

# TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: R&S TechMedic BV Dyna-Vision DVM-012SG

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

**Test Report Serial No:**  
RFI/SAR2/RP77230JD05A

**Supersedes Test Report Serial No:**  
RFI/SAR1/RP77230JD05A

|  |  |
|--|--|
| <b>This Test Report Is Issued Under The Authority<br/>Of Scott D'Adamo, Operations Manager Global<br/>Approvals</b>      | <br>pp |
| <b>Checked By: Richelieu Quoi</b><br> | <b>Report Copy No: PDF01</b>   |
| <b>Issue Date: 13 May 2010</b>   | <b>Test Dates: 29 March to 11 May 2010</b>   |

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## 1. Customer Information

|               |  |
|---------------|--|
| Company Name: | R&S TechMedic BV   |
| Address:      | Broeker Werf 6<br>1721 PC Broek op Langedijk<br>Langedijk<br>The Netherlands |

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

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

|   |                        |
|---|------------------------|
| <b>Description:</b>                     | Remote Patient Monitor |
| <b>Brand Name:</b>                      | Dyna-Vision            |
| <b>Model Name or Number:</b>            | DVM-012SG              |
| <b>Serial Number:</b>                   | DV08Y01B0082           |
| <b>IMEI Number:</b>                     | 359983000890016        |
| <b>Hardware Version Number:</b>         | 3808                   |
| <b>Software Version Number:</b>         | 3.00                   |
| <b>Hardware Revision of GSM Module:</b> | None Stated            |
| <b>Software Revision of GSM Module:</b> | None Stated            |
| <b>FCC ID Number:</b>                   | GC145698               |
| <b>Country of Manufacture:</b>          | The Netherlands        |
| <b>Date of Receipt:</b>                 | 11 March 2010          |

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

The equipment under test was a Class IIb medical device, to be used for recording and/or (simultaneous) transmission of Electrocardiography (ECG) and SpO2 signals. The EUT has Bluetooth and GSM/GPRS 850/900/1800/1900 capabilities, with an integral antenna.

### **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>            | 3 Lead Wire ECG Cable  |
| <b>Brand Name:</b>             | Dyna-Vision            |
| <b>Model Name or Number:</b>   | None Stated            |
| <b>Serial Number:</b>          | 080912-061/ 4680609    |
| <b>Cable Length and Type:</b>  | ~ 0.5 m                |
| <b>Country of Manufacture:</b> | None Stated            |
| <b>Connected to Port</b>       | Unique to Manufacturer |

|                                |                           |
|--------------------------------|---------------------------|
| <b>Description:</b>            | Carry Case with belt loop |
| <b>Brand Name:</b>             | Dyna-Vision               |
| <b>Model Name or Number:</b>   | None Stated               |
| <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>       | Not Applicable            |

**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>            | Rohde & Schwarz            |
| <b>Model Name or Number:</b>  | CMU200                     |
| <b>Serial Number:</b>         | 116284                     |
| <b>Cable Length and Type:</b> | ~2.0 m Utiflex RF cable    |
| <b>Connected to Port:</b>     | RF (Input/Output) Air Link |

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**2.6. Additional Information Related to Testing**

| Equipment Category                                       | GPRS850 / GPRS1900                  |  |                 |
|--|-------------------------------------|--|-----------------|
| Type of Unit   | Short Range Device                  |  |                 |
| Intended Operating Environment:                          | Within GSM coverage frequency range |  |                 |
| Transmitter Maximum Output Power Characteristics:        | GPRS850                             | GSM Wireless Communication Test Set was configured to allow the EUT to transmit at a maximum power of up to 33dBm. |                 |
|  | GPRS1900                            | GSM Wireless Communication Test Set was configured to allow the EUT to transmit at a maximum power of up to 30dBm. |                 |
| Transmitter Maximum Output Power Measured:               | GPRS850                             | 32.2 dBm (Measured)  |                 |
|  | GPRS1900                            | 28.5 dBm (Measured)  |                 |
| Transmitter Frequency Range:                             | GPRS850                             | (824 to 850 ) MHz  |                 |
|  | GPRS1900                            | (1850 to 1910 ) MHz  |                 |
| Transmitter Frequency Allocation of EUT When Under Test: | Channel Number                      | Channel Description  | Frequency (MHz) |
|  | 128                                 | Low  | 824.2           |
|  | 189                                 | Middle   | 836.4           |
|  | 251                                 | High   | 848.8           |
|  | 512                                 | Low  | 1850.2          |
|  | 660                                 | Middle   | 1879.8          |
|  | 810                                 | High   | 1909.8          |
| Modulation(s):   | GMSK: 217 Hz                        |  |                 |
| Modulation Scheme (Crest Factor):                        | GPRS: 4                             |  |                 |
| Antenna Type:  | Internal                            |  |                 |
| Antenna Length:  | Unknown                             |  |                 |
| Number of Antenna Positions:                             | 1 Fixed                             |  |                 |
| Power Supply Requirement:                                | 3.7 V                               |  |                 |
| Battery Type(s):   | Li-ion                              |  |                 |

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### **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 known precision", IEICE Transactions of communications, Vol. E80-B, No.5, pp. 645-652, May 1997.

KDB447498 D01 Mobile Portable RF Exposure v04

#### **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 according to the body-worn procedures in consideration with FCC OET Bulletin 65 Supplement C 01-01 test.

Prior to commencement of SAR test the FCC was contacted on the test configuration of the device. The proposed test configuration and power level was detailed in the KDB. The following KDB tracking number 971593 was assigned to the inquiry.

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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:

- GPRS1900 data allocated mode with communication test set, set up to transmit at 30 dBm with 2 uplink channels.
- GPRS850 data allocated mode with communication test-set set up to transmit at 33 dBm with 2 uplink channels.

### **5.2. Configuration and Peripherals**

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

- Standalone battery powered
- EUT was positioned with the front and rear in direct contact with the 'SAM' phantom. The EUT was tested while Placed in Dyna-Vision Carry case with belt loop and 3 Lead Wire ECG Cable attached.

### **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 EUT was gradually moved towards the flat section of the 'SAM' phantom until any point of the EUT touched the phantom.
- d) 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.
- e) The device was keyed to operate continuously in the transmit mode for the duration of the test.
- f) The location of the maximum spatial SAR distribution (hot spot) was determined relative to the EUT and its antenna.
- g) 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-GPRS850<br>Body Configuration 1g  | OET Bulletin 65 Supplement C: (2001-01) | Complied |
| Specific Absorption Rate-GPRS1900<br>Body Configuration 1g | OET Bulletin 65 Supplement C: (2001-01) | Complied |

### **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 - GPRS850 Body Configuration 1g

#### Test Summary:

|                       |       |
|-----------------------|-------|
| Tissue Volume:        | 1g    |
| Maximum Level (W/kg): | 0.119 |

#### Environmental Conditions:

|                                       |              |
|---------------------------------------|--------------|
| Temperature Variation in Lab (°C):    | 24.0 to 24.0 |
| Temperature Variation in Liquid (°C): | 23.9 to 23.9 |

#### 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)            | 189            | 0.119        | 1.600        | 1.481         | 1, 2    | Complied |
| Rear of EUT Facing Phantom  | Flat (SAM)            | 189            | 0.029        | 1.600        | 1.571         | 1, 2    | Complied |

#### Note(s):

1. SAR measurements were performed with the EUT at a separation distance of 0mm from the 'SAM' phantom flat section.
2. 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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**7.2.2. Specific Absorption Rate - GPRS1900 Body Configuration 1g****Test Summary:**

|                       |       |
|-----------------------|-------|
| Tissue Volume:        | 1g    |
| Maximum Level (W/kg): | 0.223 |

**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            | 0.223        | 1.600        | 1.377         | 1, 2    | Complied |
| Rear of EUT Facing Phantom  | Flat (SAM)            | 660            | 0.049        | 1.600        | 1.551         | 1, 2    | Complied |

**Note(s):**

1. SAR measurements were performed with the EUT at a separation distance of 0mm from the 'SAM' phantom flat section.
2. 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. Conducted Average Power Measurement**

| Channel Number | Frequency (MHz) | TX Power Measured (dBm) | Note      |
|----------------|-----------------|-------------------------|-----------|
| 128            | 824.2           | 32.2                    | Conducted |
| 189            | 836.4           | 31.9                    | Conducted |
| 251            | 848.8           | 31.0                    | Conducted |
| 512            | 1850.2          | 28.5                    | Conducted |
| 660            | 1879.8          | 28.2                    | Conducted |
| 810            | 1909.8          | 28.5                    | Conducted |

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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- GPRS850 Body Configuration 1g  | 95%              | ±18.03                 |
| Specific Absorption Rate- GPRS1900 Body Configuration 1g | 95%              | ±18.30                 |

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.

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**Measurement Uncertainty (Continued)****8.1. Specific Absorption Rate Uncertainty at 850 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 |         | u <sub>i</sub> or<br>u <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)                  | 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           |         |                      | 9.20                 | 9.20    | >500                                  |
|      | Expanded uncertainty                                  |         |         | k = 1.96                 |         |                      | 18.03                | 18.03   | >500                                  |

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**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 |         | u <sub>i</sub> or<br>u <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: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

**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             | -                            | -                      |
| A1234   | Data Acquisition Electronics | Schmid & Partner Engineering AG | DAE3              | 450              | 30 April 2009                | 12                     |
| A1238   | SAM Phantom                  | Schmid & Partners               | SAM b             | 001              | Calibrated before use        | -                      |
| A1237   | 1900 MHz Dipole Kit          | Schmid & Partner Engineering AG | D1900V2           | 540              | 26 June 2009                 | 24                     |
| A1329   | 900 MHz Dipole Kit           | Schmid & Partner Engineering AG | D900V2            | 185              | 18 Aug 2009                  | 24                     |
| A1378   | Probe                        | Schmid & Partner Engineering AG | EX3 DV3           | 3508             | 26 June 2009                 | 12                     |
| A1566   | SAM Phantom                  | Schmid & Partner Engineering AG | SAM a             | 002              | Calibrated before use        | -                      |
| A1497   | Amplifier                    | Mini-Circuits                   | zhl-42w (sma)     | e020105          | Calibrated as part of system | -                      |
| A1990   | Digital Camera               | Samsung                         | AS15              | A23WC908A 05431K | -                            | -                      |
| A215    | 20 dB Attenuator             | Narda                           | 766-20            | 9402             | Calibrated as part of system | -                      |
| 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 | -                      |

Test of: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

| RFI No. | Instrument               | Manufacturer                    | Type No.          | Serial No.      | Date Last Calibrated            | Cal. Interval (Months) |
|---------|--------------------------|---------------------------------|-------------------|-----------------|---------------------------------|------------------------|
| C1146   | Cable                    | Rosenberger MICRO-COAX          | FA147AF03 0003030 | 41752-1         | Calibrated as part of system    | -                      |
| 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      | 15 Sept 2009                    | 12                     |
| M1047   | Robot Arm                | Staubli                         | RX908 L           | F00/SD89A1/A/01 | Calibrated before use           | -                      |
| M1159   | Signal Generator         | Agilent Technologies            | E8241A            | US42110332      | Internal Check 04 December 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                     |
| S256    | SAR Lab                  | RFI                             | Site 56           | N/A             | Calibrated before use           | -                      |

**NB** In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Test of: R&S TechMedic BV Dyna-Vision DVM-012SG

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

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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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Multilateral Agreement for the recognition of calibration certificates

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 ± 3)°C and humidity < 70%.

### Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration  |
|-----------------------------|--------------------|---|------------------------|
| Power meter 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: | Name           | Function              | Signature |
|----------------|----------------|-----------------------|-----------|
|                | Jeton Kastrati | Laboratory Technician |           |
| Approved by:   | Katja Pokovic  | Technical Manager     |           |

Issued: June 29, 2009

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



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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) 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
- 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.

|                                     |                           |             |
|-------------------------------------|---------------------------|-------------|
| <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   | 40.3 mW / g $\pm$ 17.0 % (k=2) |

|   |                    |                                |
|---|--------------------|--------------------------------|
| <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   | 21.1 mW / g $\pm$ 16.5 % (k=2) |

<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     |
|---|-----------------|--------------|------------------|
| <b>Nominal Body TSL parameters</b>      | 22.0 °C         | 53.3         | 1.52 mho/m       |
| <b>Measured Body TSL parameters</b>     | (22.0 ± 0.2) °C | 53.9 ± 6 %   | 1.55 mho/m ± 6 % |
| <b>Body TSL temperature during test</b> | (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   | 40.9 mW / g ± 17.0 % (k=2) |

| 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   | 21.5 mW / g ± 16.5 % (k=2) |

<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:**

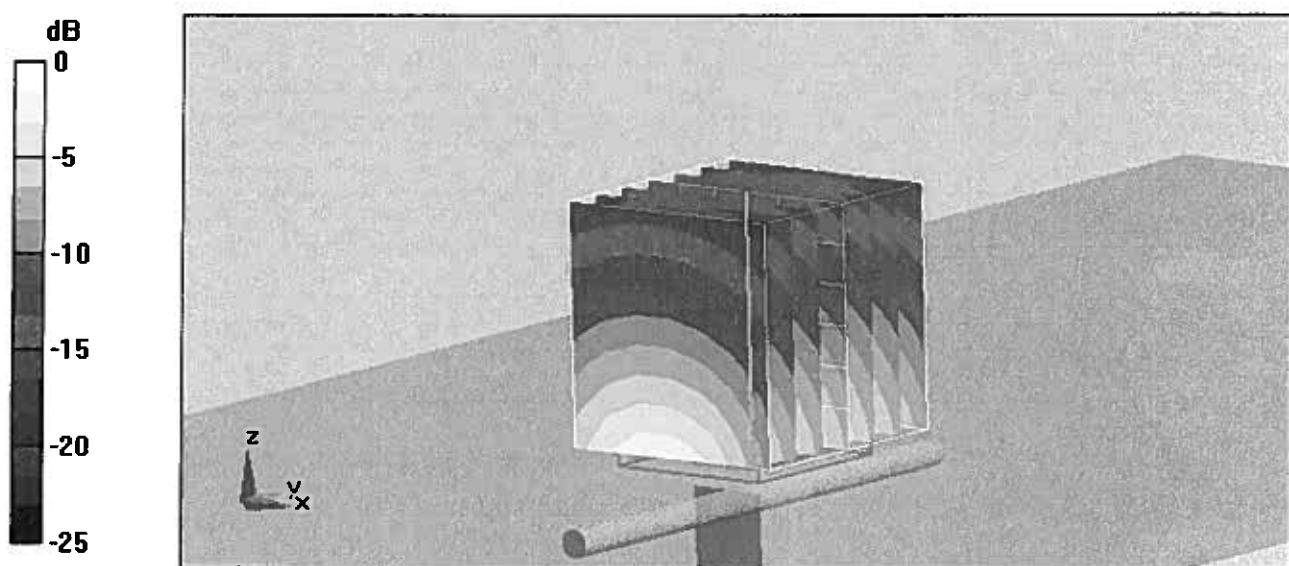
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 18.4 W/kg

