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July 14, 2006

Stan Lyles
Federal Communications Commission,
Equipment Authorization Division
Application Processing Branch
7435 Oakland Mills Road
Columbia, MD 21045

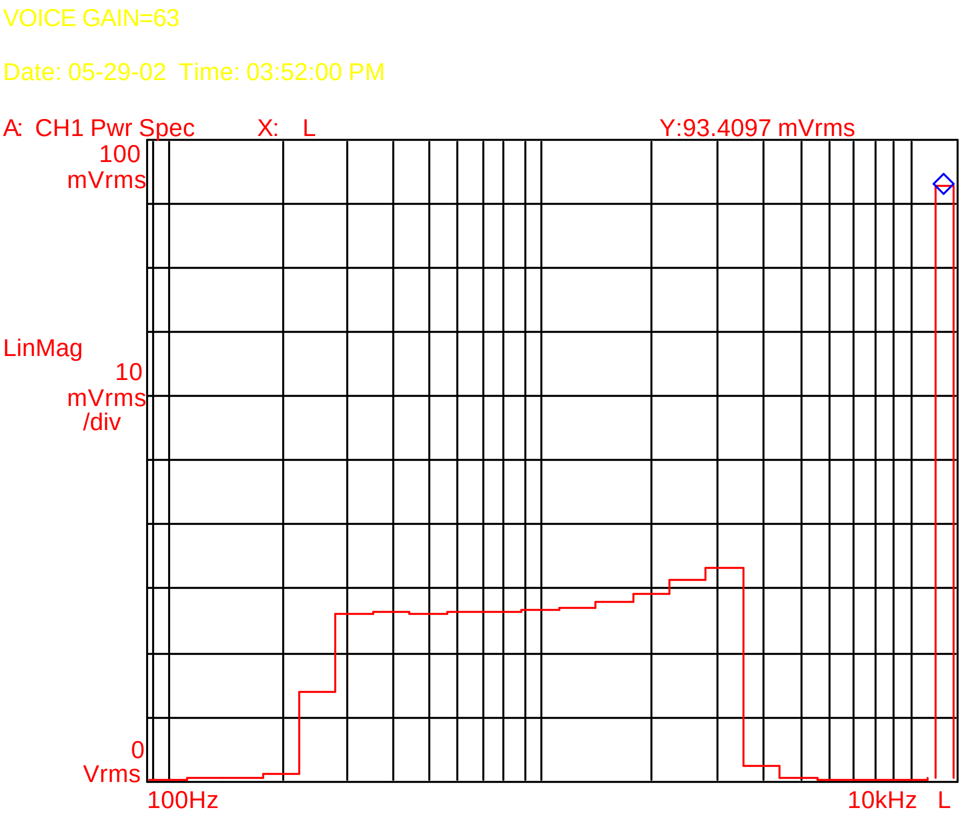
Subject: Response to the FCC Correspondence Reference # 31131 for additional information on RIM BlackBerry Wireless Handheld FCC ID: L6ARAV20CW, 731 Confirmation # EA459850.

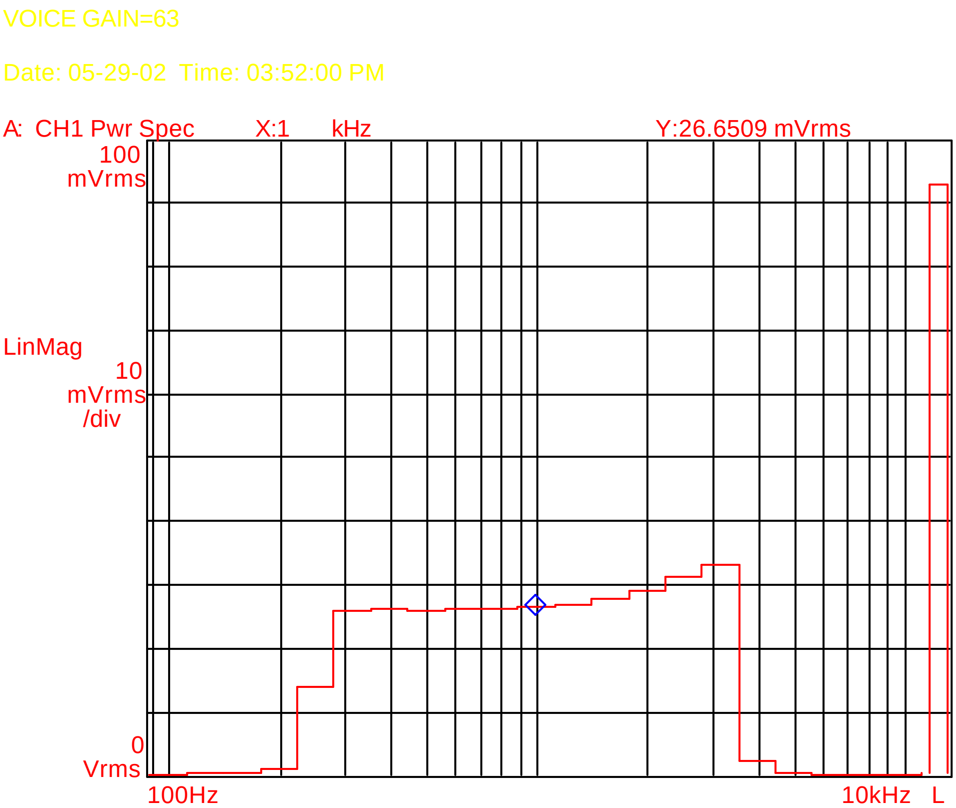
Dear Stan:

The following addresses the comment on your **Correspondence Reference #** 31131, dated June 20, 2006.

