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SAR Test Report

Report Number: M030411

Test Sample:	Handheld Transceiver
Model Number:	21-1905
Tested For:	RadioShack Corporation
FCC ID:	AAO2101905
Date of Issue:	7th May 2003

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SAR EVALUATION
RadioShack Corporation Handheld Transceiver
Model: 21-1905
Report Number: M030411
FCC ID: AAO2101905

1.0 GENERAL INFORMATION

Test Sample:	Handheld Transceiver
Device Category:	Portable Transmitter
Test Device:	Production Unit
Model Number:	21-1905
FCC ID:	AAO2101905
RF exposure Category:	General Population/Uncontrolled
Manufacturer:	RadioShack Corporation
Address:	100 Throckmorton St. Ste. 1300, Fort Worth, TX 76102-2802
Test Standard/s:	Evaluating Compliance with FCC Guidelines For Human Exposure to Radiofrequency Electromagnetic Fields Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01)
Statement Of Compliance:	The RadioShack Corporation Handheld Transceiver model 21-1905 Complied with the FCC General public/uncontrolled RF exposure limits of 1.6mW/g per requirements of 47CFR2.1093(d).
Test Dates:	29th to 30th April and 1st May 2003
Tested for:	Intertek Testing Services Hong Kong
Address:	2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong
Contact:	Joyce Chan
Test Officer:	**Aaron Sargent B.Eng**
Authorised Signature:	**Chris Zombolas** **Technical Director,** **EMC Technologies** **Pty Ltd**

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SAR EVALUATION
RadioShack Corporation Handheld Transceiver
Model: 21-1905
Report Number: M030411

2.0 DESCRIPTION OF DEVICE

2.1 Description of Test Sample

The device tested was a RadioShack Corporation Handheld Transceiver operating in the GMRS and FRS frequency bands. It has one integral antenna and was tested in the Face and Belt-Clip configurations of the phantom.

Operating Mode during Testing	: Continuous Wave 100% duty cycle
Operating Mode production sample	: 50% duty cycle
Modulation Scheme	: Direct Frequency Modulation
Device Power Rating for test sample and identical production unit	: 0.5W and 2W ERP for GMRS Frequency Band : 0.5W ERP for FRS Frequency Band
Device Dimensions (LxWxH)	: 18 x 6.5 x 3.5 cm
Antenna type	: Helical
Applicable Head Configurations	: None
Applicable Body Worn-Configurations	: Belt-Clip and Face Position
Battery Options	: Standard Alkaline (4xAA, 6V DC) : NOTE: Rechargeable Ni-Cd/Ni-MH batteries are optional but not supplied with the device.

2.2 Test sample Accessories

2.2.1 Battery Types

A commercially available 1.5V alkaline battery is used to power the RadioShack Corporation Handheld Transceiver Model: 21-1905. The maximum rated power is 2W ERP in the GMRS frequency band. SAR measurements were performed with a standard 1.5V alkaline battery.

2.2.2 Belt Clip

One type of plastic belt clip is sold with the device. The belt clip is fixed to the back of the device and provides a spacing of 18 mm between the device and flat phantom. This plastic belt-clip was attached to the device during testing in the Belt-Clip position.

2.2.3 Headset Output

The device has a headset output to which a supplied Hands free speaker/microphone was connected to the device during all testing in the belt-clip position. See following photograph.

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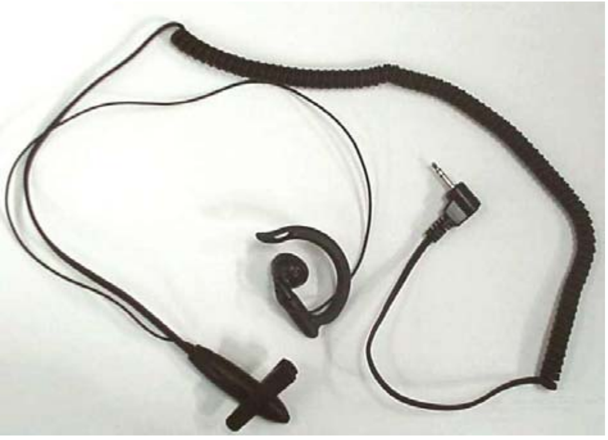
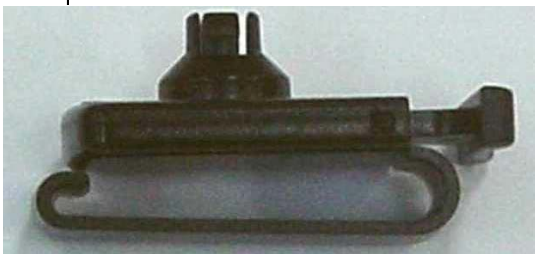
Photos of Accessories

Headset



Belt Clip



Belt Clip

2.3 Test Signal, Frequency and Output Power

The Handheld Transceiver had a total of 22 channels within the GMRS and FRS frequency bands. The frequency ranges of these modes are 462.550 MHz to 462.725 MHz and 467.5625MHz and 467.7125MHz respectively. For the SAR measurements the device was operating in VOX mode. An acoustic 1KHz sine wave was applied to the microphone input while the output of the device was monitored during all testing to ensure that it operated in continuous mode. The fixed frequency channels used in the testing are shown in Table 1. The frequency span of each Band was less than 10MHz consequently; the SAR levels of the test sample were measured for the centre channels of the GMRS and FRS frequency bands only. Excluding the speaker/microphone accessory there were no wires or other connections to the Handheld Transceiver during the SAR measurements.

