Hearing Aid Compatibility RF Emissions Test Report

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Statement of Compliance: RIM Testing Services (RTS) declares that the product was tested in accordance with the appropriate measurement standards, guidelines and recommended practices.

This wireless portable device has been shown to be in compliance with FCC 20.19 (10-1-04 Edition), Hearing Aid-Compatible Mobile Handsets.

Tested and documented by:	Signatures	Date
Daoud Attayi Compliance Specialist	Daoud Attayi	12-Sep-2005
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Approved by:		
Paul G. Cardinal, Ph.D. Manager, RIM Testing Services	Paul G Cardinal	05-August-2005

CONTENTS

1.0 Introduction

This test report documents the measurement of the near electric and magnetic fields generated by a wireless communication device in the region where a hearing aid would be used. The measurement procedures of ANSI C63.19-2001 were followed along with the guidance provided by the FCC at the May 2005 TCBC workshop with the document "Hearing Aid Compatibility: RF Emissions Measurements TCB Review Guidance, 12 May 2005".

The electric and magnetic fields from a wireless device are scanned using a SPEAG DASY4 automated system with HAC extension and free-space probes (ER3DVx and H3DVx) in a 5cm x 5cm area, 10mm above the wireless device's acoustic output. The area is divided into 9 sub-grids and the maximum values of the electrical and a magnetic field scans are evaluated automatically according to the rules defined in the standard and the device is assigned a certain category. Should the wireless device's maximum T-Coil output occur in a location other than the centre of acoustic output, then the RF field scans are repeated with the measurement area centered on the maximum T-Coil output.

The DASY4 HAC Extension consists of the following parts: the Test Arch phantom, three validation dipoles, dipole and DUT holders, magnetic and electric field probes and DASY4 software. The field probes and measurement electronics are described in Annex B.1.

The specially designed Test Arch allows high precision positioning of both the device and any of the validation dipoles. The broadband dipoles are calibrated at a single frequency and are used for system performance checks.

In order to correlate the usability of a hearing aid with a wireless device (WD), the WD's radio frequency (RF) and audio band emissions are measured. ANSI C63.19 requires:

? Radio frequency (RF) measurements of the near-field electric and magnetic fields emitted by a WD in the vicinity of the audio output to categorize these emissions for correlation with the RF immunity of the microphone mode of operation of a hearing aid.
? Audio frequency magnetic field measurements of a WD emitted in the vicinity of the audio output to categorize these emissions for correlation with the T-Coil mode of operation of a hearing aid.

Hence, the following measurements are made for the WDs:
1. RF E-Field emissions.
2. RF H-Field emissions.
3. T-Coil mode, magnetic signal strength in the audio band.
4. T-Coil mode, magnetic signal and noise articulation index.
5. T-Coil mode, magnetic signal frequency response through the audio band.

2.0 Applicable standards

[1] ANSI C63.19-2001, Rev. 3.6 (which will become ANSI C63.19-2005), American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids.

[2] FCC 47CFR § 20.19 (10-1-04 Edition), Hearing Aid-Compatible Mobile Handsets.

3.0 Equipment unit tested

3.1 Picture of Handheld

Figure 1. BlackBerry Wireless Handheld

3.2 Handheld description

Handheld Model	RAP31GW	
FCC ID	L6ARAP31GW	
Serial Number / PIN Number	202E0FD4 (LCD 1), 202EC585 (LCD 2)	
Prototype or Production Unit	Production	
Mode(s) of Operation in North America	GSM 1900	Bluetooth*
Transmitting Frequency Ranges	1850.2 – 1909.8 MHz	2402 – 2483MHz
Nominal maximum conducted RF Output Power**	29.00dBm	3.5dBm
Tolerance of Power Calibration	±0.56dBm	N/A
Duty Cycle	1:8	N/A

Table 1. Test device characterization

*For this product, a headset is the only Bluetooth application. Therefore, HAC RF emission testing is not applicable to Bluetooth.

**The measured conducted power presented in the EMC, SAR and HAC reports are within 0.20dB of each other. The differences are due to the use of different test equipment.

3.3 Batteries

1. BAT-03087-003
2. BAT-03487-002
3. BAT-06532-001

3.4 LCDs

1. LCD-05207-001
2. LCD-07301-001

3.5 Antenna description

Type	Internal Fixed Antenna
Location	Back side, centre
Configuration	Internal Fixed Antenna

Table 2. Antenna description

4.0 List of test equipment

Manufacturer	Test Equipment	Model Number	Serial Number	Calibration Due Date
Schmid & Partner Engineering AG	Data Acquisition Electronics (DAE3)	DAE3 V1	472	03-Jan-2006
Schmid & Partner Engineering AG	3-Dimensional E-Field Probe for Near-Field	ER3DV6	2286	07-Jan-2006
Schmid & Partner Engineering AG	3-Dimensional H-Field Probe for Near-Field	H3DV6	6105	10-Dec-2005
Wavetek	Communications Test Instrument	4400M	0511 057	03-Mar-2006
Hewlett Packard	Arbitrary Waveform Generator	33120A	US34007079	12-Jul-2006
TEM Consulting, LP	T-Coil radial / axial probe	SBI 1092	N/A	04-Nov-2005
Agilent	Multimeter	34401A	US36042322	15-July-2006
Agilent	Signal Generator	8648C	4037U03155	01-Aug-2005
Agilent	Signal Generator	E4433B	US38440672	27-July-2006
Agilent	Spectrum Analyzer	8563E	3745A08112	13-July-2006
Giga-tronics	Power Meter	8541C	1837762	03-Dec-2005
Giga-tronics	Power Sensor	80401A	1835838	03-Dec-2005
Schmid & Partner Engineering AG	Validation Dipole	CD 1880 V3	1008	23-Feb-2006

