Test Report No. S08EEC01155
dated 14 MAY 2008

PSB Singapore

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COMPLIANCE REPORT ON TESTING IN ACCORDANCE WITH
SAR (SPECIFIC ABSORPTION RATE) REQUIREMENTS

Supplement C (Edition 01-01)
FCC OET Bulletin 65 (Edition 97-01)

OF A
Sound blaster X-Fi-Notebook
[FCC ID: IBAAVPSB0950]
[Model : SB0950]

TEST FACILITY	TÜV SÜD PSB Pte Ltd, Electrical & Electronics Centre (EEC), Product Services, 1 Science Park Drive, Singapore 118221
PREPARED FOR	Ms Sim Lee Fong Creative Technology Ltd 31 International Business Park Creative Resource Singapore 609921
	Tel : 6895 4729 Fax : 6895 4110
QUOTATION NUMBER	Q08EEC01237
JOB NUMBER	S08EEC01155
TEST PERIOD	06-May-2008 – 14-May-2008

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LA-2007-0380-A
LA-2007-0380-A-1
LA-2007-0381-F
LA-2007-0382-B
LA-2007-0383-G
LA-2007-0384-G
LA-2007-0385-E
LA-2007-0386-C

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TEST SUMMARY

The product was tested in accordance with the following standards.

Test Results Summary

Test Standards	Description	Pass / Fail
• Supplement C (Edition 01-01) to FCC OET Bulletin 65 (Edition 97-01) • ANSI/IEEE Standard C95.1-1993	SAR Measurement Body Worn Configuration	Pass *

Note:

1. The worst-case SAR value was found to be **0.264W/kg** which is lower than the maximum limit of 1.60 W/kg, over 1g of tissue.

* Based on spatial peak uncontrolled exposure / general population level:

Body: 1.60 W/kg, over 1g of tissue.

2. Three channels as listed below, which respectively represent the lower, middle and upper channels of the Equipment Under Test (EUT) were chosen and tested. For each channel, the EUT was configured to operate in the test mode.

Transmit Channel	Frequency (GHz)
Channel 0	2.412
Channel 1	2.438
Channel 2	2.464

Modifications

No modifications were made.

DEVICE DESCRIPTION

Description	The Equipment Under Test (EUT) is a **Sound Blaster X-Fi Notebook.**
Device Category	Portable Device
Exposure Environment	General Population/Uncontrolled exposure
Test Device Type	Prototype
Brand Name	Creative
Model	SB0950
Serial Numbers	NIL
FCC ID	IBAAVPSB0950

DEVICE OPERATING CONFIGURATION

Operating Frequencies	Channel 0 (2412Mhz) (Low) Channel 1 (2438Mhz) (Mid) Channel 2 (2464Mhz) (high)
Operating Temperature Tolerance	(-20 to +50) Degree Celsius
Operating Voltage Tolerance	(1.5~ 5) Volt DC
Continuous Transmission Tolerance	The EUT shall cause no problem after transmitting for 2 hours. (Depending on the power source of supporting equipment)
Rated Output Power	15dBm, Maximum
Antenna Type	Integrated Antenna
EUT Crest Factor	1.0
Input Power	+3.3Vdc and +1.5Vdc from laptop express card slot.
Accessories	Microphone and Headphone earpiece (Refer to manufacturer's user manual / operating manual.)

MANUFACTURER

Manufacturer Address	Creative Technology Ltd 31 International Business Park Creative Resource Singapore 609921
DID	6895 4729
Fax	6895 4110

DEVICE OPERATING CONDITION

The EUT was put into operation by a radio test set. Communication between the EUT and the radio test set was established by air link. For every SAR measurement, the EUT was set to maximum output power level using fully charged battery.

TEMPERATURE AND HUMIDITY

SAR Body Measurement

Ambient Temperature:	24 ± 1^0 C
Tissue Temperature:	24 ± 1^0 C
Humidity:	53% to 57%

TEST RESULTS

The measurement results were obtained with the EUT tested in the conditions described in this report (Annex A).

Table 1 – Body Worn Position SAR Test Results (left side of laptop).

Phantom Configuration	Device Test Positions	Antenna Position	SAR (W/kg), over 1g Tissue Device Test Channel & Frequency		
			Channel: 0 2412MHz	Channel: 1 2438MHz	Channel: 2 2464MHz
Flat Phantom	EUT **Rear** Touched Phantom	fixed	0.264	0.133	0.181
Output Power (dBm) Before Test			14.0	13.9	13.8
Output Power (dBm) After Test			13.8	13.8	13.7

Remarks:
1. All modes of operations were investigated and the worst-case SAR levels are reported.
2. A fully charged battery was used for each mode of operation.
3. For **2412MHz**, the worst-case SAR value was found to be **0.264W/Kg** (over a 1g tissue) at **Channel 0** which is lower than the maximum limit of 1.60 W/Kg, please refer to the above table.
4. The SAR limit of 1.60W/Kg (Spatial Peak level for Uncontrolled Exposure / General Population) is based on the Test Standards:
   a) Supplement C (Edition 01-01) to FCC OET Bulletin 65 (Edition 97-01)
   b) ANSI/IEEE Standard C95.1-1993

Ambient Temperature: 24 ± 1^0 C
Tissue Temperature: 24 ± 1^0 C
Humidity: 53% to 57%

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 5/9/2008 1:44:41 PM

File Name: EUT Rear_ Ch 0_2412MHz_Data 1B.da4

Program Name: EUT Rear _Ch 0_2412MHz_Data 1.da4

Phantom section: Flat Section

DUT: CREATIVE VIVIO

Communication System: 2450 Mhz

Frequency: 2412 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.98 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 71

Probe: EX3DV4 - SN3541 ConvF(7.07, 7.07, 7.07) Calibrated: 7/13/2007

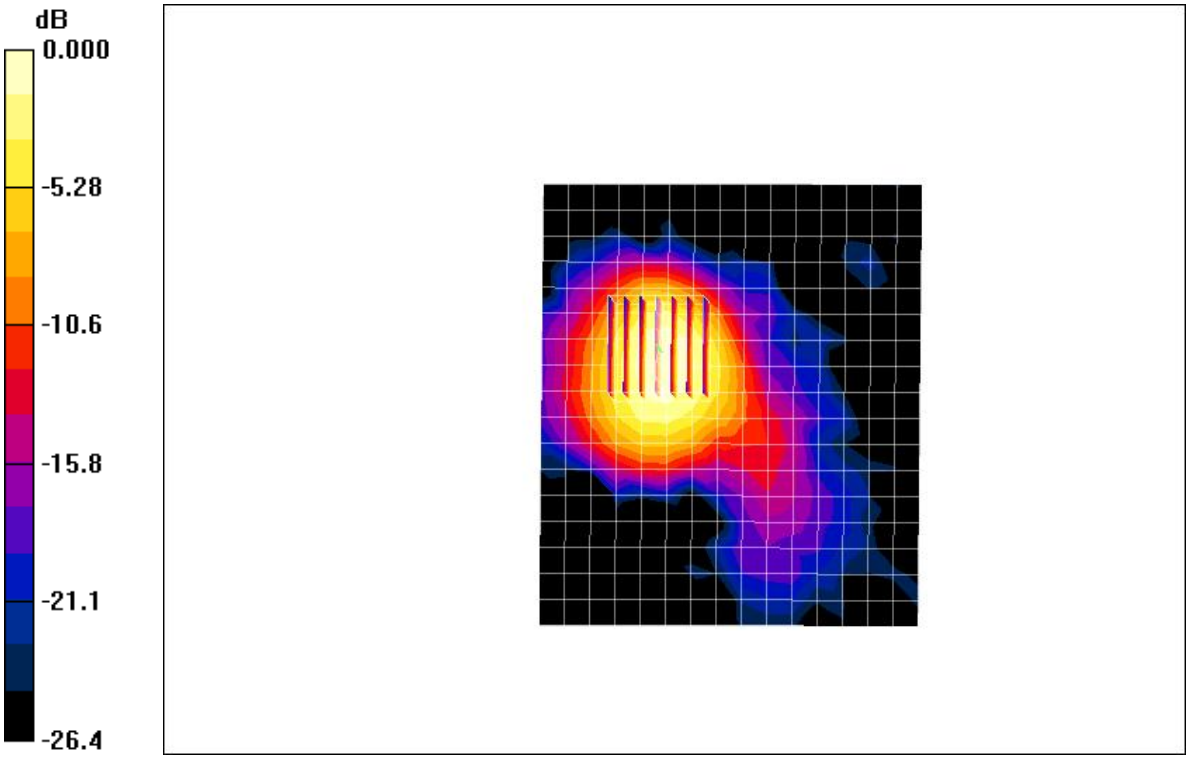
Postprocessing SW: SEMCAD, V1.8 Build 184