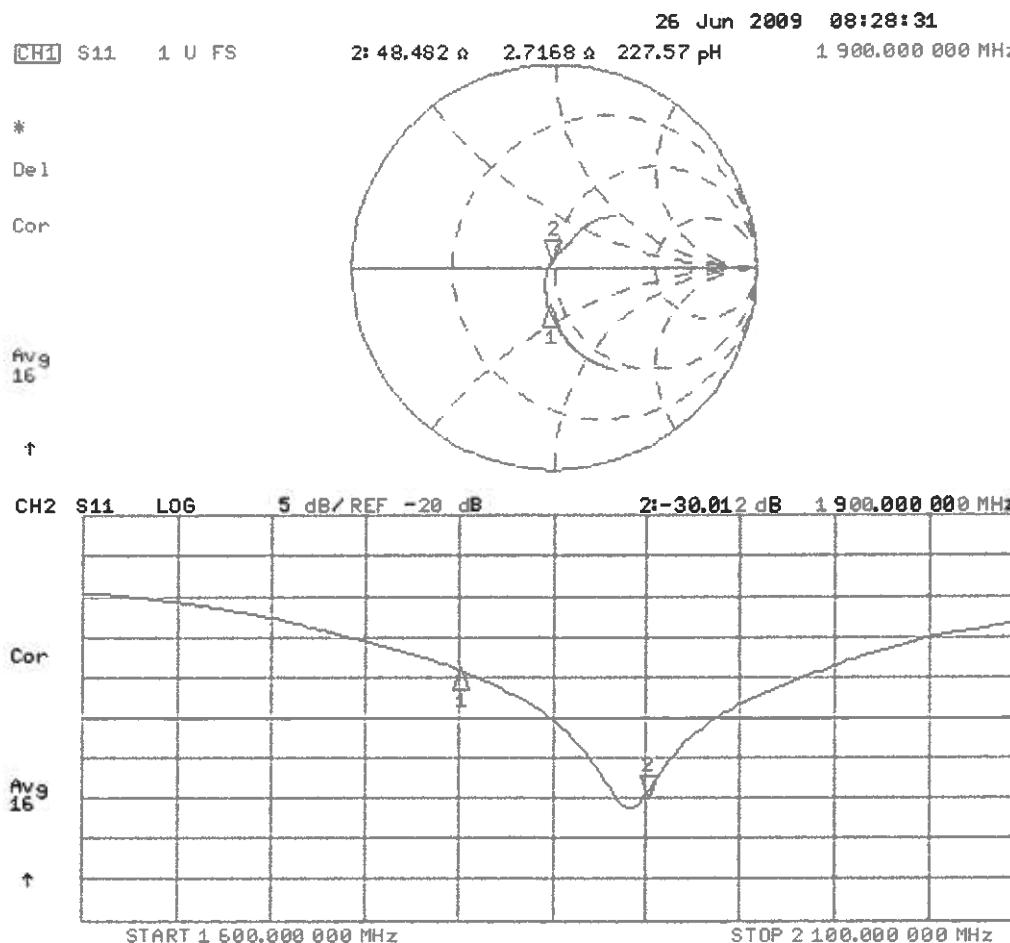
**SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.29 mW/g**

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:**

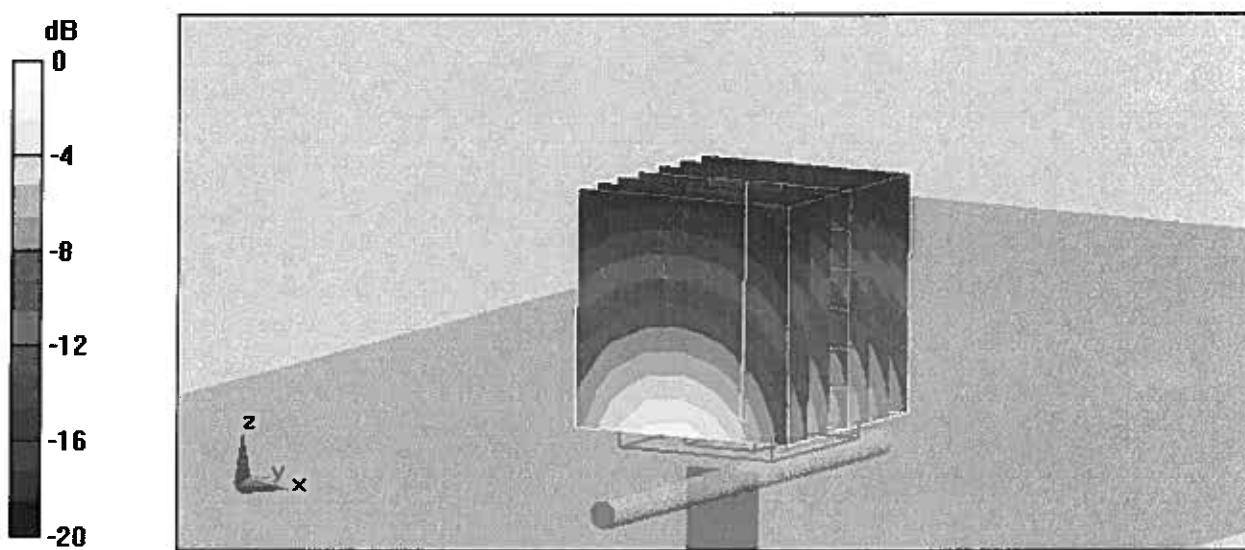
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

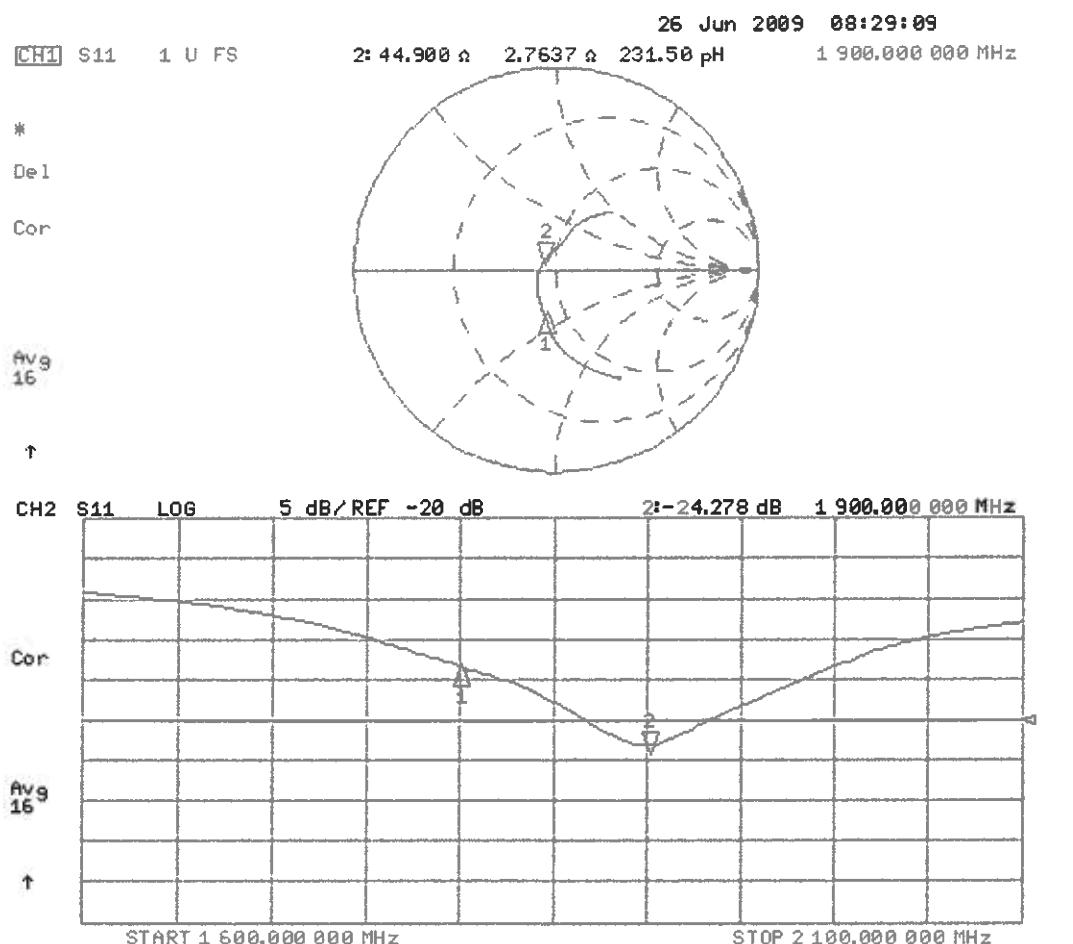
Peak SAR (extrapolated) = 18.1 W/kg

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

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



## Impedance Measurement Plot for Body TSL





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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<br>Calibration procedure for dipole validation kits |                                   |                        |  |  |  |
| Calibration date:   | August 18, 2009  |                                   |                        |  |  |  |
| Condition of the calibrated item  | In Tolerance   |                                   |                        |  |  |  |
| <p>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.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (<math>22 \pm 3</math>°C) and humidity &lt; 70%.</p> |  |                                   |                        |  |  |  |
| 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 |  |  |  |
| Calibrated by:  | Name<br>Jeton Kastrati   | Function<br>Laboratory Technician | Signature<br>          |  |  |  |
| Approved by:  | Katja Pokovic  | Technical Manager                 |                        |  |  |  |
| Issued: August 18, 2009   |  |                                   |                        |  |  |  |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory.   |  |                                   |                        |  |  |  |



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Accreditation No.: **SCS 108**

### **Glossary:**

|       |                                |
|-------|--------------------------------|
| TS    | tissue simulating liquid       |
| ConvF | sensitivity in TS / 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 TS:* 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 TS parameters:* The measured TS 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 V4.9 |  |             |
| <b>Distance Dipole Center - TSL</b> | 15 mm                     |  | with Spacer |
| <b>Zoom Scan Resolution</b>         | dx, dy, dz = 5 mm         |  |             |
| <b>Frequency</b>                    | 900 MHz ± 1 MHz           |  |             |

## Head TSL parameters

The following parameters and calculations were applied.

|   | Temperature     | Permittivity | Conductivity     |
|---|-----------------|--------------|------------------|
| <b>Nominal Head TSL parameters</b>      | 22.0 °C         | 41.5         | 0.97 mho/m       |
| <b>Measured Head TSL parameters</b>     | (22.0 ± 0.2) °C | 40.4 ± 6 %   | 0.96 mho/m ± 6 % |
| <b>Head TSL temperature during test</b> | (22.4 ± 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 | 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   | 11.0 mW /g ± 17.0 % (k=2) |

|   |                    |                           |
|---|--------------------|---------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | 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   | 7.06 mW /g ± 16.5 % (k=2) |

<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     |
|---|-----------------|--------------|------------------|
| <b>Nominal Body TSL parameters</b>      | 22.0 °C         | 55.0         | 1.05 mho/m       |
| <b>Measured Body TSL parameters</b>     | (22.0 ± 0.2) °C | 52.7 ± 6 %   | 1.06 mho/m ± 6 % |
| <b>Body TSL temperature during test</b> | (22.0 ± 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 | 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   | 11.0 mW / g ± 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | 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   | 7.16 mW / g ± 16.5 % (k=2) |

<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 |
|----------------------------------|----------|

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

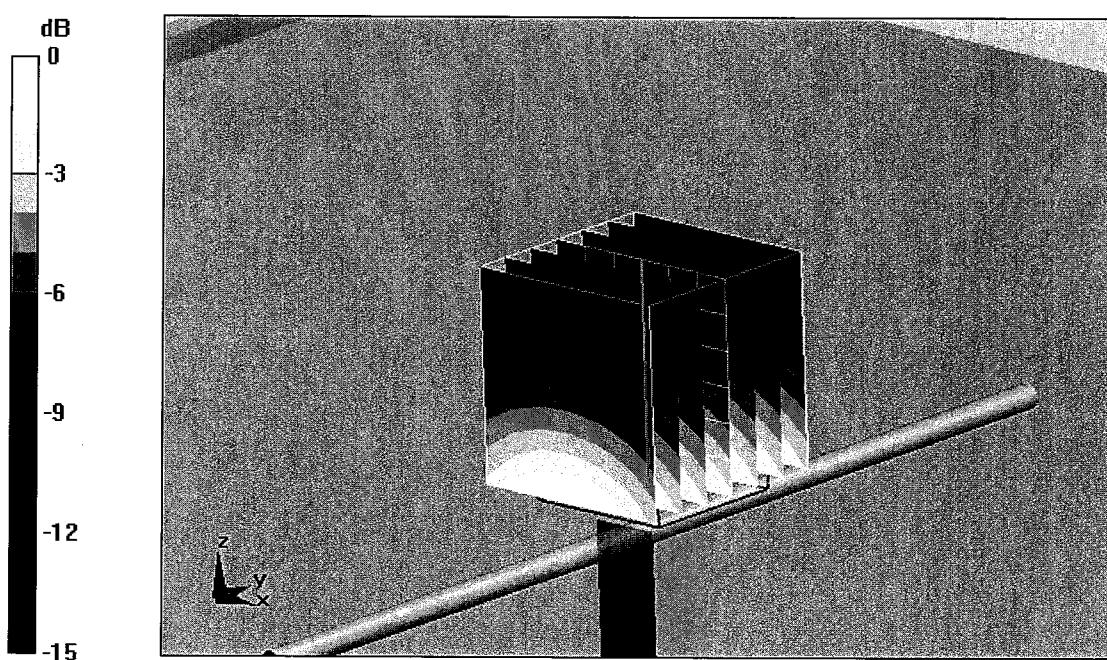
**Pin=250mW; dip=15mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 4.17 W/kg