Table 3. List of test equipment

5.0 Measurement procedures

5.1 System Validation

The test setup should be validated when first configured and verified periodically thereafter to ensure proper function. The procedure consists of two parts: dipole validation and determination of probe modulation factor.

5.1.1 Dipole Validation

The HAC validation dipole antenna serves as a known source for an electrical and magnetic RF output. Figure 2 shows the setup used for the dipole validation.

1. The dipole antenna was placed in the position normally occupied by the WD.
2. The dipole was energized with a 20 dBm un-modulated continuous-wave signal.
3. The length of the dipole was scanned with both E-field and H-field probes and the maximum value for each scan was recorded.
4. The readings were compared with the probe manufacturer's and were found to agree within the allowed tolerance of 10%. Please refer to Annex A.3 for Dipole Validation Plots.

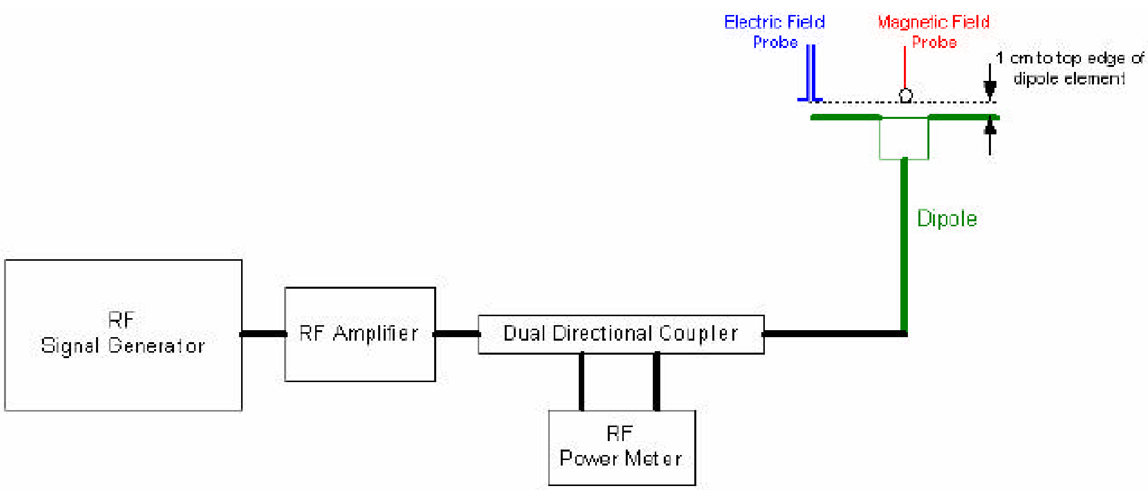


Figure 2: Dipole Validation Procedure

5.1.2 RF Field Probe Modulation Factor

The Probe Modulation Factor (PMF) characterizes the responses of the E-field and H-field probes and their instrumentation chain to a modulated signal. The PMF is the ratio of the responses to fields produced by CW and modulated signals having equal peak amplitude.

The PMF was calculated for the following signals: 80% AM and the modulated signal produced by the WD. The PMF measurement was performed with the field probe and instrumentation that will be used together during RF emissions measurements. Once calculated, the PMF was entered into the DASY software and applied to the measured modulated fields of the specified signal type.

ANSI C63.19 outlines the following procedure as one method for determining probe modulation factor:

1. Fix the probe in a set location relative to a field-generating device, such as a reference dipole antenna.
2. Illuminate the probe with a CW signal at the intended measurement frequency.
3. Record the reading of the probe measurement system of the CW signal.
4. Determine the level of the CW signal being used to drive the field-generating device.
5. Substitute a signal using the same modulation as that used by the intended WD for the CW signal and measure Peak Envelope Power using Spectrum Analyzer with 0Hz span.
6. Set the peak amplitude during transmission of the modulated signal to equal the amplitude of the CW signal.
7. Record the reading of the probe measurement system of the modulated signal.
8. The ratio of the CW to modulated signal reading is the modulation factor.

