

**EMC Technologies Pty Ltd**

A.C.N. 057 105 549

**57 Assembly Drive****Tullamarine Victoria Australia 3043****Ph: + 613 9335 3333****Fax: + 613 9338 9260**

email: melb@emctech.com.au

**SAR Test Report****Report Number: M040750**

**Test Sample:** Portable Transceiver  
**Model Number:** TPAH6A  
**Tested For:** Tait Electronics Ltd  
**FCC ID:** **CASTPAH6A**

**Date of Issue:** 1<sup>st</sup> September 2004

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**SAR EVALUATION**  
**Portable Transceiver**  
**Model: TPAH6A**  
**Report Number: M040750**

## 1.0 GENERAL INFORMATION

**Test Sample:** Two-way Radio  
**Device Category:** Portable Transmitter  
**Test Device:** Production Unit  
**Model Number:** TPAH6A  
**RF exposure Category:** Occupational/Controlled Exposure  
**Manufacturer:** Tait Electronics  
**Address:** 555 Wairakei Rd, Christchurch New Zealand

**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)

**Test Dates:** 9<sup>th</sup> – 12<sup>th</sup> August 2004  
**Tested for:** Tait Electronics Ltd  
**Address:** 555 Wairakei Rd, Christchurch New Zealand  
**Contact:** Bruce Jensen  
**Telephone:** +64 3 357 0810  
**E-mail:** [bruce.jensen@tait.co.nz](mailto:bruce.jensen@tait.co.nz)

**Test Officer:**



**Peter Jakubiec**  
Assoc Dip Elec Eng

**Authorised Signature:**



**Aaron Sargent B.Eng**  
EMR Engineer



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## 2.0 DESCRIPTION OF DEVICE

### 2.1 Description of Test Sample

The device tested was a Tait Portable Transceiver operating in 450 MHz frequency band. It has external fixed length antennas and was tested in the Face Frontal 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	: FM
Antenna type	: Helical
Applicable Head Configurations	: Face Frontal
Applicable Body Configurations	: Belt Clip Position

### 2.2 Test sample Accessories

#### 2.2.1 Battery Types

A single type of battery pack is used to power the Tait Portable Transceiver Model: TPAH6A.

#### 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 15 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 Antenna Types

Antenna Type	Abbreviation	Frequency Range
Wideband	WB	450-520MHz
Narrowband 1	NB1	435-470MHz
Narrowband 2	NB2	470-520MHz



### 2.3 Test Signal, Frequency and Output Power

The Portable Transceiver operates in the 450-520 MHz frequency band. The transmitter was configured into a test mode that ensured a continuous RF transmission for the duration of each SAR scan. The device transmission characteristics were also monitored during testing to confirm the device was transmitting continuously. 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. Excluding the speaker/microphone accessory there were no wires or other connections to the Handheld Transceiver during the SAR measurements.

#### Photos of Accessories

Headset



Belt Clip



The conducted power of the device was measured with a calibrated Power Meter. The results of this measurement are listed in table 1.

Table 1: Frequency and Output Power

Channel	Channel Frequency MHz	Battery Type	Maximum Conducted Output Power dBm
1	450	Standard	35.7
2	485	Standard	36.4
3	520	Standard	35.7

### 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 conducted RF at the antenna port before the commencement of each test and again after the completion of the test.



## 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

**Telephone:** +61 3 9335 3333  
**Facsimile:** +61 3 9338 9260  
**email:** [melb@emctech.com.au](mailto:melb@emctech.com.au)  
**website:** [www.emctech.com.au](http://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:

<b>AS/NZS 2772.1:</b>	RF and microwave radiation hazard measurement
<b>ACA:</b>	Radio communications (Electromagnetic Radiation - Human Exposure) Standard 2003
<b>FCC:</b>	Guidelines for Human Exposure to RF Electromagnetic Field OET65C 01/01
<b>CENELEC:</b>	ES59005: 1998
<b>EN 50360: 2001</b>	Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)
<b>EN 50361: 2001</b>	Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300MHz – 3GHz)
<b>IEEE 1528: 2003</b>	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Measurement Techniques.