Sensor-Surface: 4mm (Mechanical Surface Detection)

EUT Rear_Ch 0_2412MHz_Data 1/Area Scan (18x16x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.290 mW/g

EUT Rear_Ch 0_2412MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.4 V/m; Power Drift = 0.010 dB
Peak SAR (extrapolated) = 0.475 W/kg

SAR(1 g) = 0.264 mW/g; SAR(10 g) = 0.137 mW/g
Maximum value of SAR (measured) = 0.292 mW/g



0 dB = 0.292mW/g

Ambient Temperature:	**24 ± 1^0 C**
Tissue Temperature:	**24 ± 1^0 C**
Humidity:	**53% to 57%**

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 5/9/2008 10:47:39 AM

File Name: EUT Rear_ Ch 1_2438MHz_Data 1B.da4

Program Name: EUT Rear _Ch 1_2438MHz_Data 1B.da4

Phantom section: Flat Section

DUT: CREATIVE VIVIO

Communication System: 2450 Mhz

Frequency: 2438 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.98 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 71

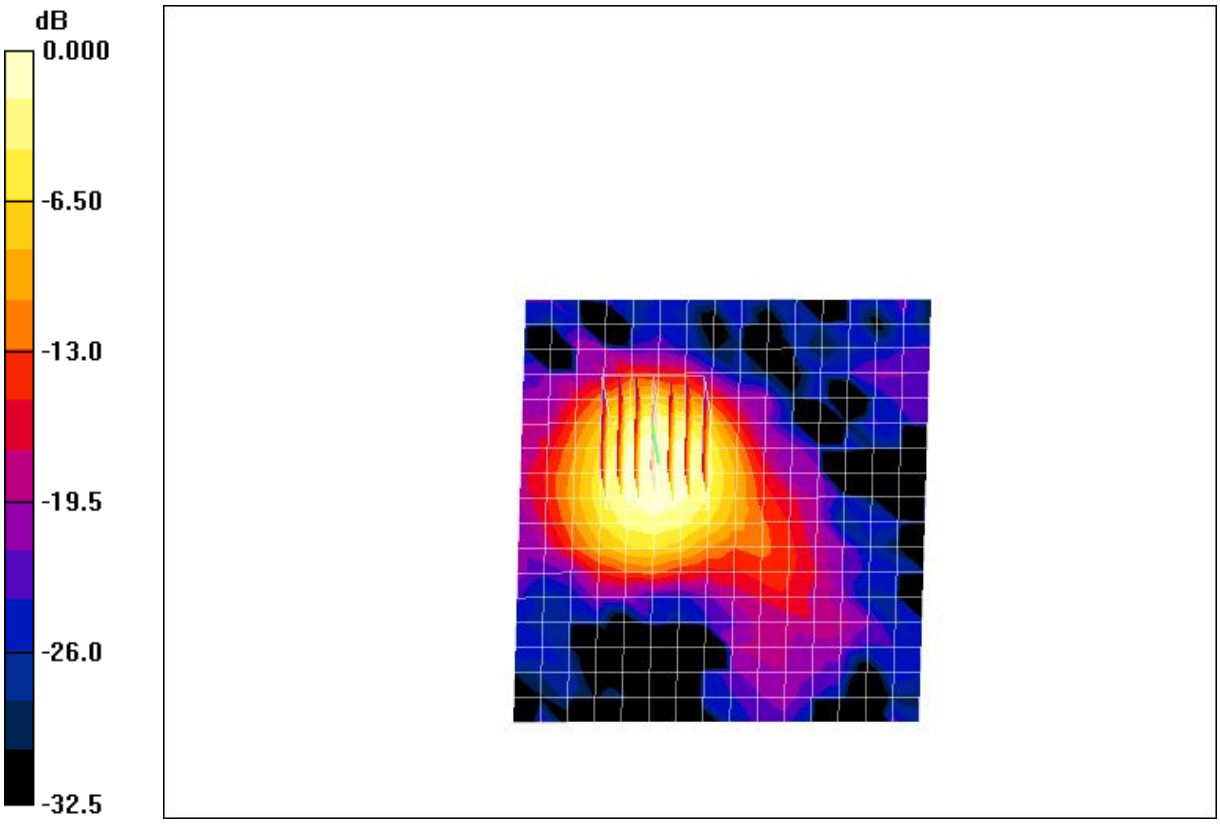
Probe: EX3DV4 - SN3541 ConvF(7.07, 7.07, 7.07) Calibrated: 7/13/2007

Postprocessing SW: SEMCAD, V1.8 Build 184

Sensor-Surface: 4mm (Mechanical Surface Detection)

EUT Rear_Ch 1_2438MHz_Data 1/Area Scan (18x16x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.202 mW/g

EUT Rear_Ch 1_2438MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.78 V/m; Power Drift = 0.106 dB
Peak SAR (extrapolated) = 0.326 W/kg
SAR(1 g) = 0.181 mW/g; SAR(10 g) = 0.095 mW/g
Maximum value of SAR (measured) = 0.203 mW/g



0 dB = 0.203mW/g

Ambient Temperature:	**24 ± 1^0 C**
Tissue Temperature:	**24 ± 1^0 C**
Humidity:	**53% to 57%**

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 5/9/2008 2:36:27 PM

File Name: EUT Rear_ Ch 2_2464MHz_Data 1.da4

Program Name: EUT Rear _Ch 2_2464MHz_Data 1.da4

Phantom section: Flat Section

DUT: CREATIVE VIVIO

Communication System: 2450 Mhz

Frequency: 2464 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.98 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 71

