MOTOROLA

FCC ID: IHDT56MN1

DECLARATION OF COMPLIANCE HAC ASSESSMENT - TELECOIL

Motorola Mobility, Inc; iDEN Mobile Devices **Audio Test Laboratory** **8000 West Sunrise Blvd; Suite A** **Fort Lauderdale, FL. 33322**	**Date of Report:** **16 March 2011** **Report Revision:** **Rev. 0** **Report ID:** **IHDT56MN1 Telecoil HAC Report**

Responsible Engineer:	Chad Jackman
Date/s Tested:	03/16/2011
Manufacturer/Location:	Motorola – Plantation, Florida
Sector/Group/Div.:	iDEN Mobile Devices
Date submitted for test:	17 March 2011
DUT Description:	Clamshell style with internal antenna
Signaling type:	TDMA: iDEN
Test TX mode(s):	2:6 (a.k.a. 1:3), 1:6
Max. Power output:	0.640W; Pulse Average; Factory tuning
Nominal Power:	0.600W; Pulse Average; Factory tuning
TX Frequency Bands:	iDEN - 806-825 MHz, 896-902 MHz
Model(s) Tested:	i440 (H82XAH6QR2AN)
Model(s) Certified:	(H82XAH6QR2AN)
Serial Number(s):	364VMADFL9
Rule Part(s):	20.19(b)(2)

Product images can be found in Exhibit 7

Approved Applicable Accessories:

Antenna(s):

2T711AV00: IFA, 806-902MHz, 1/4 wave antenna
Gain: -2.58 dBd gain

Battery(ies):

SNN5826B BT 90 High Performance Li-Ion Battery Battery Cover – NTN3015NIIA

Min. Axial field strength:	**0.53 dB A/m**
Min. Radial field strength:	**-8.71 dB A/m**
Min. ABM Desired-to-Undesired signal ratio:	**48.61 dB**
HAC Category rating:	**T4**

John Lewczak Motorola Mobility, Inc. ***/s/ John Lewczak*** **Approval Date:** 28 March 2011	**Certification Date:** 28 March 2011

Table of Contents

REVISION HISTORY

Date	Revision	Comments
3/28/2011	O	Initial release.

1.0 Introduction and Overview

This report details the utilization, test setup, test equipment, and test results of Hearing Aid Compatibility (HAC) telecoil measurements required per 47 CFR 20.19(b)(2). These measurements were performed during a controlled on-network telephone call at full rated RF power with the antenna extended to assess compliance with the ANSI C63.19-2007 standard. The data in this report are for assessing T-coil compliance only.

Per the Table 7-1 of the standard the iDEN air interface protocol articulation weighting factor (AWF) has been assigned a value of zero.

2.0 Telecoil Compliance Criteria (Per ANSI C63.19-2007; section 7.3)

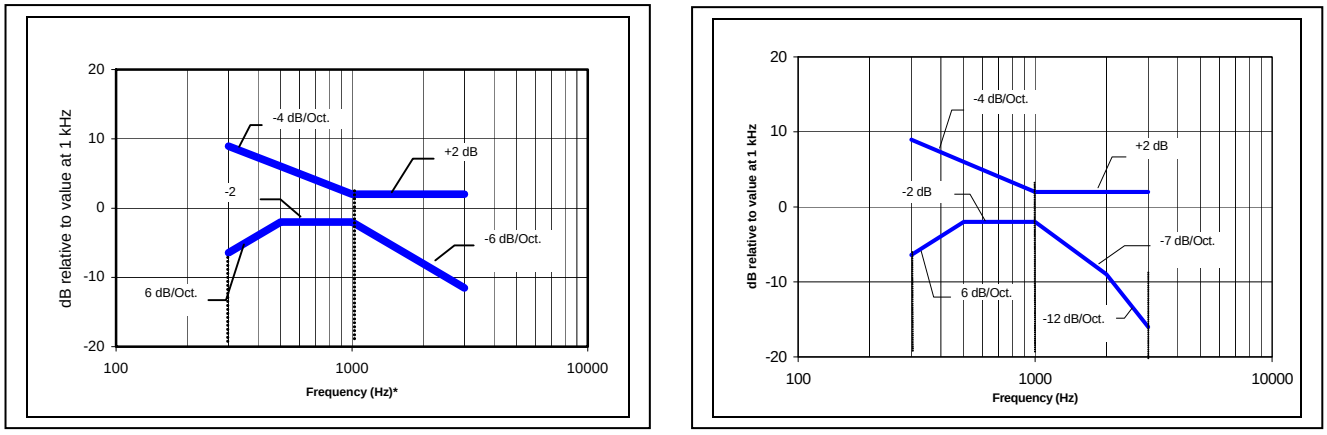
The signal quality rating shall be T4 or better per 47 CFR 20.19. Per ANSI C63.19-2007 this rating is dependent upon the articulation weighting factor (AWF) for specific air interface protocols as listed in the following table:

Table 2-1 – Signal Quality rating limits

Rating	AWF = 0
T4	> 30 dB
T3	20 to 30 dB

To merit this rating the axial component and the radial components of the audio band magnetic (ABM) field shall be ≥ -18 dB A/m at 1 kHz.

In addition the frequency response shall lie with the limit lines evident in the following graphs:



A – Mask for WDs with a field <= -15 dB(A/m) at 1 kHz B - Mask for WDs with a field that exceeds -15 dB (A/m) at 1kHz

Figure 1-1 –Frequency Response (Axial only)

The current ANSI C63.19-2007 methodology used to determine a wireless device (WD) T-category rating is illustrated in the attached flow chart in Figure 2-2. This process presumes that the interference heard by a hearing aid used is dominated by the RF interference component rather than the inductively coupled noise interference component due to pulsing currents flowing in a handset. As a result a WD T-category rating value is precluded from exceeding the RF interference rating by virtue of the highlighted steps within the diagram.

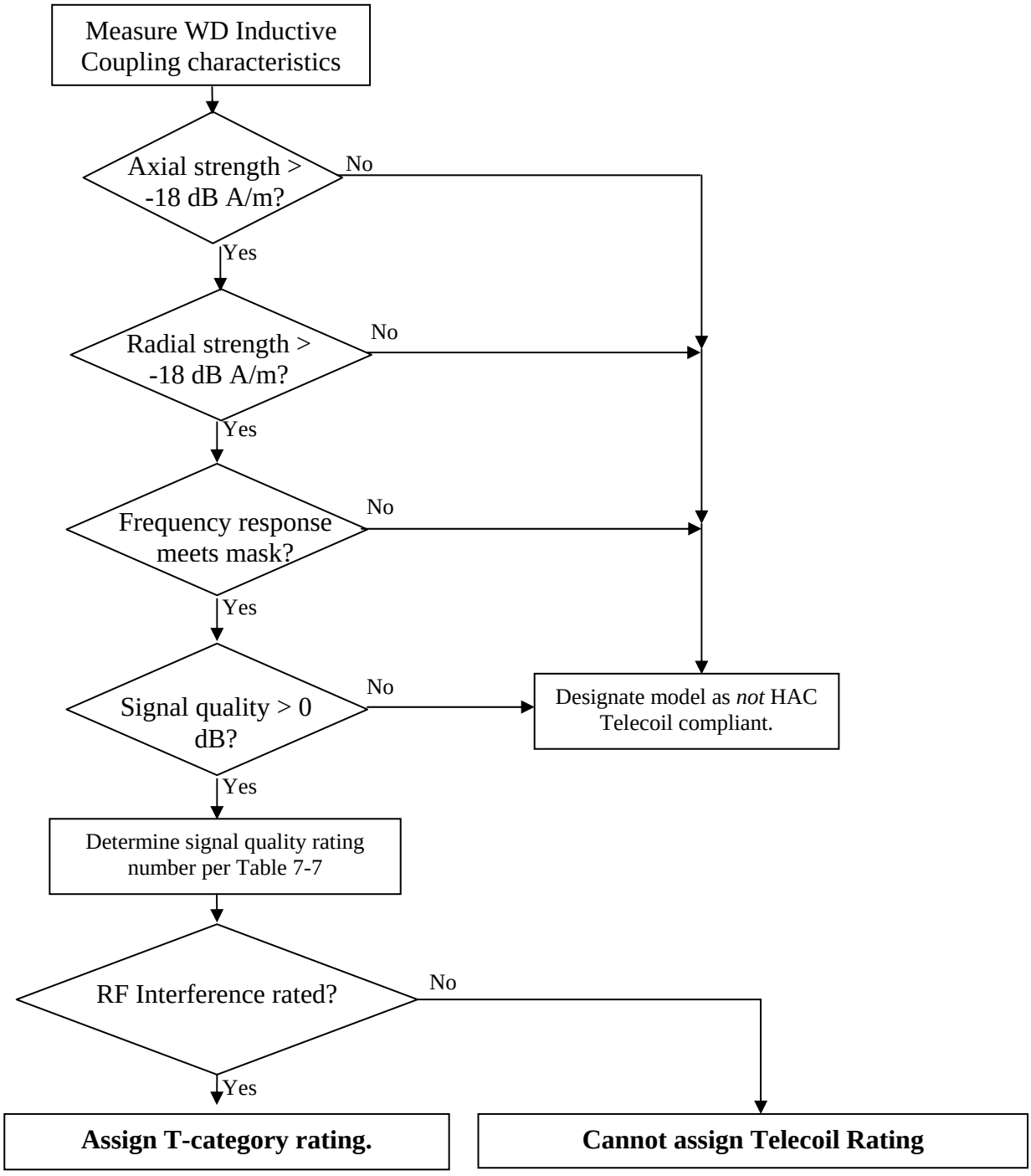


Figure 2-2 - WD Telecoil Category Rating Process
(Note: RFI rating assumed to be M3 or M4)

3.0 Description of Device Under Test (DUT)

3.1 General Description of UUT.

FCC ID: IHDT56MN1 is used for telephone service subject to 47 CFR 20.19 for hearing aid compatibility. The maximum output power is 0.640 watts pulse average as determined by the upper limit of the production line final test station. The DUT was tuned to be within 5% of the maximum rated power. It is capable of transmitting on any network commanded frequency in the bands of 806 to 821 MHz (within the United States) and 896 to 902 MHz. It employs a time division multiplexing (TDM) transmission technology with a duty cycle of 16.67% (1:6 multiplexing) or 33.33% (2:6 multiplexing) using 16-QAM modulation on each of four OFDM-like sub-carriers. Since the TDM period is fixed at 90 ms. this duty cycle difference results in a difference in the RF carrier modulation envelope fundamental frequency being either 11 Hz or 22 Hz respectively. To evaluate the effect of the difference in envelope fundamental frequency measurements were made with both duty cycles in each band of operation (see section 9).