Refer to NATA website [www.nata.asn.au](http://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  $21 \pm 1$  °C, the humidity was 41 to 42 %. The liquid parameters were measured prior to the commencement of the tests. 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 Version V4.2 Build 37** from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision 6-axis robot (working range greater than 1.1m), which positions the SAR measurement probes with a positional repeatability of better than  $\pm 0.02$  mm. The DASY4 fully complies with the OET65 C (01-01), IEEE 1528 and EN50361 SAR 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  $\pm 0.25$  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  $200 \text{ M}\Omega$ ; 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 known distance from the phantom. The measured SAR is compared to the theoretically derived level.

##### 3.4.1 Validation Results @ 450 MHz

The following table lists the dielectric properties of the tissue simulating liquid measured prior to SAR validation. The results of the validation are listed in columns 4 and 5. The forward power into the reference dipole for each SAR validation was adjusted to 250mW.

**Table 2: Validation Results (Dipole: SPEAG D450V2 SN: 1507)**

1. Validation Date	2. $\epsilon_r$ (measured)	3. $\sigma$ (mho/m) (measured)	4. Measured SAR 1g (mW/g)	5. Measured SAR 10g (mW/g)
10 <sup>th</sup> Aug 2004	42.1	0.84	1.34	0.862
11 <sup>th</sup> Aug 2004	42.9	0.86	1.33	0.861
12 <sup>th</sup> Aug 2004	43.2	0.85	1.29	0.837



### 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 450 MHz. These reference SAR values are obtained from the IEEE Std 1528-2003 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**

Date	Measured SAR 1g (mW/g)	Measured SAR 1g (Normalized to 1W)	SPEAG Calibration reference SAR Value 1g (mW/g)	Deviation From SPEAG (%)	IEEE Std 1528 reference SAR value 1g (mW/g)	Deviation From IEEE (%)
10 <sup>th</sup> Aug 2004	1.34	5.36	4.97	7.8	4.9	9.4
11 <sup>th</sup> Aug 2004	1.33	5.32	4.97	7.0	4.9	8.6
12 <sup>th</sup> Aug 2004	1.29	5.16	4.97	3.8	4.9	5.3

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 15cm with a tolerance of  $\pm 0.5$ cm. The following photo shows the depth of the liquid maintained during the testing.

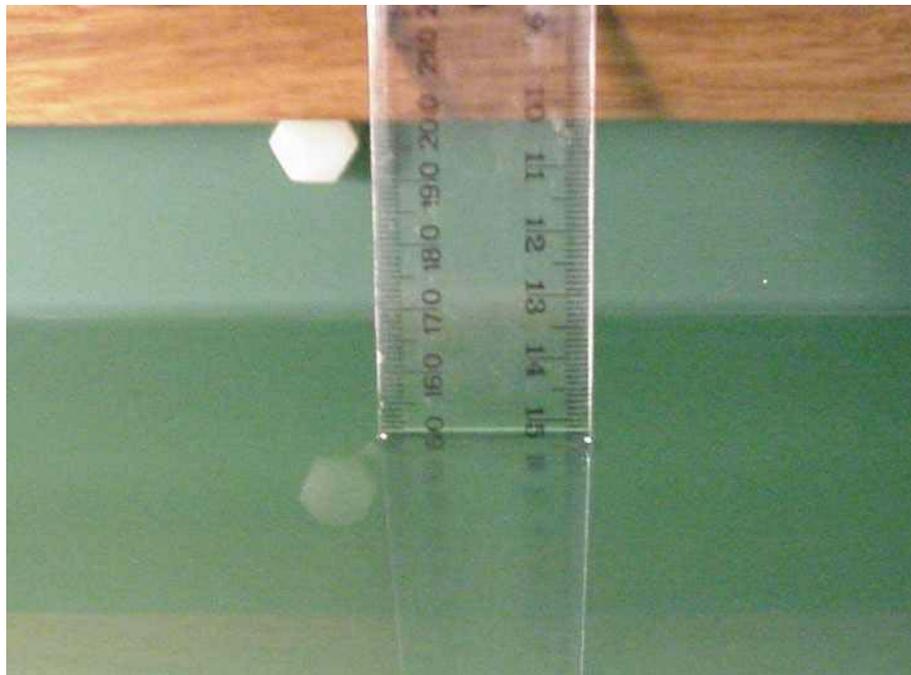


Photo of liquid Depth in Flat Phantom



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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.