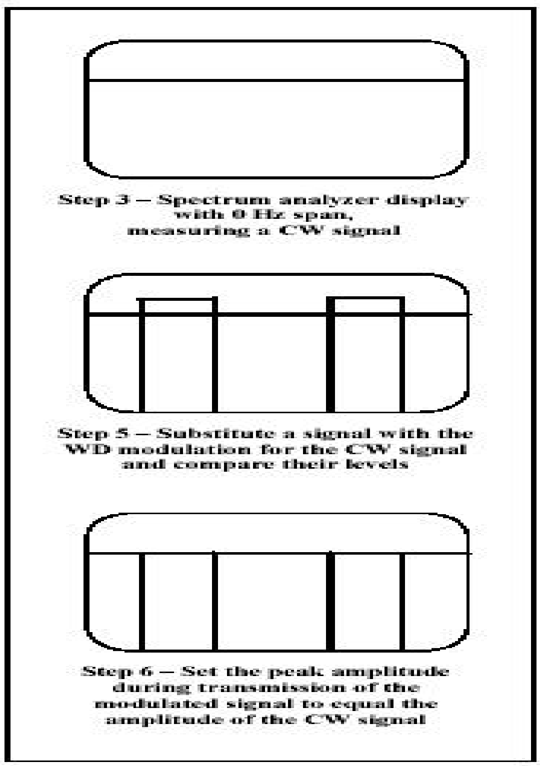


Figure 3: **Setting the RF levels for the probe modulation response procedure. Adjusting the amplitude of the WD-type signal to match the CW signal**

Please refer to Annex A.2 for 0 Hz-span spectrum analyzer plots.
Please refer to Annex A.3 for probe modulation factor measurement plots.

Power measurements were made with a power meter. The purpose of the 0 Hz-span plots is to demonstrate the type of waveform used.

The results of the dipole validation and probe modulation factor measurements are shown in Table 4. An Agilent E4433B signal generator was used to generate all signals.

f (MHz)	Signal Type	Average Power (dBm)	Peak Envelop Power (dBm)	Measured E-Field (V/m)	Target E-Field (V/m)	Mod. Factor Ratio	Delta (%)
813.5	CW	20.0	20.0	131.7	135.4	-	-2.7
813.5	80 % AM	14.8	20.0	81.8	74.4*	1.61	+9.9
813.5	GSM	10.8	20.0	46.6	47.0*	2.826	-0.8
f (MHz)	**Signal Type**	**Average Power (dBm)**	**Peak Envelop Power (dBm)**	**Measured H-Field (A/m)**	**Target H-Field (A/m)**	**Mod. Factor Ratio**	**Delta (%)**
813.5	CW	20.0	20.0	0.401	0.444	-	-9.7
813.5	80 % AM	14.8	20.0	0.260	0.244*	1.54	+6.6
813.5	GSM	10.8	20.0	0.159	0.154*	2.522	+3.2

Table 4: Dipole Validation and Modulation Factors

*Not an official target value. Neither ANSI C63.19 nor the probe manufacturer give target values for AM and WD signals. The only available target values are for 20dBm CW signals.
Therefore, from the ratio of average input powers, the modulation factor target was determined for AM and WD signals. The target value for CW was divided by the theoretical linear modulation factor to find target values for AM and WD signals. Please note that C63.19 requires values to be within 25% of their targets.

5.1.2.1 Calculation of Modulation Factor and Crest Factor:

1) Modulation Factor = Measured E or H-Field (CW) / Measured E or H-Field (Modulated)

E-Field Probe Modulation Factor for GSM1900 = 131.7 / 46.6 = 2.826
H-Field Probe Modulation Factor for GSM1900 = 0.401 / 0.159 =2.522

2) Crest Factor = $(\text{Modulation Factor})^2$

DASY4 calculates peak fields by multiplying the average field by the PMF. DASY4 derives the PMF by taking the square root of the crest factor entered by the user.

E-Field Probe Crest Factor for GSM1900 = $(2.826)^2$ = 7.99
H-Field Probe Crest Factor for GSM1900 = $(2.522)^2$ = 6.36

5.3 Near-Field RF Emission

The following procedure was used to measure RF near E-field and H-field emissions:

1. Proper operation of the field probe, probe measurement system, other instrumentation, and the positioning system was confirmed.
2. The WD was oriented in its intended test position with the reference plane in the horizontal plane (see Figure 4), and was secured in the device holder to maintain position accuracy.
3. A Wavetek 4400M Communications Test Instrument was used to place a voice call to the WD on the desired channel. The test instrument's Power Control Level was set to 0, commanding the WD to transmit at full power (30dBm nominal). Other settings include: Channel type = full rate, Discontinuous transmission off.
4. The DASY4 system measures power drift as part of each scan. If the power during a scan drifted by more than 0.25dB, the scan was repeated. Power drift measurements for the worst-case scans are included in Annex A.4. A fully charged battery was used for each test.
5. The 5cm x 5cm measurement grid was centered on the center of the acoustic output or the T-Coil output, as appropriate. The field probe was located at the initial position at the center of the measurement grid.
6. A surface verification was performed before each setup change to ensure repeatable spacing and proper maintenance of the measurement plane.
7. The electric field probe, and separately the magnetic field probe, were used to measure the highest field strength in the 5cm x 5cm reference plane.
8. The entire 5cm x 5cm region was scanned with a 5mm step size. The reading was recorded at each measurement location. Justification of the step size and interpolation used is provided at the end of Annex A.3.
9. Around the center sub-grid, five contiguous sub-grids were identified with the lowest maximum field strength readings. Please note that a maximum of five sub-grids can be excluded for both E- and H-field measurements.
10. The highest field reading was identified within the non-excluded sub-grids
11. The highest field reading was converted from average to peak V/m or A/m, as appropriate. This conversion was done by multiplying by the probe modulation factor. In the plots, DASY4 refers to the average readings as "Time averaged" and the peak values as "Slot averaged".
12. In the worst-case configuration, the probe was rotated 360° about the azimuth axis at the location of the highest field strength in the included blocks. The peak reading from this rotation was recorded and the maximum field was recalculated.
13. The highest peak reading was compared to the categories defined in C63.19 using the appropriate AWF (see Tables 5 and 6 in this report).