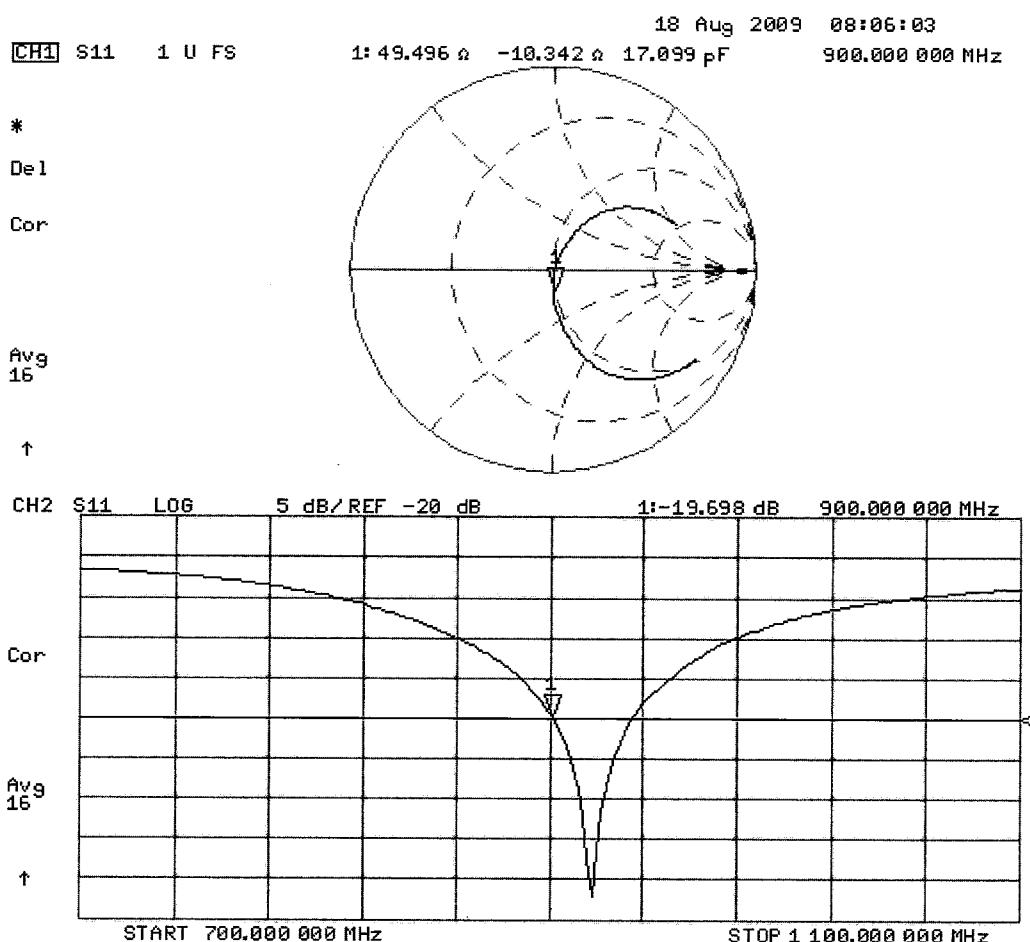
**SAR(1 g) = 2.75 mW/g; SAR(10 g) = 1.76 mW/g**

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



0 dB = 3.23mW/g

## Impedance Measurement Plot for Head TSL



# 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:  $f = 900$  MHz;  $\sigma = 1.06$  mho/m;  $\epsilon_r = 52.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

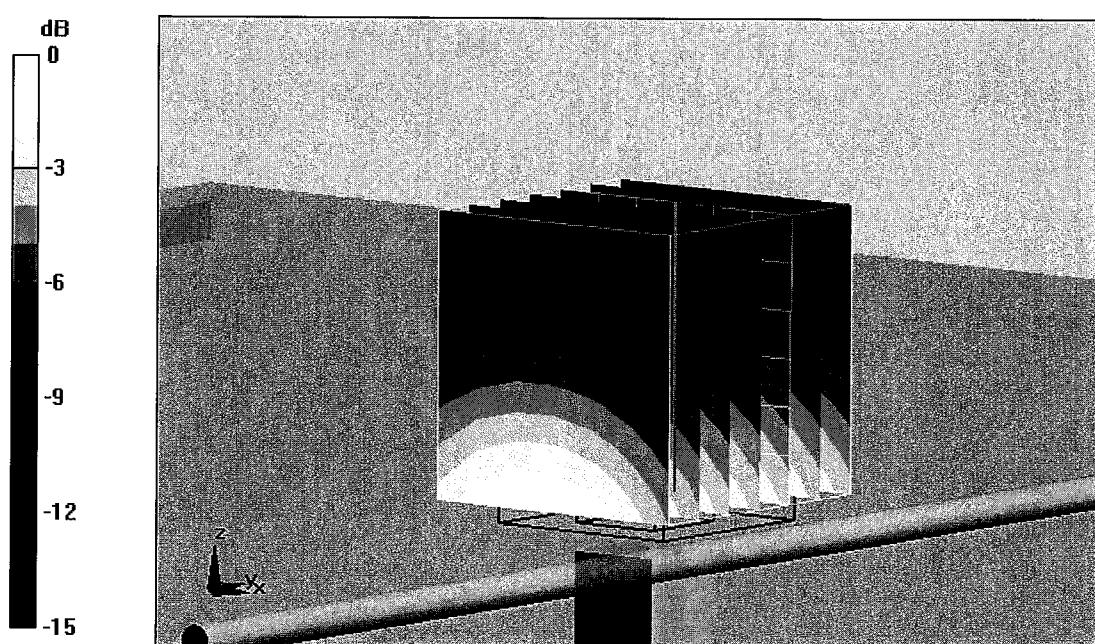
**Pin=250mW; dip=15mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

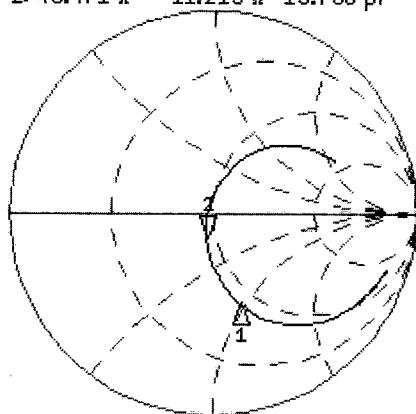


0 dB = 3.24mW/g

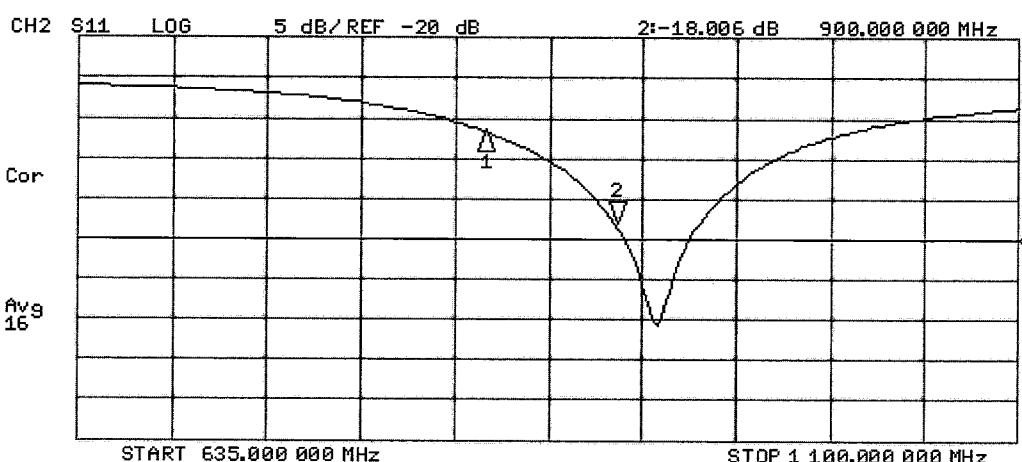
## Impedance Measurement Plot for Body TSL

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

\*  
Del  
Cor  
Avg  
16



CH1 Markers  
1: 41.352  $\Omega$   
-46.816  $\Omega$   
835.000 MHz



CH2 Markers  
1: -6.6738 dB  
835.000 MHz

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



A 1378  
Checked on 01/07/2009  
S Schweizerischer Kalibrierdienst  
C Service suisse d'étalonnage  
S Servizio svizzero di taratura  
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)

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

Accreditation No.: SCS 108

Client

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 ± 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 |

| Calibrated by: | Name           | Function              | Signature |
|----------------|----------------|-----------------------|-----------|
|                | 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 $x,y,z$             | sensitivity in free space  |
| ConvF                    | sensitivity in TSL / NORM $x,y,z$  |
| 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:**

- $NORMx,y,z$ : Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide).  $NORMx,y,z$  are only intermediate values, i.e., the uncertainties of  $NORMx,y,z$  does not effect the  $E^2$ -field uncertainty inside TSL (see below ConvF).
- $NORM(f)x,y,z = NORMx,y,z * frequency\_response$  (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- $DCPx,y,z$ : DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters*: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  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  $NORMx,y,z * ConvF$  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  $\pm 50$  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> $\pm$ 10.1% | $\mu\text{V}/(\text{V}/\text{m})^2$ | DCP X                          | <b>95</b> mV |
| NormY                                  | <b>0.63</b> $\pm$ 10.1% | $\mu\text{V}/(\text{V}/\text{m})^2$ | DCP Y                          | <b>97</b> mV |
| NormZ                                  | <b>0.66</b> $\pm$ 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**

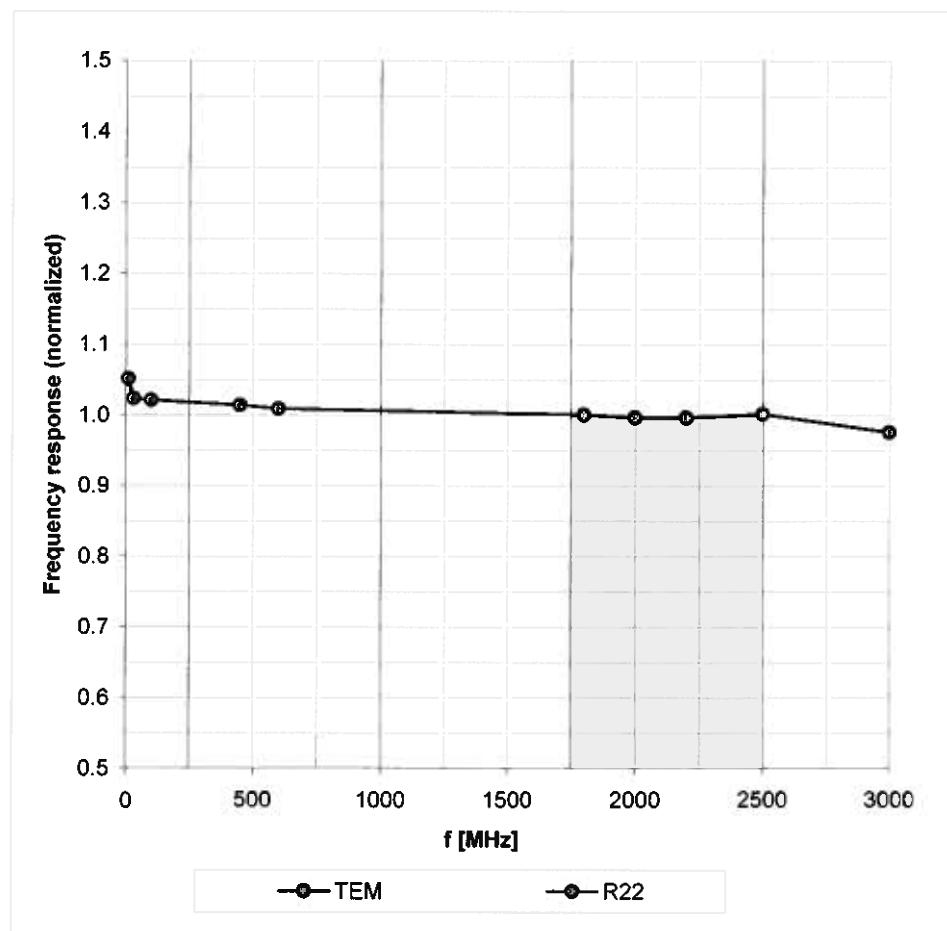
**The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.**

<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.