All SAR testing was performed in the AndreT Flat Phantom V10.1. 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

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

Phantom Properties	Requirement for specific EUT	Measured
Depth of Phantom		200mm
Width of flat section		540mm
Length of flat section		620mm
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: Flat\_Phantom V10.1 2mm**



### 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	$\epsilon_r$ (measured range)	$\epsilon_r$ (target)	$\sigma$ (mho/m) (measured range)	$\sigma$ (target)	$\rho$ kg/m <sup>3</sup>
450MHz	43.2	43.5 $\pm$ 5% (41.33 to 45.7)	0.85	0.87 $\pm$ 5% (0.74 to 0.82)	1000
485MHz	42.7	43.4 $\pm$ 5% (41.2 to 45.6)	0.87	0.87 $\pm$ 5% (0.74 to 0.82)	1000
520MHz	41.5	43.2 $\pm$ 5% (41.0 to 45.4)	0.89	0.88 $\pm$ 5% (0.74 to 0.82)	1000

**Table 6: Measured Body Simulating Liquid Dielectric Values**

Frequency Band	$\epsilon_r$ (measured range)	$\epsilon_r$ (target)	$\sigma$ (mho/m) (measured range)	$\sigma$ (target)	$\rho$ kg/m <sup>3</sup>
450MHz	55.9-56.2	56.7 $\pm$ 5% (53.9 to 59.5)	0.89	0.94 $\pm$ 5% (0.89 to 0.99)	1000
485MHz	55.3-55.6	56.6 $\pm$ 5% (53.8 to 59.4)	0.92	0.94 $\pm$ 5% (0.89 to 0.99)	1000
520MHz	54.7-56.2	56.5 $\pm$ 5% (53.7 to 59.3)	0.90-0.95	0.95 $\pm$ 5% (0.90 to 1.00)	1000

NOTE: The brain and muscle liquid parameters were within the required tolerances of  $\pm$ 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  $|2|^\circ\text{C}$ .

**Table 7: Temperature and Humidity recorded for each day**

Date	Ambient Temperature ( $^\circ\text{C}$ )	Liquid Temperature ( $^\circ\text{C}$ )	Humidity (%)
10 <sup>th</sup> Aug 2004	20.0	19.4	41
11 <sup>th</sup> Aug 2004	20.3	19.7	42
12 <sup>th</sup> Aug 2004	20.5	20.0	41

### 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



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### 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  $\epsilon=3$  and loss tangent  $\delta=0.02$ . 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.

Refer to Appendix A2-A3 for photographs of device positioning

## 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 conducted power value at the antenna port is used as a reference value for assessing the power drop of the EUT. Also a measurement of the SAR value at a fixed location is used. The power 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 81mm x 181mm surrounding the test device hot spot location. Based on this data, the area of the maximum absorption is determined by Spline interpolation. A pre-scan is performed for each phantom configuration to ensure that entire hot spot is identified.
- 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 1.3 mm. The extrapolation is based on a least square algorithm. A polynomial of the fourth order is calculated through the points in z-axis. 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



## 5.0 MEASUREMENT UNCERTAINTY

The uncertainty analysis is based on the template listed in the IEEE Std 1528-2003 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 V4.2 Build 37 – 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 <sub>i</sub> (1g)	C <sub>i</sub> (10g)	1g u <sub>i</sub> (%)	10g u <sub>i</sub> (%)	v <sub>i</sub>
<b>Measurement System</b>									
Probe Calibration (k=1) (standard calibration)	E.2.1	4.8	N	1	1	1	4.8	4.8	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	1	R	1.73	1	1	0.6	0.6	∞
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	0.8	R	1.73	1	1	0.5	0.5	∞
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	1	R	1.73	1	1	0.6	0.6	∞
<b>Test Sample Related</b>									
Test Sample Positioning	E.4.2	2.9	N	1	1	1	2.9	2.9	11
Device Holder Uncertainty	E.4.1	3.6	N	1	1	1	3.6	3.6	7
Output Power Variation – SAR Drift Measurement	6.6.2	12	R	1.73	1	1	6.9	6.9	∞
<b>Phantom and Tissue Parameters</b>									
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	4.3	R	1.73	0.64	0.43	1.6	1.1	∞
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	4.3	R	1.73	0.6	0.49	1.5	1.2	∞
Liquid Permittivity – Measurement uncertainty	E.3.3	5	N	1	0.6	0.49	3.0	2.5	5
Combined standard Uncertainty			RSS				13.6	12.5	154
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				27.1	25.01	

