A Test Lab Techno Corp.

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HAC T-Coil Test Report

Test Report No.	:	**0808FS13**
Applicant	:	**Hewlett-Packard Company**
Trade Name	:	**Hewlett-Packard**
Model Name	:	**HSTNH-I18C**
IMEI No	:	**351602000125260**
EUT Type	:	**PDA Phone**
Dates of Test	:	**Aug. 22, 2008**
Test Environment	:	**Ambient Temperature： 22 ±2 ℃**
		Relative Humidity： 40 - 70 %
Test Lab	:	**Changan Lab**
HAC T-Coil Standard	:	**ANSI C63.19-2006**
C63.19 T-Coil Rated Category	:	**T3 (Audio Band Magnetic)**
Statement of Compliance	:	**FCC 47 CFR §20.19. The measurements were performed to ensure compliance to the ANSI C63.19-2006 standard. It also declares that the product was tested in accordance with the appropriate measurement standards, guidelines and recommended practices.**

1. The test operations have to be performed with cautious behavior, the test results are as attached.
2. The test results are under chamber environment of A Test Lab Techno Corp. A Test Lab Techno Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples.
3. The measurement report has to be written approval of A Test Lab Techno Corp. It may only be reproduced or published in full.

Country Huang **20080826**
Testing Center Manager

Sam Chuang **20080826**
Testing Engineer

Contents

1. Description of Equipment Under Test (EUT)

Applicant： **Hewlett-Packard Company**
3000 Hanover Street, Palo Alto, California 94304, U.S.A.

Manufacturer	：	Inventec Appliances Co., LTD.
Manufacturer Address	：	No.37 Wugong 5th Rd. Wugu Shiong, Taipei, Taiwan
EUT Type	：	PDA Phone
Trade Name	：	Hewlett-Packard
Model Name	：	HSTNH-I18C
IMEI No	：	351602000125260
Hardware Version	：	DVT3
Software Version	：	E3-0088
Antenna type	：	Internal Type
EUT Type	：	Production Unit
Battery Option	：	Standard / Model No.: HSTNH-K18B-H (3.7V 3180mAh)

2. Description of the Test Procedure

2.1 Test Arch and Device Holder

The test device was placed in the Device Holder (illustrated below) that is supplied by SPEAG. Using this positioner the tested device is positioner under Test Arch.

Figure 1. WD Holder

2.2 Test Positions

The device was positioned such that Device Reference level was touching the bottom of the Test Arch. The speaker output is aligned with the intersection of the Test Arch's middle bar and dielectric wire. The WD is positioned always this way to ensure repeatability of the measurements. Coordinate system depicted below is used to define exact locations of measurement points relative to the center of the speaker output.

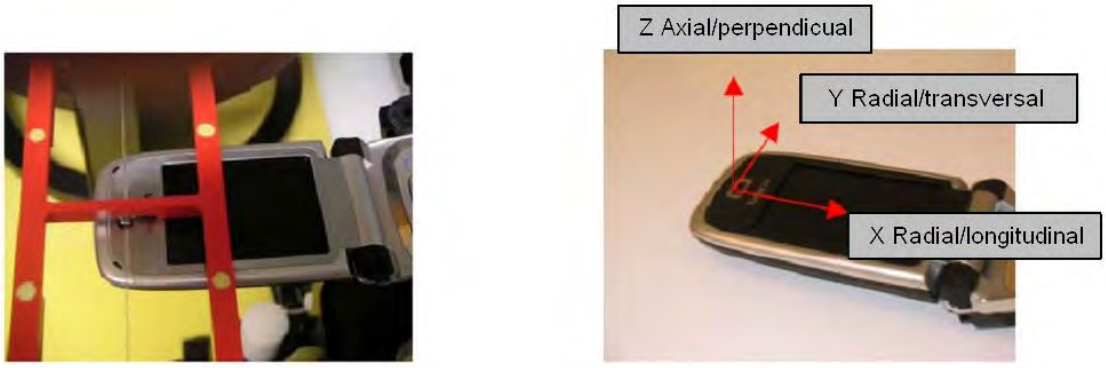


Figure 2. Photo of a typical device positioned under Test Arch and coordinate system

2.3 T-coil Scan Procedures

Manufacturer can either define measurement locations for WD categorization or optimum locations can be found using following procedure; First, coarse scans in all measurement orientations, centered at the earpiece, are made to find approximate locations of optimum signal. More accurate fine scans are made in these locations to find final measurement points.