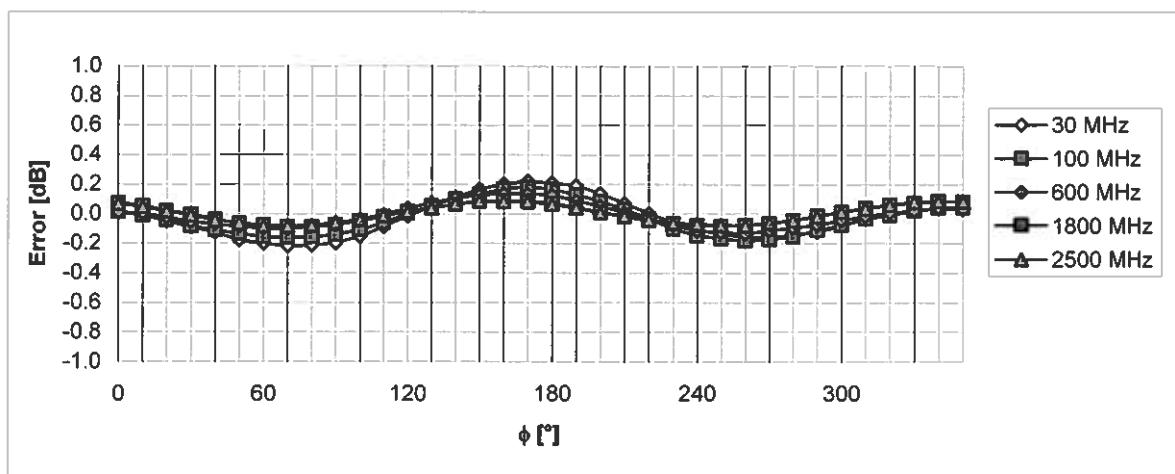
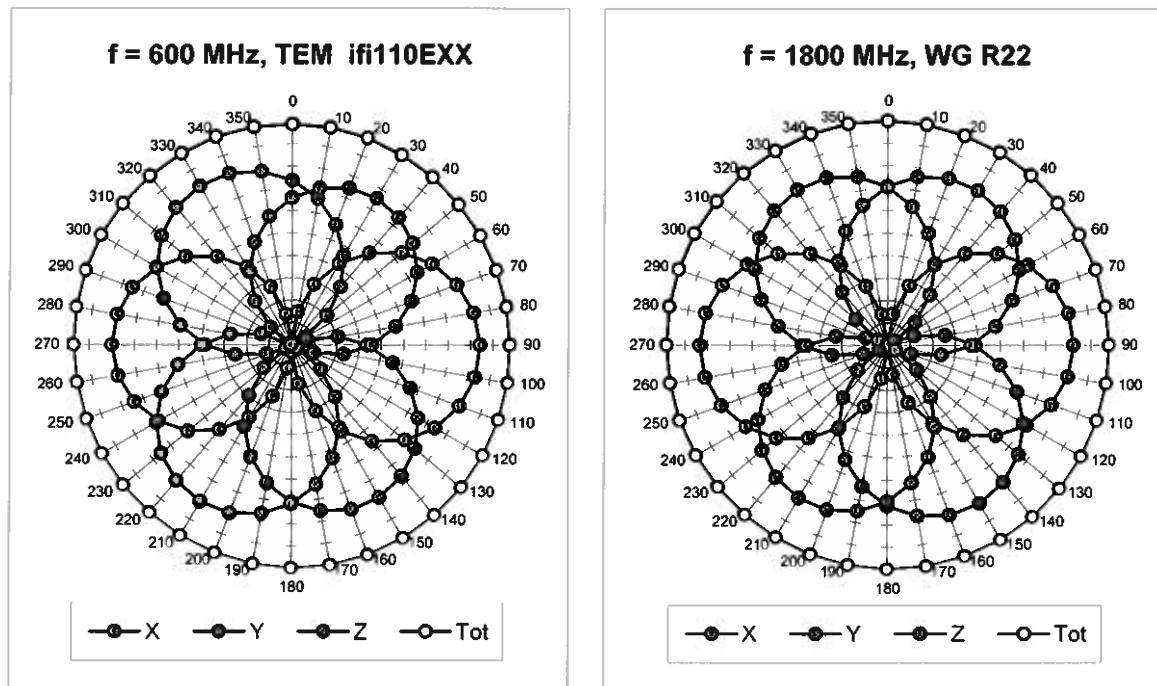
## Frequency Response of E-Field

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



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

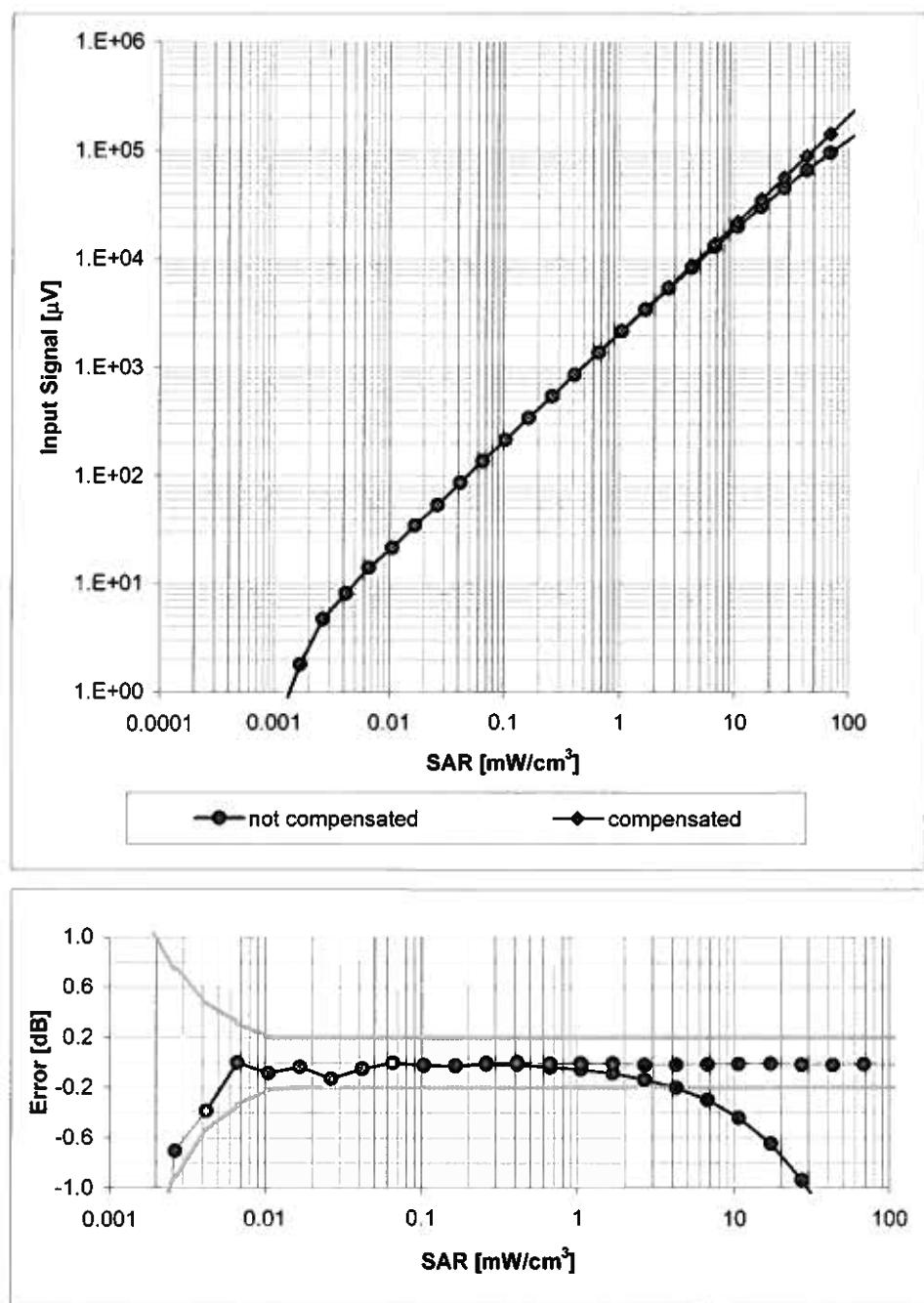
## Receiving Pattern ( $\phi$ ), $\vartheta = 0^\circ$



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

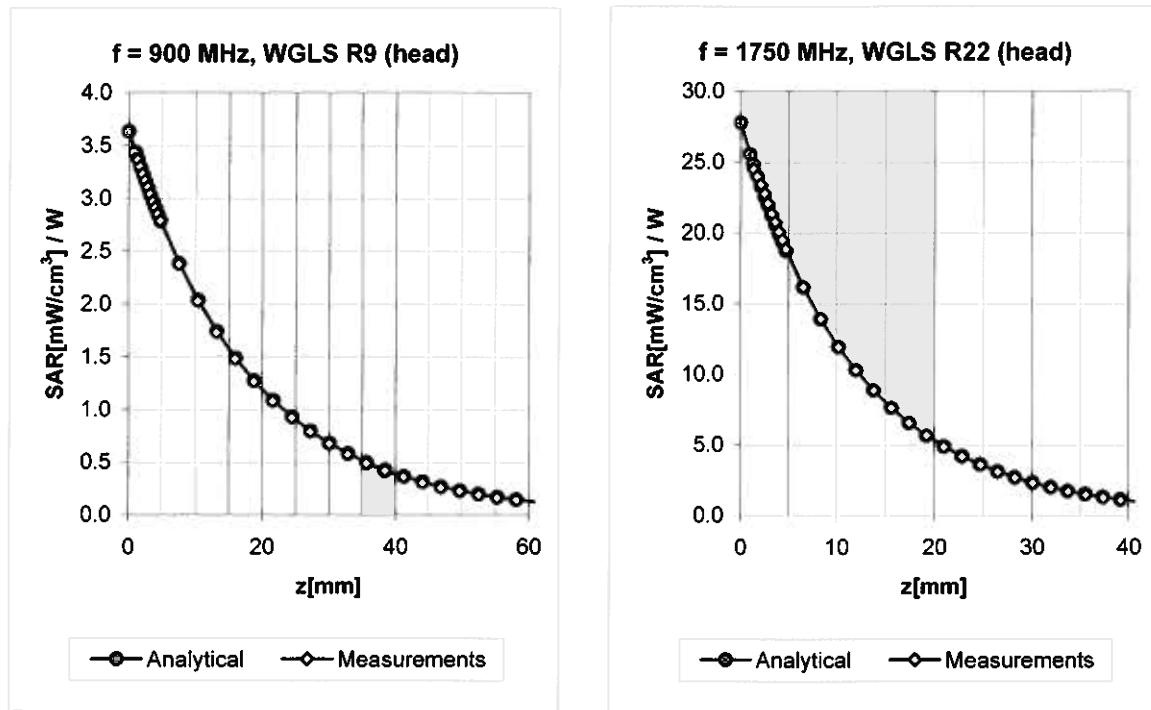
## Dynamic Range $f(\text{SAR}_{\text{head}})$

(Waveguide R22,  $f = 1800$  MHz)



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

## Conversion Factor Assessment

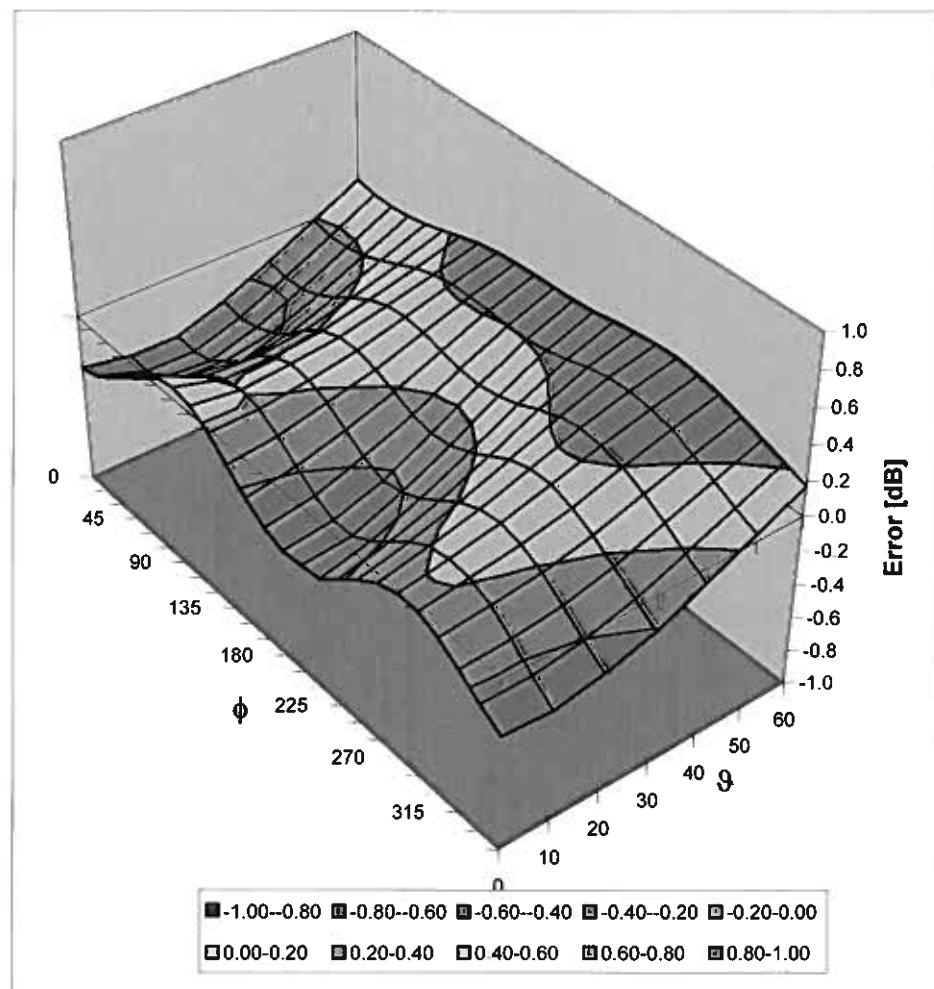


| f [MHz] | Validity [MHz] <sup>c</sup> | TSL  | Permittivity | Conductivity | Alpha | Depth | ConvF | Uncertainty   |
|---------|-----------------------------|------|--------------|--------------|-------|-------|-------|---------------|
| 450     | ± 50 / ± 100                | Head | 43.5 ± 5%    | 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:  $\pm 2.6\%$  ( $k=2$ )

Test of: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

## **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.

Test of: R&S TechMedic BV Dyna-Vision DVM-012SG

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

---

#### **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.

Test of: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

### **Appendix 3. 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/77230JD05/001     | Front of EUT Facing Phantom GPRS CH189         |
| SCN/77230JD05/002     | Rear of EUT Facing Phantom GPRS CH189          |
| SCN/77230JD05/003     | Front of EUT Facing Phantom GPRS CH660         |
| SCN/77230JD05/004     | Rear of EUT Facing Phantom GPRS CH660          |
| SCN/77230JD05/005     | System Performance Check 900MHz Body 29 03 10  |
| SCN/77230JD05/006     | System Performance Check 900MHz Body 30 03 10  |
| SCN/77230JD05/007     | System Performance Check 1900MHz Body 29 03 10 |