- If a WD has more than one antenna position, it is necessary to test the WD only in the condition of maximum antenna efficiency, i.e. antenna extended.
- The WD's backlight shuts off automatically a short time after a call is established.

Table 5 shows the ANSI C63.19 M-rating categories for Wireless Device RF emissions. Table 6 outlines the Articulation Weighting Factors for various cellular technologies.

Category	Telephone RF Parameters				
Near Field	AWF	E-Field Emissions (Peak)		H-Field Emissions (Peak)	
Category M1	0	199.5 – 354.8	V/m	0.60 – 1.07	A/m
	-5	149.6 – 266.1	V/m	0.45 – 0.80	A/m
Category M2	0	112.2 – 199.5	V/m	0.34 – 0.60	A/m
	-5	84.1 – 149.6	V/m	0.25 – 0.45	A/m
Category M3	0	63.1 – 112.2	V/m	0.19 – 0.34	A/m
	-5	47.3 – 84.1	V/m	0.14 – 0.25	A/m
Category M4	0	<63.1	V/m	<0.19	A/m
	-5	<47.3	V/m	<0.14	A/m

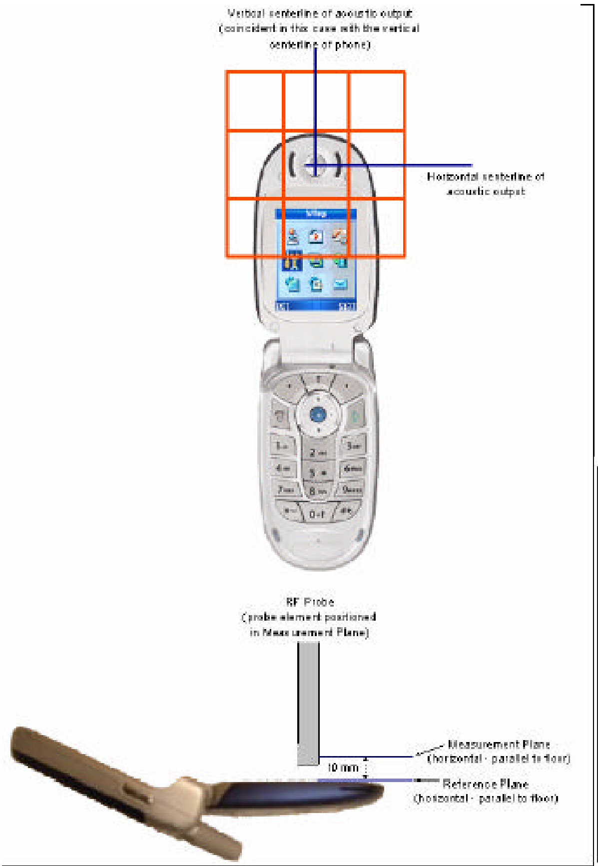
Category	Telephone RF Parameters				
Near Field	AWF	E-Field Emissions (Peak)		H-Field Emissions (Peak)	
Category M1	0	46 – 51	dB (V/m)	-4.4 – 0.6	dB (A/m)
	-5	43.5 – 48.5	dB (V/m)	-6.9 – -1.9	dB (A/m)
Category M2	0	41 – 46	dB (V/m)	-9.4 – -4.4	dB (A/m)
	-5	38.5 – 43.5	dB (V/m)	-11.9 – -6.9	dB (A/m)
Category M3	0	36 – 41	dB (V/m)	-14.4 – -9.4	dB (A/m)
	-5	33.5 – 38.5	dB (V/m)	-16.9 – -11.9	dB (A/m)
Category M4	0	<36	dB (V/m)	<-14.4	dB (A/m)
	-5	<33.5	dB (V/m)	<-16.9	dB (A/m)

Table 5: Wireless Device near-field categories

Standard	Technology	AWF (dB)
TIA/EIA/IS-2000	CDMA	0
TIA/EIA-136	TDMA (50 Hz)	0
J-STD-007	GSM (217)	-5
T1/T1P1/3GPP	UMTS (WCDMA)	0
iDEN™	TDMA (22 and 11 Hz)	0

Table 6: Articulation Weighting Factor (AWF)

Figures 4 and 5 show the orientation of the WD in the reference plane.



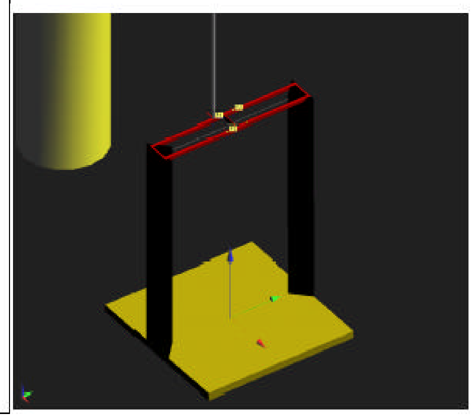


Figure 4: WD reference plane for RF emission measurements **Figure 5: HAC Phantom/Test Arch**

5.4 Wireless Device Audio Band Magnetic Signal Test

- The Audio Band Magnetic (ABM) test run for this report was solely for the purpose of locating the centre of the T-Coil output, not to determine if the WD is in compliance with the T-Coil requirements of ANSI C63.19.