A different Vocoder is used for each multiplexing factor as commanded by the cellular network because a more efficient Vocoder is needed to achieve the greater spectral efficiency provided by the low-rate 1:6 multiplexing. Each Vocoder operates for the full duration of a transmission burst and both produce a random digital stream during the burst so between them there is essentially no difference in the modulation envelope during the burst. Accordingly measurements were made for the 2 duty cycles using the Vocoder normally used with the particular duty cycle.

User controls include selecting the duration of the backlight duration and the audio frequency response characteristic. Once set, these characteristics are maintained until the user adjusts them. Instructions for setting the backlight duration and the frequency response are provided in the User Guide respectively in the sections entitled *Customizing Your Phone, User Settings,* and *Advanced Calling Features, Features for the Hearing Impaired.*

3.2 Summary of Concurrency of Operating Modes.

Air Interface	Band (MHz)	Type	C63.19 Tested	Simultaneous Transmission[1]	Concurrent Single Transmission	Reduced Power 20.19 (c)(1)[2]	Voice Over Digital Transport (Data)
iDEN	800	VO	Yes	NA	Yes	NA	NA
	900					NA	NA
	Packet Data/	DT	NA	NA	NA	NA	No

VO: Voice CMRS/PSTN Service Only

V/D: Voice CMRS/PSTN and Data Service

DT: Digital Transport (Data).

[1] Not to be tested.

[2] 2010 Order permits a user-selectable mode that reduces power up to 2.5 dB for 1900 MHz GSM *only.*

4.0 Test Equipment List

Table 4-1 – List of test equipment used

Equipment Type	Model Number	Serial Number	Calibration Due
Axial Probe	HAC – A100	0484	11-30-11
Radial Probe	HAC – R100	0484	11-30-11
Audio Analyzer software	SoundCheck 9.0	SC-422	11-02-11
Input amplifier	SoundConnect	PS-418	11-02-11
Telephone Magnetic Field Simulator	TMFS-1	300-01151	APREL TMFS v.1.6, Release 23 March 2005

5.0 Descriptions of Measurement System (a variation of ANSI C63.19-2007; Figure 6-1)

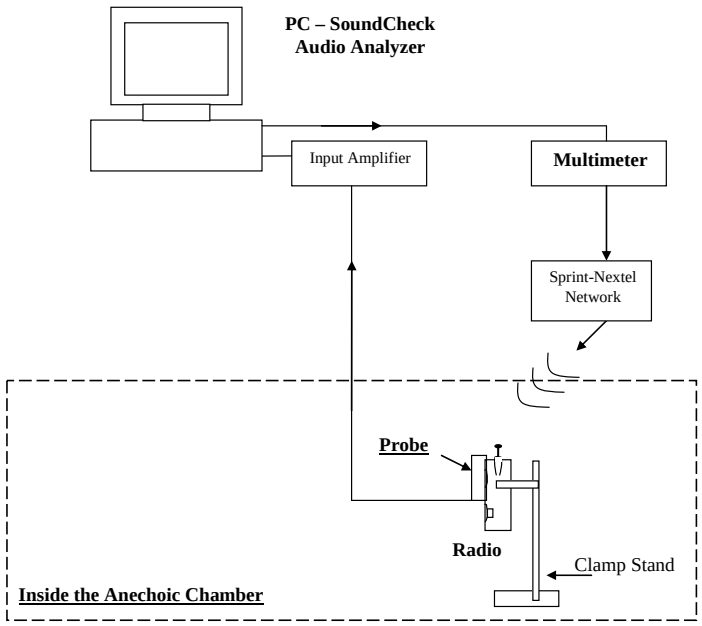


Figure 5-1 – Test setup

The laboratory utilizes the Listen *SoundCheck* system, which is a software package that both generates and measures audio signals via a D/A card installed in a personal computer. This software provides the filtering and integration functions necessary to complete the measurements in ANSI C63.19-2007, sections 6.3.4.2 and 6.3.4.3. The 11-second P50 male audio signal so generated is applied to the DUT which is engaged in an on-network telephone call as the antenna is not removable and the antenna port connector lies between the battery and the housing. Transmission power was monitored via embedded diagnostic software that displays output power to ensure no power cutback occurred. The measurement system consists of a CCL A-100 Axial telecoil probe and an R-100 Radial telecoil probe. Section 4.0 presents relevant test equipment information. All measurement equipment used to assess Telecoil HAC compliance was calibrated.

6.0 Measurement System Verification

The HAC measurements were conducted with Axial and Radial telecoil probes model/serial numbers A-100/0484 and R-100/0484. A Telephone Magnetic Field Simulator (TMFS) was used (rather than a Helmholtz coil) for system verification following the guidelines stated in the TMFS procedures document. For calibration, telecoil probe output signal levers were compared with target valued provided by the manufacturer, and the results provided in Table 6-1-1. The photos below depict the validation setup using the TMFS.

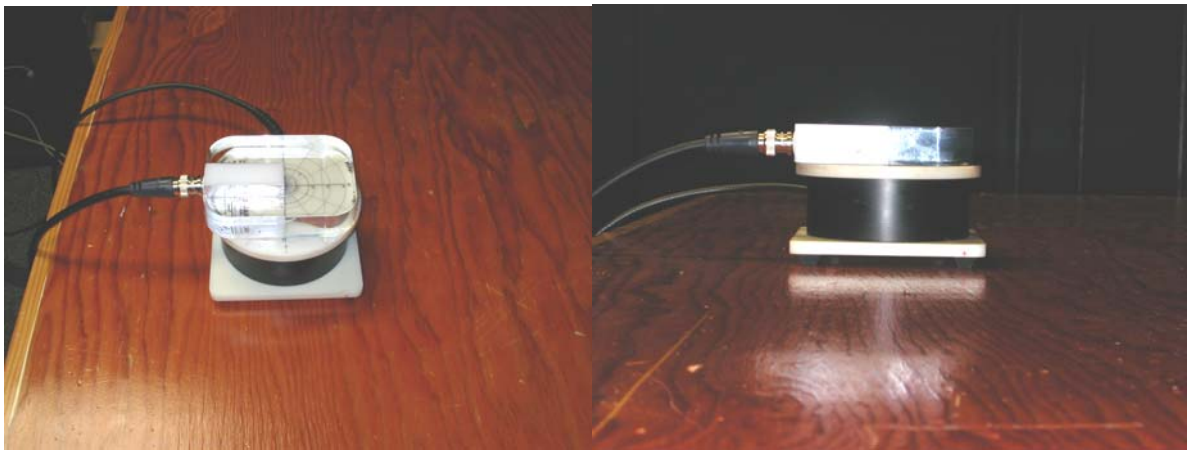


Figure 6-1 – Probe coil being calibrated with TMFS

6.1 System Verification Test Results

In accordance with ANSI C63.19-2007, clause 6.2.4 the probes were calibrated and sensitivity levels at 1 kHz verified and listed below on 22 September 2008. System verification measurement results for Axial and Radial probes are listed and compared with expected values from the TMFS in Table 6-1-1. The amplitude linearity data obtained using a Helmholtz coil are shown in Table 6-1-2. The data demonstrates compliance to the ± 0.5 dB tolerance, with the output varying in corresponding 10 dB steps.

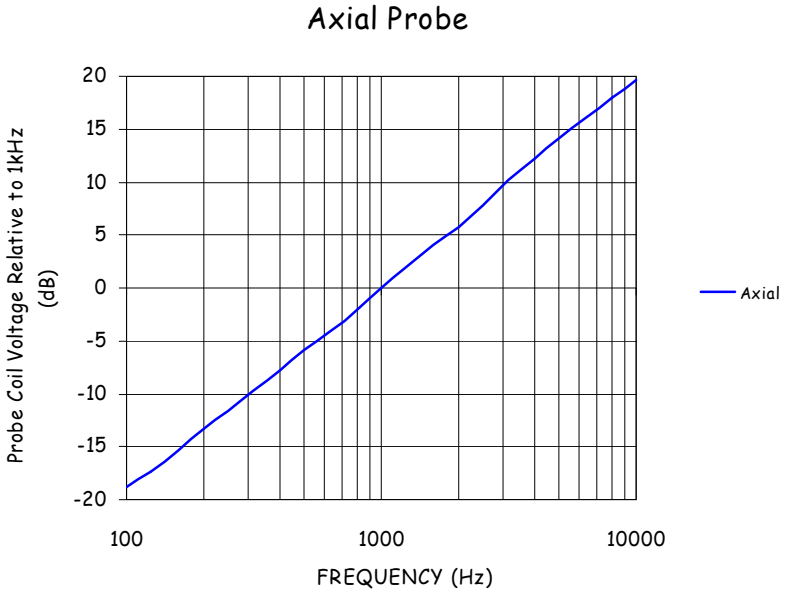


Figure 6-1-1 - Axial Probe sensitivity at 1000 Hz: -60.4 dB V/(A/m)

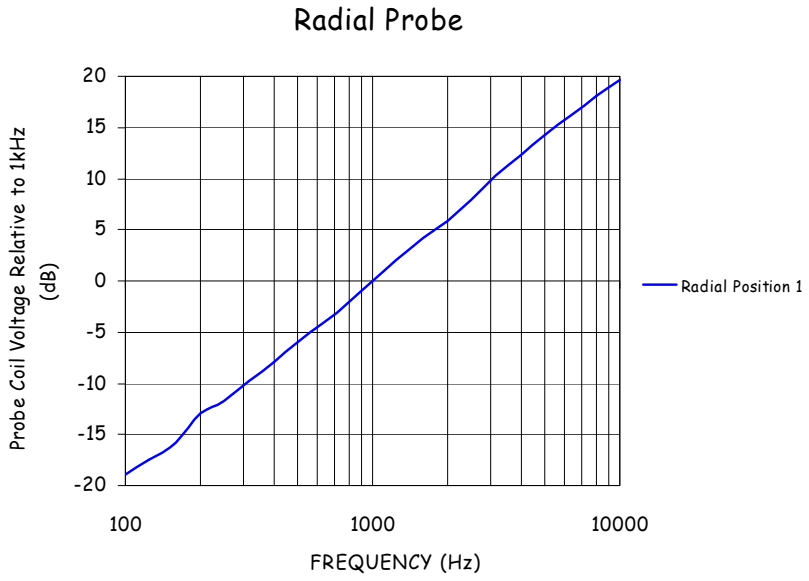


Figure 6-1-2 - Radial Probe sensitivity at 1000 Hz: -60.2 dB V/(A/m)