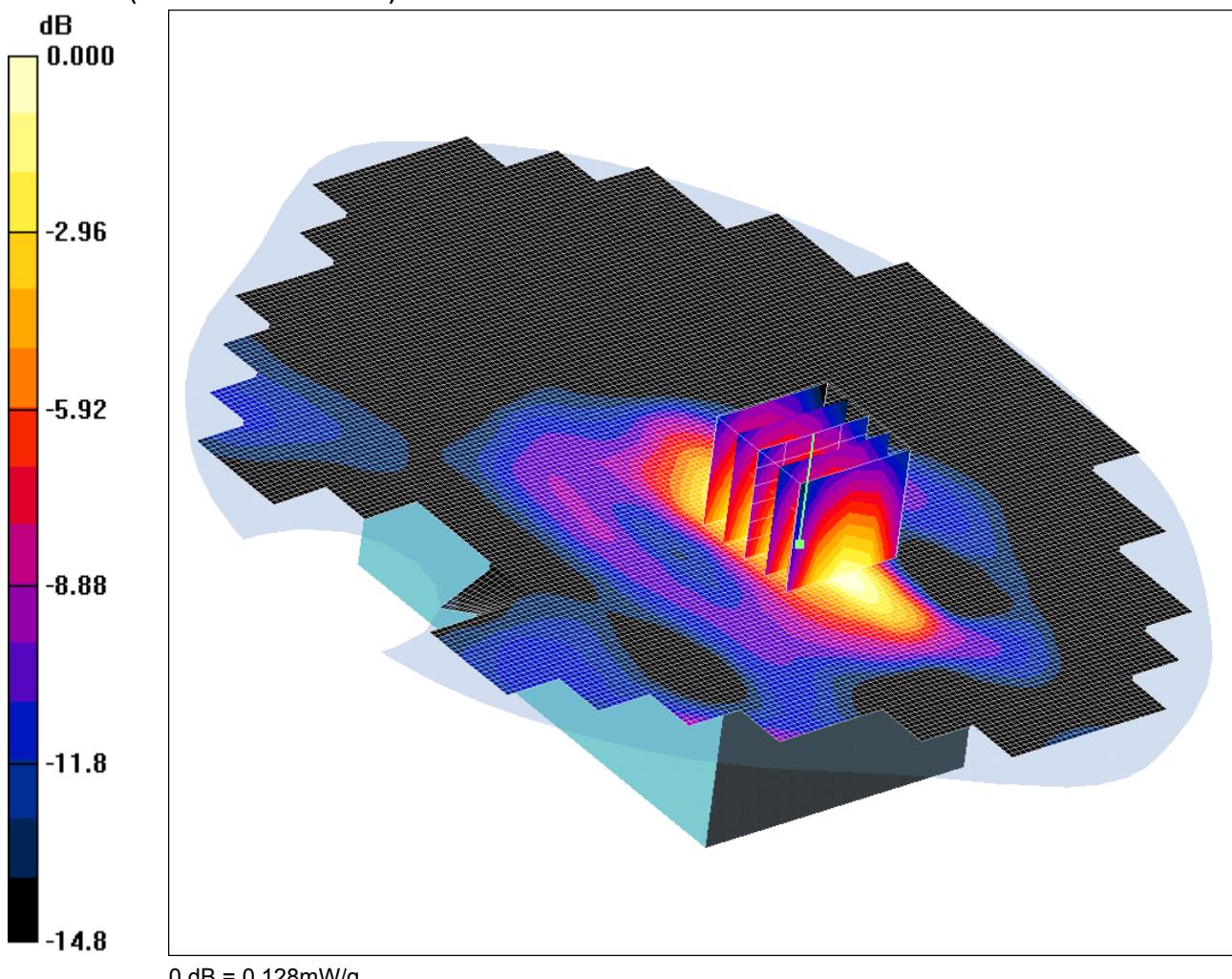
Test of: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

SCN/77230JD05/001: Front of EUT Facing Phantom GPRS CH189

Date 29/03/2010

DUT: R&amp;S TechMedic B.V.; Type: Dyna-Vision Outdoor Patient Monitor+ Dyna-Vision 3-Lead ECG Cable; Serial: DV08Y01B0082 (IMEI: 359983000890016) + 080912-061/ 4680609



Communication System: GPRS 850 MHz; Frequency: 836.4 MHz; Duty Cycle: 1:4

Medium: 900 MHz MSL Medium parameters used (interpolated):  $f = 836.4$  MHz;  $\sigma = 0.959$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3508; ConvF(9.99, 9.99, 9.99); Calibrated: 26/06/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn450; Calibrated: 30/04/2009
- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1207
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Front of EUT Facing Phantom - Middle/Area Scan (151x201x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.140 mW/g

Front of EUT Facing Phantom - Middle/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.96 V/m; Power Drift = -0.081 dB

Peak SAR (extrapolated) = 0.176 W/kg

SAR(1 g) = 0.119 mW/g; SAR(10 g) = 0.071 mW/g

Maximum value of SAR (measured) = 0.128 mW/g

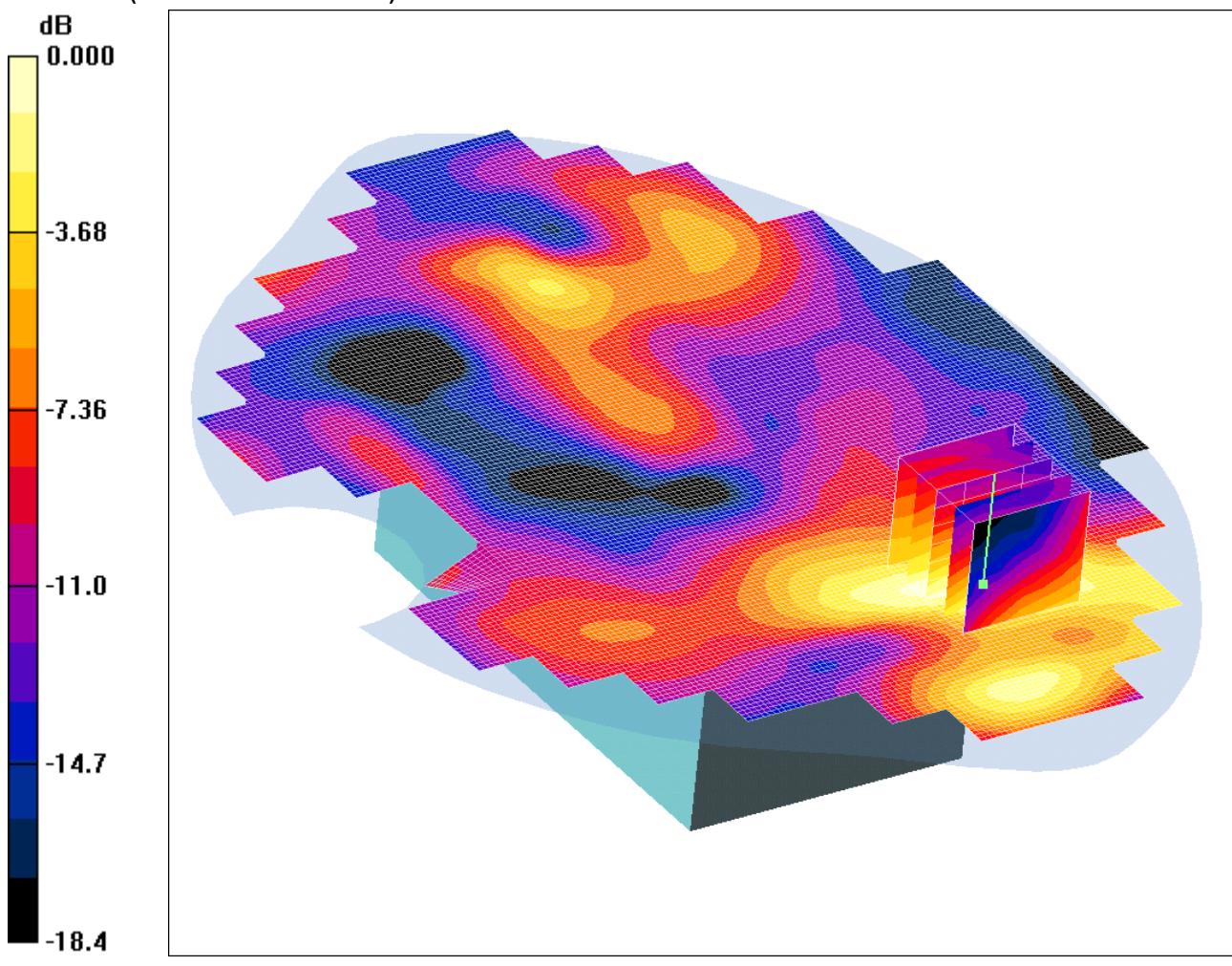
Test of: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

SCN/77230JD05/002: Rear of EUT Facing Phantom GPRS CH189

Date 30/03/2010

DUT: R&amp;S TechMedic B.V.; Type: Dyna-Vision Outdoor Patient Monitor+ Dyna-Vision 3-Lead ECG Cable; Serial: DV08Y01B0082 (IMEI: 359983000890016) + 080912-061/ 4680609



Communication System: GPRS 850 MHz; Frequency: 836.4 MHz; Duty Cycle: 1:4

Medium: 900 MHz MSL Medium parameters used (interpolated):  $f = 836.4$  MHz;  $\sigma = 0.959$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3508; ConvF(9.99, 9.99, 9.99); Calibrated: 26/06/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn450; Calibrated: 30/04/2009
- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1207
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Rear of EUT Facing Phantom - Middle/Area Scan (151x201x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.027 mW/g

Rear of EUT Facing Phantom - Middle/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.91 V/m; Power Drift = 0.165 dB

Peak SAR (extrapolated) = 0.056 W/kg

SAR(1 g) = 0.029 mW/g; SAR(10 g) = 0.016 mW/g

Maximum value of SAR (measured) = 0.030 mW/g

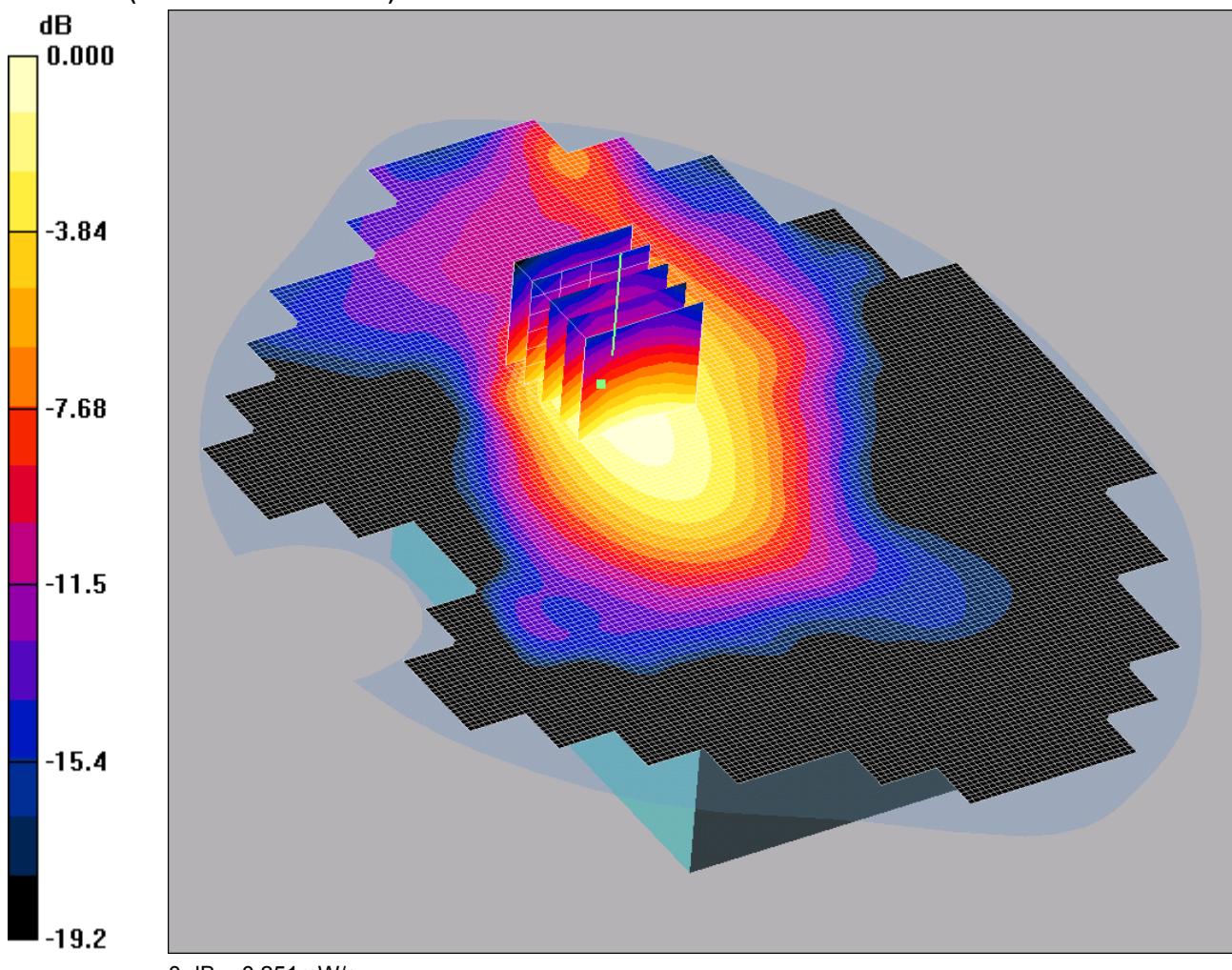
Test of: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

SCN/77230JD05/003: Front of EUT Facing Phantom GPRS CH660

Date 29/03/2010

DUT: R&amp;S TechMedic B.V.; Type: Dyna-Vision Outdoor Patient Monitor+ Dyna-Vision 3-Lead ECG Cable; Serial: DV08Y01B0082 (IMEI: 359983000890016) + 080912-061/ 4680609



Communication System: GPRS 1900; Frequency: 1879.8 MHz; Duty Cycle: 1:4

Medium: 1900 MHz MSL Medium parameters used (interpolated):  $f = 1879.8$  MHz;  $\sigma = 1.56$  mho/m;  $\epsilon_r = 50.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3508; ConvF(8.23, 8.23, 8.23); Calibrated: 26/06/2009

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE3 Sn450; Calibrated: 30/04/2009

- 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 Facing Phantom - Middle/Area Scan (151x201x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.250 mW/g

Front of EUT Facing Phantom - Middle/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.36 V/m; Power Drift = -0.156 dB