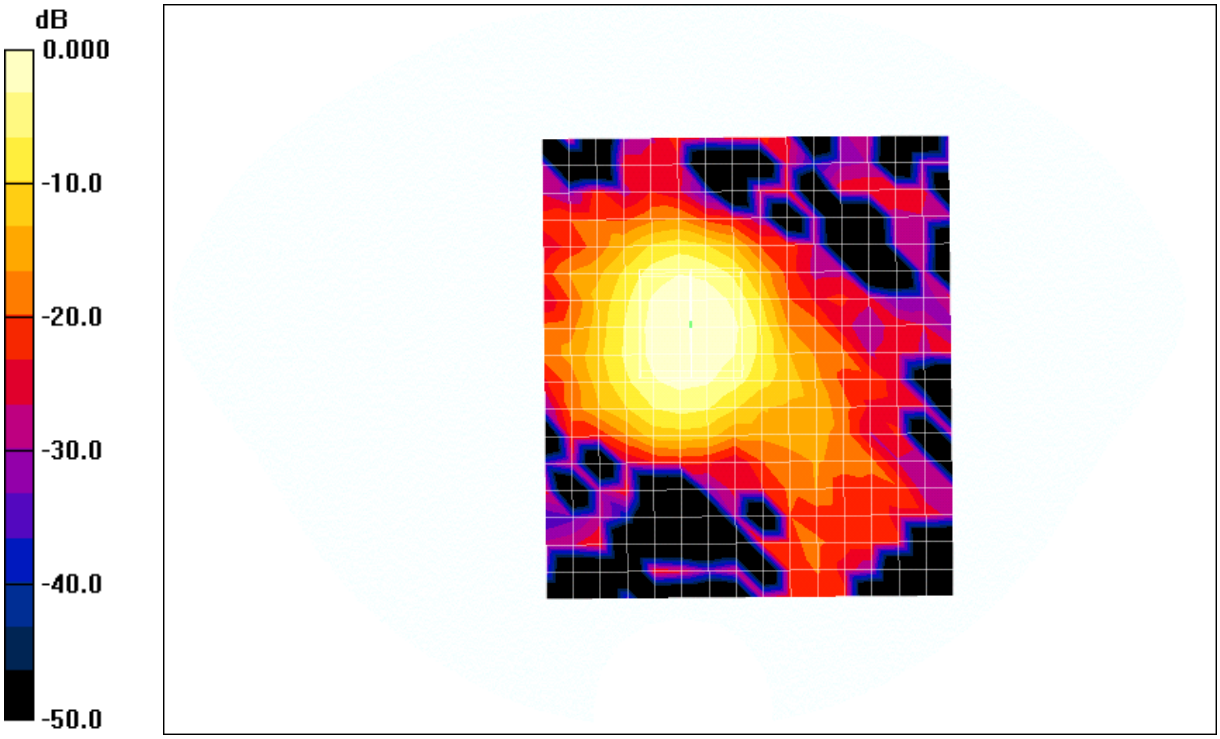
Probe: EX3DV4 - SN3541 ConvF(7.07, 7.07, 7.07) Calibrated: 7/13/2007

Postprocessing SW: SEMCAD, V1.8 Build 184

Sensor-Surface: 4mm (Mechanical Surface Detection)

EUT Rear_Ch 2_2464MHz_Data 1/Area Scan (18x16x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.143 mW/g

EUT Rear_Ch 2_2464MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.74 V/m; Power Drift = 0.076 dB
Peak SAR (extrapolated) = 0.241 W/kg
SAR(1 g) = 0.133 mW/g; SAR(10 g) = 0.069 mW/g
Maximum value of SAR (measured) = 0.148 mW/g



0 dB = 0.148mW/g

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January 2008

ANNEX A

TEST INSTRUMENTATION
&
GENERAL PROCEDURE

TEST INSTRUMENTATION & GENERAL PROCEDURES ANNEX A

A.1 General Test Procedure

In the SAR measurement, the positioning of the probes must be performed with sufficient accuracy to obtain repeatable measurements in the presence of rapid spatial attenuation phenomena. The accurate positioning of the E-field probe is accomplished by using a high precision robot. The robot can be taught to position the probe sensor following a specific pattern of points. In a first sweep, the sensor is positioned as close as possible to the interface, with the sensor enclosure touching the inside of the fiberglass shell. The SAR is measured on a grid of points, which covers the curved surface of the phantom in an area larger than the size of the EUT. After the initial scan, a high- resolution grid is used to locate the absolute maximum measured energy point. At this location, attenuation versus depth scan will be accomplished by the measurement system to calculate the SAR value.

A.2 SAR Test Instrumentation

SAR Measurement System

- **Positioning Equipment**
  Type: High Precision Industrial Robot, RX90.
  Precision: High precision (repeatability 0.02mm)
  Reliability: High reliability (industrial design)

- **Compaq Computer**
  Type: 2.4GHz Pentium
  Memory: 512MB SDRAM
  Operating System: Windows 2000
  Dell Monitor: 17" LCD

- **Dosimetric E-Field Probe**
  Type: ET3DV6
  Isotropy Error (∅): ±0.25dB
  Dynamic Range: 0.01 – 100 W/kg

- **Phantom & Tissue**
  Phantom: "Phantom SAM 12" and "450MHz Phantom" were manufactured by SPEAG.
  Tissue: Simulated Tissue with electrical characteristics similar to those of the human at normal body temperature (23 ± 1°C)
  Shell: Fiberglass shell phantom with 2mm thickness for "Phantom SAM 12".
  Fiberglass shell phantom with 2mm or 6mm thickness for "450MHz Flat Phantom".

TEST INSTRUMENTATION & GENERAL PROCEDURES ANNEX A

A.3 Test Setup

Phantom

The "Phantom SAM 12", manufactured by SPEAG is a fiberglass shell phantom with 2 mm shell thickness. It has three measurement areas:

- Left hand
- Right hand
- Flat phantom

1) The "Phantom SAM 12" table comes in the sizes: A 100x50x85 cm (LxWxH).
2) The "450MHz Flat Phantom – 6mm Shell Thickness" table comes in the sizes: A 82x44x18 cm (LxWxH) is used for System Validation Test.
3) The "450MHz Flat Phantom – 2mm Shell Thickness" table comes in the sizes: A 82x44x18 cm (LxWxH) is used for SAR Measurement.

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. Only one device holder is necessary if two phantoms are used (e.g., for different solutions).

Simulated tissue

Simulated Tissue: Suggested in a paper by George Hartsgrove and colleagues in University of Ottawa Ref.: Bioelectromagnetics 8:29-36 (1987)

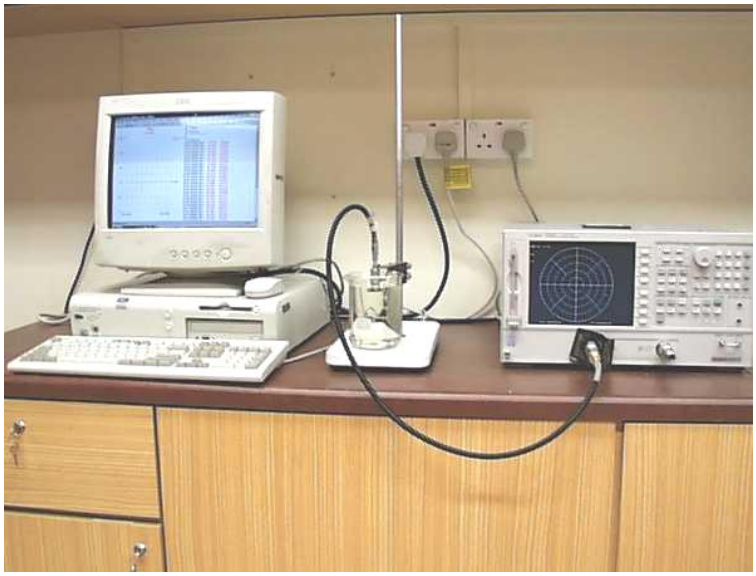
This simulated tissue is mainly composed of water, sugar and salt. At higher frequencies, in order to achieve the proper conductivity, the solution does not contain salt. Also, at these frequencies, D.I. water and alcohol is preferred.
Tissue Density : Approximately 1.25 g/cm^3

- **Preparation**
  The ingredients (i.e. water, sugar, salt, etc) required to prepare the simulated tissue are carefully weighed and poured into a clean container for mixing. A stirring paddle, that is attached to a hand drill is used to stir the solution for a duration of about 30 minutes or more. When the ingredients are completely dissolved, the solution is left in the container for the air bubbles to disappear.