1) In Section 1.2 you mention averaging times. Please provide specific details used for each portion of the testing/calibration.

A Dynamic Signal Analyzer was used to measure time averaging of speech-simulated signal. The analyzer was set to measure the audio signal at 1/3 octave, 60 seconds time averaging. The speech simulated signal duration is 2 seconds; the DASY4 program was set to repeat the audio file while measuring time averaging. Amplifier setting of the DASY4 software was adjusted to get correct input level. Time averaged input level measurement plots are shown below:





Top plot shows RMS time averaging voltage (sum of third-octave filters from 100 Hz to 10 Hz) and bottom plots is RMS voltage at 1 kHz third-octave filter.

2) In Section 1.3 you discuss bandwidth compensation. Please provide additional clarification about this. Include when and why BC is used. Also please explain how BC is "calculated" and or derived. Why should the BC for 1025 KHz not be one? Plots show a value other than one. Please show input spectral plots related. Please explain differences seen between the narrowband test and voice signal test.

If an input signal is completely within the 1 kHz third-octave band used (narrow band signal), no compensation is required. If the test signal contains spectral components in other third-octave bands, the power in the 1 kHz subband is lower for the same overall power, and the reading from the 1 kHz band is consequently reduced. This reduction shall be compensated to give the equivalent reading as when using a narrowband signal. The reduction - when using a wideband signal with the same overall RMS power - is the ratio between the overall RMS power and the RMS power in the 1 kHz band. For a broadband voice signal, the power is determined by summing up their contribution in all third-octave subbands. The correction in dB can be calculated as (20 * log (Vrms total / Vrms 1k)).

For 1025 Hz, the proposed factor is very close to 0 dB (linear 1), because the signal is completely within the 1 kHz subband. Small deviations may occur due to noise during the reference measurement, or due to other spectral components. Differences between the narrowband and the voice signal test: ABM1 (without BWC for the same RMS reading) is smaller for the wideband (voice) signal compared to the narrowband signal by the BWC. For the "***48k_voice_300-3000 (duration 2 s)"*** predefined signals, the difference is provided by SPEAG to be 10.8 dB.

The Bandwidth Compensation Factor can be calculated from the measured power levels from response 1) above.

BWC = 20 * log (Vrms total / Vrms 1k).
BWC = 20 log (93.41 / 26.65)
= 10.9 dB

The difference in results between the narrowband 1.025 kHz sine and voice signal could be that CDMA 2000 vocoders do not pass a narrowband signal very well. However, the T rating is the same for both signal types.

3) Please fully address the FCC 3G policy recently issued to the TCBs during the May 2006 conference call. Details of device capability and justification for tested modes is needed. Please include not only RF modes but vocoders modes/options.

The followings are the **FCC 3G Measurement Procedures issued in May 2006**, applicable to handsets operating under CDMA 2000, Release 0, with MS Protocol Revision 6 (**P_REV 6**). The default test configuration is to measure SAR/HAC RF in RC3 with an established radio link between the DUT and a communication test set. SAR/HAC RF in RC1 is selectively confirmed if the output power is higher by more than ¼ dB.

Output Power Verification
Maximum output power is verified on the High, Middle and Low channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. Results for at least steps 3, 4 and 10 of the power measurement procedures should be tabulated in the SAR / HAC report as shown on Table 4. Steps 3 and 4 should be measured using SO55 with power control bits in "All Up" condition. TDSO / SO32 may be used instead of SO55 for step 4. Step 10 should be measured using TDSO / SO32 with power control bits in the "Bits Hold" condition (i.e. alternative Up/Down Bits).

3GPP2 C.S0011/ TIA-98-E, section 4.4.5.2 Method of Measurement

3. If the mobile station supports Reverse Traffic Channel Radio Configuration 1 and 7
Forward Traffic Channel Radio Configuration 1, set up a call using Fundamental 8
Channel Test Mode 1 with 9600 bps data rate only and perform steps 6 through 8.
4. If the mobile station supports the Radio Configuration 3 Reverse Fundamental 11

Channel and demodulation of Radio Configuration 3, 4, or 5, set up a call using 12 Fundamental Channel Test Mode 3 with 9600 bps data rate only and 13 perform steps 6 through 8.
6. Set the test parameters as specified in Table 1.
7. Send continuously ‘0’ power control bits to the mobile station.
8. Measure the mobile station output power at the mobile station antenna connector.
10. If the mobile station supports the Radio Configuration 3 Reverse Fundamental Channel, Radio Configuration 3 Reverse Supplemental Channel 0 and demodulation of Radio Configuration 3, 4, or 5, set up a call using Supplemental Channel Test Mode 3 with 9600 bps Fundamental Channel and 9600 bps Supplemental Channel 0 data rate, and perform the following:
a) Set the test parameters as specified in Table 2.
b) Send alternating ‘0’ and ‘1’ power control bits to the mobile station using the smallest supported closed loop power control step size supported by the mobile station.
c) Determine the active channel configuration. If the desired channel configuration is not active, increase Îor by 1 dB and repeat the verification. Repeat this step until the desired channel configuration becomes active.
d) Measure the mobile station output power at the antenna connector and record the levels.