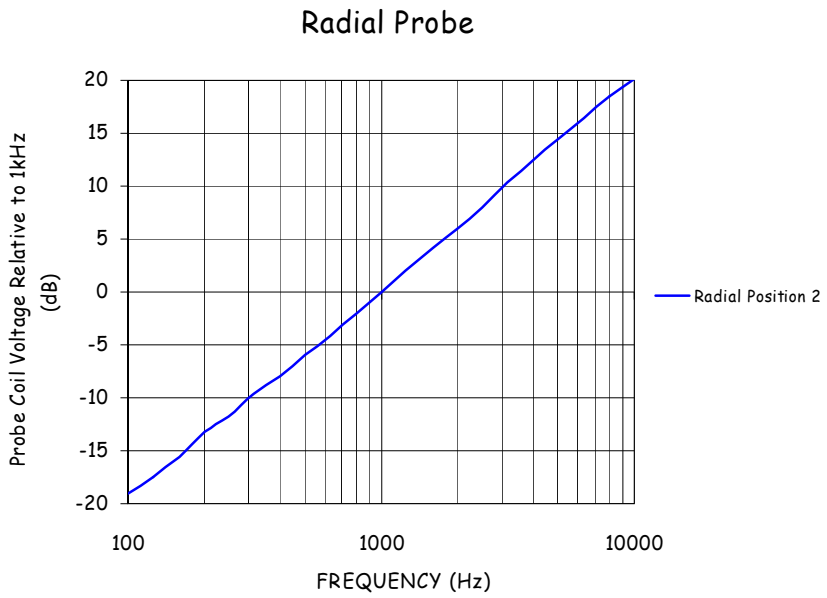


Figure 6-1-3 - Radial Probe sensitivity at 1000 Hz: -60.2 dB V/(A/m)

Table 6-1-1 - Probe Sensitivity

Orientation	Input Signal	Target Magnetic Field	Measured Magnetic field	Deviation
Axial	1 kHz, 0.5V	-20.0 dB A/m	-20.66 dB A/m	0.66 dB
Radial 1	1 kHz, 0.5V	-27.5 dB A/m	-28.08 dB A/m	0.58 dB
Radial 2	1 kHz, 0.5V	-27.5 dB A/m	-27.90 dB A/m	0.40 dB

Table 6-1-2 - Probe Linearity

Level	Delta of Axial Probe (at 1 kHz)	Delta of Radial Probe (at 1 kHz)	Acceptance Criteria	Result
0 - 10	0.0	0.0	± 0.5 dB	Pass
10 - 20	0.0	0.0	± 0.5 dB	Pass
20 - 30	-0.2	-0.2	± 0.5 dB	Pass
30 – 40	-0.1	-0.2	± 0.5 dB	Pass

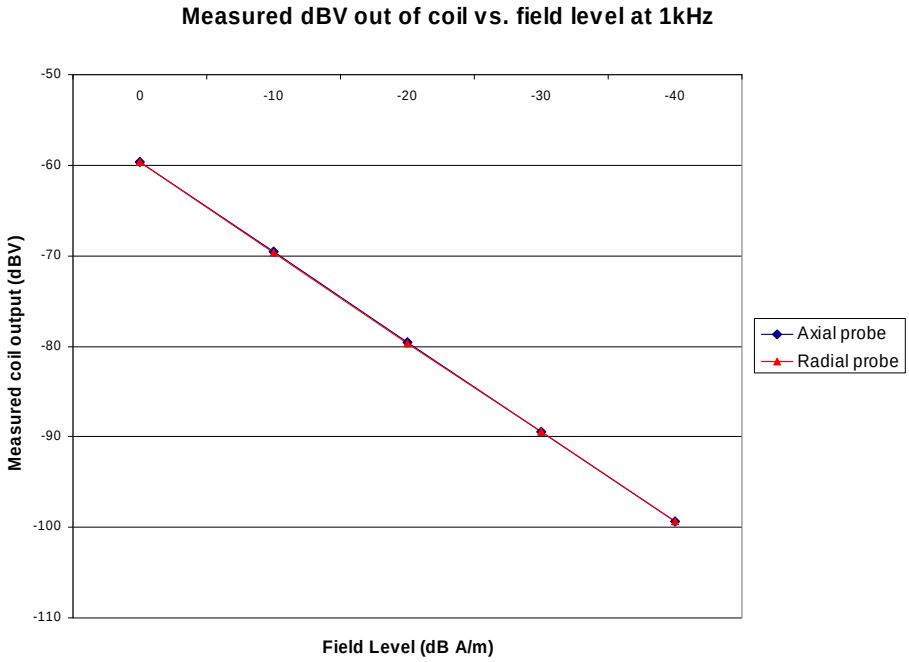


Figure 6-1-4 – Axial/Radial Probe Linearity

6.2 RF Immunity Verification

To alleviate any concern that RF radiation from the handset would influence ABM readings by the measurement system the ambient noise floor was measured when a Reference Coil was positioned where the handset antenna was located during ABM measurements. The Plots below show the Axial probe ambient noise floor measured with and without RF. The RF signal was produced with a signal generator at 900 and 1900 MHz transmitting at a power level of 1 Watt. The data shows only a small affect to the frequency response below 300 Hz, the amount of which would be negligible in the determination of the signal quality.

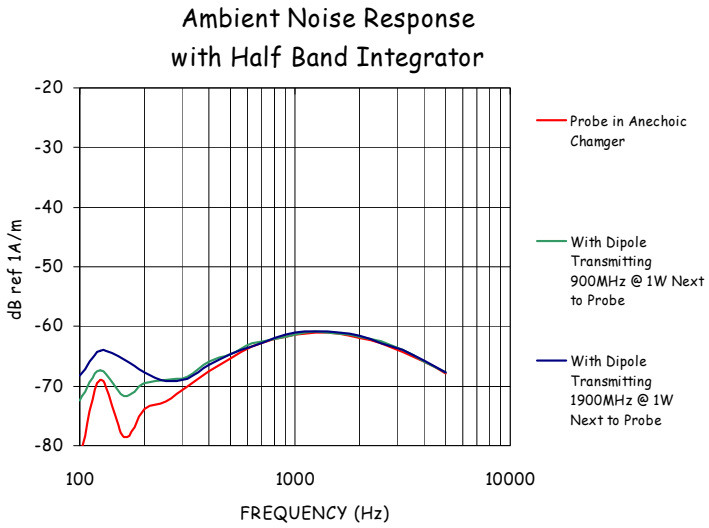


Figure 6-2 – Noise with RF Measured Response

6.3 RF Frequency Independence

It was noted in section 5 that a live on-the-air network call test was used to obtain audio band magnetic (ABM) data using the system illustrated in Figure 5-1 rather than a base station emulator. This was done because no base station emulator is available commercially or internally that supports both of the Vocoders described in section 3. A limitation of the network test is that the network assigned RF test frequency could not be controlled and was limited to a narrow frequency range near those listed with the ABM data in section 9. To compensate for this testing limitation an additional set of ABM data was taken to verify that the ABM data was not dependent on the RF test frequency.

The commercially available R2660B Service Monitor instrument listed in Table 4-1 does support testing at selectable frequencies, but only using the 33.3% duty cycle 2:6 Vocoder. One was used to obtain additional ABM1 and ABM 2 axial orientation data at several band-edge and mid-band frequencies to verify that the ABM data is independent of the test frequency. The data is listed in the following table together with some statistical results that show ABM data is essentially independent of the RF test frequency.

Table 6.3 –Axial Probe Measurements

Axial		
Test Frequency (MHz)	**AMB1 (dB A/m)**	**AMB2 (dB A/m)**
806.1000 MHz	18.07	-49.21
813.5125 MHz	18.01	-48.28
820.9875 MHz	17.95	-49.28
896.1062 MHz	18.69	-49.10
900.9812 MHz	18.92	-48.83
Standard Deviation	**0.45**	**0.41**

7.0 DUT Setup and Test Procedure

The test setup was done as specified in ANSI C63.19-2007, section 6.3.2 and Figure 6-1. Axial and radial measurements were performed at locations in accordance with ANSI C63.19-2007; Annex A.3, and are illustrated in the test setup photograph. The coordinates for these locations, relative to the acoustic output center, are given in Table 7. The test flow and procedure was per ANSI C63.19-2007, Figure 6-3, and section 6.3.1 was followed in order to demonstrate compliance. The test procedure consisted of placing the DUT in an interconnect phone call from the Sprint-Nextel system to a phone on the Motorola test site. Transmission power was monitored via embedded diagnostic software that displays output power to ensure no power cutback occurred. Then from the Motorola Audio Lab connection to the Mobile Switch Center (MSC) on the Motorola test site an 11 second P50 male signal was sent to the DUT. The P50 artificial speech levels were determined by the reference input levels as stated in ANSI C63.19-2007, Table 6-1.

iDEN TDMA (22 and 11 Hz): -18 dBm0

Below is the corresponding voltage level used to send the audio signal to the iDEN network:

Input Level to the iDEN Network: -20.7 dB V = 92.26mV

The signal was then measured with the telecoil and analyzed for frequency response and level. The test results were obtained with:

- The DUT user interface configured for telecoil operation,
- The display and keypad lighting off as would normally be the case when used for a call.

- The probe manually positioned for maximum coupling, then secured (See coordinates in Table 7):
    - Axial - center of acoustic output.
    - Radial 1 - probe at 0 degrees just left of the acoustic output center.
    - Radial 2 - probe at 90 degrees just above the acoustic output center.