- **Measurement of Electrical Characteristics of Simulated Tissue**
  1) S-PARAMETER Network Analyzer, Agilent 8753ES (30kHz – 6GHz)
  2) Agilent 85070D Dielectric Probe Kit

TEST INSTRUMENTATION & GENERAL PROCEDURES ANNEX A

ELECTRICAL CHARACTERISTIC MEASUREMENT SETUP



- **Description of the Agilent 85070D Dielectric Probe Kit**

  The 85070D is a dielectric probe that is used to measure the intrinsic electrical properties of materials in the RF and microwave frequency bands. The 85070D software allows you to measure the complex dielectric constant (also called permittivity) of liquids and semi-solids, incuding the dielectric loss factor of loss tangent.

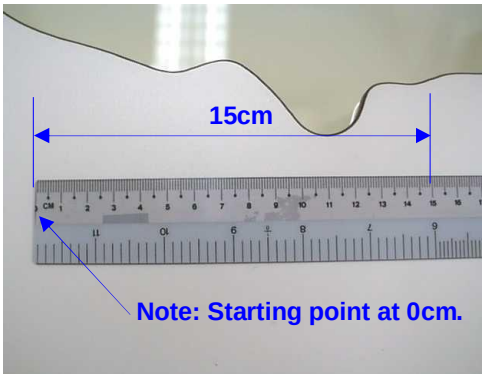
  To obtain data at hundreds of frequencies in seconds, simply immerse the probe into liquids or semi-solids - no special fixtures or containers are required. The 85070D must be used in conjunction with an Agilent network analyzer. The network analyzer provides the high frequency stimulus, and measures the reflected response.

  The probe transmits a signal into the material under test (MUT). The measured reflected response from the materials is then related to its dielectric properties. A computer controls the system, and runs software that guides the user through a measurement sequence. An effort is made to keep the results dielectric constant and conductivity within 5 % of published data.

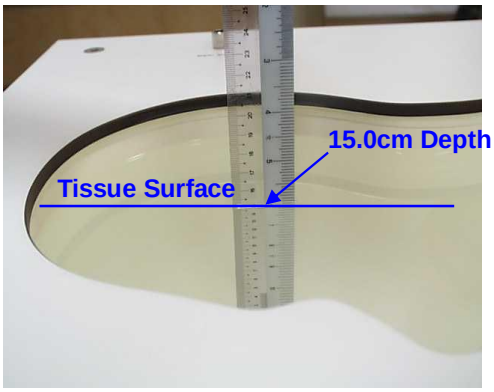
TEST INSTRUMENTATION & GENERAL PROCEDURES ANNEX A

Tissue Depth

The tissue depth at the head of the Phantom SAM 12 is approximately 15cm ±0.5cm.



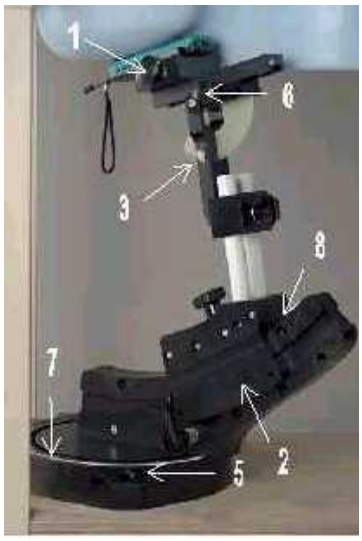
At "Phantom SAM 12"



Tissue – 15.0cm Depth

TEST INSTRUMENTATION & GENERAL PROCEDURES ANNEX A

Positioning of EUT



The DASY4 holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65º. The intended use position in the CENELEC document is has a rotation angle of 65º and an inclination angle of 80º. The rotation centers for both scales is the ear opening. Thus the device needs no repositioning when changing the angles. The device rotation around the device axis is not changed in the holder. In the CENELEC standard it is always 0º. If the standard changes, a support will be provided with the new angle.

1. **"Cheek/Touch Position"** – the device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom. This test position is established:

i) When any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom.

ii) (Or) When any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.

For existing head phantoms – when the handset loses contact with the phantom at the pivoting point, rotation should continue until the device touches the cheek of the phantom or breaks its last contact from the ear spacer.

2. **"Ear/Tilt Position"** – With the handset aligned in the "Cheek/Touch Position":

i) If the earpiece of the handset is not in full contact with the phantom's ear spacer (in the "Cheek/Touch position") and the peak SAR location for the "Cheek/Touch" position is located at the ear spacer region or corresponds to the earpiece region of the handset, the device should be returned to the "initial ear position" by rotating it away from the mouth until the earpiece is in full contact with the ear spacer.

TEST INSTRUMENTATION & GENERAL PROCEDURES ANNEX A

ii) (Otherwise) The handset should be moved (translated) away from the cheek perpendicular to the line passes through both "ear reference points" (note: one of these ear reference points may not physically exist on a split head model) for approximate 2-3 cm. While it is in this position, the handset is tilted away from the mouth with respect to the "test device reference point" by 15°. After the tilt, it is then moved (translated) back toward the head perpendicular to the line passes through both "ear reference points" until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process should be repeated with a tilt angle less than 15° so that the device and its antenna would touch the phantom simultaneously. This test position may require a device holder or positioner to achieve the translation and tilting with acceptable positioning repeatability.

3. **Body Worn Configuration**

All body worn accessories are tested for the FCC RF exposure compliance. The phone is positioned into carrying case (if available) and placed below of the flat phantom. Headset or ear piece (if available) is connected during measurements.

TEST INSTRUMENTATION & GENERAL PROCEDURES ANNEX A

Instrument	Model	S/No	Cal Due Date	
Boonton RF Power Meter (Dual Channel)	4532	97701	1 Apr 2009	X
Boonton Power Sensor (used as reference)	51075	32002	1 Apr 2009	X
Boonton Power Sensor	51075	32097	1 Apr 2009	X
S-Parameter Network Analyzer (30kHz – 6GHz)	8753ES	MY40001026	29 Apr 2009	X
Agilent 85070D Dielectric Probe Kit	85075D	21356	-	X
Anritsu RF Signal Generator (10MHz – 20GHz)	68347C	04306	-	X
Amplifier Research Power Amplifier (1MHz – 1000MHz)	25W1000B	27225	-	X
Amplifier Research Power Amplifier (800MHz – 4.2GHz)	25S1G4A	29346	-	
Agilent Dual Directional Coupler (0.1~2.0)GHz	HP778D	18289	-	X
AR Directional Coupler (0.8~4.2)GHz	DC7144	29245	-	X
R&S Universal Radio Communication Tester	CMU-200	837587/068	01 Aug 2008	
2450MHz System Validation Dipole	D2450V2	752	19 Jun 2008	X
Data Acquisition Electronics (DAE4)	DAE4	627	14 Jun 2008	X
Dosimetric E-field Probe	EX3DV4	3541	13 July 2008	X