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-104
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

Table 1

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-86
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

Table 2

Test Parameters for Maximum RF Output Power for Spreading Rate 1

Band	Channel	1x EvDO Data (153.6kbps)	CDMA2000 RC	SO2 Loopback	SO55 Loopback	TDSO SO32 Test Data Service
CDMA 800	1013	N/A	RC1	24.70	24.60	N/A
			RC3	24.60	24.65	N/A
	384	N/A	RC1	24.90	24.86	N/A
			RC3	24.90	24.86	N/A
	777	N/A	RC1	24.80	24.70	N/A
			RC3	24.80	24.71	N/A
Band	**Channel**	**1x EvDO Data (153.6kbps)**	**CDMA2000 RC**	**SO2 Loopback**	**SO55 Loopback**	**TDSO SO32 Test Data Service**
CDMA 1900	25	N/A	RC1	23.90	23.90	N/A
			RC3	23.90	23.90	N/A
	600	N/A	RC1	23.80	23.80	N/A
			RC3	23.80	23.80	N/A
	1175	N/A	RC1	23.90	23.80	N/A
			RC3	23.80	23.80	N/A

Table 3: Conducted RF output power measured for various settings

The above modes and configurations apply to SAR / HAC RF emission and were addressed in the correspondence Reference # 24544, 731 Confirmation # TC662230, dated November 24, 2005.

As far as the speech service and vocoder type is concerned, our CDMA 2000 devices do not operate in voice and data service simultaneously; therefore the above Loopback or Data Services do not apply. In addition, there are no voc oders options for those setting.

Speech Service SO1, SO3 include vocoders which are used for audio testing. SO1 is not a supported service. However, our CDMA 2000 devices support SO3: RC1, RC3 and vocoder type 8k Enhanced / 8k Enhanced (Low). The input audio level of –18 dBm0 was measured with CMU200 vocoder option set to 8k Enhanced (Low).

The noise spectrum for the above configurations were evaluated and it was determined that the following configurations S03, RC1, 8k Enhance (Low) options generated the highest noise.

Point scan/z (axial) scan at point with noise 2 (SO3, RC1, 8k Enhanced Low)/ABM Noise(x,y,z) (1x1x1):

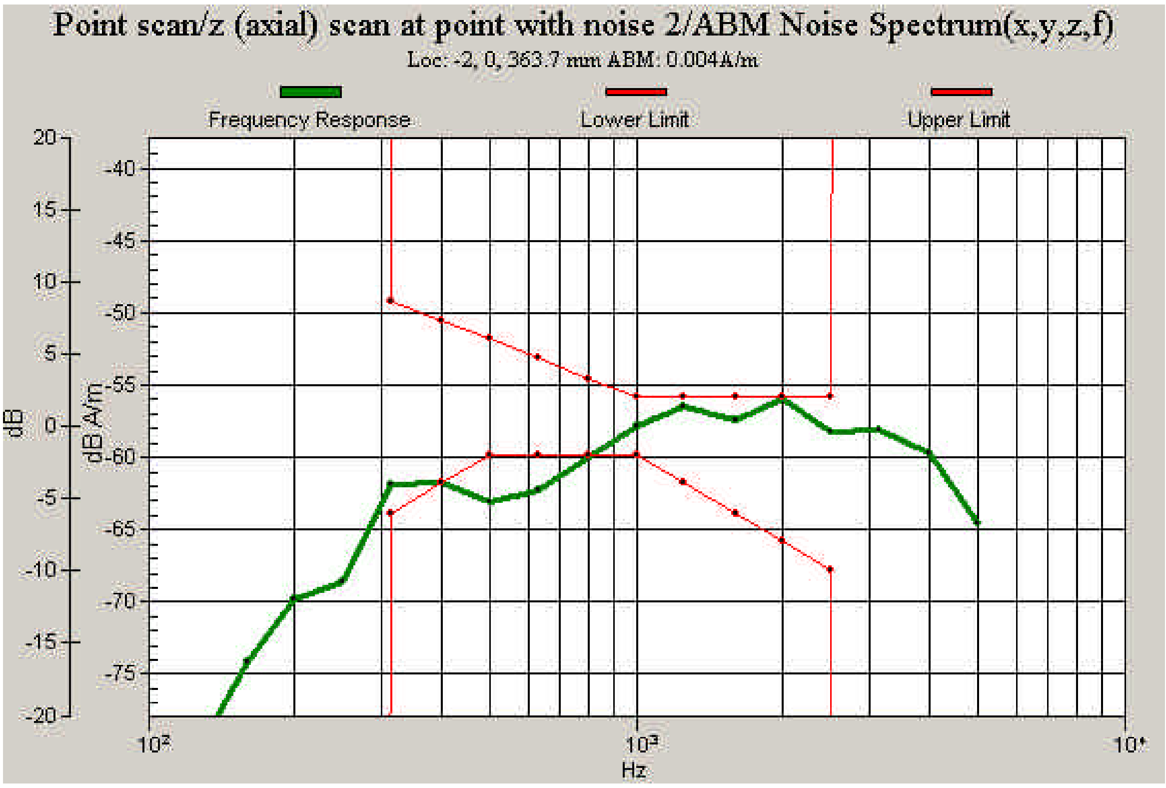
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM2 = -47.6185 dB A/m
Location: -2, 0, 363.7 mm