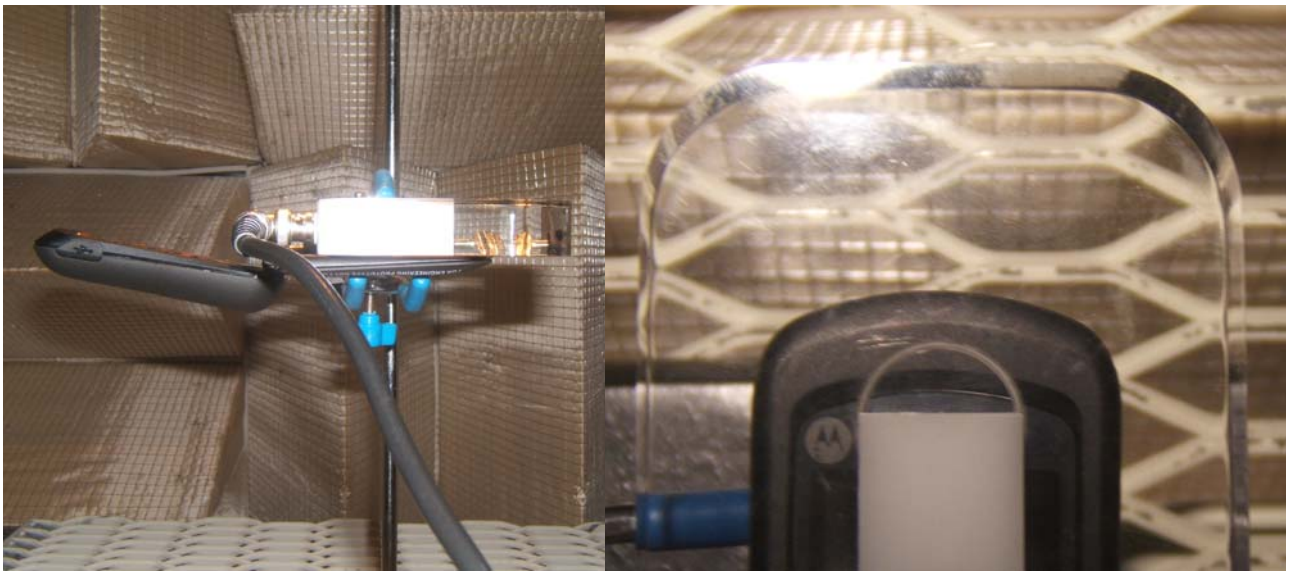


Figure 7-1 – Test holder

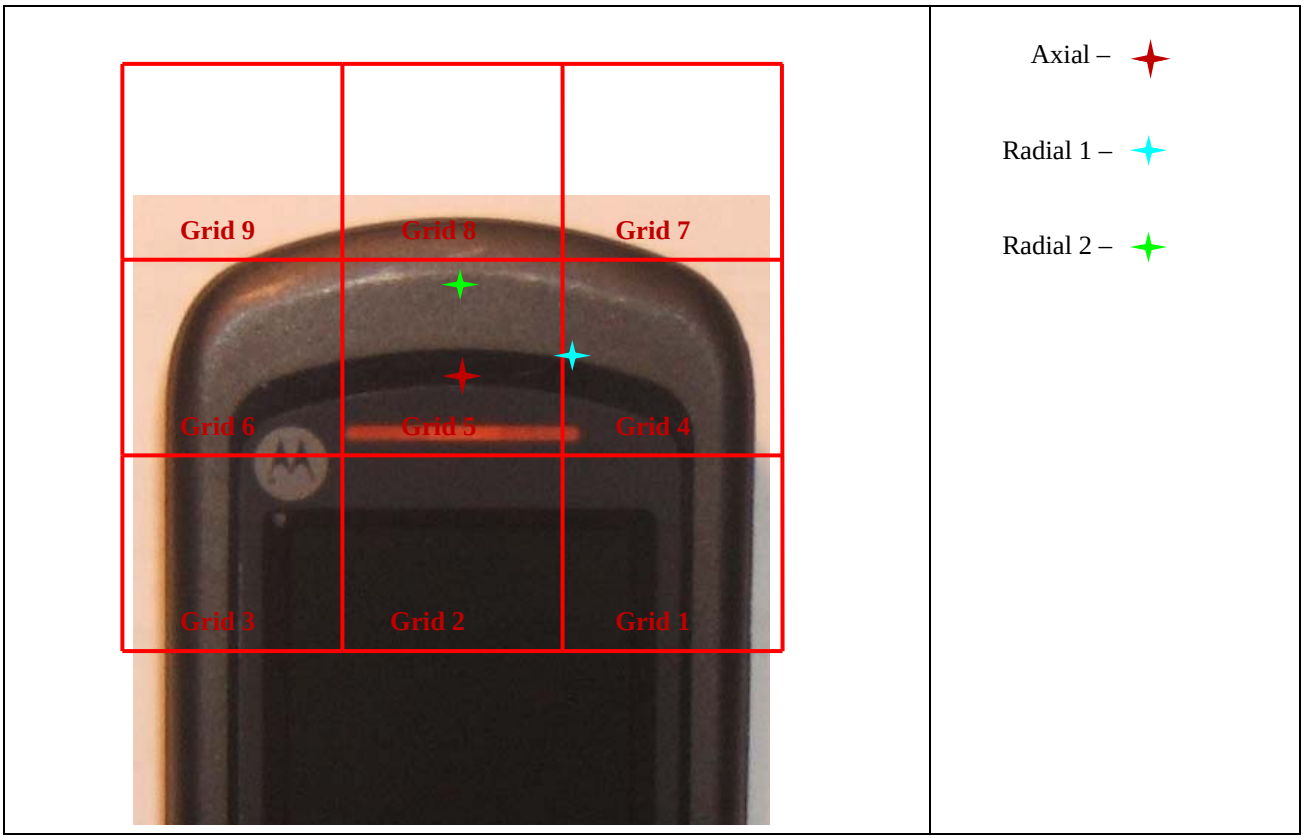


Figure 7-2 – Measurement location coordinates

Table 7 – Measurement location coordinates

Location	X coordinate (mm)	Y coordinate (mm)	Sub-grid Number (See Appendix A)
Axial -	0	1.0	5
Radial 1 -	7.35	1.0	5
Radial 2 -	0	6.51	5

Note: X is offset to the right from the center of the acoustic output and Y is the vertical offset (see Figure A-5 in ANSI C63.19-2007).

8.0 Environmental Test Conditions

The table below presents the range and average environmental conditions during the HAC tests reported herein:

Table 8 – Environmental Conditions

	Target	Measured
Ambient Temperature	23 ˚C +/- 5 ˚C	Within Guidelines
Relative Humidity	0 - 80 %	Within Guidelines

The audio lab ambient and test system noise level was determined and found satisfactory as specified in ANSI C63.19-2007, section 6.2.1. The following graph shows the results obtained using a 1/3rd octave resolution bandwidth filter.