Estimated total measurement uncertainty for the DASY4 measurement system was  $\pm 13.6$ . The extended uncertainty (K = 2) was assessed to be  $\pm 27.1$  based on 95% confidence level. The uncertainty is not added to the measurement result.



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**Table 10: Uncertainty Budget for DASY4 Version V4.2 Build 37 - Validation**

a	b	c	d	e= f(d,k)	f	g	h=cxf/e	i=cxg/e	k
Uncertainty Component	Sec.	Tol. (6%)	Prob. Dist.	Div.	C <sub>i</sub> (1g)	C <sub>i</sub> (10g)	1g u <sub>i</sub> (6%)	10g u <sub>i</sub> (6%)	v <sub>i</sub>
<b>Measurement System</b>									
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	∞
<b>Test Sample Related</b>									
Dipole axis to liquid		1	R	1.73	1	1	0.6	0.6	∞
Input power and SAR drift measurement		4.7	R	1.73	1	1	2.7	2.7	∞
<b>Phantom and Tissue Parameters</b>									
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 13: SPEAG DASY4 Version V4.2 Build 37**

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	Yes
Flat Phantom	AndreT	10.1	P 10.1	Not Applicable	Yes
Flat Phantom	AndreT	9.1	P 9.1	Not Applicable	No
Flat Phantom	SPEAG	PO1A 6mm	1003	Not Applicable	No
Data Acquisition Electronics	SPEAG	DAE3 V1	359	09-July-2005	No
Data Acquisition Electronics	SPEAG	DAE3 V1	442	09-Sept - 04	Yes
Probe E-Field - Dummy	SPEAG	DP1	N/A	Not applicable	No
Probe E-Field	SPEAG	ET3DV6	1380	14-July-2005	No
Probe E-Field	SPEAG	ET3DV6	1377	19-Sept - 04	Yes
Probe E-Field	SPEAG	ES3DV6	3029	23-Sept - 04	No
Antenna Dipole 300 MHz	SPEAG	D300V2	1005	27- Nov-2005	No
Antenna Dipole 450 MHz	SPEAG	D450V2	1009	24-Jan-05	Yes
Antenna Dipole 900 MHz	SPEAG	D900V2	047	12-July-2006	No
Antenna Dipole 1640 MHz	SPEAG	D1640V2	314	25-May-2006	No
Antenna Dipole 1800 MHz	SPEAG	D1800V2	242	13-July-2006	No
Antenna Dipole 2450 MHz	SPEAG	D2450V2	724	9-Nov-2004	No
Antenna Dipole 5600 MHz	SPEAG	D5GHzV2	1008	05-Oct-2005	No
RF Amplifier	EIN	603L	N/A	In test	Yes
RF Amplifier	Mini-Circuits	ZHL-42	N/A	In test	Yes
RF Amplifier	Mini-Circuits	ZVE-8G	N/A	In test	Yes
Synthesized signal generator	Hewlett Packard	ESG-D3000A	GB37420238	*Not Required	Yes
RF Power Meter Dual	Hewlett Packard	437B	3125012786	26-May-05	Yes
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481H	1545A01634	27-May-05	Yes
RF Power Meter Dual	Gigatronics	8542B	1830125	15-Jan-05	Yes
RF Power Sensor	Gigatronics	80301A	1828805	15-Jan-05	Yes
RF Power Meter Dual	Hewlett Packard	435A	1733A05847	*Not Required	Yes



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## 7.0 SAR TEST METHOD

### 7.1 Description of the Test Positions (Face Frontal and Belt Clip)

SAR measurements were performed in the “Face Frontal” and “Belt Clip” positions. Both the “Face Frontal” and “Belt Clip” positions were measured in the flat section of the AndreT 10.1 phantom. See Appendix A for photos of test positions.