The Audio Band Magnetic Field or T-Coil output of a wireless device is measured using an EM Scan automated system from TEM Consulting. This consists of a Magnetic Field T-Coil Axial Probe, Sound Level Meter, Voltmeter and accompanying software. The scan is performed in a 5cm x 5cm area, 10mm above the acoustic output (see Figure 7). The location of the maximum field strength is referred to as the centre of the T-Coil.

The measurement shall not include undesired properties from the WD's RF field. By replacing the antenna with a coaxial cable providing a conducted connection, undesired RF emissions from the WD's transmitter can be excluded.

ANSI C63.19 describes the procedure as follows:

1. Position the WD in the test setup and connect the WD RF connector to a base station simulator or a non-radiating load.
2. Set the reference drive level for the system with the maximum volume control setting or as specified by the manufacturer. The drive level is set such that the reference input level is input to the base station simulator (or manufacturer's test mode equivalent) in the 1 kHz, 1/3 octave band. This drive level shall be used for the audio band signal test (ABM1 at ***f***). Either a sine wave at 1025 Hz or a voice-like signal shall be used for the reference audio signal. If interference is found at 1025 Hz an alternate reference audio signal frequency may be used. The same drive level will be used for the ABM1 frequency response measurements at each 1/3-octave band center frequency.

The following reference input levels that correlate to a normal speech input level shall be used for the standard transmission protocols.

STANDARD	TECHNOLOGY	INPUT (dBm0)
IS-95	CDMA	-18 dBm0
IS-136	TDMA (50 Hz)	-18 dBm0
J-STD-007	GSM (217 Hz)	-16 dBm0
iDEN	TDMA (22 and 11 Hz)	-18 dBm0

Table 7 – Reference input level for normal speech input level

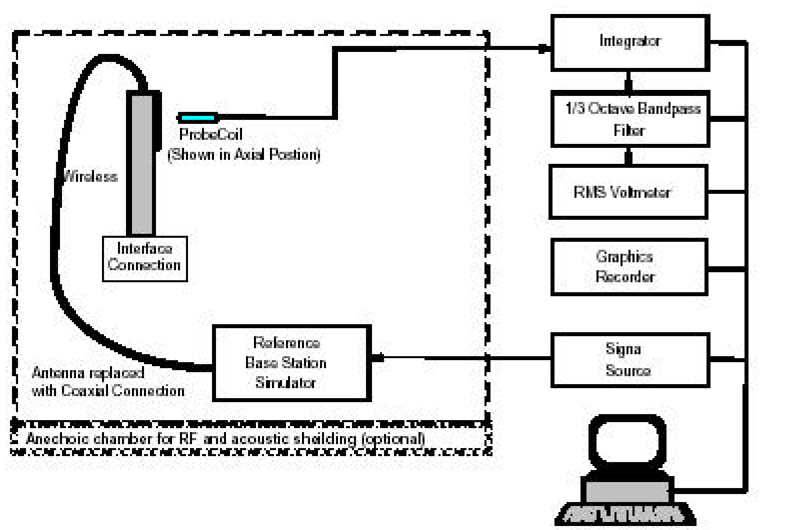


Figure 6: Magnetic field measurement test setup – in call method

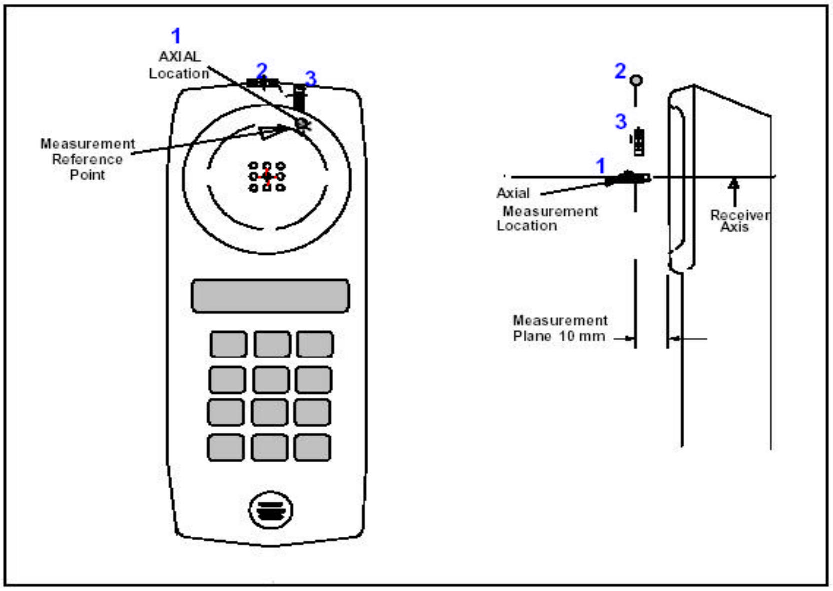


Figure 7: Axis & planes for WD audio frequency magnetic field measurements

6.0 Summary of results

Table 8 shows the results of the RF near-field emissions tests.