On completion of the SAR tests the EUT was was modified to accept a standard RF connector at the RF output of the device. Circuit diagrams were supplied by ITS Hong Kong to enable these modifications to be undertaken. The conducted power of the device was subsequently measured with a calibrated Power Meter. The results of this measurement taken after batteries were fitted are listed in table 1.

Table 1: Frequency and Output Power

Channel	Channel Frequency MHz	Battery Type	Maximum Conducted Output Power Measured
GMRS Channel 4	462.6375	1.5V Duracell Alkaline	1.65W (32.17dBm)
FRS Channel 11	467.6375	1.5V Duracell Alkaline	0.180W (22.56dBm)

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2.4 Battery Status

The device battery was fully charged prior to commencement of measurement. Each SAR test was completed within 30 minutes. The battery condition was monitored by measuring the RF field at a defined position inside the phantom before the commencement of each test and again after the completion of the test. It was not possible to perform conducted power measurements at the output of the device, at the beginning and end of each scan due to lack of a suitable antenna port. The uncertainty associated with the power drift was less than 26% and was factored into the final SAR results.

Because of the power droop of this device, some additional tests were undertaken to ensure that the measured SAR levels were conservative. This testing used an external DC power supply to supplement the battery (6V) while shielded cables and ferrites were used on all wires connecting to the device. The results of these measurements are listed in section 8.0.

2.5 DETAILS OF TEST LABORATORY

2.5.1 Location

EMC Technologies Pty Ltd - ACN/ABN: 82057105549
57 Assembly Drive
Tullamarine, (Melbourne) Victoria
Australia 3043

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Facsimile: +61 3 9338 9260
email: melb@emctech.com.au
website: www.emctech.com.au

2.5.2 Accreditations

EMC Technologies Pty. Ltd. is accredited by the National Association of Testing Authorities, Australia (NATA). **NATA Accredited Laboratory Number: 5292**

EMC Technologies Pty Ltd is NATA accredited for the following standards:

AS/NZS 2772.1:	RF and microwave radiation hazard measurement
ACA:	Electromagnetic Radiation Human Exposure Standard
FCC:	Guidelines for Human Exposure to RF Electromagnetic Field
CENELEC:	ES59005

The scope of the NATA accreditation does not cover the SAR measurements in this report.

Refer to NATA website www.nata.asn.au for the full scope of accreditation.

2.5.3 Environmental Factors

The measurements were performed in a shielded room with no background network signals. The temperature in the laboratory was controlled to within 20.5±1.5 °C, the humidity was in the range 47% to 56%. The liquid parameters were measured daily prior to the commencement of each test. Tests were performed to check that reflections within the environment did not influence the SAR measurements. The noise floor of the DASY4 SAR measurement system using the SN1377 probe is less than 5μV in both air and liquid mediums.

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3.0 DESCRIPTION OF SAR MEASUREMENT SYSTEM

3.1 Probe Positioning System

The measurements were performed with the state of the art automated near-field scanning system **DASY4 V4.0 Build 51** from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision 6-axis robot (working range greater that 1.1m), which positions the SAR measurement probes with a positional repeatability of better than ±0.02 mm. The DASY4 fully complies with the OET65 C (01-01), IEEE 1528 and EN50361SAR measurement requirements.

3.2 E-Field Probe Type and Performance

The SAR measurements were conducted with the dosimetric probe ET3DV6 Serial: 1377 (manufactured by SPEAG) designed in the classical triangular configuration and optimised for dosimetric evaluation. The probe has been calibrated and found to be accurate to better than ±0.25 dB. The probe is suitable for measurements close to material discontinuity at the surface of the phantom. The sensors of the probe are directly loaded with Schottky diodes and connected via highly resistive lines (length = 300 mm) to the data acquisition unit.

3.3 Data Acquisition Electronics

The data acquisition electronics (DAE3) consists of 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. The input impedance of the DAE3 box is 200 MΩ; the inputs are symmetrical and floating. Common mode rejection is above 80dB.Transmission to the PC-card is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

The mechanical probe-mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

3.4 Calibration and Validation Procedures and Data

Prior to the SAR assessment, the system validation kit was used to verify that the DASY4 was operating within its specifications. The validation was performed at 450 MHz with the SPEAG D450V2 calibrated dipole.

The validation dipoles are highly symmetric and matched at the centre frequency for the specified liquid and distance to the phantom. The accurate distance between the liquid surface and the dipole centre is achieved with a distance holder that snaps onto the dipole.

System validation is performed by feeding a known power level into a reference dipole, set at a know distance from the phantom. The measured SAR is compared to the theoretically derived level.

3.4.1 Validation Results @ 450MHz

The following table lists the dielectric properties of the tissue simulating liquid measured prior to each SAR validation. The results of the validation for each day are listed in columns 4 and 5. The forward power into the reference dipole for each SAR validation was adjusted to 100mW.

Table 2: Validation Results (Dipole: SPEAG D450V2 SN: 1009)

1. Validation Date	2. $\in r$ (measured)	3. σ (mho/m) (measured)	4. Measured SAR 1g (mW/g)	5. Measured SAR 10g (mW/g)
29th April 2003	42.5	0.86	0.534	0.345
30th April 2003	42.2	0.84	0.533	0.346
1st May 2003	42.3	0.83	0.468	0.311

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3.4.2 Deviation from reference validation values

The reference SAR values are derived using a reference dipole and flat phantom suitable for a centre frequency of 450MHz. These reference SAR values are obtained from the IEEE Std 1528-200X and are normalized to 1W.