ANNEX B

TEST SETUP PHOTOGRAPHS

TEST SETUP PHOTOGRAPHS ANNEX B

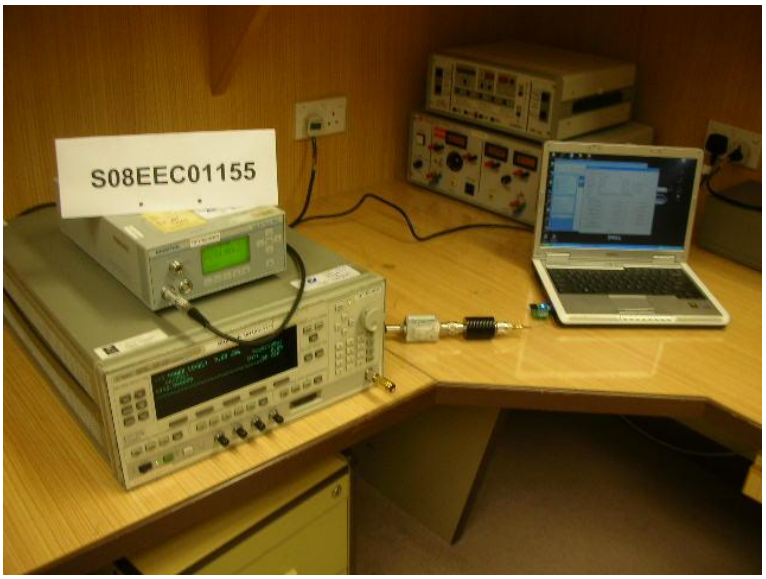
SAR Test Setup Photographs

SAR Test Setup

SAR Test Setup (font view)

TEST SETUP PHOTOGRAPHS ANNEX B

Conducted Power Measurement Setup

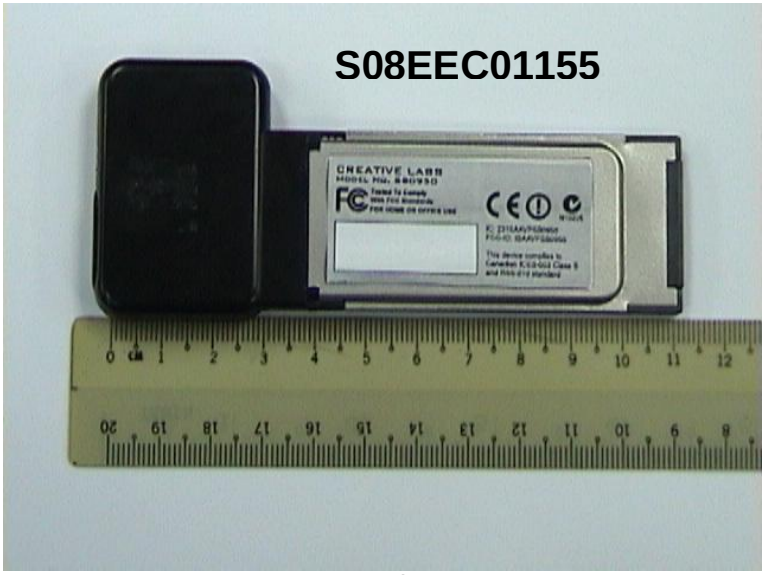


Conducted Power Measurement Setup

TEST SETUP PHOTOGRAPHS ANNEX B

EUT PHOTOGRAPHS

Front of EUT



Rear of EUT

ANNEX C

TISSUE SIMULANT DATA SHEETS

TISSUE SIMULANT DATA SHEETS ANNEX C

Type of Tissue	**Body**
Target Frequency (MHz)	2450
Target Dielectric Constant	52.7
Target Conductivity (S/m)	1.95
Composition (by weight)	Water (72.55%) Glycol (27.34%) Sugar (0%) Salt (0.11%) HEC (0%) Preventol D7 (0%)
Measured Dielectric Constant	52.11
Measured Conductivity (S/m)	1.975

Probe Name	Dosimetric E-field Probe EX3DV4
Probe Serial Number	3541
Sensor Offset (mm)	1.0
Conversion Factor	7.79 ± 11.0%
Probe Calibration Due Date (DD/MM/YY)	13 July 2008

TISSUE SIMULANT DATA SHEETS — ANNEX C

Body Tissue at 2450MHz

Frequency	e'	e''	Conductivity
2440000000	52.22	14.51	1.9674
2441000000	52.22	14.51	1.9679
2442000000	52.20	14.51	1.9683
2443000000	52.19	14.51	1.9689
2444000000	52.20	14.50	1.9684
2445000000	52.18	14.49	1.9677
2446000000	52.18	14.50	1.9710
2447000000	52.16	14.50	1.9717
2448000000	52.16	14.48	1.9695
2449000000	52.13	14.51	1.9737
2450000000	**52.11**	**14.51**	**1.9750**
2451000000	52.12	14.51	1.9753
2452000000	52.09	14.52	1.9781
2453000000	52.08	14.52	1.9787
2454000000	52.07	14.52	1.9793
2455000000	52.06	14.53	1.9818
2456000000	52.04	14.55	1.9850
2457000000	52.03	14.54	1.9847
2458000000	52.02	14.56	1.9881
2459000000	51.99	14.56	1.9890
2460000000	51.98	14.55	1.9887
2461000000	51.97	14.58	1.9935
2462000000	51.94	14.59	1.9954
2463000000	51.93	14.60	1.9979
2464000000	51.92	14.59	1.9972
2465000000	51.92	14.63	2.0031
2466000000	51.89	14.63	2.0037
2467000000	51.87	14.64	2.0072
2468000000	51.87	14.66	2.0105
2469000000	51.85	14.66	2.0104
2470000000	51.85	14.67	2.0127
2471000000	51.82	14.69	2.0165
2472000000	51.80	14.68	2.0167
2473000000	51.78	14.72	2.0221
2474000000	51.76	14.72	2.0229
2475000000	51.77	14.74	2.0265
2476000000	51.76	14.75	2.0295
2477000000	51.73	14.77	2.0322
2478000000	51.72	14.78	2.0340
2479000000	51.71	14.79	2.0363
2480000000	51.69	14.82	2.0414

Tested by: SSW
Date : May 9, 2008
Frequency: 2450MHz
Mixture: Body Tissue
Tissue temp: 24°C

Composition		
Tap Water	0.0g	0.00%
Ultra Pure Water	25500.0g	72.55%
Sugar	0.0g	0.00%
Glyco	9610.0g	27.34%
Salt	38.4g	0.11%
Preventol D7	0.0g	0.00%
Total Weight	35148.4g	100.0%

Result (FCC)	Dielectric Constant	Conductivity
Measured	52.11	1.9750
Target (FCC)	52.7	1.95
Low Limit	50.065	1.8525
High Limit	55.335	2.0475
% Off Target	-1.12	1.28

e'= Dielectric Constant
e''= Loss Factor

ANNEX D

SAR VALIDATION RESULTS

SAR VALIDATION RESULTS ANNEX D

SAR Validation – Body Tissue at 2450MHz (Dipole forward power = 250mW)

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 5/9/2008 3:07:33 PM

File Name: 2450MHz Body_System Validation.da4

Program Name: S08EEC01155

Phantom section: Flat Section

DUT: Dipole 2450 MHz

Communication System: CW

Frequency: 2450 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.98 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 71