Wireless Device: BlackBerry Wireless Handheld - Model: RAP31GW RF Emissions Test							
E-field							
Mode	**f (MHz)**	**Cond. Power (dBm)**	**Peak E-Field (V/m)**	**Peak E-Field after 360° Rotation* (V/m)**	**Center at mid Speaker or T-Coil**	**Batt #, LCD**	**M-Rating**
GSM 1900	1850.2	29.2	75.2	-	Speaker	1, 1	3
	1880.0	29.1	78.0	-	Speaker	1, 1	3
	1909.8	28.6	57.9	-	Speaker	1, 1	3
	1850.2	-	78.3	-	T-Coil	1, 1	3
	1880.0	-	79.7	81.6	T-Coil	1, 1	3
	1909.8	-	31.4	-	T-Coil	1, 1	3
	1880.0	-	78.6	-	T-Coil	2, 1	3
	1880.0	-	74.6	-	T-Coil	3, 1	3
	1880.0	-	76.3	-	T-Coil	1, 2	3
H-Field							
Mode	**f (MHz)**	**Cond. Power (dBm)**	**Peak H-Field (A/m)**	**Peak H-Field after 360° Rotation* (A/m)**	**Center at mid Speaker or T-Coil**	**Batt #, LCD**	**M-Rating**
GSM 1900	1850.2	-	0.230	-	Speaker	1, 1	3
	1880.0	-	0.217	-	Speaker	1, 1	3
	1909.8	-	0.161	-	Speaker	1, 1	3
	1850.2	-	0.233	0.242	T-Coil	1, 1	3
	1880.0	-	0.223	-	T-Coil	1, 1	3
	1909.8	-	0.179	-	T-Coil	1, 1	3
	1850.2	-	0.227	-	T-Coil	2, 1	3
	1850.2	-	0.227	-	T-Coil	3, 1	3
	1850.2	-	0.218	-	T-Coil	1, 2	3
Overall M-Rating:							**M3**

Table 8 – Data Summary

*In accordance with the TCB guidance, the probe was rotated 360° in the worst-case configuration. The rotation was performed at the location of maximum field strength in the included blocks. This location was found by exporting the data from the worst-case scan to a spreadsheet and finding the point of highest field strength in the non-excluded blocks. The robot then moved the probe to the coordinates of this point to do the rotation.

6.1 Conclusion

The RIM BlackBerry 7285 Wireless Handheld Model Number RAP31GW is categorized to be M3 based on RF performance in accordance with ANSI C63.19-2001, Rev. 3.6: American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids.

Therefore, the handheld is found to be in compliance with the requirements of FCC 20.19 (10-1-04 Edition) Hearing Aid-Compatible Mobile Handsets.

7.0 Measurement uncertainty

Table 9 outlines the measurement uncertainty for the SPEAG DASY4 measurement system.

HAC Uncertainty Budget
According to ANSI C63.19 [1]

Error Description	Uncertainty value	Prob. Dist.	Div.	(c_i) E	(c_i) H	Std. Unc. E	Std. Unc. H
Measurement System							
Probe Calibration	±5.1 %	N	1	1	1	±5.1 %	±5.1 %
Axial Isotropy	±4.7 %	R	$\sqrt{3}$	1	1	±2.7 %	±2.7 %
Sensor Displacement	±16.5 %	R	$\sqrt{3}$	1	0.145	±9.5 %	±1.4 %
Boundary Effects	±2.4 %	R	$\sqrt{3}$	1	1	±1.4 %	±1.4 %
Linearity	±4.7 %	R	$\sqrt{3}$	1	1	±2.7 %	±2.7 %
Scaling to Peak Envelope Power	±2.0 %	R	$\sqrt{3}$	1	1	±1.2 %	±1.2 %
System Detection Limit	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %
Readout Electronics	±0.3 %	N	1	1	1	±0.3 %	±0.3 %
Response Time	±0.8 %	R	$\sqrt{3}$	1	1	±0.5 %	±0.5 %
Integration Time	±2.6 %	R	$\sqrt{3}$	1	1	±1.5 %	±1.5 %
RF Ambient Conditions	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %
RF Reflections	±12.0 %	R	$\sqrt{3}$	1	1	±6.9 %	±6.9 %
Probe Positioner	±1.2 %	R	$\sqrt{3}$	1	0.67	±0.7 %	±0.5 %
Probe Positioning	±4.7 %	R	$\sqrt{3}$	1	0.67	±2.7 %	±1.8 %
Extrap. and Interpolation	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %
Test Sample Related							
Device Positioning Vertical	±4.7 %	R	$\sqrt{3}$	1	0.67	±2.7 %	±1.8 %
Device Positioning Lateral	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %
Device Holder and Phantom	±2.4 %	R	$\sqrt{3}$	1	1	±1.4 %	±1.4 %
Power Drift	±5.0 %	R	$\sqrt{3}$	1	1	±2.9 %	±2.9 %
Phantom and Setup Related							
Phantom Thickness	±2.4 %	R	$\sqrt{3}$	1	0.67	±1.4 %	±0.9 %
Combined Std. Uncertainty						±14.7 %	±10.9 %
Expanded Std. Uncertainty on Power						**±29.4 %**	**±21.8 %**
Expanded Std. Uncertainty on Field						**±14.7 %**	**±10.9 %**

Table 9. **Worst-Case uncertainty budget for HAC free field assessment according to ANSI C63.19.**

[1] The budget is valid for the frequency range 800 MHz - 3 GHz and represents a worst-case analysis.