The SPEAG calibration reference SAR value is the SAR validation result obtained in a specific dielectric liquid using the validation dipole (D450V2) during calibration. The measured one-gram SAR should be within 10% of the expected target reference values shown in table 3 below.

Table 3: Deviation from reference validation values

Frequency and Date	Measured SAR 1g (mW/g)	Measured SAR 1g (Normalized to 1W)	SPEAG Calibration reference SAR Value 1g (mW/g)	Deviation From SPEAG (1g)	IEEE Std 1528 reference SAR value 1g (mW/g)	Deviation From IEEE (1g)
29th April 2003	0.534	5.34	4.97	7%	4.9	9%
30th April 2003	0.533	5.33	4.97	7%	4.9	9%
1st May 2003	0.468	4.68	4.97	-6%	4.9	-4%

NOTE: All reference validation values are referenced to 1W input power.

3.4.3 Liquid Depth 15cm

During the SAR measurement process the liquid level was maintained to a level of a least 15cm with a tolerance of ± 0.2cm. The following photo shows the depth of the liquid maintained during the testing.

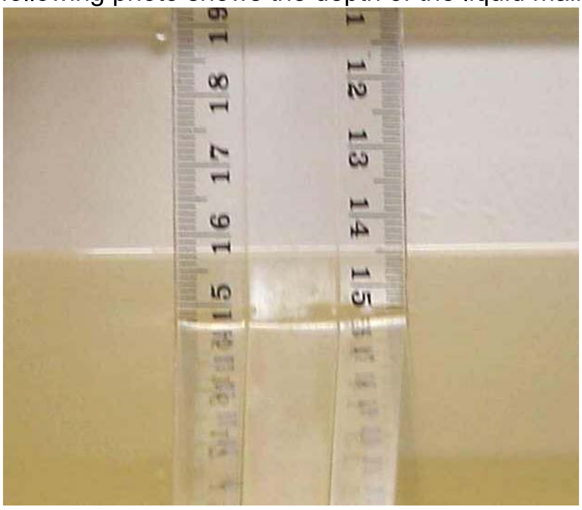

Photo of liquid Depth in Flat Phantom

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3.5 Phantom Properties (Size, Shape, Shell Thickness)

The phantom used during the validations was the “Flat Phantom” model: PO1A V4.4e from SPEAG. It is a strictly validation phantom with a single thickness of 6mm and was filled with the required tissue simulating liquid. The flat phantom support structures were all non-metallic and spaced more than one device width away in transverse directions.

For SAR testing in the body worn positions an AndreT phantom was used. The phantom thickness is 2.0mm+/-0.2 mm and the phantom was filled with the required tissue simulating liquid. Table 4 provides a summary of the measured phantom properties. *Refer to Appendix D Part 4, for details of SAM phantom thickness tolerance, corresponding dielectric properties, and loss tangent*.

Table 4: Phantom Properties (300MHz-2500MHz)

Phantom Properties	Requirement for specific EUT	Measured
Depth of Phantom	>150mm	200mm
Width of flat section	>13cm (Twice EUT Width)	320mm
Length of flat section	>36cm (Twice EUT Length)	870mm
Thickness of flat section	2.0mm ±0.2mm (flat section)	2.08 – 2.20mm
Dielectric Constant	<5.0	4.603 @ 300MHz (worst-case frequency)
Loss Tangent	<0.05	0.0379 @ 2500MHz (worst-case frequency)

Photo 1: AndreT 2mm Flat Phantom

Photo 2: AndreT 2mm Flat Phantom

3.6 Tissue Material Properties

The dielectric parameters of the brain simulating liquid were measured prior to SAR assessment using the HP85070A dielectric probe kit and HP8714B Network Analyser. The actual dielectric parameters are shown in the following table.

Table 5: Measured Brain Simulating Liquid Dielectric Values

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
463 MHz Brain	41.9	43.5 ±5% (41.3 to 45.6)	0.85	0.87 ±5% (0.83 to 0.91)	1000
468 MHz Brain	41.9	43.5 ±5% (41.3 to 45.6)	0.84	0.87 ±5% (0.83 to 0.91)	1000

Table 6: Measured Body Simulating Liquid Dielectric Values

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
463 MHz Muscle	54.9	56.7 ±5% (53.9 to 59.5)	0.93	0.94 ±5% (0.89 to 0.98)	1000
468 MHz Muscle	54.8	56.7 ±5% (53.9 to 59.5)	0.94	0.94 ±5% (0.89 to 0.98)	1000

NOTE: The brain and muscle liquid parameters were within the required tolerances of ±5%.

3.6.1 Liquid Temperature and Humidity

The humidity and dielectric/ambient temperatures are recorded during the assessment of the tissue material dielectric parameters. The difference between the ambient temperature of the liquid during the dielectric measurement and the temperature during tests was less than |2|°C.

Table 7: Temperature and Humidity recorded for each day

Date	Ambient Temperature (°C)	Liquid Temperature (°C)	Humidity (%)
29th April 2003	21.6	21.2	56
30th April 2003	19.8	19.6	50
1st May 2003	19.8	19.5	47

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3.7 Simulated Tissue Composition Used for SAR Test

The tissue simulating liquids are created prior to the SAR evaluation and often require slight modification each day to obtain the correct dielectric parameters.