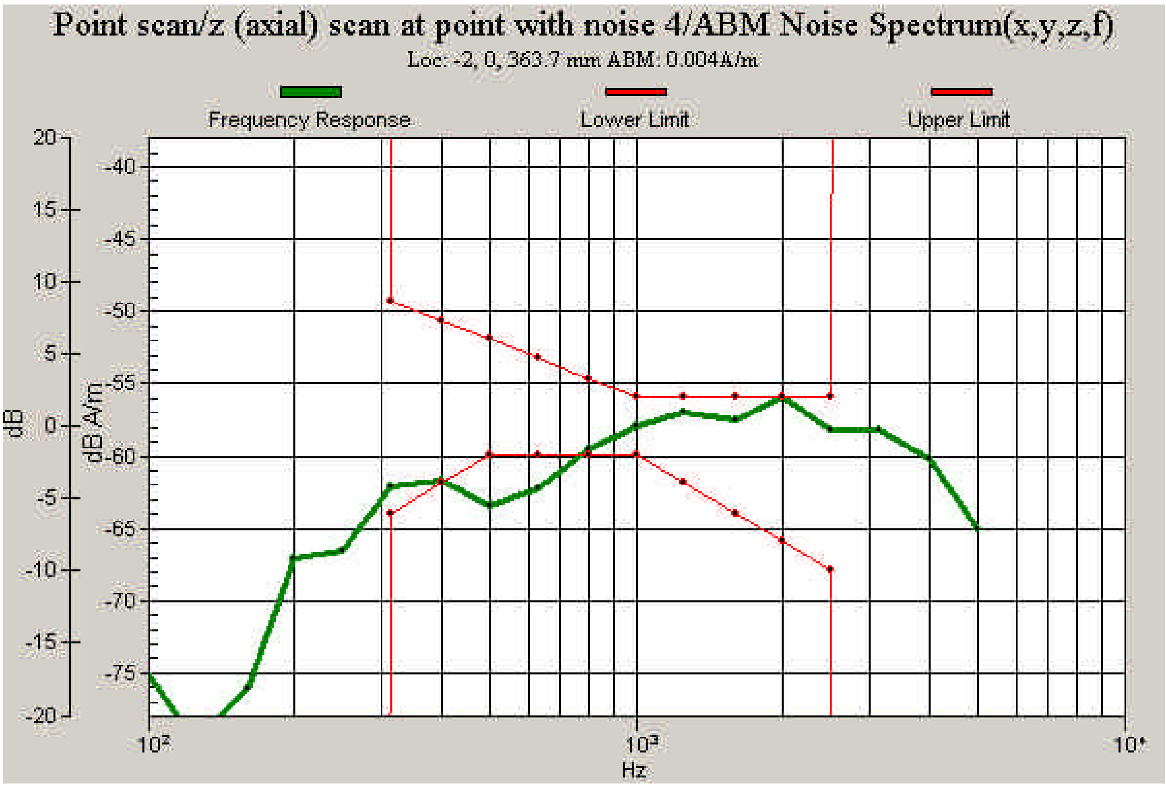
Point scan/z (axial) scan at point with noise 4 (SO3, RC3, 8k Enhanced Low) /ABM Noise(x,y,z) (1x1x1):

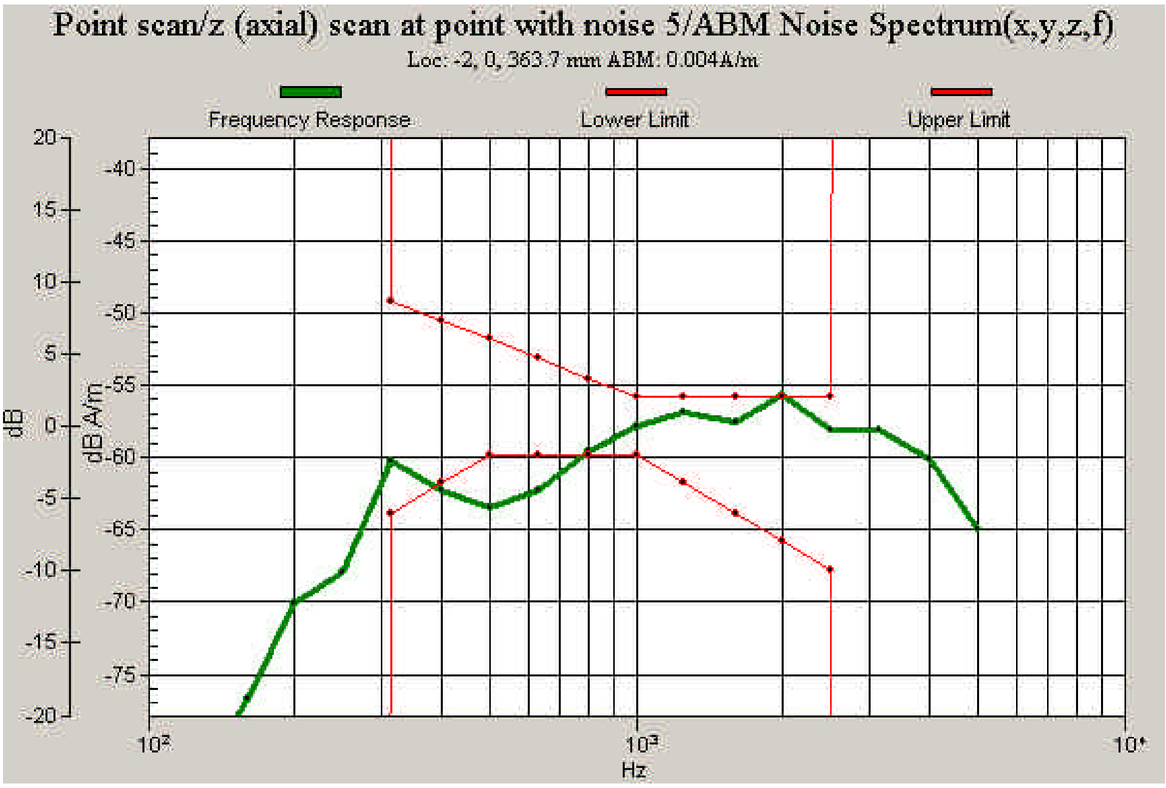
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM2 = -47.8978 dB A/m
Location: -2, 0, 363.7 mm

Point scan/z (axial) scan at point with noise 5 (SO3, RC1, 8k Enhanced) /ABM Noise(x,y,z) (1x1x1):

Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM2 = -47.8361 dB A/m
Location: -2, 0, 363.7 mm







4) Please provide additional details for the ambient noise measurement ABM1. Is the value presented a narrow (1 KHz 1/3 octave bin) or broadband value?