Peak SAR (extrapolated) = 0.396 W/kg

SAR(1 g) = 0.223 mW/g; SAR(10 g) = 0.115 mW/g

Maximum value of SAR (measured) = 0.251 mW/g

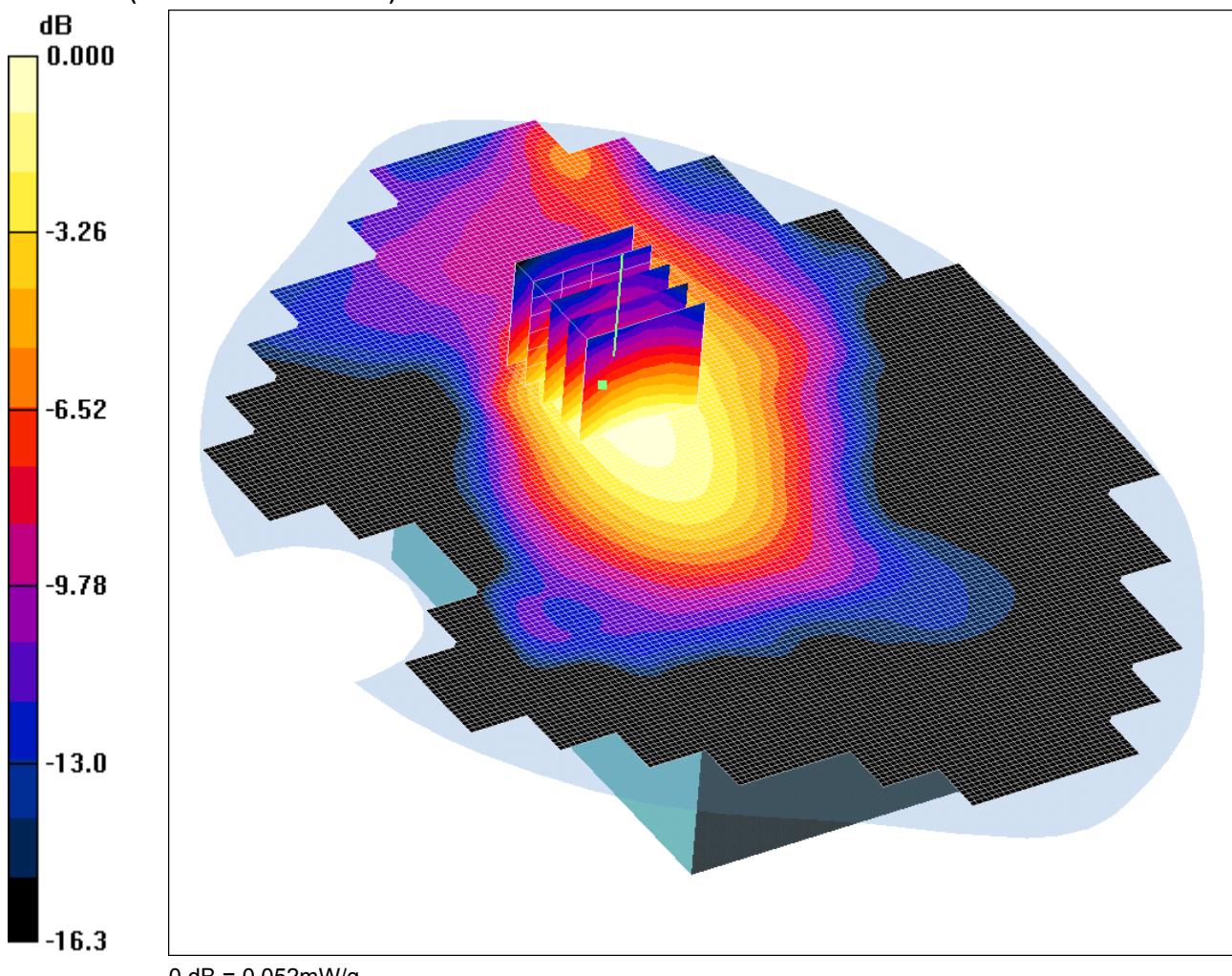
Test of: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

SCN/77230JD05/004: Rear of EUT Facing Phantom GPRS CH660

Date 29/03/2010

DUT: R&amp;S TechMedic B.V.; Type: Dyna-Vision Outdoor Patient Monitor + Dyna-Vision 3-Lead ECG Cable; Serial: DV08Y01B0082 (IMEI: 359983000890016) + 080912-061/ 4680609



Communication System: GPRS 1900; Frequency: 1879.8 MHz; Duty Cycle: 1:4

Medium: 1900 MHz MSL Medium parameters used (interpolated):  $f = 1879.8$  MHz;  $\sigma = 1.56$  mho/m;  $\epsilon_r = 50.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3508; ConvF(8.23, 8.23, 8.23); Calibrated: 26/06/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn450; Calibrated: 30/04/2009
- 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 Facing Phantom - Middle/Area Scan (151x201x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.054 mW/g

Rear of EUT Facing Phantom - Middle/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.82 V/m; Power Drift = 0.018 dB

Peak SAR (extrapolated) = 0.078 W/kg

**SAR(1 g) = 0.049 mW/g; SAR(10 g) = 0.030 mW/g**

Maximum value of SAR (measured) = 0.052 mW/g

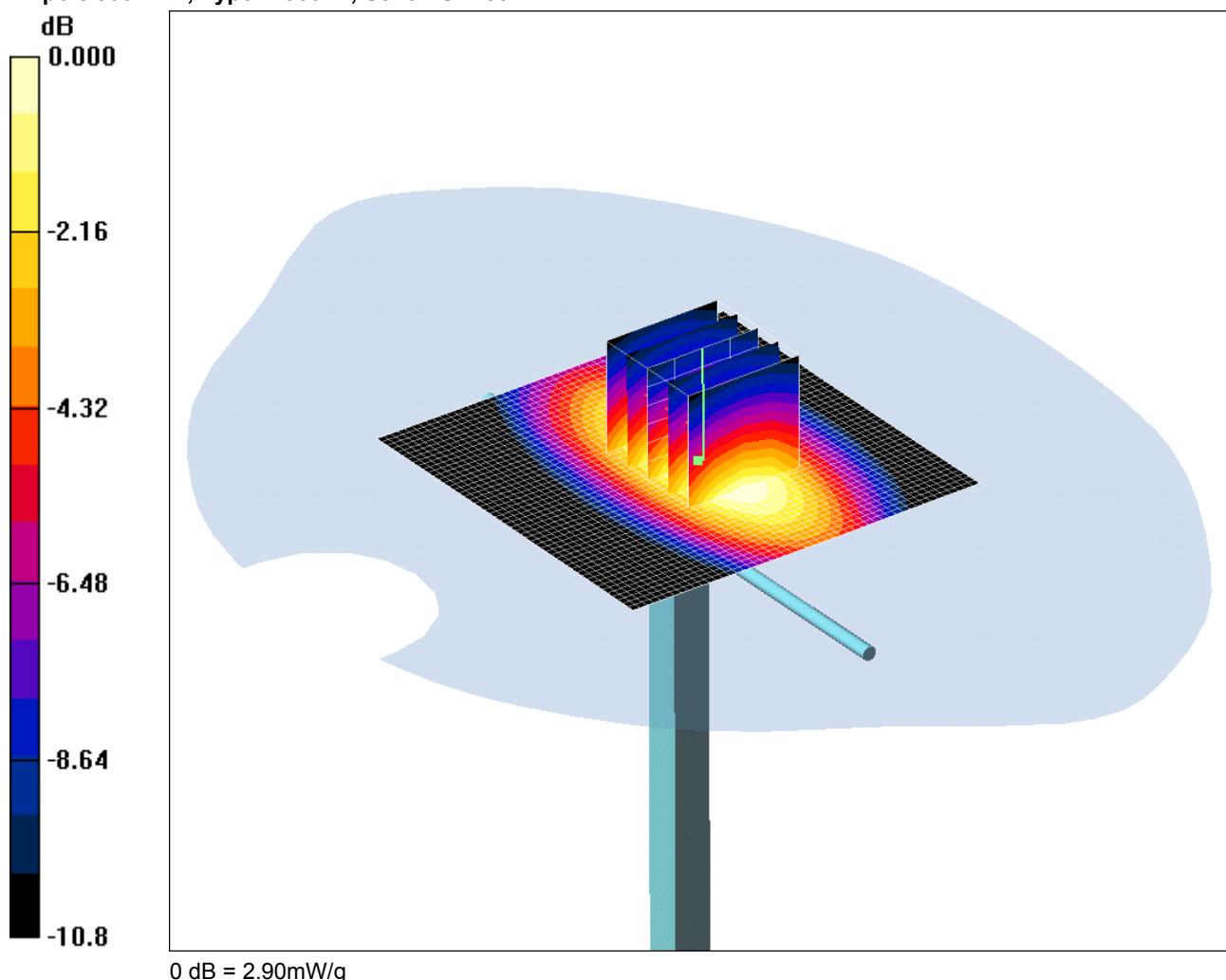
Test of: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

SCN/77230JD05/005: System Performance Check 900MHz Body 29 03 10

Date 29/03/2010

DUT: Dipole 900 MHz; Type: D900V2; Serial: SN185



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

Medium: 900 MHz MSL Medium parameters used:  $f = 900$  MHz;  $\sigma = 1.02$  mho/m;  $\epsilon_r = 53$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3508; ConvF(9.99, 9.99, 9.99); Calibrated: 26/06/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn450; Calibrated: 30/04/2009
- 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/Area Scan (51x51x1):** Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 3.01 mW/g

**d=15mm, Pin=250mW/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 51.4 V/m; Power Drift = 0.013 dB

Peak SAR (extrapolated) = 4.03 W/kg

**SAR(1 g) = 2.69 mW/g; SAR(10 g) = 1.75 mW/g**

Maximum value of SAR (measured) = 2.90 mW/g

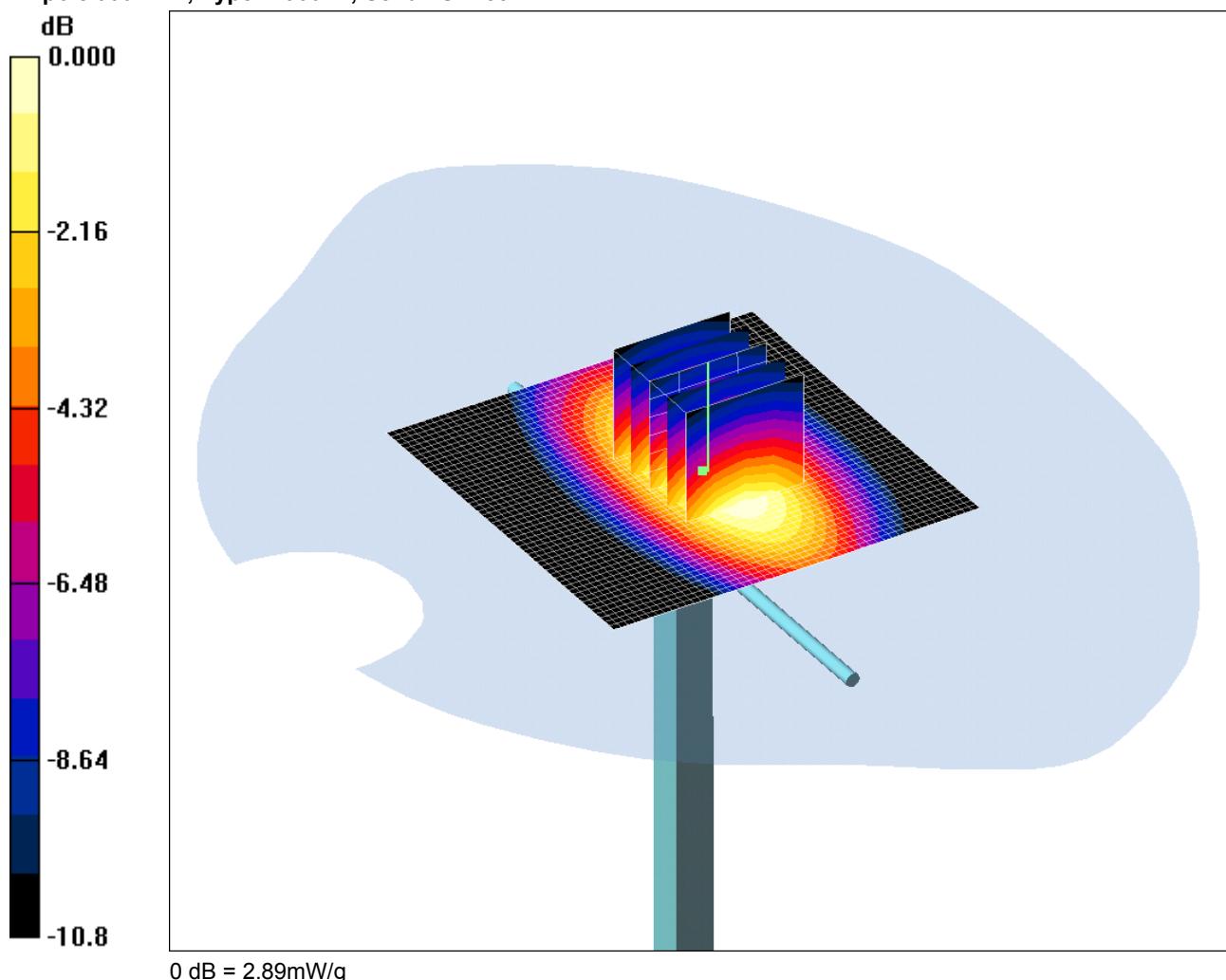
Test of: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

SCN/77230JD05/006: System Performance Check 900MHz Body 30 03 10

Date 30/03/2010

DUT: Dipole 900 MHz; Type: D900V2; Serial: SN185



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

Medium: 900 MHz MSL Medium parameters used:  $f = 900$  MHz;  $\sigma = 1.02$  mho/m;  $\epsilon_r = 53$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3508; ConvF(9.99, 9.99, 9.99); Calibrated: 26/06/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn450; Calibrated: 30/04/2009
- 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/Area Scan (51x51x1):** Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 2.99 mW/g