Table 8: Tissue Type: Brain @ 450MHz
Volume of Liquid: 60 Litres

Approximate Composition	% By Weight
Distilled Water	38.56
Salt	3.95
Sugar	56.32
HEC	0.98
Bactericide	0.19

Table 9: Tissue Type: Muscle @ 450MHz
Volume of Liquid: 60 Litres

Approximate Composition	% By Weight
Distilled Water	51.16
Salt	1.49
Sugar	46.78
HEC	0.52
Bactericide	0.05

*Refer "OET Bulletin 65 97/01 P38"

3.8 Device Holder for DASY4

The DASY4 device holder supplied by SPEAG 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 rotation centres for both scales is the ear opening. Thus the device needs no repositioning when changing the angles.

The DASY4 device holder is made of low-loss material having the following dielectric parameters: relative permittivity ε=3 and loss tangent δ=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, to reduce the influence on the clamp on the test results.

A foam spacer is used to raise the device above the clamp of the device holder to minimise any affect on the radiation characteristics of the device. In cases where foam is not used the device is mounted so that the antenna is unobstructed.

Refer to Appendix A2 for photograph of device positioning.

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4.0 SAR MEASUREMENT PROCEDURE USING DASY4

The SAR evaluation was performed with the SPEAG DASY4 system. A summary of the procedure follows:

a) A measurement of the SAR value at a fixed location is used as a reference value for assessing the power drop of the EUT. The SAR at this point is measured at the start of the test and then again at the end of the test.

b) The SAR distribution at the exposed side of the head *or* the flat section of the flat phantom is measured at a distance of 3.9 mm from the inner surface of the shell. The area covers the entire dimension of the head and the horizontal grid spacing is 20 mm x 20 mm. The actual Area Scan has dimensions of 150mm x 300mm surrounding the test device. Based on this data, the area of the maximum absorption is determined by Spline interpolation.

c) Around this point, a volume of 30 mm x 30 mm x 30 mm is assessed by measuring 7 x 7 x 7 points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:

   (i) The data at the surface are extrapolated, since the centre of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation is based on a least square algorithm. A polynomial of the fourth order is calculated through the points in z-axes. This polynomial is then used to evaluate the points between the surface and the probe tip.

   (ii) The maximum interpolated value is searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g and 10 g) are computed using the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one-dimensional splines with the “Not a knot”- condition (in x, y and z-direction). The volume is integrated with the trapezoidal – algorithm. One thousand points (10 x 10 x 10) are interpolated to calculate the averages.

   (iii) All neighbouring volumes are evaluated until no neighbouring volume with a higher average value is found.

   (iv) The SAR value at the same location as in Step (a) is again measured

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5.0 MEASUREMENT UNCERTAINTY

The uncertainty analysis is based on the template listed in the IEEE Std 1528-200X for both Handset SAR tests and Validation uncertainty. The measurement uncertainty of a specific device is evaluated independently and the total uncertainty for both evaluations (95% confidence level) must be less than 30%.

Table 10: Uncertainty Budget for DASY4 Version V4.1 Build 33 – EUT SAR test

a	b	c	d	e= f(d,k)	f	g	h=cxf/e	i=cxg/e	k
Uncertainty Component	Sec.	Tol. (%)	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i (%)	10g u_i (%)	v_i
Measurement System									
Probe Calibration (k=1) (numerical calibration)	E.2.1	4.4	N	1	1	1	4.4	4.4	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	0	R	1.73	0.707	0.707	0.0	0.0	∞
Boundary Effect	E.2.3	8.8	R	1.73	1	1	5.1	5.1	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	1	N	1	1	1	1.0	1.0	∞
Response Time	E.2.7	0	R	1.73	1	1	0.0	0.0	∞
Integration Time	E.2.8	0	R	1.73	1	1	0.0	0.0	∞
RF Ambient Conditions	E.6.1	0.05	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	2.9	R	1.73	1	1	1.7	1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	3.9	R	1.73	1	1	2.3	2.3	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6	N	1	1	1	6.0	6.0	11
Device Holder Uncertainty	E.4.1	3.1	N	1	1	1	3.1	3.1	7
Output Power Variation – SAR Drift Measurement	6.6.2	11	R	1.73	1	1	6.4	6.4	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity – Deviation from target values	E.3.2	5	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity – Measurement uncertainty	E.3.3	10	N	1	0.64	0.43	6.4	4.3	5
Liquid Permittivity – Deviation from target values	E.3.2	5	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity – Measurement uncertainty	E.3.3	5	N	1	0.6	0.49	3.0	2.5	5
Combined standard Uncertainty			RSS				±14.6	±13.6	154
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				±29.2	±27.19	

Estimated total measurement uncertainty for the DASY4 measurement system was ±14.6%. The extended uncertainty (K = 2) was assessed to be ±29.2% based on 95% confidence level. The uncertainty is not added to the measurement result. The uncertainty due to device power drift (up to 26%) was factored into the final SAR values.