#### 7.1.1 “Face Frontal 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.

#### 7.1.2 “Belt Clip” Position

The device was tested in the (2.00 mm) flat section of the AndreT phantom for the “Belt Clip” position. A belt clip maintained a distance of approximately 15mm 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. This position was also performed with the following accessories attached to the device:

1. Leather pouch
2. Speaker Microphone

*NOTE: See appendix A for photos of test positions.*

### 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)



## 8.0 SAR MEASUREMENT RESULTS

The SAR values averaged over 1 g tissue mass were determined for the sample device for the Face Frontal and Belt Clip configurations of the phantom.

**Table 14: SAR MEASUREMENT RESULTS– Face Frontal and Belt Clip positions**

1. Test Position	2. Plot No.	3. Ant	4. Test Channel	5. Test Freq (MHz)	6. Measured 1g SAR Results (mW/g)	7. Measured 1g SAR Results 50% Duty Cycle (mW/g)	8. Measured Drift (dB)
Belt-Clip	1	WB	1	450	2.65	1.33	-0.34
	2	WB	2	485	4.83	2.42	-0.40
	3	WB	3	520	2.00	1.00	-0.45
	4	NB1	1	450	3.51	1.76	-0.30
	5	NB2	2	485	3.01	1.51	-0.40
Pouch Belt-Clip	6	WB	1	450	1.48	0.74	-0.10
	7	WB	2	485	1.64	0.82	-0.20
	8	WB	3	520	0.91	0.46	-0.40
	9	NB1	1	450	1.45	0.73	-0.40
	10	NB2	2	485	1.09	0.55	-0.30
Belt-Clip with Speaker Microphone	11	WB	1	450	4.13	2.07	-0.30
	12	WB	2	485	7.74	3.87	-0.20
	13	WB	3	520	8.05	4.03	-0.40
	14	NB1	1	450	5.91	2.96	-0.00
	15	NB2	2	485	4.61	2.31	-0.30
Face Frontal	16	WB	1	450	4.52	2.26	-0.10
	17	WB	2	485	4.74	2.37	-0.20
	18	WB	3	520	1.30	0.65	-0.40
	19	NB1	1	450	3.68	1.84	-0.20
	20	NB2	2	485	3.58	1.79	-0.40
Face Frontal With speaker Microphone	21	WB	1	450	2.38	1.19	-0.20
	22	WB	2	485	4.58	2.29	-0.40
	23	WB	3	520	6.05	3.03	-0.30
	24	NB1	1	450	2.71	1.36	-0.10
	25	NB2	2	485	3.71	1.86	-0.10

Note: The uncertainty of the system ( $\pm 27.1\%$ ) has not been added to the results.

The FCC SAR limit for Non-occupational exposure is 1.6 m W/g measurement in a 1g cube of tissue.



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## 9.0 COMPLIANCE STATEMENT

The Tait Model TPAH6A 450MHz FCC ID: CASTPAH6A Portable Transceiver was found to comply with the FCC SAR requirements.

After extrapolating to a 50% duty cycle the highest SAR level recorded was 4.03 mW/g for a 1g cube. This value was measured in the "Belt-Clip with speaker microphone" position, and was below the controlled limit of 8.0 mW/g, and also below the controlled limit of 8.0 mW/g, even taking into account the measurement uncertainty of 27.1%.



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### APPENDIX A1 TEST SAMPLE PHOTOGRAPHS