**d=15mm, Pin=250mW/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 51.3 V/m; Power Drift = -0.038 dB

Peak SAR (extrapolated) = 4.01 W/kg

**SAR(1 g) = 2.67 mW/g; SAR(10 g) = 1.73 mW/g**

Maximum value of SAR (measured) = 2.89 mW/g

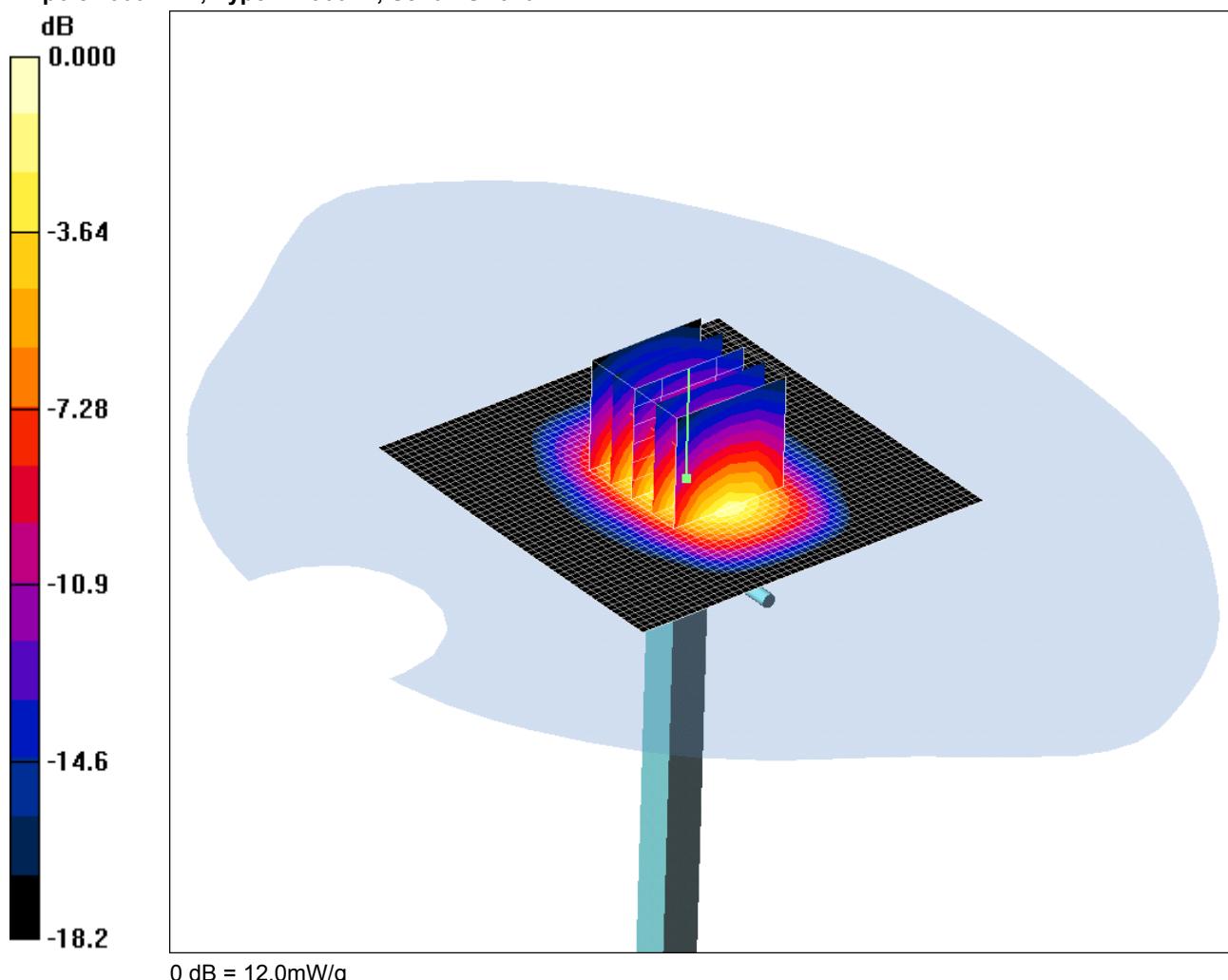
Test of: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

SCN/77230JD05/007: System Performance Check 1900MHz Body 29 03 10

Date 29/03/2010

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: SN540



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

Medium: 1900 MHz MSL Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.58$  mho/m;  $\epsilon_r = 50.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3508; ConvF(8.23, 8.23, 8.23); Calibrated: 26/06/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn450; Calibrated: 30/04/2009
- 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=10mm, Pin=250mW/Area Scan (51x51x1):** Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 15.8 mW/g

**d=10mm, Pin=250mW/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 86.4 V/m; Power Drift = -0.002 dB

Peak SAR (extrapolated) = 20.0 W/kg

**SAR(1 g) = 10.7 mW/g; SAR(10 g) = 5.47 mW/g**

Maximum value of SAR (measured) = 12.0 mW/g

Test of: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

## Appendix 4. Photographs

This appendix contains the following photographs:

| Photo Reference Number | Title  |
|------------------------|--|
| PHT/77230JD05/001      | Test configuration for the measurement of Specific Absorption Rate (SAR) |
| PHT/77230JD05/002      | Front of EUT With Carry Case + 3 Lead Wire ECG Cable Facing Phantom      |
| PHT/77230JD05/003      | Rear of EUT With Carry Case + 3 Lead Wire ECG Cable Facing Phantom       |
| PHT/77230JD05/004      | Front of EUT   |
| PHT/77230JD05/005      | Rear of EUT  |
| PHT/77230JD05/006      | Front of EUT in Carrying Case  |
| PHT/77230JD05/007      | Rear of EUT in Carrying Case   |
| PHT/77230JD05/008      | 3 Lead Wire ECG Cable  |
| PHT/77230JD05/009      | 900 MHz Body Fluid Level   |
| PHT/77230JD05/010      | 1900 MHz Body Fluid Level  |

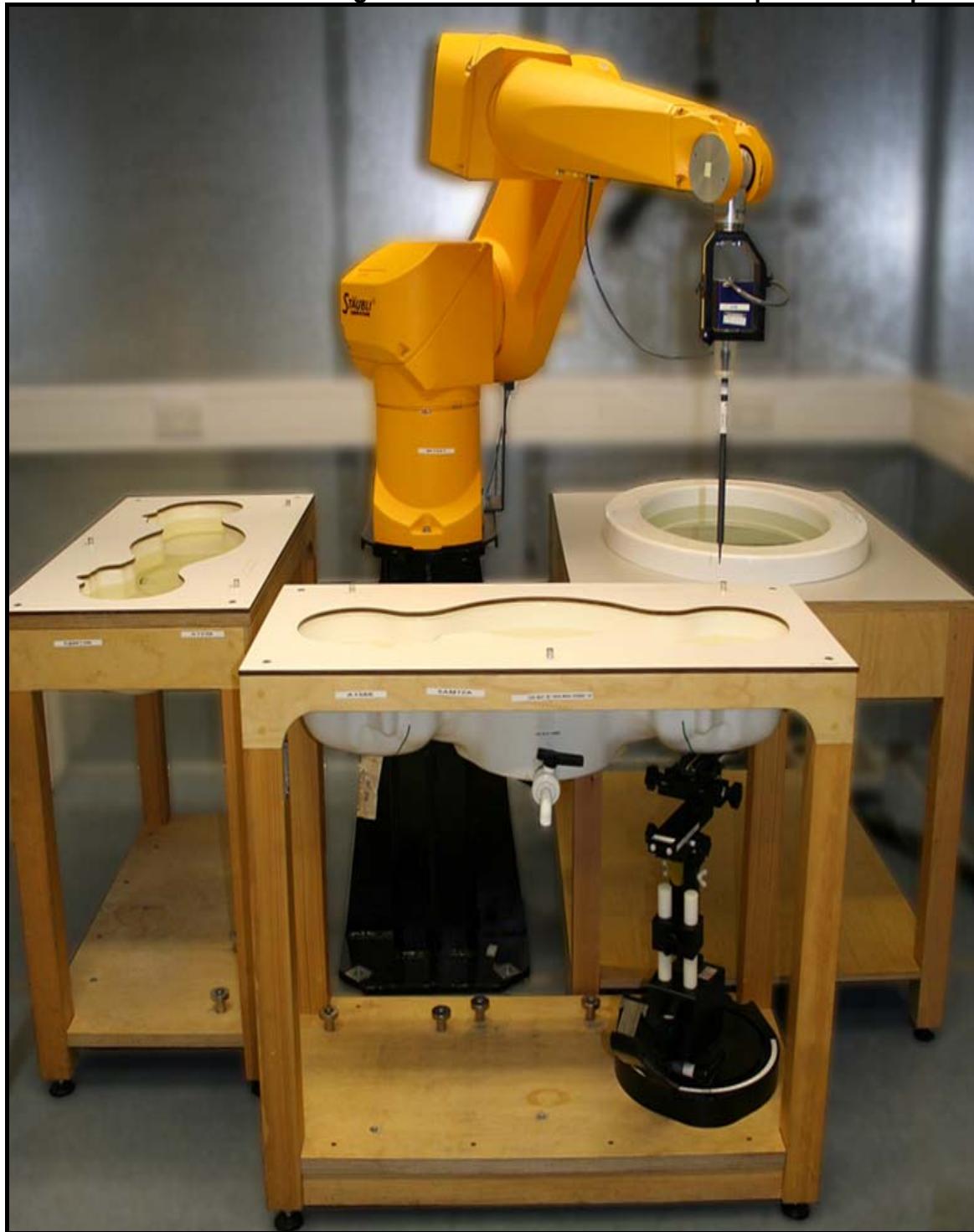
Test of: R&S TechMedic BV Dyna-Vision DVM-012SG

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

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**PHT/77230JD05/01: Test configuration for the measurement of Specific Absorption Rate (SAR)**

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Test of: R&S TechMedic BV Dyna-Vision DVM-012SG

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

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PHT/77230JD05/02: Front of EUT With Carry Case + 3 Lead Wire ECG Cable Facing Phantom



Test of: R&S TechMedic BV Dyna-Vision DVM-012SG

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

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PHT/77230JD05/03: Rear of EUT With Carry Case + 3 Lead Wire ECG Cable Facing Phantom



Test of: R&S TechMedic BV Dyna-Vision DVM-012SG

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

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PHT/77230JD05/04: Front of EUT



Test of: R&S TechMedic BV Dyna-Vision DVM-012SG

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

PHT/77230JD05/05: Rear of EUT

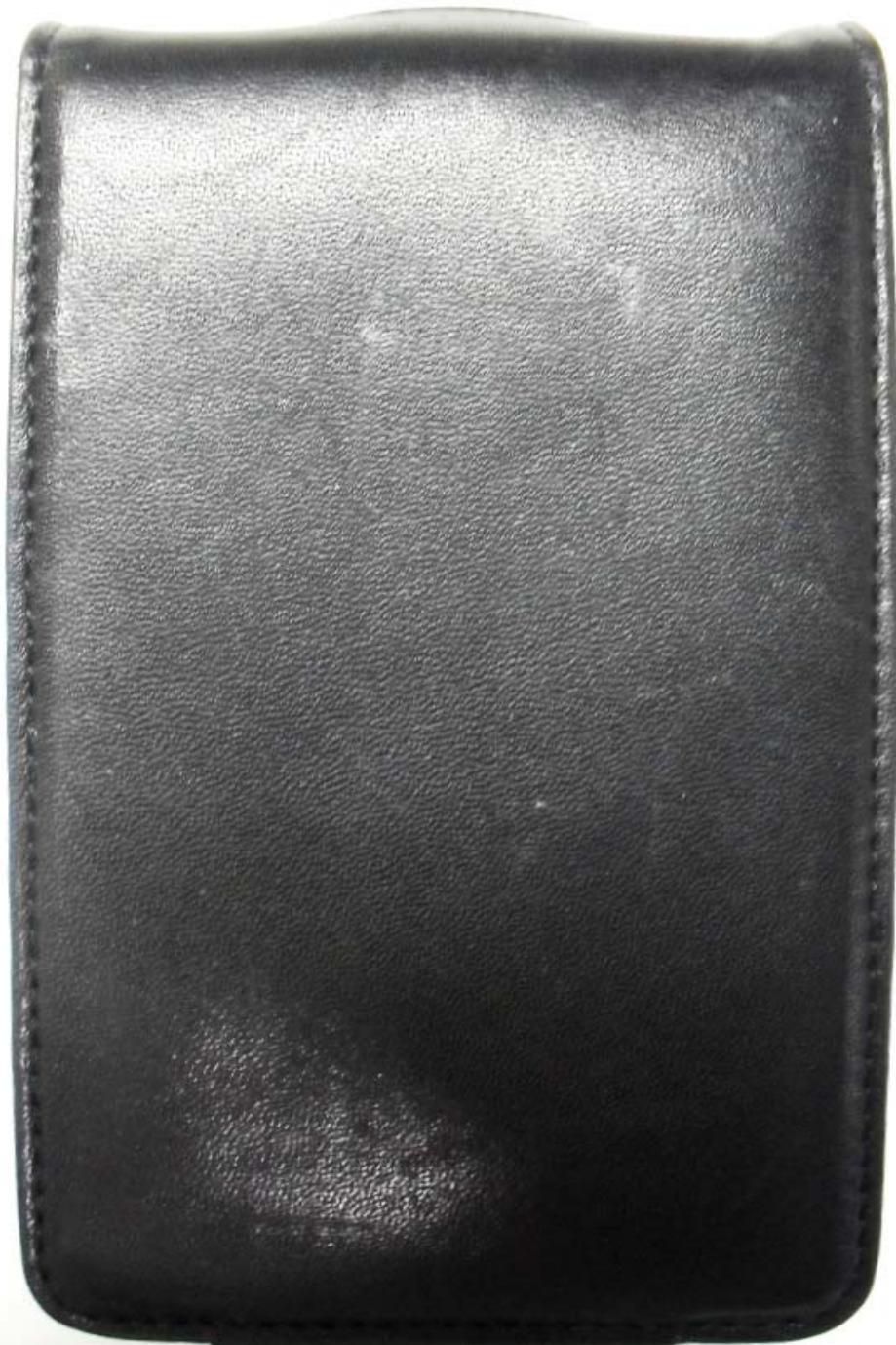


Test of: R&S TechMedic BV Dyna-Vision DVM-012SG

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

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**PHT/77230JD05/06: Front of EUT in Carrying Case**