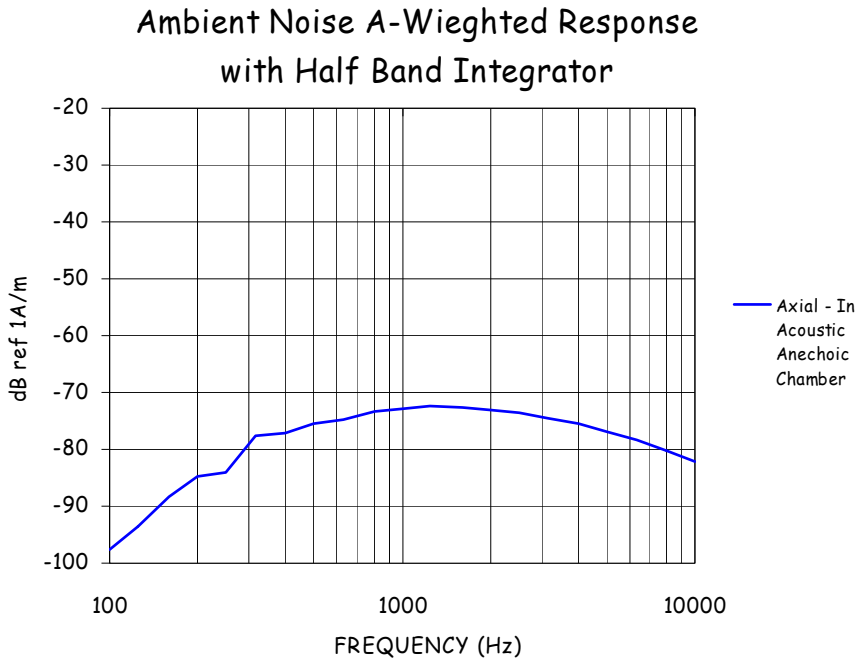


Figure 8-1– Axial Ambient Magnetic frequency distribution

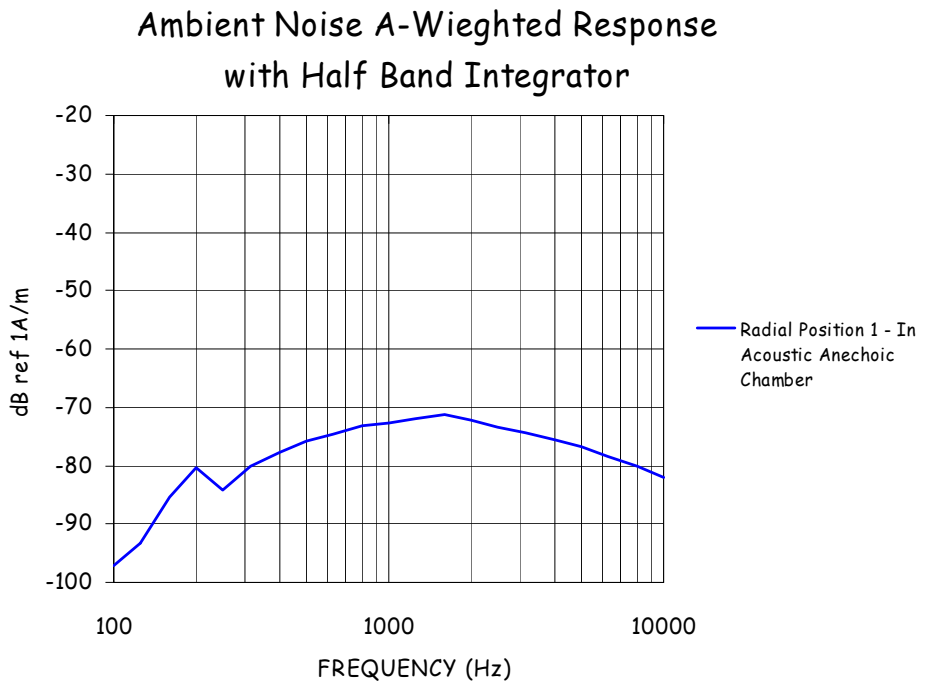


Figure 8-2 – Radial Position 1 Ambient Magnetic frequency distribution

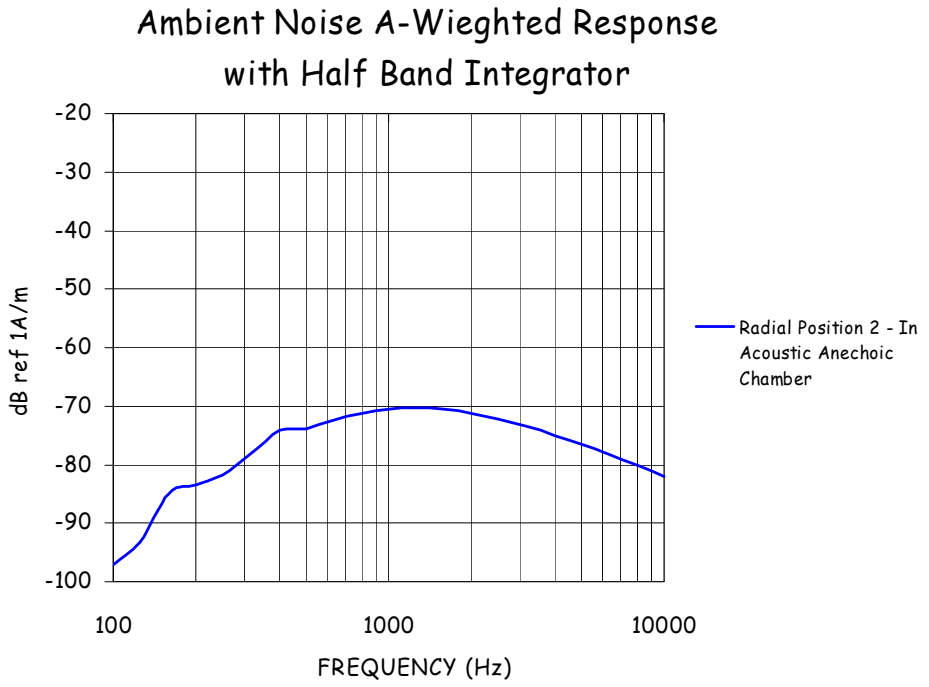


Figure 8-3 – Radial Position 2 Ambient Magnetic frequency distribution

9.0 Test Results Summary

The telecoil desired signal strength (ABM1) results per ANSI C63.19-2007, section 6.3.4.2 are shown in Section 9.2 for the 800 MHz band and 9.4 for the 900 MHz band. The desired signal results are reported herein at the center of the 800 & 900 MHz bands only, as measured in a 1/3 octave bandwidth filter. The ABM1 frequency response plots for both 800 & 900MHz are shown in Section 9.1, and illustrate compliance with the ANSI C63.19-2007 limits given in Section 2. Signal quality results depend on the undesired signal strengths (ABM2) measured per ANSI C63.19-2007, Section 6.3.4.3 and are half band integrated with an A-weighted filter applied. The undesired signal results are plotted in Figures 9-2-1 and 9-2-2 for 800 MHz and Figures 9-4-1 and 9-4-2 for the 900 MHz band. The Desired-to-Undesired ABM signal strength ratio is taken to be the difference between the lowest signal strength measured and the greatest band-dependent interference level measured. This number is in bold and highlighted in **Blue**. Signal to Noise ratios are reported in Section 9.3 for the 800 MHz band and 9.5 for the 900 MHz band. All measurements were made with backlighting off.

9.1 Axial frequency response plot data comparison:

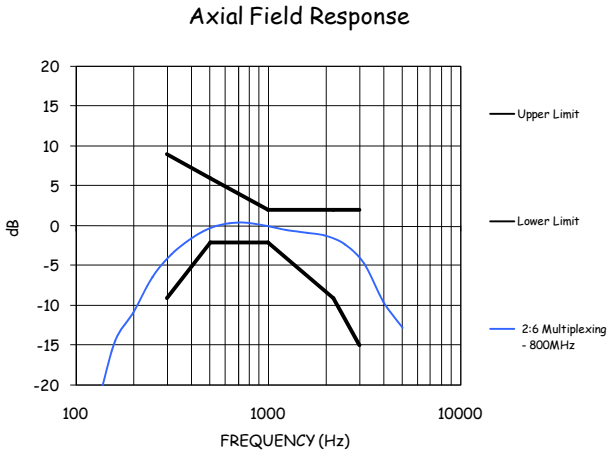


Figure 9-1-1: 800 MHz Measured Frequency Response (2:6).

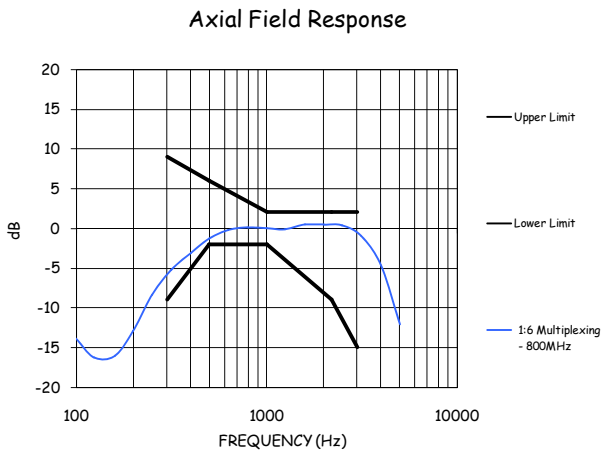


Figure 9-1-2: 800 MHz Measured Frequency Response (1:6).

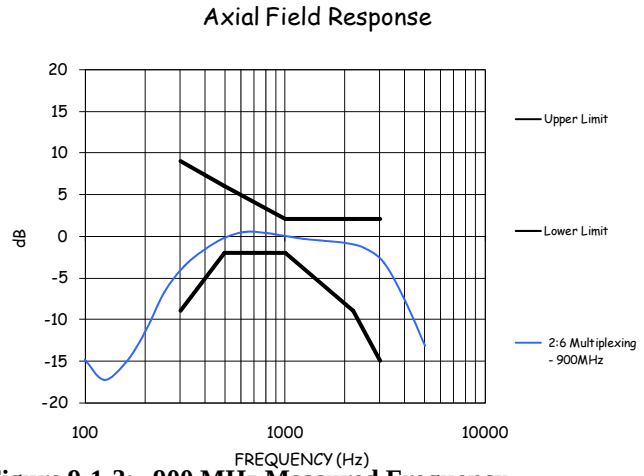


Figure 9-1-3: 900 MHz Measured Frequency Response (2:6).

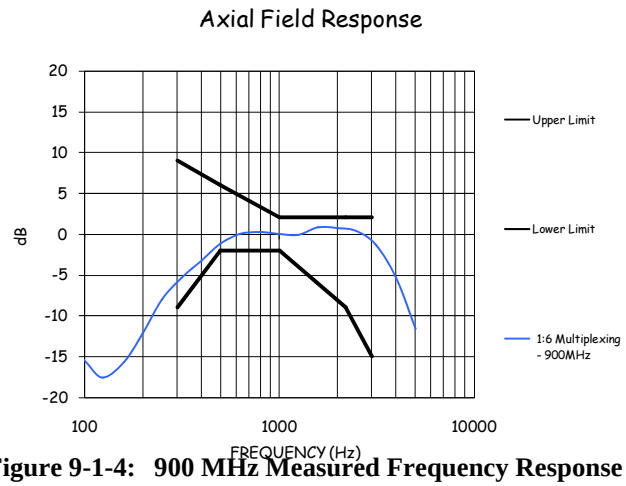


Figure 9-1-4: 900 MHz Measured Frequency Response (1:6).

The frequency responses above were measured with the DUT configured to optimize hearing aid inductive coupling frequency response, a setting selected by the user via the keypad.

These plots demonstrate that this model complies with the ANSI C63.19-2007 limits given in Section 7.3.2 and thus met the requirements of 47 CFR 20.19.

9.2 800 MHz Band Audio band magnetic (ABM) signal strength measured at 816.4125MHz

Measurement Orientation with 2:6 multiplexing	Desired signal ABM1 (dB A/m)	Undesired Signal ABM2 (dB A/m)
Axial	0.53	-56.34
Radial 1	-6.60	-55.21
Radial 2	-8.71	-66.13

Measurement Orientation with 1:6 multiplexing	Desired signal ABM1 (dB A/m)	Undesired Signal ABM2 (dB A/m)
Axial	1.14	-56.76
Radial 1	-6.12	-56.05
Radial 2	-7.42	-67.51

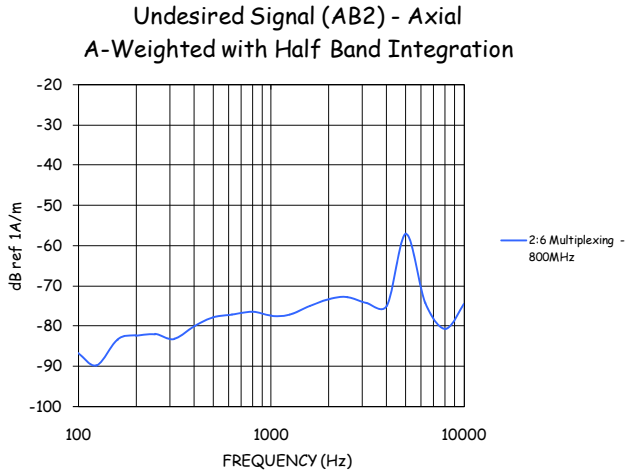


Figure 9-2-1: 800 MHz Undesired Signal (2:6).

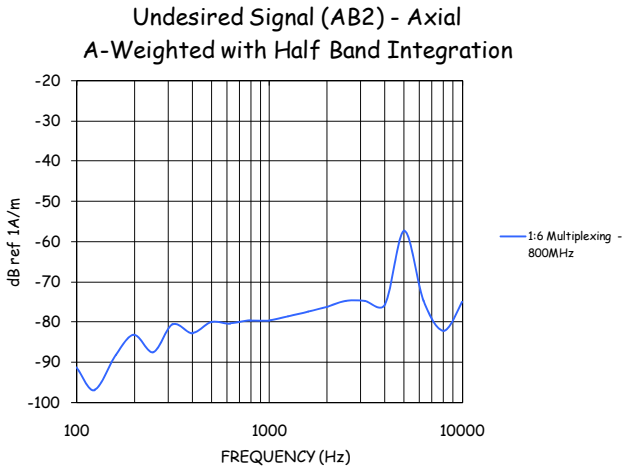


Figure 9-2-2: 800 MHz Undesired Signal (1:6).