7.1 Site-Specific Uncertainty

RF Reflections

Section 4.2 of ANSI C63.19 requires that any RF reflecting objects are a minimum distance of 2 wavelengths away from the WD under test. For this WD, the longest wavelength occurs when the WD is transmitting at 1850.2MHz. The wavelength is:

$$l = \frac{c}{f} = \frac{3.00 \cdot 10^{8}\, m/s}{1850.2MHz} = 0.162m$$

Therefore, 2 wavelengths result in a distance of 0.32m. Tests are performed in an RF shielded chamber. The distance to the nearest wall is >1m and the distance to the robot's safety guardrail is ~1.0m, both satisfying the requirement. In addition, RF absorbing cones are placed at the base of the robot to further reduce reflections. The HAC phantom arch is made of low dielectric constant plastic and should not be a source of reflections.

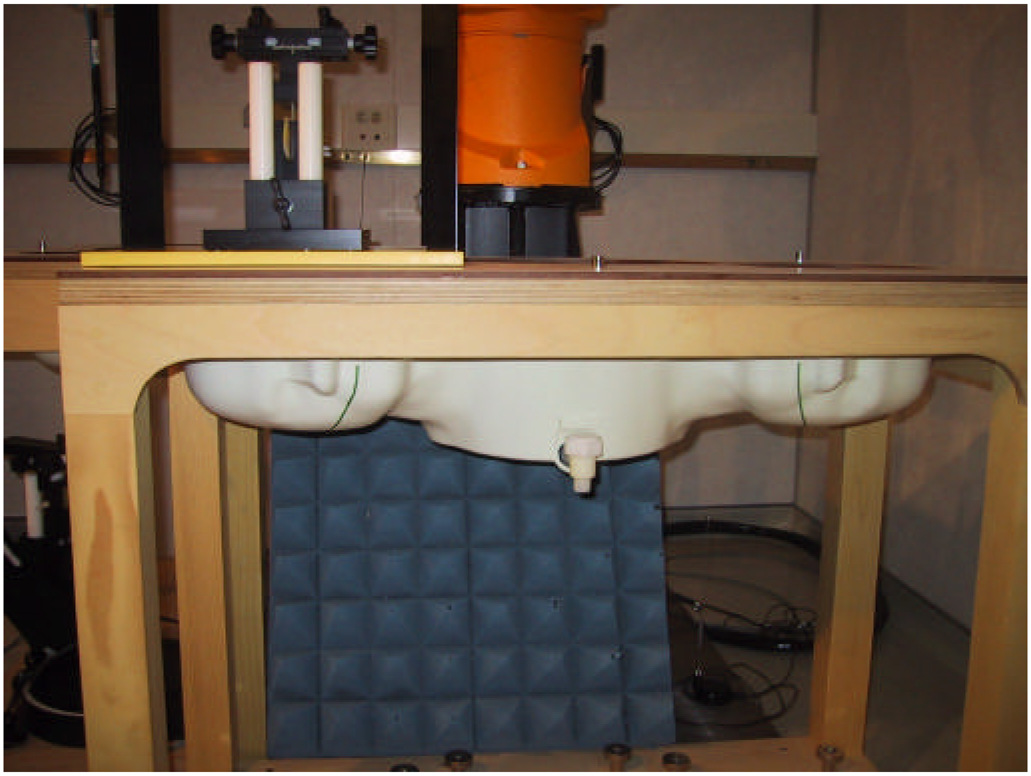


Figure 8: DASY4 system with absorbing material

Environmental Conditions

During measurements, the temperature of the test lab was kept between 21^{o}C and 25^{o}C and relative humidity was maintained between 30% and 40%.

Ambient Noise

C63.19 requires ambient noise to be at least 20dB below the measurement level. Scans of ambient fields were performed for verification. The ambient E-Field level was determined to be 3.03V/m and the ambient H-field level 0.001A/m. The ambient noise was determined to be more than ~32 dB below the dipole validation results with an input power of 20 dBm. Plots of ambient field scans follow.