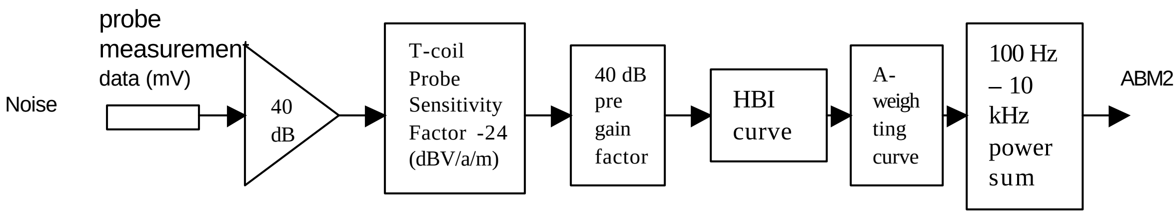
ABM1 is only the narrowband part. The integral of a wideband signal is only calculated internally for bandwidth compensation.

5) Please provide additional details for the ambient noise measurement ABM2. Please clarify the frequency range. The report only mentions A weighting used but not HBI. Please clarify.

ABM2 includes HBI as well as A-weighting curves as shown below.

The numerical values (ABM Noise) are the final result of the weighted integral. DASY4 uses filters by applying convolution in the time-domain. Therefore, significant contributions beyond 10 kHz would appear in the ABM2 result, even if they are not directly visible in the visualized spectrum.

ABM2 measurement flow chart:



6) Please include a demonstration that the probe/system complies with the frequency and linearity response requirements in C63.19 Annex C.5 up to at least 10 kHz. The calibration and ambient noise charts provided only go up to 5 kHz. Significant audio band noise components beyond 10 KHz should be addressed.

SPEAG, the manufacturer of the T-Coil system tested the probe frequency response and its dynamic range. The compliance is stated in the certificate of conformity document 880-SPAM1001A-As.pdf at the end of this document. Also the probe frequency has been verified and the response deviation from the ideal differentiator was within +0.05 and - 0.46 dB in the range 100 Hz to 10 kHz on the center frequencies of the third-octave bands. Note that the probe preamplifier as well as AMMI internal preamplifiers, filters and processing were included in the measurements.

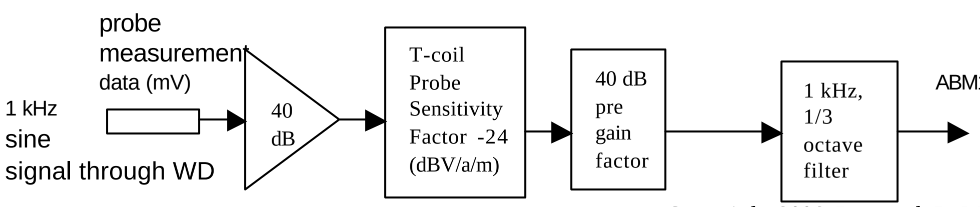
For the dynamic range and the frequency response of the SPEAG probe system, the manufacturer has supplied a report directly to Martin Perrine of the FCC. This report is not intended for publication.

7) Please provide additional details of how the P50 signal was used to verify the frequency response. Please provide details of any processing/math applied.

During the reference measurement, the spectral distribution of the input signal is determined. A spectral distribution results is equivalent to the input distribution plus the response of the WD. To determine the response of the WD, the spectrum from the WD is deducted. The response is then compared to the limits, which are level dependent (based on the ABM1 signal level). For the display, the spectrum is displayed with the BWC applied.

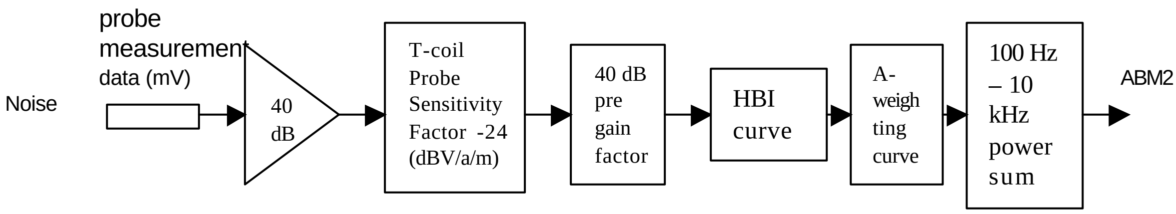
8) Please provide full details of all math used and probe correction/factors applied for ABM1 and ABM2 measurements. Please demonstrate that they are implemented correctly. One option for the later might be to compare expected result progression as each curve is added for a white Gaussian noise input.

ABM1 measurement flow chart:



Sine tone:
RTA 1 kHz (data + probe sensitivity of (24.0 dB V/(a/m)) – 40 dB pre-gain) = ABM1 (in dB (A/m))

ABM2 measurement flow chart:



Broadband noise:

Power Sum 1/3 octave, 0.1 - 10 kHz [RTA 0.1 – 10 kHz (data + probe sensitivity of (24.0 dB V/(A/m)) – 40 dB pre-gain)] + HBI curve + A_weighting curve = ABM2 (in dB (A/m))

Probe correction factors: Only the integrator is applied for ABM1. Refer to the certificate of conformity for the AMCC calibration coil 880-SDHACP02A-As.pdf at the end of this document.

At 1 kHz, a typical level of -28 dBV of coil voltage is equivalent to a field of -8 dB A/m at the coil center. From the probe output level at this frequency (typ. -32 dBV), the sensitivity of typ. 0.066 V / (A/m) can be calculated.