Considering that the user has no choice of multiplexing ratio the highlighted ABM1 axial and radial values are the minimum values that all users might experience. The ABM2 values reported are the greatest values measured for the battery type listed.

9.3 800 MHz Band Desired to Undesired ABM Signal Ratio

Measurement Orientation	ABM Ratio (dB) 2:6 Multiplexing	ABM Ratio (dB) 1:6 Multiplexing
Axial	56.87	57.90
Radial 1	48.61	49.93
Radial 2	57.42	60.09

9.4 900 MHz Band Audio band magnetic (ABM) signal strength measured at 900.98125MHz

Measurement Orientation with 2:6 multiplexing	Desired signal ABM1 (dB A/m)	Undesired Signal ABM2 (dB A/m)
Axial	1.10	-55.75
Radial 1	-6.06	-55.39
Radial 2	-6.82	-67.27

Measurement Orientation with 1:6 multiplexing	Desired signal ABM1 (dB A/m)	Undesired Signal ABM2 (dB A/m)
Axial	1.88	-55.64
Radial 1	-6.19	-55.04
Radial 2	-6.61	-66.55

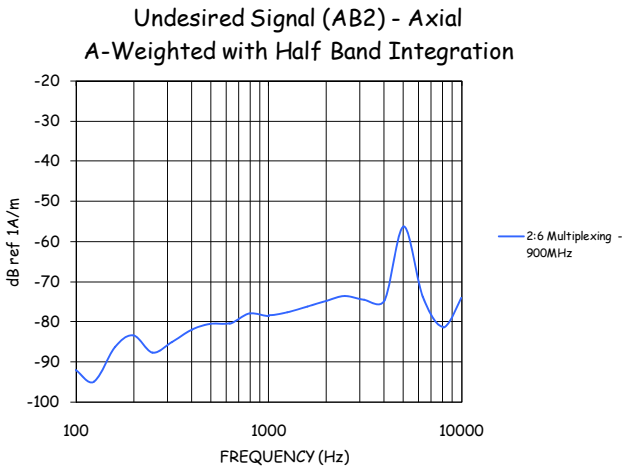


Figure 9-4-1: 900 MHz Undesired Signal (2:6).

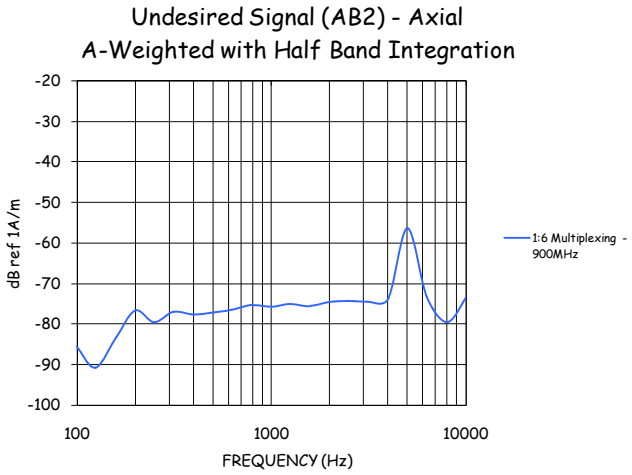


Figure 9-4-2: 900 MHz Undesired Signal (1:6).

9.5 900 MHz Band Desired to Undesired ABM Signal Ratio

Measurement Orientation	ABM Ratio (dB) 2:6 Multiplexing	ABM Ratio (dB) 1:6 Multiplexing
Axial	56.85	57.52
Radial 1	49.33	48.85
Radial 2	60.45	59.94

9.6 Minimum ABM1 Signal Strength Summary

Given that users cannot select either the frequency band or the multiplexing ratio then the minimum signal strength all users will experience is evident by comparing the highlighted values in sections 9.2 and 9.4. Those values are:

Minimum axial: 0.53 dB A/m
Minimum radial: -8.71 dB A/m (at location radial 1)

Comparing the summaries in sections 9.6 and 9.7 with the ANSI C63.19-2007 limits in Section 2 then per the flow chart in Figure 2 it is evident that this model complies with the signal strength requirements mandated by FCC 47 CFR section 20.19.

9.7 Minimum Desired to Undesired Signal Ratio Summary

Given that users cannot select either the frequency band or the multiplexing ratio then the minimum signal strength all users will experience is evident by comparing the highlighted values in sections 9.3 and 9.5. The result is:

Minimum Desired to Undesired Signal: 48.61 dB (in the 800 MHz band)

Comparing the measured desired to undesired signal ratio values listed in the tables of sections 9.3 and 9.5 with Table 1 in section 2 a rating of T4 may be justified based solely on audio band magnetic (ABM) measurements. Considering the RF interference potential this rating can be justified as long as the RF field strength warrants a rating of T4 at the specific locations where the telecoil measurements were made.

10.0 Uncertainty budget

Table 7 - List of Uncertainties

Contributor	**Data (dB)**	**Data type**	**Probability distribution**	**Divisor**	**Std. uncertainty (dB)**
RF reflections	+/- 0.8	Specification	rectangular	1.73	+/- 1.39
Acoustic noise	+/- 0.8	Specification	rectangular	1.73	+/- 1.39
Probe coil sensitivity	+/- 0.5	Specification	rectangular	1.73	+/- 0.87
Reference signal level	+/- 0.25	Specification	rectangular	1.73	+/- 0.43
Positioning accuracy	+/- 0.5	Standard deviation	Normal	1.00	+/- 0.50
Cable loss	+/- 1	Uncertainty	Normal	2.00	+/- 2.00
Frequency analyzer	+/- 0.3	Specification	rectangular	1.73	+/- 0.52
System repeatability	+/- 0.4	Standard deviation	Normal	1.00	+/- 0.40
Repeatability of the WD	+/- 0.3	Standard deviation	Normal	1.00	+/- 0.30
Combined standard uncertainty			Normal	1	0.83
Expanded uncertainty (coverage factor = 2) U			Normal (K=2)	2	1.65

11.0 Declaration of Conformity

Motorola, Inc. hereby declares that based on the data herein this model complies with the requirements of 47 CFR 20.19(b)(2) with a rating of T4 based on ANSI C63.19-2007.

ANNEX A (HAC Distribution Plots: E and H-Field RF Data)

Serial: 364VMACHWW; Procedure Notes: Battery: SNN5826B; Vocoder: 1:6
Communication System: iDEN 800, 1:6; Frequency: 824.98 MHz; Duty Cycle: 1:6
Medium: Air; Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3

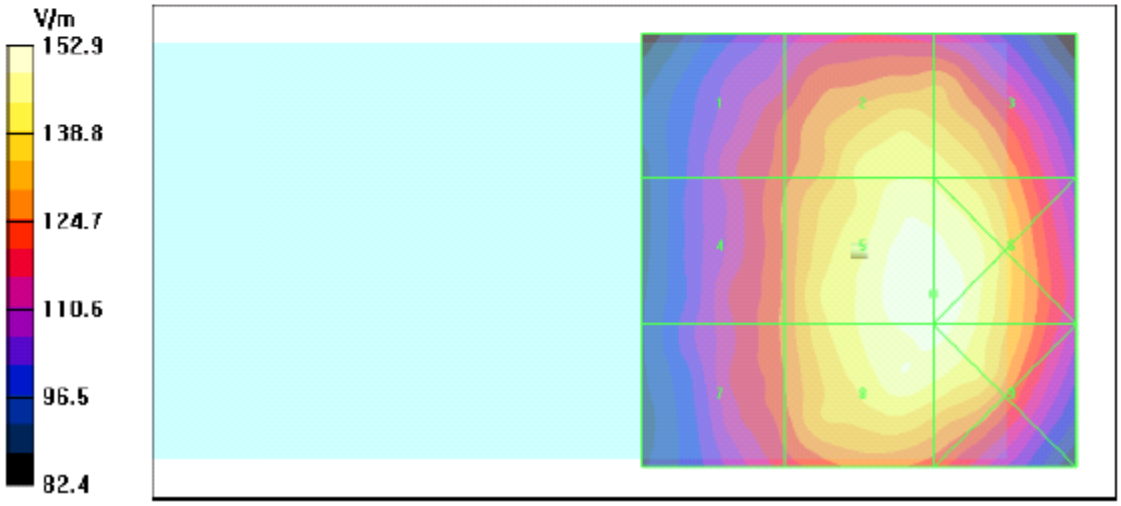
DASY4 Configuration:

- Probe: ER3DV6R - SN2244; ConvF(1, 1, 1); Calibrated: 5/11/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn387; Calibrated: 5/19/2010
- Phantom: R-3, HAC Test Arch (rev.2); Type: SD HAC P01 BA; Serial: 1071;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Hearing Aid Compatibility Test (101x101x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 152.9 V/m
Probe Modulation Factor = 5.03
Device Reference Point: 0.000, 0.000, -6.30 mm
Reference Value = 37.5 V/m; Power Drift = -0.153 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak E-field in V/m

Grid 1 **123.8 M4**	Grid 2 **143.5 M4**	Grid 3 **142.5 M4**
Grid 4 **126.6 M4**	Grid 5 **152.9 M4**	Grid 6 **152.9 M4**
Grid 7 **126.5 M4**	Grid 8 **150.5 M4**	Grid 9 **150.4 M4**



Serial: 364VMACHWW; Procedure Notes: Battery: SNN5826B; Vocoder: 1:6
Communication System: iDEN 900, 1:6; Frequency: 901.98 MHz; Duty Cycle: 1:6
Medium: Air; Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3