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Table 11: Uncertainty Budget for DASY4 Version V4.0 Build 51 - Validation

a	b	c	d	e= f(d,k)	f	g	h=cxf/e	i=cxg/e	k
Uncertainty Component	Sec.	Tol. (± %)	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i (± %)	10g u_i (± %)	v_i
Measurement System									
Probe Calibration (k=1) (standard calibration)	E.2.1	4.4	N	1	1	1	4.4	4.4	∞
Axial Isotropy	E.2.2	4.7	R	1.73	1	1	2.7	2.7	∞
Hemispherical Isotropy	E.2.2	0	R	1.73	1	1	0.0	0.0	∞
Boundary Effect	E.2.3	8.3	R	1.73	1	1	4.8	4.8	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	1	N	1	1	1	1.0	1.0	∞
Response Time	E.2.7	0	R	1.73	1	1	0.0	0.0	∞
Integration Time	E.2.8	0	R	1.73	1	1	0.0	0.0	∞
RF Ambient Conditions	E.6.1	0.05	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	2.9	R	1.73	1	1	1.7	1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	3.9	R	1.73	1	1	2.3	2.3	∞
Test Sample Related									
Test Sample Positioning		1	R	1.73	1	1	0.6	0.6	∞
Device Holder Uncertainty		4.7	R	1.73	1	1	2.7	2.7	∞
Output Power Variation – SAR Drift Measurement									
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity – Deviation from target values	E.3.2	5	R	1.73	0.6	0.43	1.7	1.2	∞
Liquid Conductivity – Measurement uncertainty	E.3.3	10	N	1.73	0.6	0.43	3.5	2.5	5
Liquid Permittivity – Deviation from target values	E.3.2	5	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity – Measurement uncertainty	E.3.3	5	N	1.73	0.6	0.49	1.7	1.4	5
Combined standard Uncertainty			RSS				10.0	9.5	154
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				20.0	19.1	

Estimated total measurement uncertainty for the DASY4 measurement system was ±10.0%. The extended uncertainty (K = 2) was assessed to be ±20.0% based on 95% confidence level. The uncertainty is not added to the Validation measurement result.

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6.0 EQUIPMENT LIST AND CALIBRATION DETAILS

Table 12: SPEAG DASY4 Version 4.0 Build 51

Equipment Type	Manufacturer	Model Number	Serial Number	Calibration Due	Used For this Test?
Robot - Six Axes	Staubli	RX90BL	N/A	Not applicable	Yes
Robot Remote Control	SPEAG	CS7MB	RX90B	Not applicable	Yes
SAM Phantom	SPEAG	N/A	1260	Not applicable	No
SAM Phantom	SPEAG	N/A	1060	Not applicable	No
Flat Phantom	AndreT	PL870	011	Not Applicable	Yes
Flat Phantom	SPEAG	PO1A V4.4e 6mm	1003	Not Applicable	Yes
Data Acquisition Electronics	SPEAG	DAE3 V1	359	27-Aug-2003	No
Data Acquisition Electronics	SPEAG	DAE3 V1	442	Oct – 03	Yes
Probe E-Field - Dummy	SPEAG	DP1	N/A	Not applicable	No
Probe E-Field	SPEAG	ETDV6	1380	9-Nov-2003	No
Probe E-Field	SPEAG	ET3DV6	1377	6–Sept-03	Yes
Antenna Dipole 450 MHz	SPEAG	D450V2	1009	24-Jan-05	Yes
Antenna Dipole 900 MHz	SPEAG	D900V2	047	27-Aug-2004	No
Antenna Dipole 1800 MHz	SPEAG	D1800V2	242	28-Aug-2004	No
Antenna Dipole 2450 MHz	SPEAG	D2450V2	724	9-Nov-2004	No
RF Amplifier	Mini-Circuits	ZHL-42	N/A	Not applicable	Yes
Synthesized signal generator	Hewlett Packard	ESG-D3000A	GB37420238	In test	Yes
RF Power Meter Dual	Hewlett Packard	437B	3125012786	23-May-03	Yes
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481H	1545A01634	23-May-03	Yes
RF Power Meter Dual	Gigatronics	8542B	1830125	10-Sept-03	Yes
RF Power Sensor	Gigatronics	80301A	1828805	10-Sept-03	Yes
Network Analyser	Hewlett Packard	8714B	GB3510035	10-Sept-03	Yes
Dual Directional Coupler	NARDA	3022	75453	In test	Yes
Spectrum Analyser 9 kHz - 22 GHz	Hewlett Packard	8593EM	3412A00105	23-May-03	Yes

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7.0 OET BULLETIN 65 – SUPPLEMENT C TEST METHOD

7.1 Description of the Test Positions (Belt Clip and In front of face)

SAR measurements were performed in the “Face Position” and “Belt Clip” position. Both the “Belt Clip” and “Face position” were measured in the flat section of the AndreT (PL870) phantom.
See Appendix A for photos of test positions.

7.1.1 “Belt Clip” Position

The device was tested in the 2.00mm flat section of the AndreT phantom for the “Belt Clip” position. A belt clip maintained a distance of approximately 18mm between the back of the device and the flat phantom. The Transceiver was placed at the flat section of the phantom and suspended until the Belt Clip touched the phantom. The belt clip was made of plastic and the device was connected with the hands free earpiece/microphone.

7.1.2 “Face Position”

The SAR evaluation was performed in the flat section of the AndreT phantom. The device was placed 25mm from the phantom, this position is equivalent to the device placed in front of the nose. The supporting hand was not used.

7.2 List of All Test Cases (Antenna In/Out, Test Frequencies, User Modes)

The device has a fixed antenna. The SAR was measured at three test channels with the test sample operating at maximum power, as specified in section 2.3.