9) Please provide key sections from the RF emission test related to the RF T rating.

With reference to the RF report number “RTS-0181-0507-01” that was submitted to FCC in July 2005, the worst case E or H-Field M rating centered at the axial T-coil location determines the RF rating.

In this case the worst case M rating centered at the axial T_coil location is M3.

Please refer to the related RF emission T_coil M rating from the report “RTS-0181-0507-01” with corrected M rating for f < 960 MHz in accordance with C63.19 revision 3.12.

HAC RF Summary of results

Table below shows the results of the RF near-field (E-Field) emissions tests. The worst-case result is highlighted.

Wireless Device: BlackBerry Wireless Handheld - Model: RAV20CW									
RF Emissions Test									
Mode	**f (MHz)**	**Cond. Power (dBm)**	**Peak E-Field (V/m)**	**Peak E-Field after 360° Rotation* (V/m)**	**Centered at mid Speaker or T-Coil**	**Data Rate**	**Batt #**	**M-Rating**	**Excl. Blocks after re-evaluation ****
CDMA 800	824.7	24.9	84.0	-	Speaker	1	1	4	-
	836.52	25.0	89.7	90.9	Speaker	1	1	4	-
	848.52	24.9	86.3	-	Speaker	1	1	4	-
	824.7	-	82.0	-	T-Coil	1	1	4	-
	836.52	-	87.8	-	T-Coil	1	1	4	-
	848.52	-	83.4	-	T-Coil	1	1	4	-
	836.52	-	86.9	-	Speaker	1	2	4	-
	836.52	-	80.3	-	Speaker	1	3	4	-
	836.52	-	88.2	-	Speaker	1	4	4	-
	836.52	-	88.2	-	Speaker	1/8	1	4	-
CDMA 1900	1851.25	24.0	67.5	-	Speaker	1	1	3	-
	1880.00	23.9	68.2	-	Speaker	1	1	3	-
	1908.50	24.0	65.9	-	Speaker	1	1	3	-
	1851.25	-	69.0	-	T-Coil	1	1	3	-
	1880.00	-	66.6	-	T-Coil	1	1	3	-
	1908.50	-	63.3	-	T-Coil	1	1	3	-
	1851.25	-	67.3	-	T-Coil	1	2	3	-
	1851.25	-	64.8	-	T-Coil	1	3	3	-
	1851.25	-	69.2	-	T-Coil	1	4	3	-
	1851.25	-	69.2	-	T-Coil	1/8	4	3	-
Overall M-Rating:								**M3**	

Table 8 – E-Field 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.

** In cases where the E and H field scans did not share at least one common exclusion block, the blocks were re-evaluated manually for one of the two fields.

Table 9 shows the results of the RF near-field (H-Field) emissions tests. The worst-case result is highlighted.

Wireless Device: BlackBerry Wireless Handheld - Model: RAV20CW									
RF Emissions Test									
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**	**Data Rate**	**Batt #**	**M-Rating**	**Excl. Blocks after re-evaluation ****
CDMA 800	824.7	-	0.115	-	Speaker	1	1	4	-
	836.52	-	0.134	-	Speaker	1	1	4	-
	848.52	-	0.118	-	Speaker	1	1	4	-
	824.7	-	0.102	-	T-Coil	1	1	4	-
	836.52	-	0.122	-	T-Coil	1	1	4	-
	848.52	-	0.107	-	T-Coil	1	1	4	-
	836.52	-	0.134	-	Speaker	1	2	4	-
	836.52	-	0.124	-	Speaker	1	3	4	-
	836.52	-	0.131	-	Speaker	1	4	4	-
	836.52	-	0.129	-	Speaker	1/8	1	4	-
CDMA 1900	1851.25	-	0.183	-	Speaker	1	1	4	-
	1880.00	-	0.196	0.204	Speaker	1	1	3	-
	1908.50	-	0.181	-	Speaker	1	1	4	-
	1851.25	-	0.172	-	T-Coil	1	1	4	-
	1880.00	-	0.189	-	T-Coil	1	1	4	-
	1908.50	-	0.176	-	T-Coil	1	1	4	-
	1880.00	-	0.193	-	Speaker	1	2	3	-
	1880.00	-	0.191	-	Speaker	1	3	3	-
	1880.00	-	0.193	-	Speaker	1	4	3	-
	1880.00	-	0.194	-	Speaker	1/8	1	3	-
Overall M-Rating:								**M3**	

Table 9 – H-Field 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.

** In cases where the E and H field scans did not share at least one common exclusion block, the blocks were re-evaluated manually for one of the two fields.

10) Please give scan resolution details.

A coarse scan over an area 5 cm by 5 cm with step of 10 mm is initially performed followed by a fine scan over an area of 1 cm by 1 cm with step size of 2 mm then finally a point scan to find the maximum Audio Band Magnetic Field level and the location.

11) Please justify the choice of RF frequency for testing.

The table below shows axial ABM measurement results conducted on the cell band: low, mid and high RF channel for justification of choice of RF frequency. The delta was determined to be within the measurement uncertainty and did not change the T_rating.