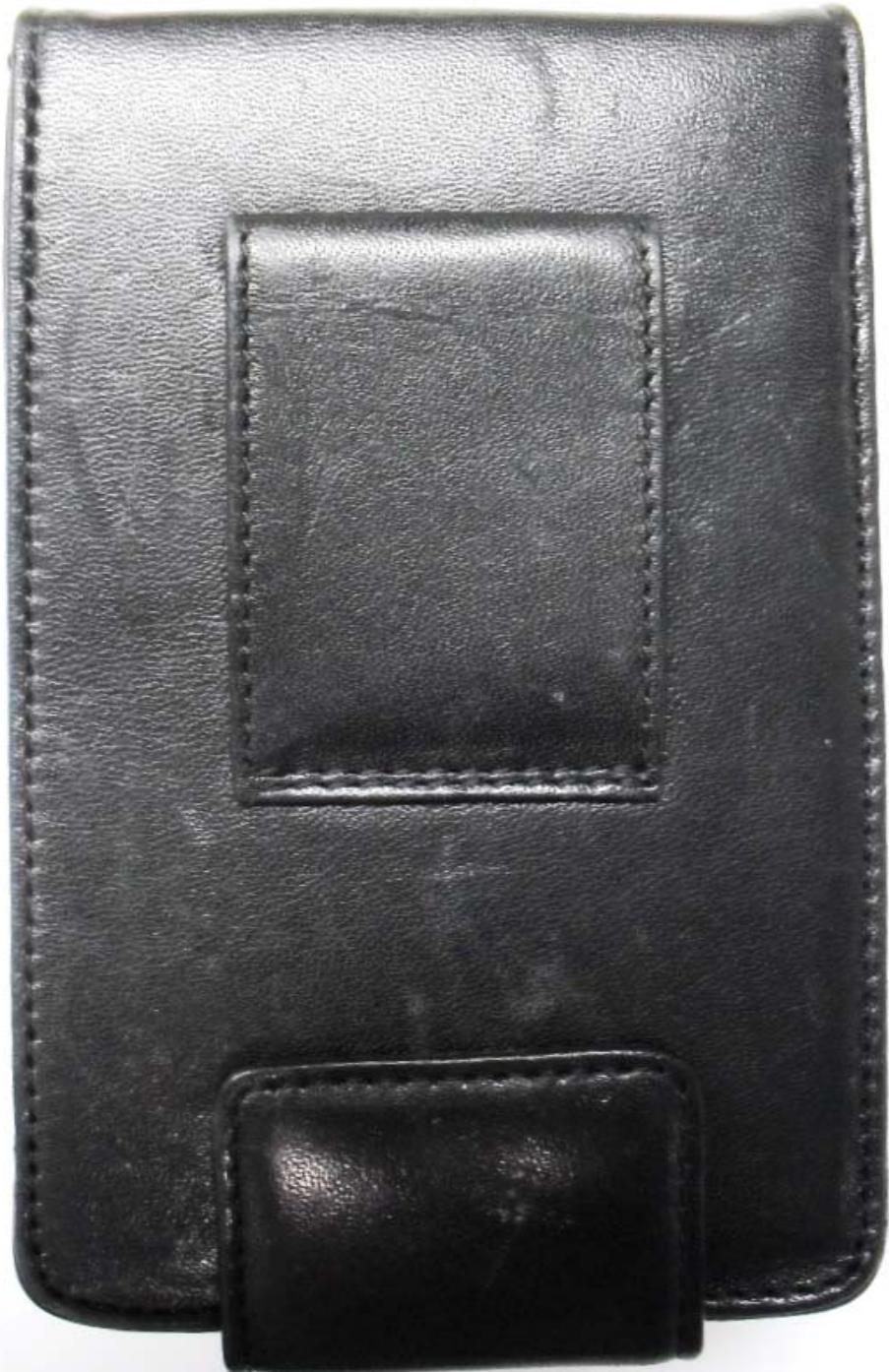


Test of: R&S TechMedic BV Dyna-Vision DVM-012SG

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

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**PHT/77230JD05/07: Rear of EUT in Carrying Case**



Test of: R&S TechMedic BV Dyna-Vision DVM-012SG

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

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PHT/77230JD05/08: 3 Lead Wire ECG Cable

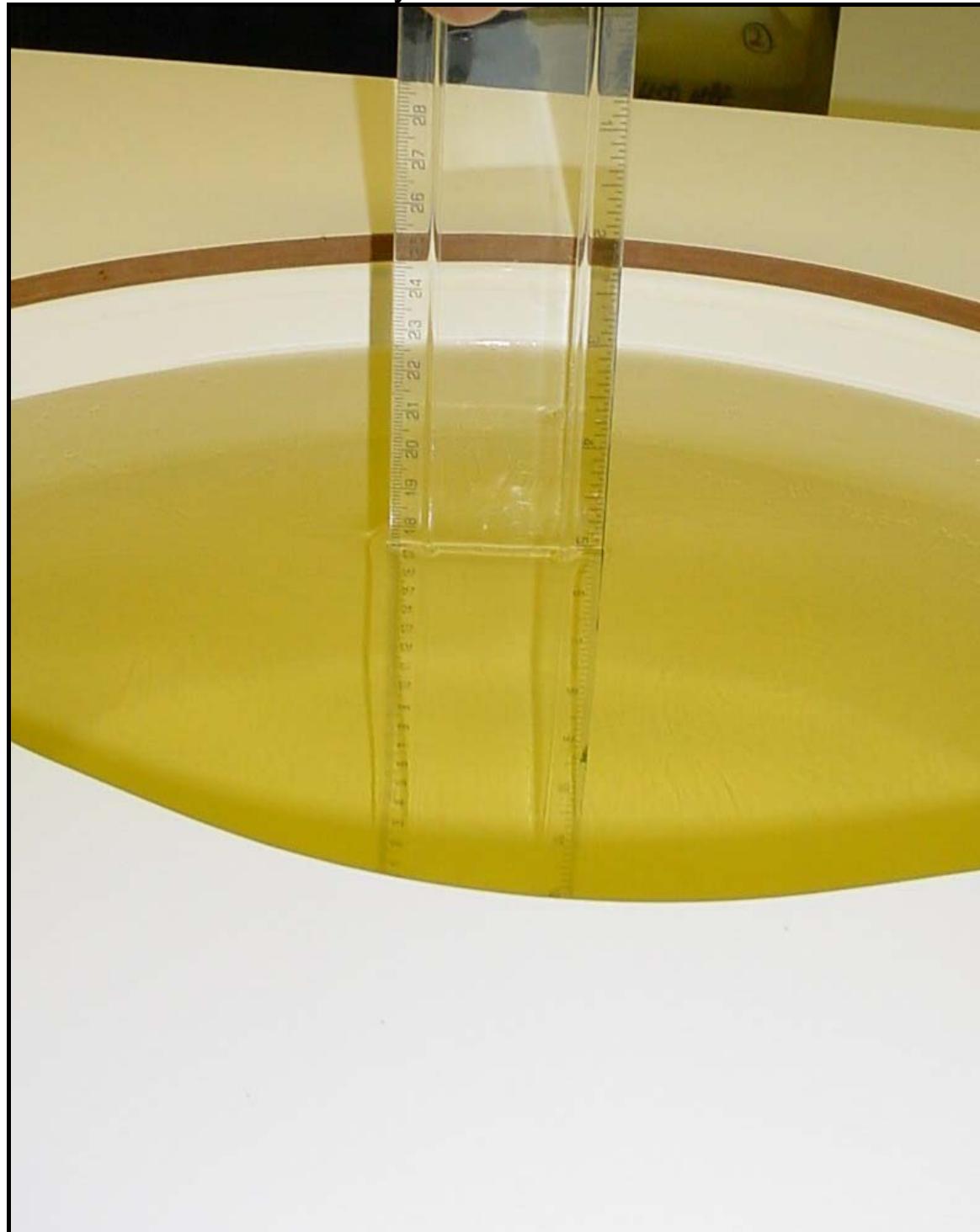


Test of: R&S TechMedic BV Dyna-Vision DVM-012SG

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

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**PHT/77230JD05/09: 900 MHz Body Fluid Level**



Test of: R&S TechMedic BV Dyna-Vision DVM-012SG

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

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PHT/77230JD05/010: 1900 MHz Body Fluid Level



Test of: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

## Appendix 5. Validation of System

Prior to the assessment, the system was verified in the flat region of the phantom.

900 MHz and 1900 MHz dipoles were used. A forward power of 250 mW was applied to the dipole and the system was verified to a tolerance of  $\pm 5\%$  for the 900 MHz and 1900 MHz dipoles. The applicable verification (normalised to 1 Watt).

Date: 29/03/2010

Validation Dipole and Serial Number: D900V2 SN:124

| Simulant | Frequency (MHz) | Room Temperature | Liquid Temperature | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|------------------|--------------------|--------------|--------------|----------------|---------------|-----------|
| Body     | 900             | 24.0 °C          | 23.9 °C            | $\epsilon_r$ | 55.00        | 53.05          | -3.55         | 5.00      |
|          |                 |                  |                    | $\sigma$     | 1.05         | 1.02           | -3.04         | 5.00      |
|          |                 |                  |                    | 1g SAR       | 11.00        | 10.76          | -2.18         | 5.00      |
|          |                 |                  |                    | 10g SAR      | 7.16         | 7.00           | -2.23         | 5.00      |

Date: 30/03/2010

Validation Dipole and Serial Number: D900V2 SN:124

| Simulant | Frequency (MHz) | Room Temperature | Liquid Temperature | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|------------------|--------------------|--------------|--------------|----------------|---------------|-----------|
| Body     | 900             | 24.0 °C          | 23.9 °C            | $\epsilon_r$ | 55.00        | 53.05          | -3.55         | 5.00      |
|          |                 |                  |                    | $\sigma$     | 1.05         | 1.02           | -3.04         | 5.00      |
|          |                 |                  |                    | 1g SAR       | 11.00        | 10.68          | -2.91         | 5.00      |
|          |                 |                  |                    | 10g SAR      | 7.16         | 6.92           | -3.35         | 5.00      |

Date: 29/03/2010

Validation Dipole and Serial Number: D1900V2:SN:540

| Simulant | Frequency (MHz) | Room Temperature | Liquid Temperature | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|------------------|--------------------|--------------|--------------|----------------|---------------|-----------|
| Body     | 1900            | 24.0 °C          | 24.0 °C            | $\epsilon_r$ | 53.30        | 50.79          | -4.72         | 5.00      |
|          |                 |                  |                    | $\sigma$     | 1.52         | 1.58           | 3.74          | 5.00      |
|          |                 |                  |                    | 1g SAR       | 40.90        | 42.80          | 4.65          | 5.00      |
|          |                 |                  |                    | 10g SAR      | 21.50        | 21.88          | 1.77          | 5.00      |

Test of: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

## **Appendix 6. Simulated Tissues**

The body mixture consists of water and glycol. Visual inspection is made to ensure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the tissue.

| Ingredient       | Frequency               |
|------------------|-------------------------|
|                  | 835/850/900 MHz<br>Body |
| De-Ionised Water | 50.75%                  |
| Sugar            | 48.21%                  |
| Salt             | 0.94%                   |
| Kathon           | 0.10%                   |

| Ingredient                  | Frequency             |
|-----------------------------|-----------------------|
|                             | 1800/1900 MHz<br>Body |
| De-Ionised Water            | 69.79%                |
| Diglycol Butyl Ether (DGBE) | 30.00%                |
| Salt                        | 0.20%                 |

Test of: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

## **Appendix 7. DASY4 System Details**

### **A.7.1. DASY4 SAR Measurement System**

RFI Global Services Ltd, SAR measurement facility utilises the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 system is comprised of the robot controller, computer, near-field probe, probe alignment sensor, and the SAM phantom containing brain or muscle equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller; teach pendant (Joystick), and remote control. This is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. The data acquisition electronics (DAE) performs signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection etc. The DAE is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card. The DAE3 utilises a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

Test of: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

**A.7.2. DASY4 SAR System Specifications****Robot System**

|                              |  |
|------------------------------|--|
| <b>Positioner:</b>           | Stäubli Unimation Corp. Robot Model: RX90L |
| <b>Repeatability:</b>        | 0.025 mm                                   |
| <b>No. of Axis:</b>          | 6  |
| <b>Serial Number:</b>        | F00/SD89A1/A/01                            |
| <b>Reach:</b>                | 1185 mm                                    |
| <b>Payload:</b>              | 3.5 kg                                     |
| <b>Control Unit:</b>         | CS7  |
| <b>Programming Language:</b> | V+   |

**Data Acquisition Electronic (DAE) System**

|                |             |
|----------------|-------------|
| Serial Number: | DAE3 SN:450 |
|----------------|-------------|

**PC Controller**

|                          |                          |
|--------------------------|--------------------------|
| <b>PC:</b>               | Dell Precision 340       |
| <b>Operating System:</b> | Windows 2000             |
| <b>Data Card:</b>        | DASY4 Measurement Server |
| <b>Serial Number:</b>    | 1080                     |

**Data Converter**

|                          |  |
|--------------------------|--|
| <b>Features:</b>         | Signal Amplifier, multiplexer, A/D converted and control logic.                      |
| <b>Software:</b>         | DASY4 Software   |
| <b>Connecting Lines:</b> | Optical downlink for data and status info.<br>Optical uplink for commands and clock. |

**PC Interface Card**

|                  |   |
|------------------|---|
| <b>Function:</b> | 24 bit (64 MHz) DSP for real time processing Link to DAE3<br>16 bit A/D converter for surface detection system serial link to robot direct emergency stop output for robot. |
|------------------|---|

Test of: R&amp;S TechMedic BV Dyna-Vision DVM-012SG

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

**DASY4 SAR System Specifications (Continued)****E-Field Probe**

|                              |                                |
|------------------------------|--------------------------------|
| <b>Model:</b>                | EX3DV3                         |
| <b>Serial No:</b>            | 3508                           |
| <b>Construction:</b>         | Triangular core                |
| <b>Frequency:</b>            | 10 MHz to >6 GHz               |
| <b>Linearity:</b>            | $\pm 0.2$ dB (30 MHz to 6 GHz) |
| <b>Probe Length (mm):</b>    | 330                            |
| <b>Probe Diameter (mm):</b>  | 12                             |
| <b>Tip Length (mm):</b>      | 20                             |
| <b>Tip Diameter (mm):</b>    | 2.5                            |
| <b>Sensor X Offset (mm):</b> | 1                              |
| <b>Sensor Y Offset (mm):</b> | 1                              |
| <b>Sensor Z Offset (mm):</b> | 1                              |

**Phantom**

|                        |                  |
|------------------------|------------------|
| <b>Phantom:</b>        | SAM Phantom      |
| <b>Shell Material:</b> | Fibreglass       |
| <b>Thickness:</b>      | 2.0 $\pm 0.1$ mm |