Probe: EX3DV4 - SN3541 ConvF(7.07, 7.07, 7.07) Calibrated: 7/13/2007

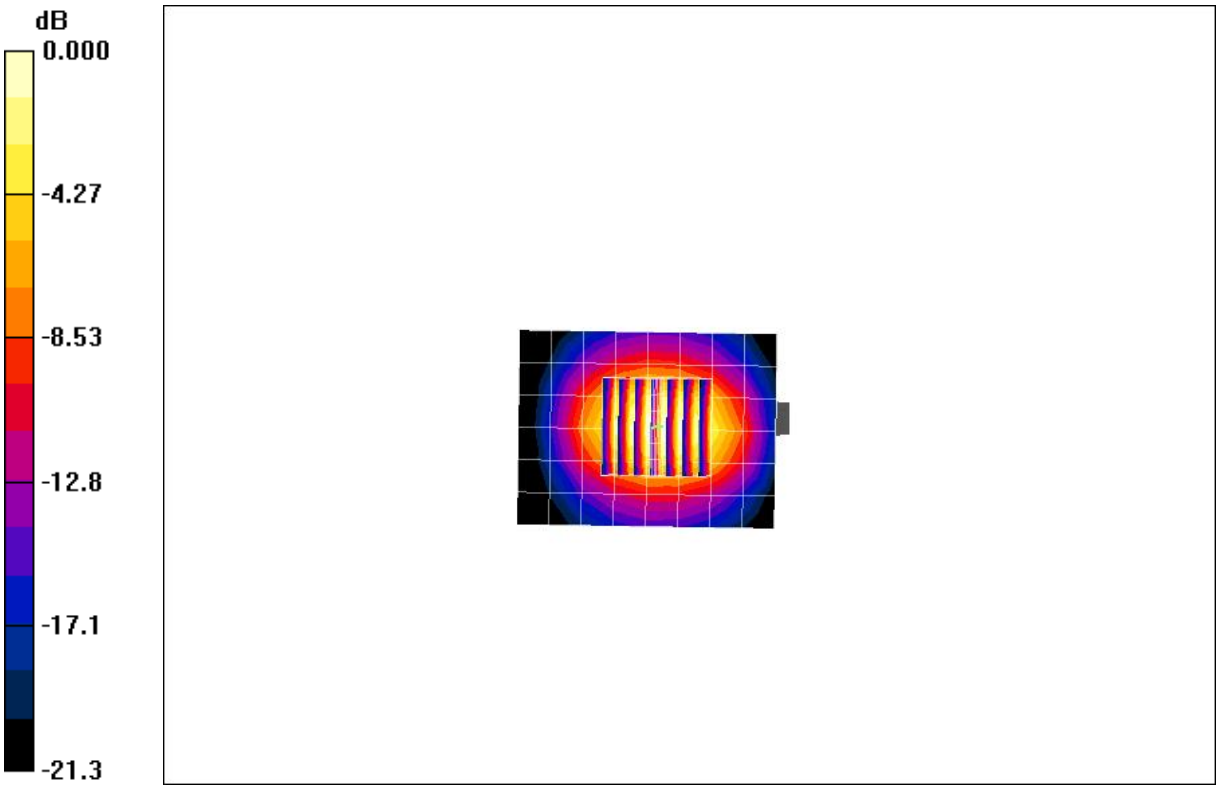
Postprocessing SW: SEMCAD, V1.8 Build 184

Sensor-Surface: 4mm (Mechanical Surface Detection)

EUT Rear_Ch 1_2438MHz_Data 1/Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 14.0 mW/g

EUT Rear_Ch 1_2438MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 84.5 V/m; Power Drift = -0.047 dB
Peak SAR (extrapolated) = 25.5 W/kg
SAR(1 g) = 12.8 mW/g; SAR(10 g) = 6.07 mW/g
Maximum value of SAR (measured) = 14.6 mW/g

SAR VALIDATION RESULTS ANNEX D



0 dB = 14.6mW/g

ANNEX E

MEASUREMENT UNCERTAINTY

MEASUREMENT UNCERTAINTY ANNEX E

Measurement Uncertainty

All test measurement carried out are traceable to national standards. The uncertainty of measurement at a confidence level of 95%, with a coverage of 2, is **±20.6%.**

Error Description	Uncertainty Value ± %	Probability Distribution	Divisor	ci 1g	Standard Unc.(1g)	Vi or Veff
Measurement System						
Probe Calibration	± 4.8	normal	1	1	± 4.8	∞
Axial isotropy	± 4.7	rectangular	√3	(1-cp)^1/2	± 1.9	∞
Hemispherical Isotropy	± 9.6	rectangular	√3	(cp)^1/2	± 3.9	∞
Spatial resolution	± 0.0	rectangular	√3	1	± 0.0	∞
Boundary effects	± 1.0	rectangular	√3	1	± 0.6	∞
Linearity	± 4.7	rectangular	√3	1	± 2.7	∞
System Detection limit	± 1.0	rectangular	√3	1	± 0.6	∞
Readout electronics	± 1.0	normal	1	1	± 1.0	∞
Response time	± 0.8	rectangular	√3	1	± 0.5	∞
Integration time	± 2.6	rectangular	√3	1	± 1.5	∞
RF ambient conditions	± 3.0	rectangular	√3	1	± 1.7	∞
Probe Positioning Mechanical Tolerance	± 0.4	rectangular	√3	1	± 0.2	∞
Probe Positioning with respect to Phantom Shell	± 2.9	rectangular	√3	1	± 1.7	∞
Extrapolation, Interpolation and Integration Algorithms for Max. SAR Evaluation	± 1.0	rectangular	√3	1	± 0.6	∞
Test Sample Related						
Device positioning	± 2.9	normal	1	1	± 2.9	145
Device holder uncertainty	± 3.6	normal	1	1	± 3.6	5
Power drift	± 5.0	rectangular	√3	1	± 2.9	∞
Phantom and Tissue Parameters						
Phantom uncertainty	± 4.0	rectangular	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	rectangular	√3	0.64	± 1.8	∞
Liquid conductivity (meas)	± 2.5	normal	1	0.64	± 1.6	∞
Liquid permittivity (target)	± 5.0	rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (meas)	± 2.5	normal	1	0.6	± 1.5	∞
Combined Standard Uncertainty					± 10.3	330
Coverage Factor for 95%		**k=2**				
Extended Standard Uncertainty					± 20.6	

ANNEX F

SAR PROBE CALIBRATION CERTIFICATES

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

Calibration Laboratory of
Schmid & Partner
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Accreditation No.: SCS 108

Client TUV SUD PSB Pte Ltd

Certificate No: EX3-3541_Jul07

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3541
Calibration procedure(s)	QA CAL-01.v6 and QA CAL-14.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	July 13, 2007
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41495277	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41498087	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-07 (METAS, No. 217-00671)	Mar-08
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-06 (METAS, No. 217-00593)	Aug-07
Reference Probe ES3DV2	SN: 3013	4-Jan-07 (SPEAG, No. ES3-3013_Jan07)	Jan-08
DAE4	SN: 654	20-Apr-07 (SPEAG, No. DAE4-654_Apr07)	Apr-08

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

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

Issued: July 13, 2007

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Certificate No: EX3-3541_Jul07 Page 1 of 9

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Certificate No: EX3-3541_Jul07 Page 2 of 9

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

EX3DV4 SN:3541 July 13, 2007

Probe EX3DV4

SN:3541

Manufactured:	May 3, 2004
Last calibrated:	June 23, 2006
Repaired:	June 19, 2007
Recalibrated:	July 13, 2007

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: EX3-3541_Jul07 Page 3 of 9

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

EX3DV4 SN:3541 **July 13, 2007**

DASY - Parameters of Probe: EX3DV4 SN:3541

Sensitivity in Free Space[A] Diode Compression[B]

NormX	**0.460** ± 10.1%	μV/(V/m)^2	DCP X	**93** mV
NormY	**0.420** ± 10.1%	μV/(V/m)^2	DCP Y	**99** mV
NormZ	**0.410** ± 10.1%	μV/(V/m)^2	DCP Z	**96** 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		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	3.6	1.2
SAR_{be} [%]	With Correction Algorithm	0.0	0.0

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

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	4.8	2.8
SAR_{be} [%]	With Correction Algorithm	0.1	0.4

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%.