7.3 FCC RF Exposure Limits for Occupational/ Controlled Exposure

Spatial Peak SAR Limits For:	
Partial-Body:	8.0 mW/g (averaged over any 1g cube of tissue)
Hands, Wrists, Feet and Ankles:	20.0 mW/g (averaged over 10g cube of tissue)

7.4 FCC RF Exposure Limits for Un-controlled/Non–occupational

Spatial Peak SAR Limits For:	
Partial-Body:	1.6 mW/g (averaged over any 1g cube of tissue)
Hands, Wrists, Feet and Ankles:	4.0 mW/g (averaged over 10g cube of tissue)

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8.0 SAR MEASUREMENT RESULTS

The SAR values averaged over 1 g and 10 g tissue masses were determined for the sample device for the Face and Belt-Clip configurations of the phantom. All SAR values are scaled up by the measured drift (column 8) and extrapolated to account for the PTT time averaged duty cycle of 50%.

Table 13: SAR MEASUREMENT RESULTS– Face and Belt-Clip positions

1. Test Position	2. Plot No.	3. Test Channel	4. Test Freq (MHz)	5. Device Power Source (6V)	6. Measured 1g SAR Results (mW/g)	7. Extrapolated SAR *Column 7 = [Column 6 * InvLog (|Column 8|/10)]/2*	8. Measured Drift (dB)
Belt Clip Position	1	04	462.637	Batteries Only	1.87	1.18	-1.0
Belt Clip Position	2	04	462.637	DC Power Supply	1.93	1.11	-0.6
Belt Clip Position	3	11	467.637	Batteries Only	0.297	0.15	0.08
Face Position	4	04	462.637	Batteries Only	1.80	1.08	-0.80
Face Position	6	11	467.637	Batteries Only	0.228	0.12	-0.10

NOTE: The measurement uncertainty was at times greater than 30% due to the high SAR power drift of the device. To provide a conservative estimate of SAR the uncertainty due to the power drift was factored into the final SAR results above. A drift of 1.0dB corresponds to 26% in percentage terms.

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10.0 COMPLIANCE STATEMENT

The RadioShack Corporation Model 21-1905 FCC ID: AAO2101905 GMRS and FRS band Handheld Transceiver was found to comply with the FCC SAR requirements.

After extrapolating to a 50% duty cycle and scaling the SAR values by the measured power droop the highest SAR level recorded was 1.18 mW/g for a 1g cube. This value was measured on channel 04 in the “Belt-Clip” position without a DC power supply supplementing the 6.0V battery. This was below the uncontrolled limit of 1.6 mW/g, even taking into account the uncertainty due to power drift variation.

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APPENDIX A1
TEST SAMPLE PHOTOGRAPHS

RadioShack Corporation
Model: 21-1905

Alkaline Battery

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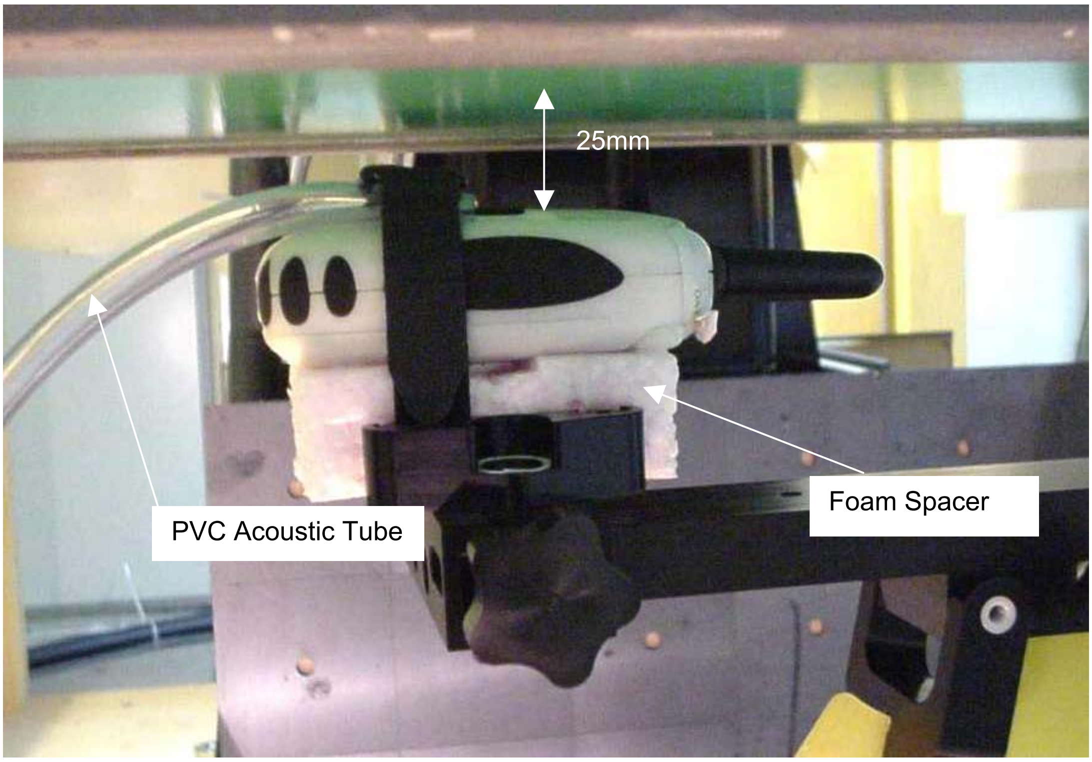
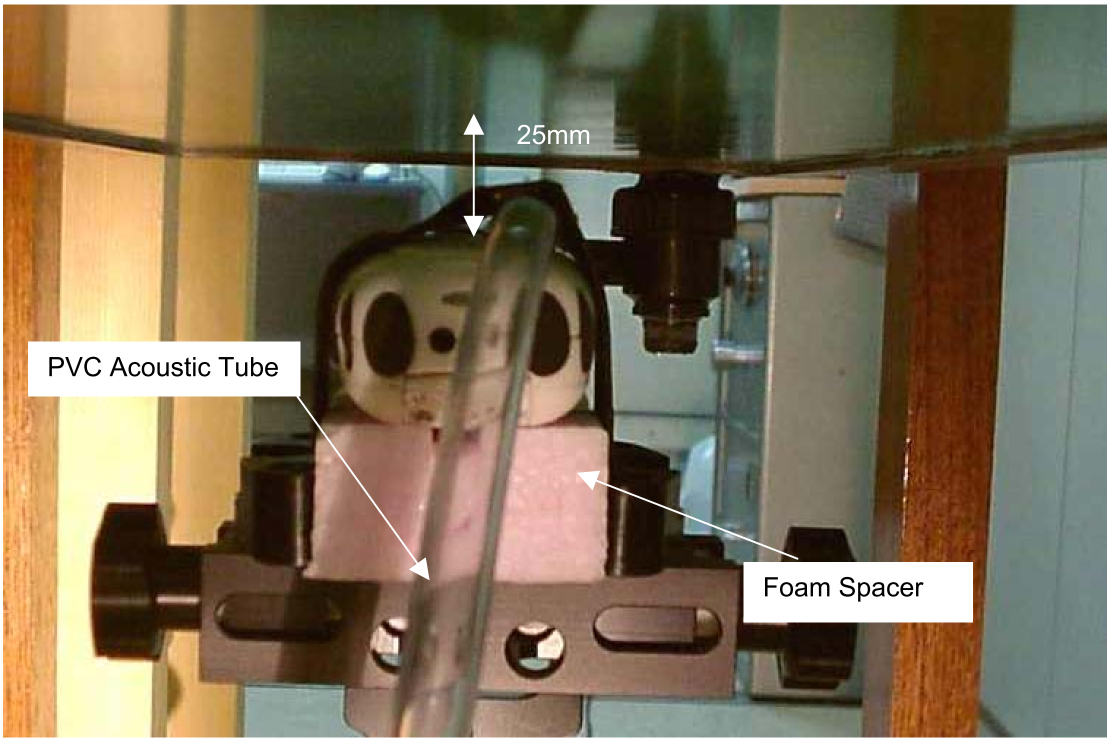
APPENDIX A2
TEST SETUP PHOTOGRAPHS