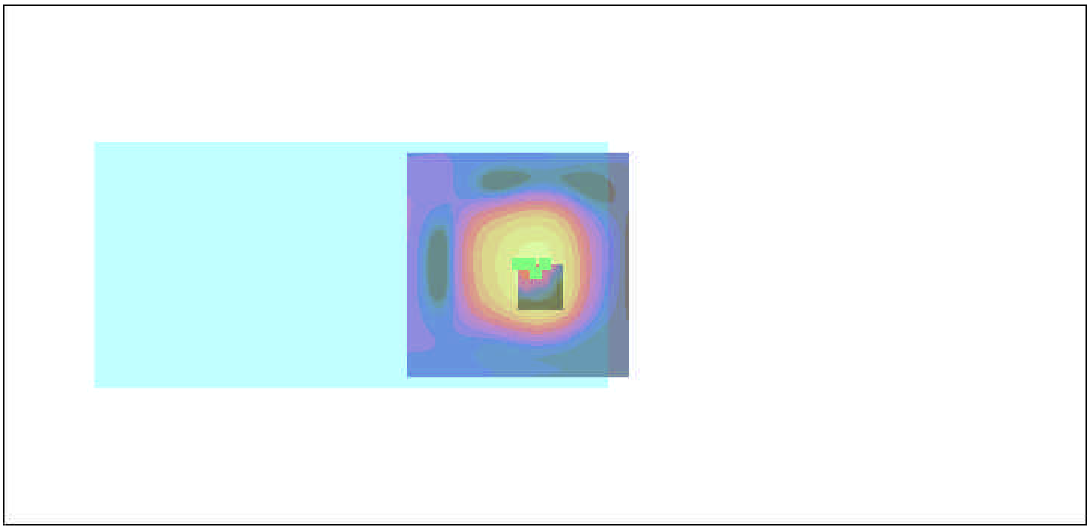
Channel	**ABM1 dB (A/m)**	**ABM2 dB (A/m)**	**ABM1/ABM2 dB**
Low	-6.85	-47.62	40.76
Mid	-6.76	-47.85	41.09
High	-6.84	-47.53	40.68

12) Please demonstrate that operation of the BT does not effect the measurement results.

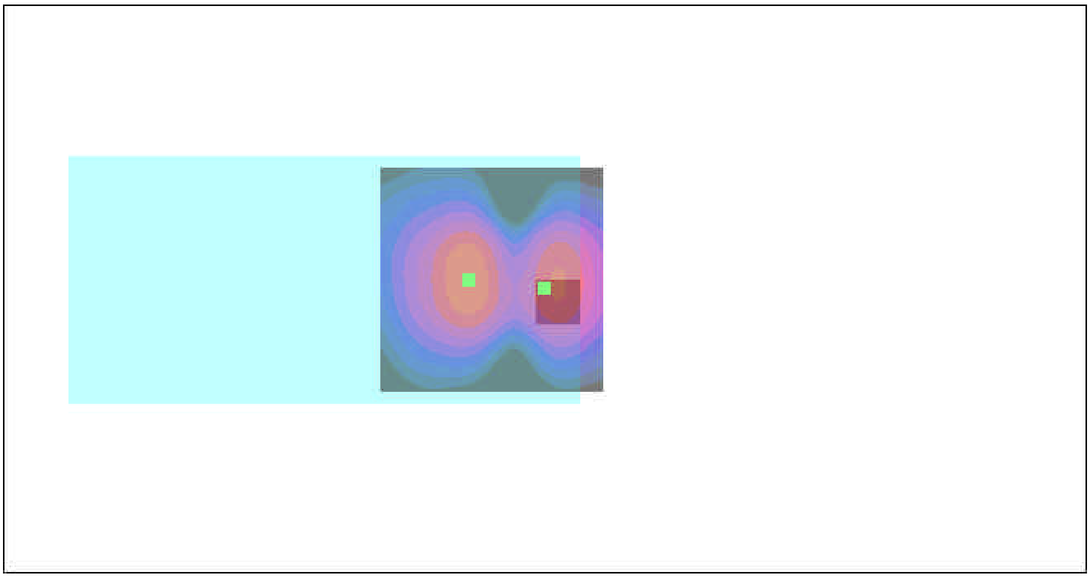
The BT operation for our handhelds is with a BT headset only. Therefore, BT operation does not affect HAC measurements since this mode of operation is not applicable to a HA user or HAC testing.

13) Please show the final measurement locations overlaid on the device along with reference locations.

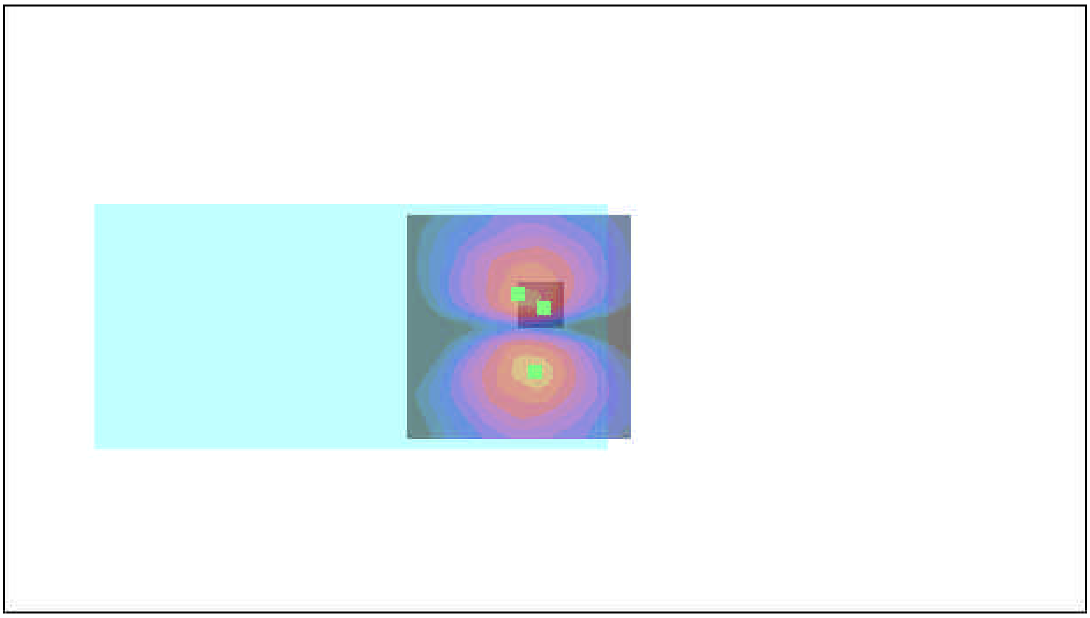
The picture and plots below show ABM peak or reference location for each probe orientation relative to the center of the speaker output:



Point scan/z (axial) scan at point with noise/ABM SNR(x,y,z) (1x1x1):
Measurement grid: dx=2mm, dy=2mm
Cursor:
Location: -6, 0 mm



Point scan/x (longitudinal) scan at point with noise/ABM Signal(x,y,z) (1x1x1):
Measurement grid: dx=2mm, dy=2mm
Cursor:
Location: -12, 2 mm



Point scan/y (transversal) scan at point with noise/ABM Noise(x,y,z) (1x1x1):
Measurement grid: dx=2mm, dy=2mm
Cursor:
Location: -6, -4 mm

Schmid & Partner Engineering AG

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Certificate of conformity

Item	Audio Magnetic 1D Field Probe AM1DV2
Type No	**SP AM1 001 A**
Series No	1001 ff.
Manufacturer / Origin	Schmid & Partner Engineering AG Zurich, Switzerland

Description of the item
The Audio Magnetic Field Probe AM1DV2 is a fully RF shielded magnetic field probe for the frequency range from 100 Hz to 20 kHz. The signal from the pickup coil is amplified in a symmetric 40dB low noise amplifier and fed to a 3 pin connector at the side. Power is supplied via the same and monitored via the LED near the connector. The single sensor in the probe is arranged in a tilt angle allowing measurement of 3 orthogonal field components by rotating the probe around its axis.

Handling of the item
The probe is manufactured and designed for operation in air and shall not be exposed to humidity or liquids. In order to keep the performance and alignment, the probe must not be disassembled. The full performance can only be achieved using the SPEAG provided accessories and following the corresponding manual.

Tests

Test	Requirement	Details	Units tested
Sensor angle	Probe configuration data for alignment with field	see corresponding probe certificate	all
Dimensions	according to corresponding probe certificate	verified at delivery / light beam alignment prior to measurement usage	all / in setup by user
Frequency response	within +/- 0.5 dB of ideal differentiator from 100 Hz to 10 kHz	Coil current of AMCC measured with R&S UPL, probe including amplifier and AMMI ADC input	First article
Dynamic range	max. + 21 dB A/m @ 1 kHz Noise level typ. -70 dB A/m @ 1 kHz ABM2 typ. -60 dB A/m	with AMMI	Samples / all
Linearity	within < 0.1 dB from 5 dB below limitation to 16 dB above noise level	tested betwen +15 dB A/m @ 1 kHz, to -70 dB A/m @ 10 kHz	Samples
Sensitivity	typ. -24 dBV / A/m @ 1 kHz at probe output	verified at delivery / calibrated in setup prior to measurement usage	all / in setup by user
RF shielding	immunity to AM modulated RF signal	1 kHz 80 % AM	all

Standards
[1] ANSI PC63.19-2006 Draft 3.12

Conformity
Based on the tests above, we certify that this item is in compliance with the requirements of [1].

Date 22.5.2006

Stamp / Signature

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Certificate of conformity

Item	Audio Magnetic Calibration Coil AMCC
Type No	**SD HAC P02 A**
Series No	1001 ff.
Manufacturer / Origin	Schmid & Partner Engineering AG Zurich, Switzerland

Description of the item
The Audio Magnetic Calibration coil (AMCC) is a Helmholtz Coil designed according to standard [1], section D.9 for calibration of the AM1D probe. Two horizontal coils are positioned above a non-metallic base plate and generate a homogeneous magnetic field in the z direction (normal to it).

Configuration
The AMCC consists of two parallel coils of 20 turns with radius 143 mm connected in parallel in a distance of 143 mm. With this design, a current of 10 mA produces a field of 1 A/m.
The DC input resistance at the input BNC socket is adjusted by a series resistor to a DC resistance of approximately 50 Ohm. The voltage required to produce a field of 1 A/m is consequently approx. 500 mV.
To current through the coil is monitored via a shunt resistor of 10 Ohm +/- 1%. The voltage is available on a BNO socket with 100 mV corresponding to 1 A/m.

Handling of the item
The coil shall be positioned in a non-metallic environment to avoid distortion of the magnetic field.

Tests

Test	Requirement	Details	Units tested
Number of turns	N = 20 per coil	Resistance measurment	all
Orientation of coils	parallel coils with same direction of windings	Magnetic field variation in the AMCC axis	all
Coil radius	r = 143 mm	mechanical dimension	First article
Coil distance	d = 143 mm distance between coil centers	mechanical dimension	First article
Input resistance	51.7 +/- 2 Ohm	DC resistance at BNC input connector	all
Shunt resistance	R = 10.0 Ohm +/- 1 %	DC resistance at BNO output connector	all
Shunt sensitivity	Hc = 1 A/m per 100 mV according to formula Hc = (U / R) * N / r / (1.25^1.5)	Field measurement compared with Narda ELT400 + BN2300/90.10	First article

Standards
[1] ANSI PC63.19-2006 Draft 3.12

Conformity
Based on the tests above, we certify that this item is in compliance with the requirements of [1].

Date 22.5.2006

Stamp / Signature

s p e a g
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Please do not hesitate to contact the undersigned should you have any questions.

Yours truly,

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