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

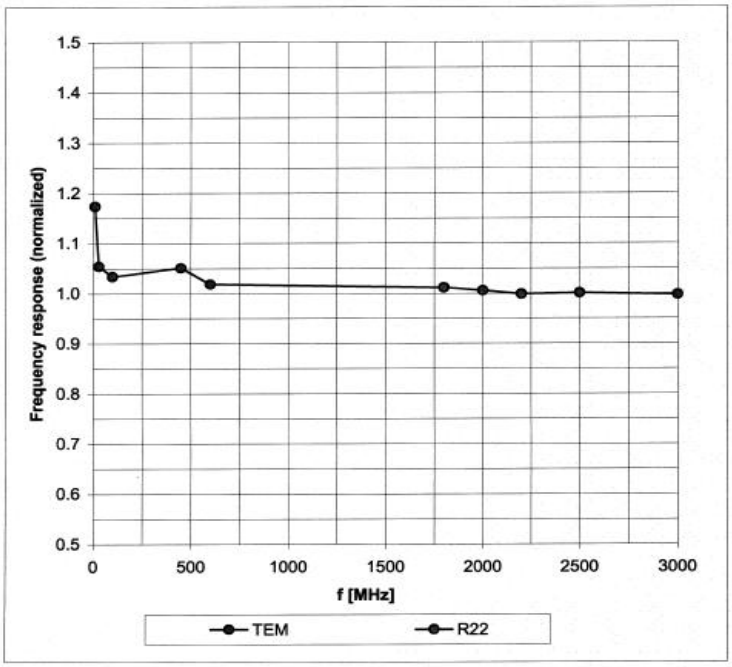
[B] Numerical linearization parameter: uncertainty not required.

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

EX3DV4 SN:3541 July 13, 2007

Frequency Response of E-Field

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



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

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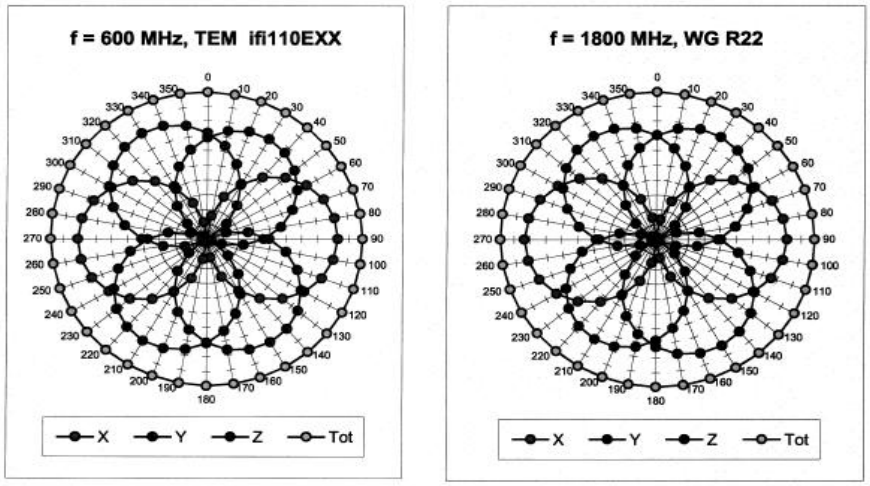
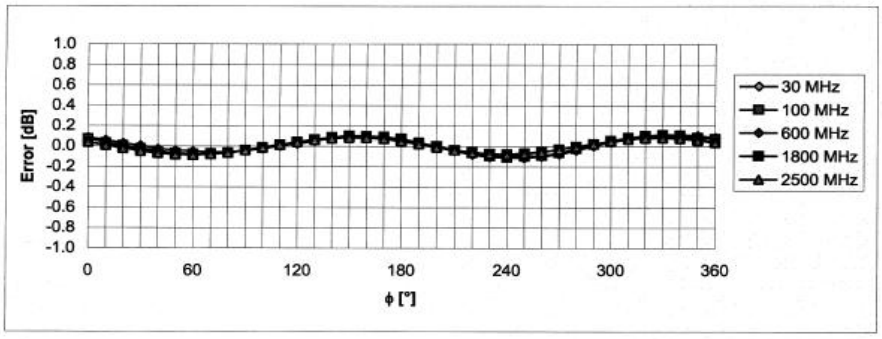
SAR PROBE CALIBRATION CERTIFICATES ANNEX F

EX3DV4 SN:3541 **July 13, 2007**

Receiving Pattern (ϕ), ϑ = 0°





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

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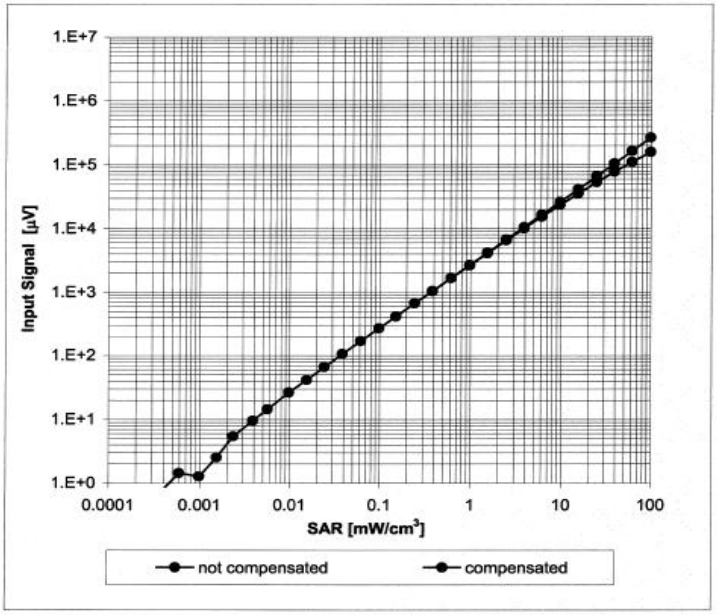
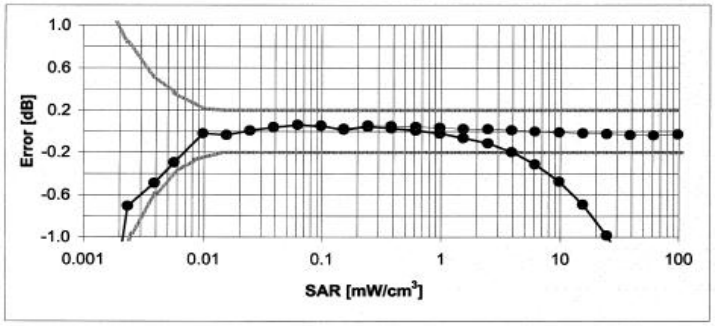
SAR PROBE CALIBRATION CERTIFICATES ANNEX F

EX3DV4 SN:3541 **July 13, 2007**

Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)





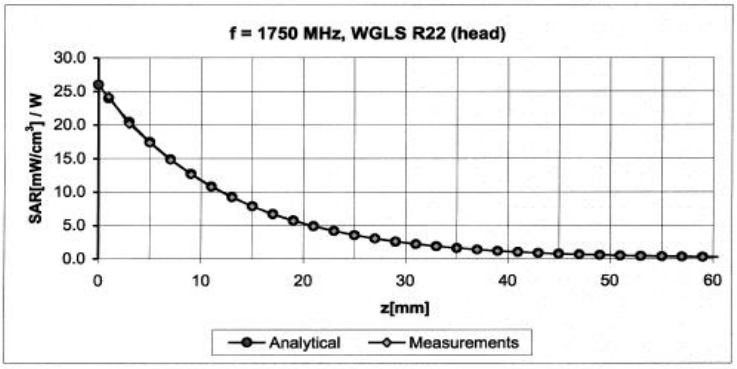
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Certificate No: EX3-3541_Jul07 Page 7 of 9