Face Position



Face Position



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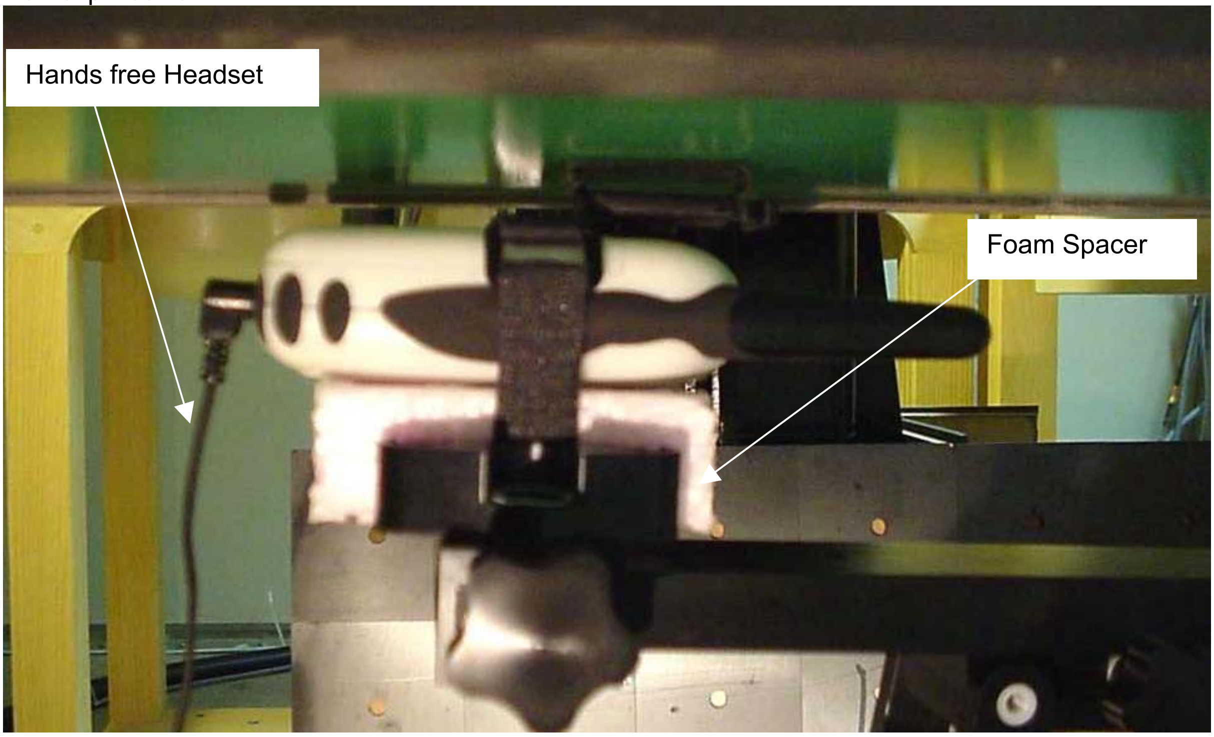
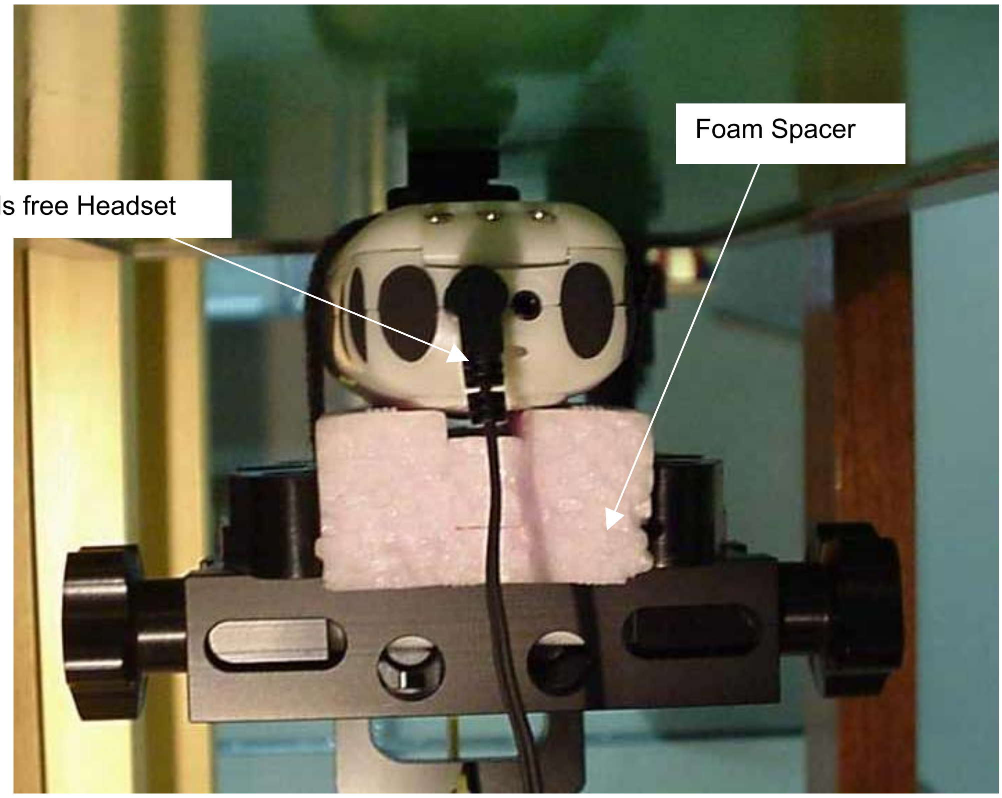
APPENDIX A3
TEST SET UP PHOTOGRAPHS