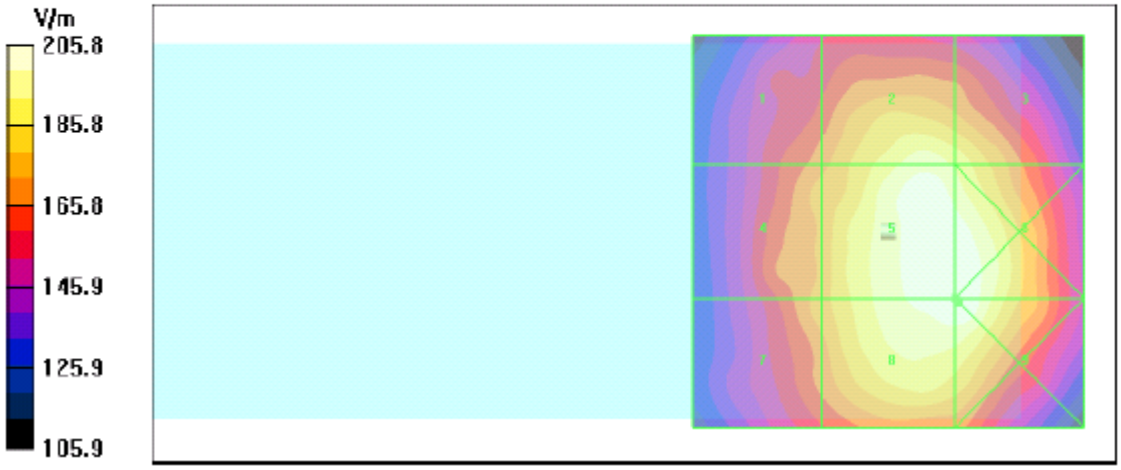
DASY4 Configuration:

- Probe: ER3DV6R - SN2244; ConvF(1, 1, 1); Calibrated: 5/11/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn387; Calibrated: 5/19/2010
- Phantom: R-3, HAC Test Arch (rev.2); Type: SD HAC P01 BA; Serial: 1071;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Hearing Aid Compatibility Test (101x101x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 205.7 V/m
Probe Modulation Factor = 4.85
Device Reference Point: 0.000, 0.000, -6.30 mm
Reference Value = 52.4 V/m; Power Drift = 0.046 dB
Hearing Aid Near-Field Category: M3 (AWF 0 dB)

Peak E-field in V/m

Grid 1 **170.6 M4**	Grid 2 **197.2 M4**	Grid 3 **191.5 M4**
Grid 4 **176.6 M4**	Grid 5 **205.7 M3**	Grid 6 **205.8 M3**
Grid 7 **176.7 M4**	Grid 8 **205.7 M3**	Grid 9 **205.8 M3**



Serial: 364VMACHWW; Procedure Notes: Battery: SNN5826B; Vocoder: 2:6
Communication System: iDEN 800, 1:3 or 2:6; Frequency: 824.98 MHz; Duty Cycle: 1:3
Medium: Air; Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3

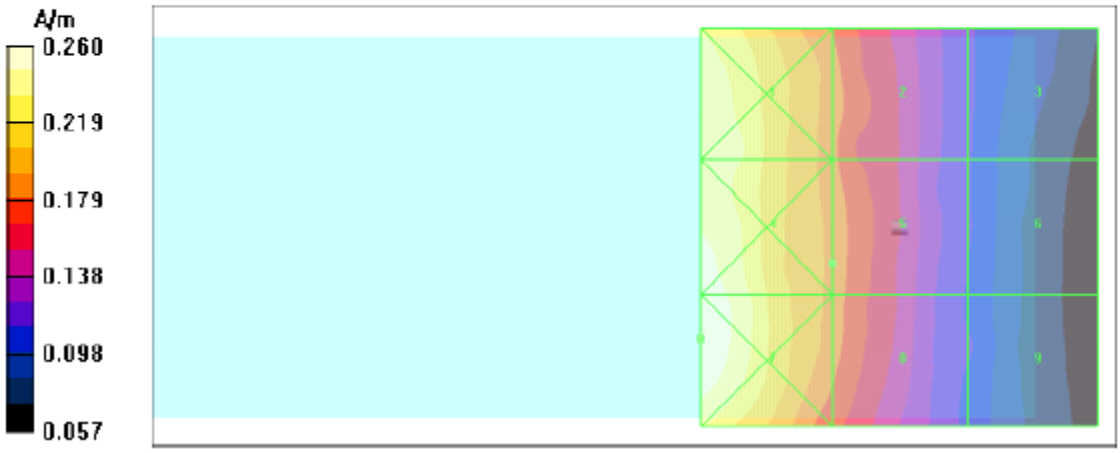
DASY4 Configuration:

- Probe: H3DV6 - SN6078; ; Calibrated: 5/11/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn650; Calibrated: 5/20/2010
- Phantom: R-3, HAC Test Arch (rev.2); Type: SD HAC P01 BA; Serial: 1071;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Hearing Aid Compatibility Test (101x101x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 0.188 A/m
Probe Modulation Factor = 3.08
Device Reference Point: 0.000, 0.000, -6.30 mm
Reference Value = 0.053 A/m; Power Drift = -0.001 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak H-field in A/m

Grid 1 0.246 M4	Grid 2 **0.186 M4**	Grid 3 **0.115 M4**
Grid 4 0.254 M4	Grid 5 **0.188 M4**	Grid 6 **0.114 M4**
Grid 7 0.260 M4	Grid 8 **0.187 M4**	Grid 9 **0.114 M4**



Serial: 364VMACHWW; Procedure Notes: Battery: SNN5826B; Vocoder: 1:6
Communication System: iDEN 900, 1:6; Frequency: 901.98 MHz; Duty Cycle: 1:6
Medium: Air; Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3

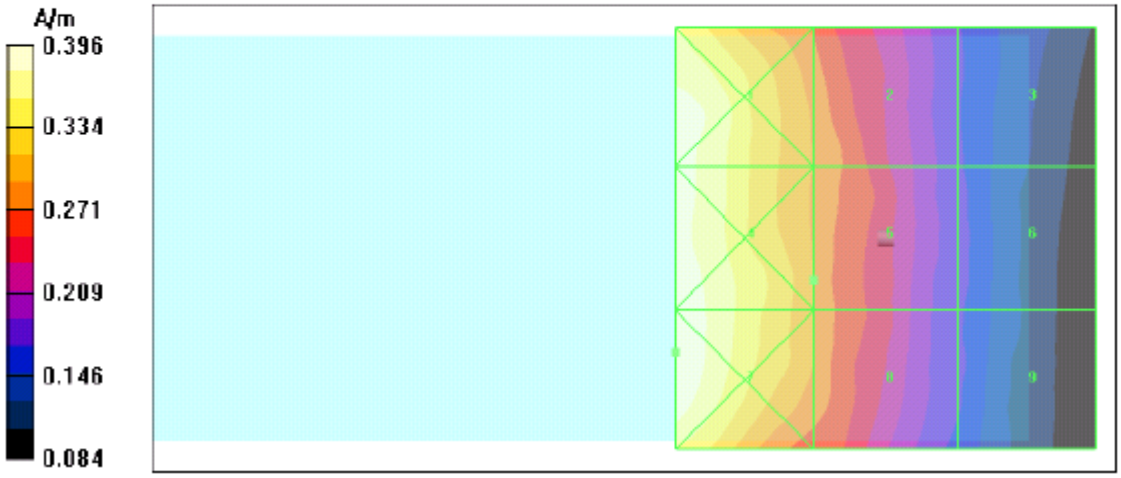
DASY4 Configuration:

- Probe: H3DV6 - SN6078; ; Calibrated: 5/11/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn650; Calibrated: 5/20/2010
- Phantom: R-3, HAC Test Arch (rev.2); Type: SD HAC P01 BA; Serial: 1071;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Hearing Aid Compatibility Test (101x101x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 0.293 A/m
Probe Modulation Factor = 4.30
Device Reference Point: 0.000, 0.000, -6.30 mm
Reference Value = 0.058 A/m; Power Drift = 0.124 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak H-field in A/m

Grid 1 0.385 M4	Grid 2 **0.291 M4**	Grid 3 **0.173 M4**
Grid 4 0.393 M4	Grid 5 **0.293 M4**	Grid 6 **0.178 M4**
Grid 7 0.396 M4	Grid 8 **0.292 M4**	Grid 9 **0.174 M4**



ANNEX B (Manufacturer's Probe Calibration Certificates)

Communication Certification Laboratory

CALIBRATION
I.D. 0484
DATE 11-30-2010 BY MG
DUE 11-30-2011

HAC Probe Certificate of Calibration

Client: Lockheed Martin
Test No: 162460-1.1
Model No: R-100
Serial No: 0484
Description: HAC Probe (Radial)

Job Number/Certificate No. 1608
Test Program Revision: None
Laboratory Site No: 1

At the time of calibration, this certifies that the above product was calibrated in accordance with applicable Communication Certification Laboratory (CCL) procedures. This report is not to be reproduced, except in full, without written approval of CCL.

At planned intervals, CCL measurement standards are calibrated by comparison to or measurement against national standards, natural physical constants, or consensus standards.

National Standards are administered by NIST (National Institute of Standards and Technology) or other recognized national standards laboratories.

Initial testing found this instrument WITHIN SPECIFICATION. The measurement uncertainty is ±0.13 dB.

Support documentation relative to traceability is on file and is available for examination upon request.

CCL recommends calibration of this equipment in the interval of 1 year and the calibration due date based on this interval is one year from the calibration date.