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

EX3DV4 SN:3541 **July 13, 2007**

Conversion Factor Assessment



f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.55	0.80	9.62 ± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.55	0.80	9.43 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.16	1.30	8.00 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.19	1.16	7.87 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.42	1.00	7.35 ± 11.8% (k=2)
5200	± 50 / ± 100	Head	36.0 ± 5%	4.66 ± 5%	0.33	1.78	5.01 ± 13.1% (k=2)
5500	± 50 / ± 100	Head	35.6 ± 5%	4.96 ± 5%	0.35	1.78	4.76 ± 13.1% (k=2)
5800	± 50 / ± 100	Head	35.3 ± 5%	5.27 ± 5%	0.32	1.78	4.55 ± 13.1% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.62	0.80	9.66 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.60	0.80	9.25 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.20	1.07	8.07 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.18	1.15	7.79 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.45	1.00	7.07 ± 11.8% (k=2)
5200	± 50 / ± 100	Body	49.0 ± 5%	5.30 ± 5%	0.35	1.80	4.42 ± 13.1% (k=2)
5500	± 50 / ± 100	Body	48.6 ± 5%	5.65 ± 5%	0.32	1.80	4.07 ± 13.1% (k=2)
5800	± 50 / ± 100	Body	48.2 ± 5%	6.00 ± 5%	0.31	1.80	4.30 ± 13.1% (k=2)

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

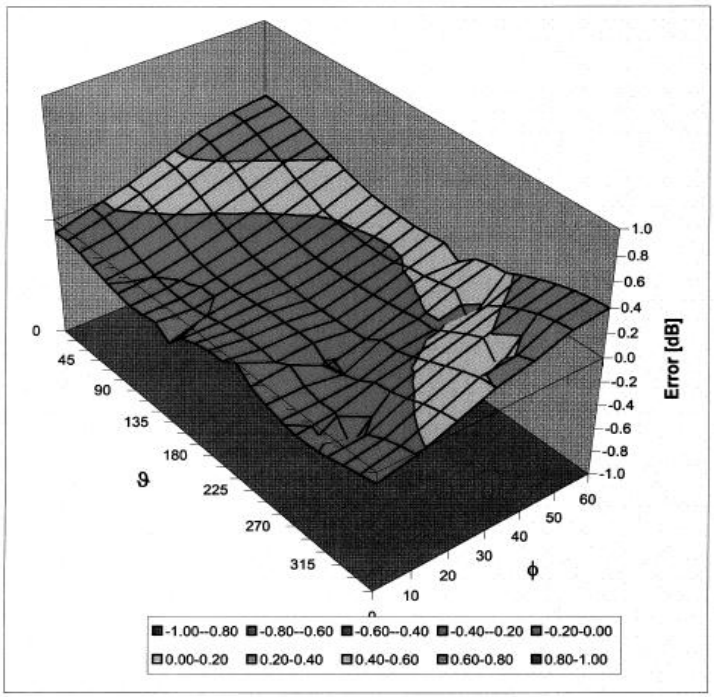
Certificate No: EX3-3541_Jul07 Page 8 of 9

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

EX3DV4 SN:3541 **July 13, 2007**

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Certificate No: EX3-3541_Jul07 Page 9 of 9

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

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Accreditation No.: SCS 108

Client TUV SUD PSB

Certificate No: DAE4-627_Jun07

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BA - SN: 627
Calibration procedure(s)	QA CAL-06.v12 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	June 14, 2007
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
Fluke Process Calibrator Type 702	SN: 6295803	13-Oct-06 (Elcal AG, No: 5492)	Oct-07
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-06 (Elcal AG, No: 5478)	Oct-07
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1002	15-Jun-06 (SPEAG, in house check)	In house check Jun-07

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	
Approved by:	Fin Bomholt	R&D Director	

Issued: June 14, 2007

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Certificate No: DAE4-627_Jun07 Page 1 of 5

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Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters contain technical information as a result from the performance test and require no uncertainty.
- *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
- *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
- *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
- *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
- *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
- *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
- *Input resistance:* DAE input resistance at the connector, during internal auto-zeroing and during measurement.
- *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
- *Power consumption:* Typical value for information. Supply currents in various operating modes.

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range:	1LSB =	6.1μV ,	full range =	-100...+300 mV
Low Range:	1LSB =	61nV ,	full range =	-1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	405.082 ± 0.1% (k=2)	404.004 ± 0.1% (k=2)	404.555 ± 0.1% (k=2)
Low Range	3.94466 ± 0.7% (k=2)	3.96422 ± 0.7% (k=2)	3.95337 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	204 ° ± 1 °

Certificate No: DAE4-627_Jun07 Page 3 of 5

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

Appendix

1. DC Voltage Linearity

High Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	200000	200000.4	0.00
Channel X	+ Input	20000	20005.14	0.03
Channel X	- Input	20000	-19995.61	-0.02
Channel Y	+ Input	200000	200000.2	0.00
Channel Y	+ Input	20000	20005.27	0.03
Channel Y	- Input	20000	-20002.39	0.01
Channel Z	+ Input	200000	200000	0.00
Channel Z	+ Input	20000	20004.96	0.02
Channel Z	- Input	20000	-19999.55	0.00

Low Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	2000	2000.1	0.00
Channel X	+ Input	200	200.11	0.06
Channel X	- Input	200	-200.71	0.36
Channel Y	+ Input	2000	2000	0.00
Channel Y	+ Input	200	198.90	-0.55
Channel Y	- Input	200	-200.21	0.11
Channel Z	+ Input	2000	2000	0.00
Channel Z	+ Input	200	199.07	-0.47
Channel Z	- Input	200	-200.90	0.45

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	15.14	13.75
	- 200	-13.53	-14.26
Channel Y	200	7.77	7.70
	- 200	-8.05	-9.02
Channel Z	200	8.45	8.40
	- 200	-10.68	-10.60

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	3.20	0.40
Channel Y	200	-0.05	-	5.25
Channel Z	200	-0.01	-0.11	-

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4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	15897	14024
Channel Y	16247	17138
Channel Z	15820	15417

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	-0.18	-1.03	2.48	0.45
Channel Y	-1.12	-2.08	0.01	0.43
Channel Z	-0.47	-2.88	0.79	0.41

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance

	Zeroing (MOhm)	Measuring (MOhm)
Channel X	0.2001	201.3
Channel Y	0.2001	201.8
Channel Z	0.2001	202.0

8. Low Battery Alarm Voltage (verified during pre test)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (verified during pre test)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.0	+6	+14
Supply (- Vcc)	–0.01	-8	-9

ANNEX G

REFERENCES

REFERENCES ANNEX G

The methods and procedures used for the measurements contained in this report are details in the following reference standards:

Publications	Year	Title
Supplement C (Edition 01-01) to FCC OET Bulletin 65 (Edition 97-01)	2001	"Evaluating Compliance with FCC Guidelines for Human Exposure to radio Frequency Fields"
IEEE Standard 1528-200X	2000	"Product Performance Standards Relative to the safe Use of Electromagnetic Energy"
ANSI/IEEE C95.3	1992	"Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave"
ANSI/IEEE C95.1	1992	"Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300GHz"
ACA, Radio Communications (EMR Human Exposure)	2000 (No.2)	"Radiocommunication (Electromagnetic Radiation – Human Exposure)"
EN50360	2001	Product Standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300MHz – 3GHz)
EN50361	2001	Basic Standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phone (300MHz – 3GHz)
EN62209-1	2006	Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (300MHz – 3GHz)