Belt Clip Position



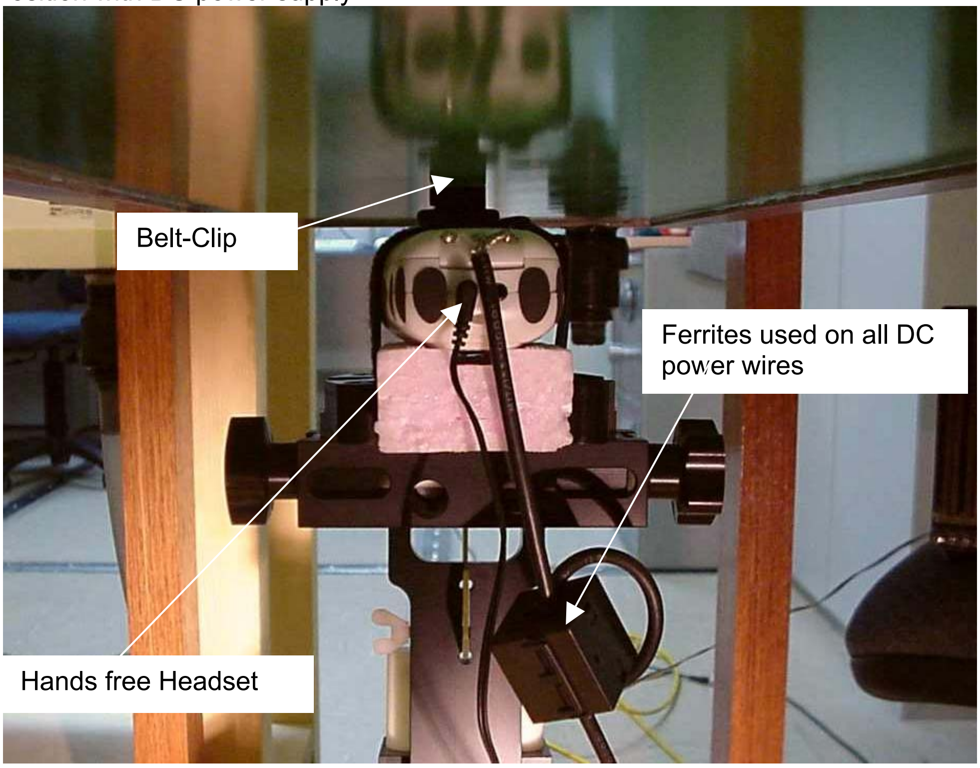
Belt Clip Position



APPENDIX A4
TEST SET UP PHOTOGRAPHS

Belt Clip Position with DC power supply

Belt Clip Position with DC power supply



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