Battery



Battery



TPAH6A



TPAH6A

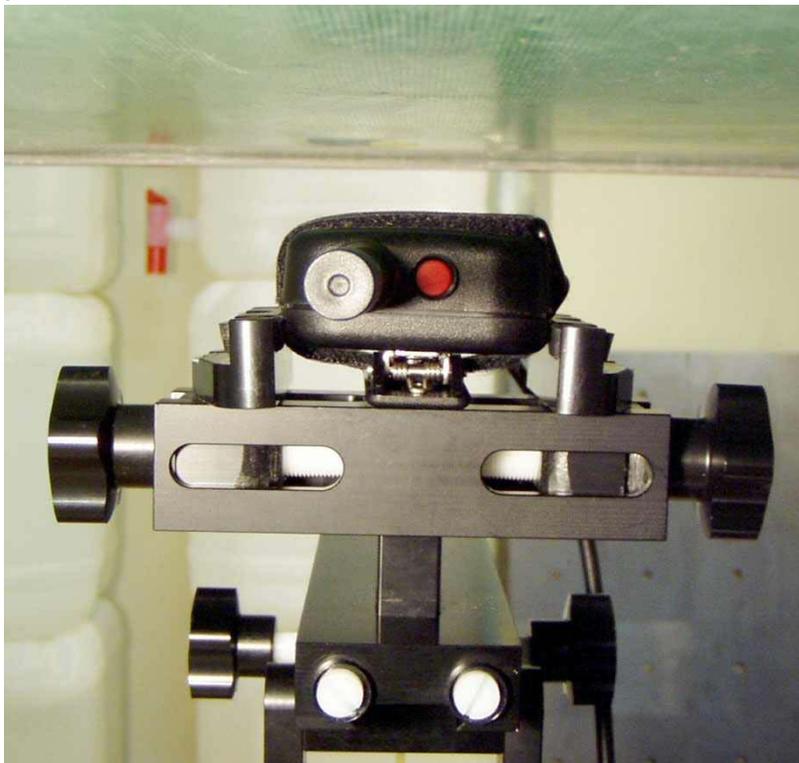


## APPENDIX A2 TEST SETUP PHOTOGRAPHS

Face Frontal Position



Belt Clip Position



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### APPENDIX A3 TEST SET UP PHOTOGRAPHS

Belt-Clip Position with holster

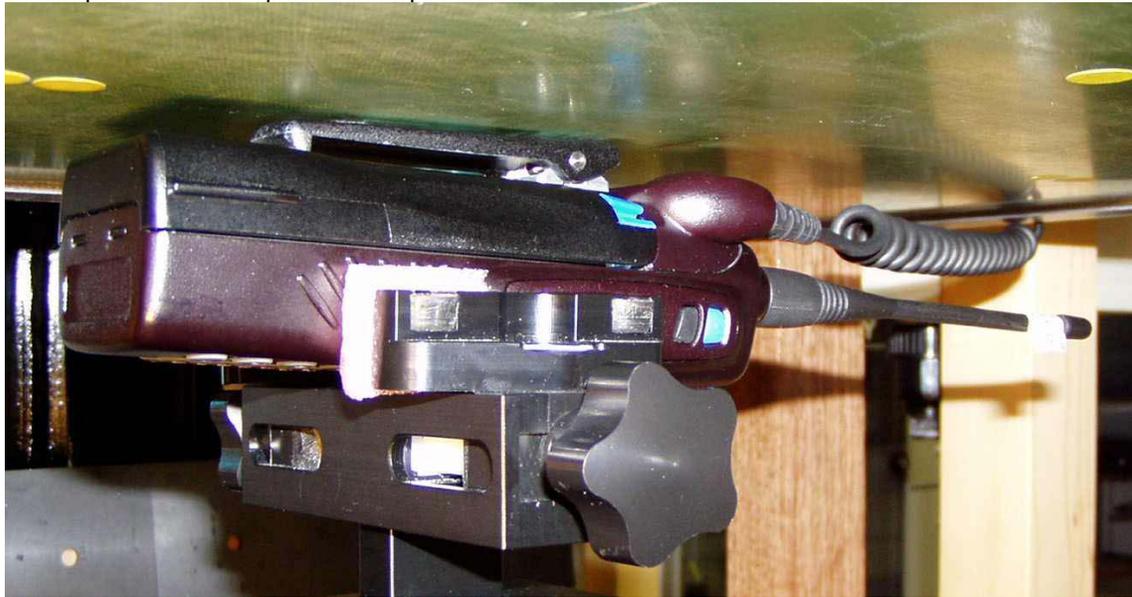


Belt Clip Position with holster



## APPENDIX A4 TEST SET UP PHOTOGRAPHS

Belt-Clip Position with speaker microphone



Belt-Clip position with speaker microphone