Standards Used

ID No.	Model No.	Manufacturer	Serial No.	Calibrated
245	HP3585A	Hewlett Packard	---	2010-03-05
533	Signal Power Bench	CCL		2010-10-06
1030	CCL Helmholtz Coil per IEEE Standard 1027 Appendix C			

Temperature: 73° F Relative Humidity: 15%

Received in tolerance Yes Returned in tolerance Yes

Calibration Date: November 30, 2010

Calibration Technician

Corporate Office and Laboratory
1940 West Alexander Street Salt Lake City, Utah 84119-2039
Tel (801) 972-6146 Fax (801) 972-8432

www.cclab.com

EMC Open Area Test Site
29145/29151 Old Lincoln Hwy Wanship, Utah 84017-9760
Tel (435) 336-5868

Communication Certification Laboratory

Hearing Aid Probe Calibration

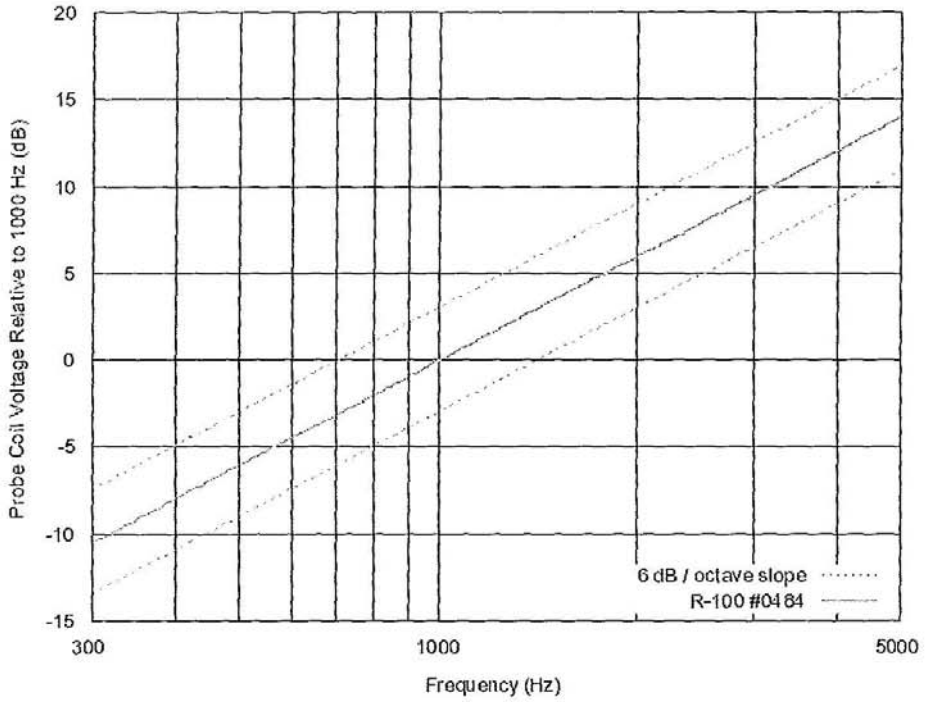
Model: R-100 Data Form: P1

Serial Number: 0484

Specification Reference: IEEE Standard 1027, Sections 5.1 and 5.2

Sensitivity at 1000 Hz: -60.2 dBV/(A/m)

Frequency Response:



* The measurement uncertainty of the probe is ± 0.13

Humidity:	15%	Temperature:	73 °F
Test Equipment:	Signal Power B - Bar Code 533	Date:	30-Nov-10
Test Operator:	M.Gates		

Communication Certification Laboratory

Hearing Aid Probe Calibration

Model: R-100 Data Form: P1

Serial Number: 0484

Specification Reference: IEEE Standard 1027, Sections 5.1 and 5.2

Summary Data

Freq (Hz)	Sens (dBV)	1kHz Ref	Freq (Hz)	Sens (dBV)	1kHz Ref	Freq (Hz)	Sens (dBV)	1kHz Ref
300	-70.6	-10.4	3590	-49.1	11.1			
394	-68.3	-8.1	3684	-48.9	11.3			
488	-66.5	-6.3	3778	-48.6	11.6			
582	-65.0	-4.8	3872	-48.4	11.8			
676	-63.7	-3.5	3966	-48.2	12.0			
770	-62.6	-2.4	4060	-48.0	12.2			
864	-61.5	-1.3	4154	-47.8	12.4			
958	-60.6	-0.4	4248	-47.6	12.6			
1000	-60.2	0.0	4342	-47.4	12.8			
1052	-59.8	0.4	4436	-47.2	13.0			
1146	-59.1	1.1	4530	-47.0	13.2			
1240	-58.4	1.8	4624	-46.9	13.3			
1334	-57.7	2.5	4718	-46.7	13.5			
1428	-57.1	3.1	4812	-46.5	13.7			
1522	-56.6	3.6	4906	-46.4	13.8			
1616	-56.1	4.1	5000	-46.2	14.0			
1710	-55.6	4.6						
1804	-55.1	5.1						
1898	-54.7	5.5						
1992	-54.3	5.9						
2086	-53.9	6.3						
2180	-53.5	6.7						
2274	-53.1	7.1						
2368	-52.8	7.4						
2462	-52.4	7.8						
2556	-52.1	8.1						
2650	-51.8	8.4						
2744	-51.5	8.7						
2838	-51.2	9.0						
2932	-50.9	9.3						
3026	-50.6	9.6						
3120	-50.3	9.9						
3214	-50.1	10.1						
3308	-49.8	10.4						
3402	-49.6	10.6						
3496	-49.3	10.9						

Humidity: 15% Temperature: 73 °F

Test Equipment: Signal Power B - Bar Code 533 Date: 30-Nov-10

Test Operator: M.Gates

Communication Certification Laboratory

CALIBRATION
I.D. 0484
DATE 11-30-2010 BY MG
DUE 11-30-2011

HAC Probe Certificate of Calibration

Client: Lockheed Martin
Test No: 162460-1.1
Model No: A-100
Serial No: 0484
Description: HAC Probe (Axial)

Job Number/Certificate No. 1607
Test Program Revision: None
Laboratory Site No: 1

At the time of calibration, this certifies that the above product was calibrated in accordance with applicable Communication Certification Laboratory (CCL) procedures. This report is not to be reproduced, except in full, without written approval of CCL.

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Initial testing found this instrument WITHIN SPECIFICATION. The measurement uncertainty is ±0.13 dB.

Support documentation relative to traceability is on file and is available for examination upon request.

CCL recommends calibration of this equipment in the interval of 1 year and the calibration due date based on this interval is one year from the calibration date.

Standards Used

ID No.	Model No.	Manufacturer	Serial No.	Calibrated
245	HP3585A	Hewlett Packard	---	2010-03-05
533	Signal Power Bench	CCL		2010-10-06
1030	CCL Helmholtz Coil per IEEE Standard 1027 Appendix C			

Temperature: 73° F Relative Humidity: 15%

Received in tolerance Yes Returned in tolerance Yes

Calibration Date: November 30, 2010

Calibration Technician

Corporate Office and Laboratory
1940 West Alexander Street Salt Lake City, Utah 84119-2039
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www.cclab.com

EMC Open Area Test Site
29145/29151 Old Lincoln Hwy Wanship, Utah 84017-9760
Tel (435) 336-5868

Communication Certification Laboratory

Hearing Aid Probe Calibration

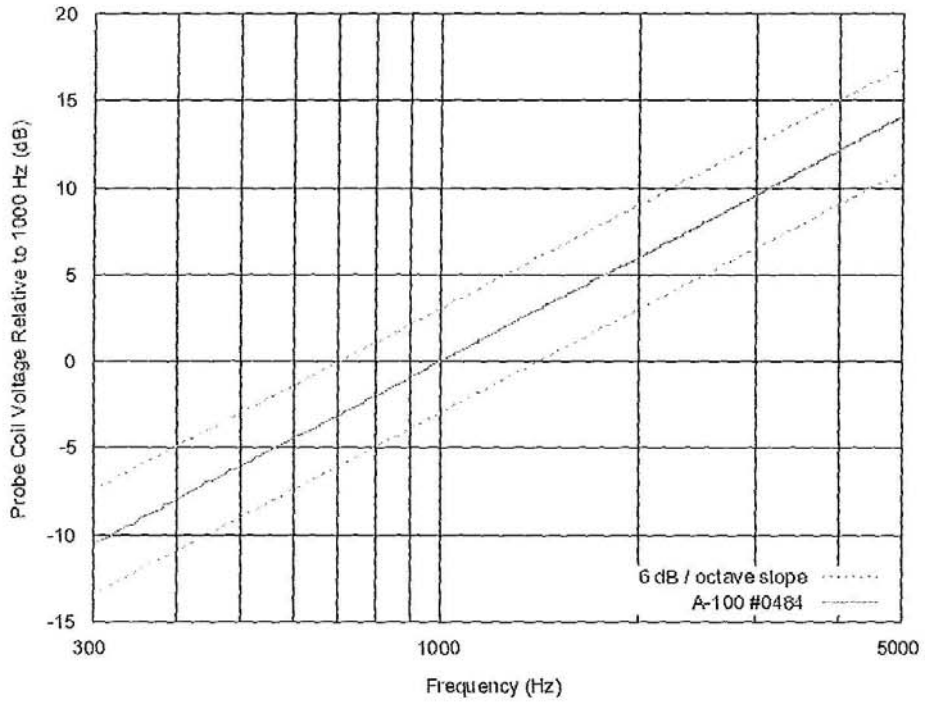
Model: A-100 Data Form: P1

Serial Number: 0484

Specification Reference: IEEE Standard 1027, Sections 5.1 and 5.2

Sensitivity at 1000 Hz: -60.2 dBV/(A/m)

Frequency Response:



* The measurement uncertainty of the probe is ± 0.13

Humidity:	15%	Temperature:	73 °F
Test Equipment:	Signal Power B - Bar Code 533	Date:	30-Nov-10
Test Operator:	M.Gates		

Communication Certification Laboratory

Hearing Aid Probe Calibration

Model: A-100 Data Form: P1

Serial Number: 0484

Specification Reference: IEEE Standard 1027, Sections 5.1 and 5.2

Summary Data

Freq (Hz)	Sens (dBV)	1kHz Ref	Freq (Hz)	Sens (dBV)	1kHz Ref	Freq (Hz)	Sens (dBV)	1kHz Ref
300	-70.6	-10.4	3590	-49.0	11.2			
394	-68.3	-8.1	3684	-48.8	11.4			
488	-66.4	-6.2	3778	-48.6	11.6			
582	-64.9	-4.7	3872	-48.3	11.9			
676	-63.7	-3.5	3966	-48.1	12.1			
770	-62.5	-2.3	4060	-47.9	12.3			
864	-61.5	-1.3	4154	-47.7	12.5			
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1710	-55.5	4.7						
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1898	-54.7	5.5						
1992	-54.2	6.0						
2086	-53.8	6.4						
2180	-53.4	6.8						
2274	-53.1	7.1						
2368	-52.7	7.5						
2462	-52.4	7.8						
2556	-52.1	8.1						
2650	-51.7	8.5						
2744	-51.4	8.8						
2838	-51.1	9.1						
2932	-50.8	9.4						
3026	-50.6	9.6						
3120	-50.3	9.9						
3214	-50.0	10.2						
3308	-49.8	10.4						
3402	-49.5	10.7						
3496	-49.3	10.9						

Humidity: 15% Temperature: 73 °F

Test Equipment: Signal Power B - Bar Code 533 Date: 30-Nov-10

Test Operator: M.Gates