Date/Time: 14/07/2005 11:22:49 AM　　　Page 1 of 2

Date/Time: 14/07/2005 11:22:49 AM

Lab: RIM Testing Services (RTS)

Ambient measurement_E-Field

DUT: HAC Dipole 1880 MHz; Type: CD1880V3

Communication System: CW; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: H Device Section

DASY4 Configuration:
- Probe: ER3DV6 - SN2285; ConvF(1, 1, 1); Calibrated: 10/12/2004
- Sensor-Surface: 0mm (Fix Surface)Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn472; Calibrated: 03/01/2005
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

E Scan 10mm above CD 1880 MHz/Hearing Aid Compatibility Test (5x19x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of Total (measured) = 1.43 V/m

E Scan 10mm above CD 1880 MHz/Hearing Aid Compatibility Test (41x181x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of Total field (slot averaged) = 3.03 V/m
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

E in V/m (Time averaged)

Grid 1 **1.62**	Grid 2 **1.94**	Grid 3 **2.67**
Grid 4 **2.04**	Grid 5 **3.03**	Grid 6 **2.59**
Grid 7 **2.23**	Grid 8 **1.57**	Grid 9 **1.91**

E in V/m (Slot averaged)

Grid 1 **1.62**	Grid 2 **1.94**	Grid 3 **2.67**
Grid 4 **2.04**	Grid 5 **3.03**	Grid 6 **2.59**
Grid 7 **2.23**	Grid 8 **1.57**	Grid 9 **1.91**

Category	AWF (dB)	Limits for E-Field Emissions (V/m)	Limits for H-Field Emissions (A/m)
M1	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 0.34
	-5	47.3 - 84.1	0.15 - 0.25
M4	0	<63.1	<0.19

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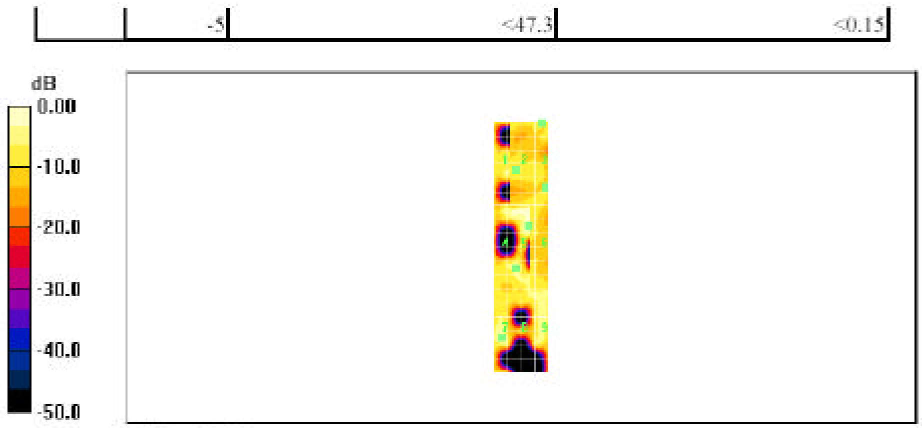

0 dB = 3.03V/m

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Lab: RIM Testing Services (RTS)

Ambient noise 1880_H_Field

DUT: HAC Dipole 1880 MHz; Type: CD1880V3

Communication System: CW; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: H Dipole Section

DASY4 Configuration:
- Probe: H3DV6 - SN6105; ; Calibrated: 10/12/2004
- Sensor-Surface: 0mm (Fix Surface)Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn472; Calibrated: 03/01/2005
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

H Scan 10mm above CD 1880 MHz/Hearing Aid Compatibility Test (5x19x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of Total (measured) = 0.00 A/m

H Scan 10mm above CD 1880 MHz/Hearing Aid Compatibility Test (41x181x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of Total field (slot averaged) = 0.00 A/m
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

H in A/m (Time averaged)

Grid 1	Grid 2	Grid 3
0.00	**0.00**	**0.00**
Grid 4	Grid 5	Grid 6
0.00	**0.00**	**0.00**
Grid 7	Grid 8	Grid 9
0.00	**0.00**	**0.00**

H in A/m (Slot averaged)

Grid 1	Grid 2	Grid 3
0.00	**0.00**	**0.00**
Grid 4	Grid 5	Grid 6
0.00	**0.00**	**0.00**
Grid 7	Grid 8	Grid 9
0.00	**0.00**	**0.00**

Category	AWF (dB)	Limits for E-Field Emissions (V/m)	Limits for H-Field Emissions (A/m)
M1	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 0.34
	-5	47.3 - 84.1	0.15 - 0.25
M4	0	<63.1	<0.19

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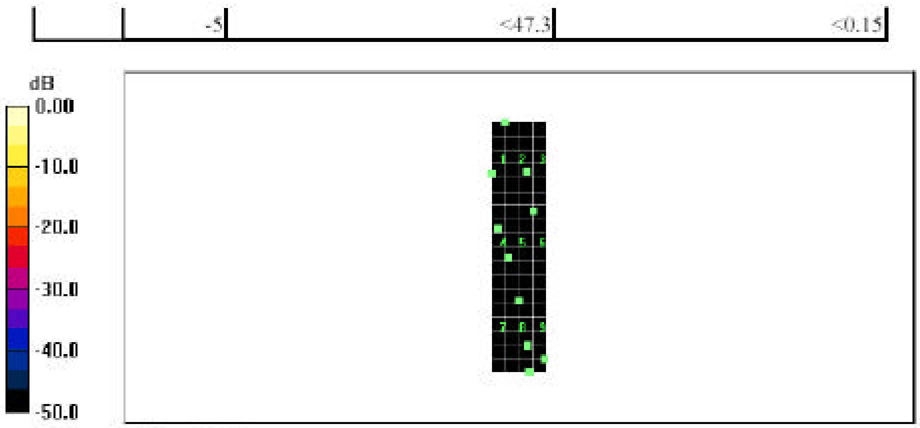

0 dB = 0.00A/m

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