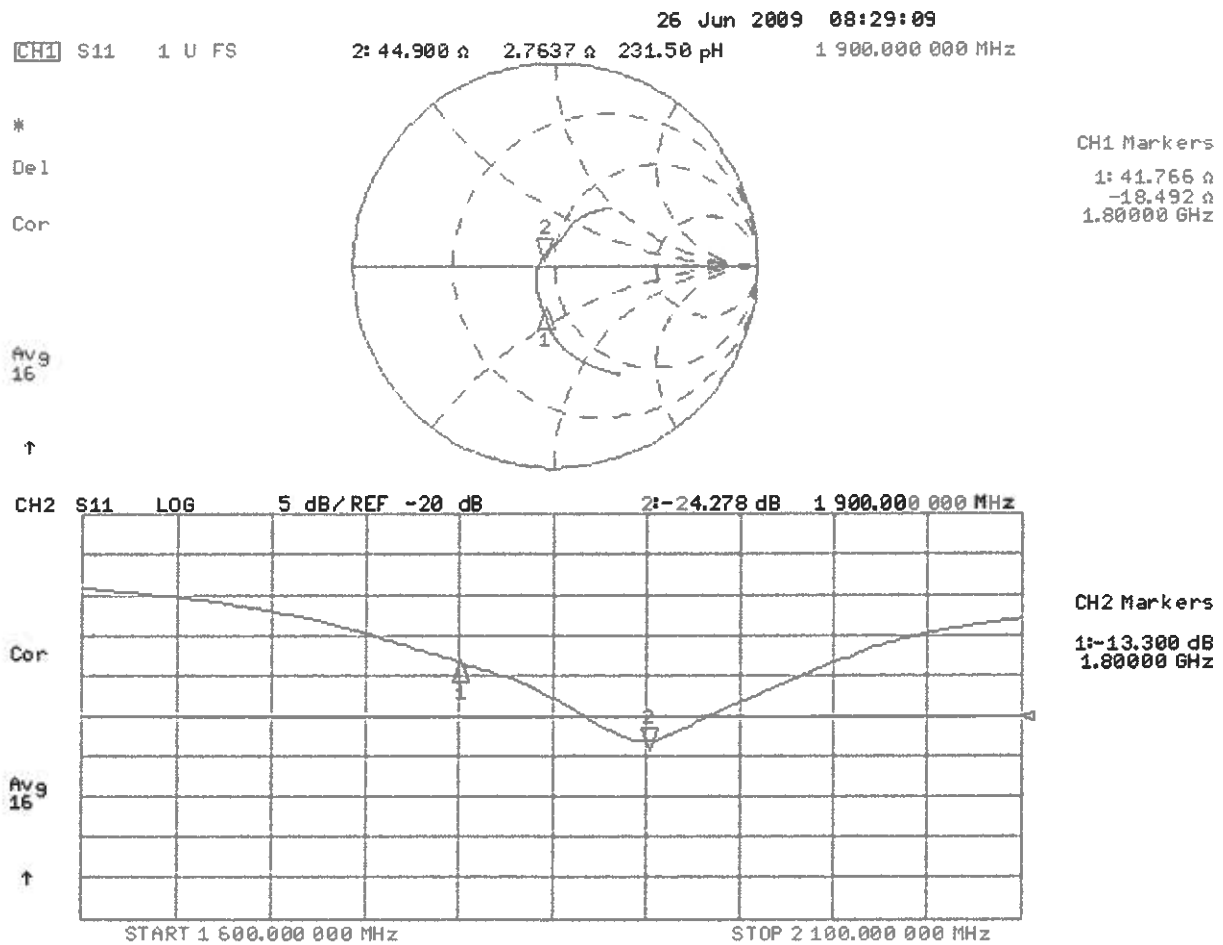
**SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.4 mW/g**

Maximum value of SAR (measured) = 12.9 mW/g



0 dB = 12.9mW/g

Impedance Measurement Plot for Body TSL





Test of: P-01B

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

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## **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 where 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.
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Test of: P-01B

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

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#### **A.2.2. 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, against appropriate limits for each measurement position in accordance with the standard.

The test was performed in a shielded enclosure with the temperature controlled to remain between +18.0°C and +25.0°C. The tissue equivalent material fluid temperature was controlled to give a maximum variation of  $\pm 2.0^\circ\text{C}$

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.

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 343 points (5 mm spacing in each axis  $\approx 27\text{g}$ ) 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.

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