2.4 Measurement procedure and used test signals

During measurements signal is fed to WD via communication tester. Proper gain setting is used in software to ensure correct signal level fed to communication tester speech input.

Measurement software compares fed signal and signal from measurement probe and applies proper filtering and integration procedures.

Broadband voice-like signals are used during scans and frequency response measurement to ensure proper operation of WD vocoder and audio enhancement algorithms.

Both signal (ABM1) and undesired audio noise (ABM2) are measured consequently to enable determination of signal + noise to noise ratio (SNR).
In final measurement sine signal is used to determine signal strength @ 1 kHz.

2.5 T-coil Requirements and Category Limits

RF Emissions

The radial components of the magnetic field shall be ≥-18dB (A/m) at 1 kHz, in 1/3 octave band filter for all orientations.

Frequency Response

Frequency response of the axial component must follow the frequency curve depicted below:

Frequency response is between 300 Hz and 3000 Hz.

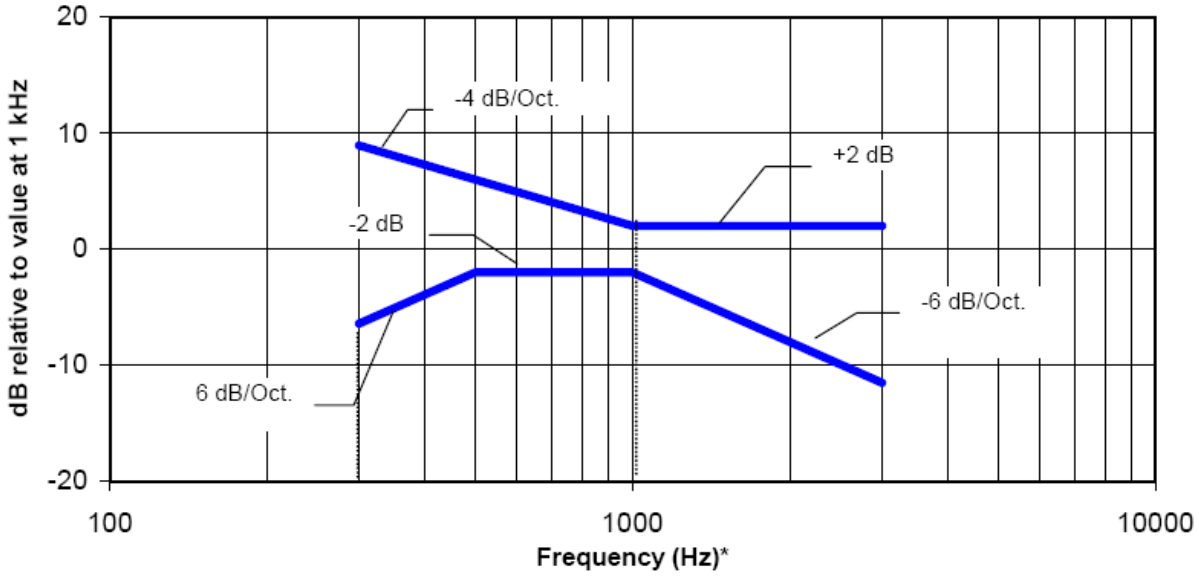


Figure 3. Magnetic field frequency response for WDs with a field ≤ -15 dB (A/m) at 1 kHz

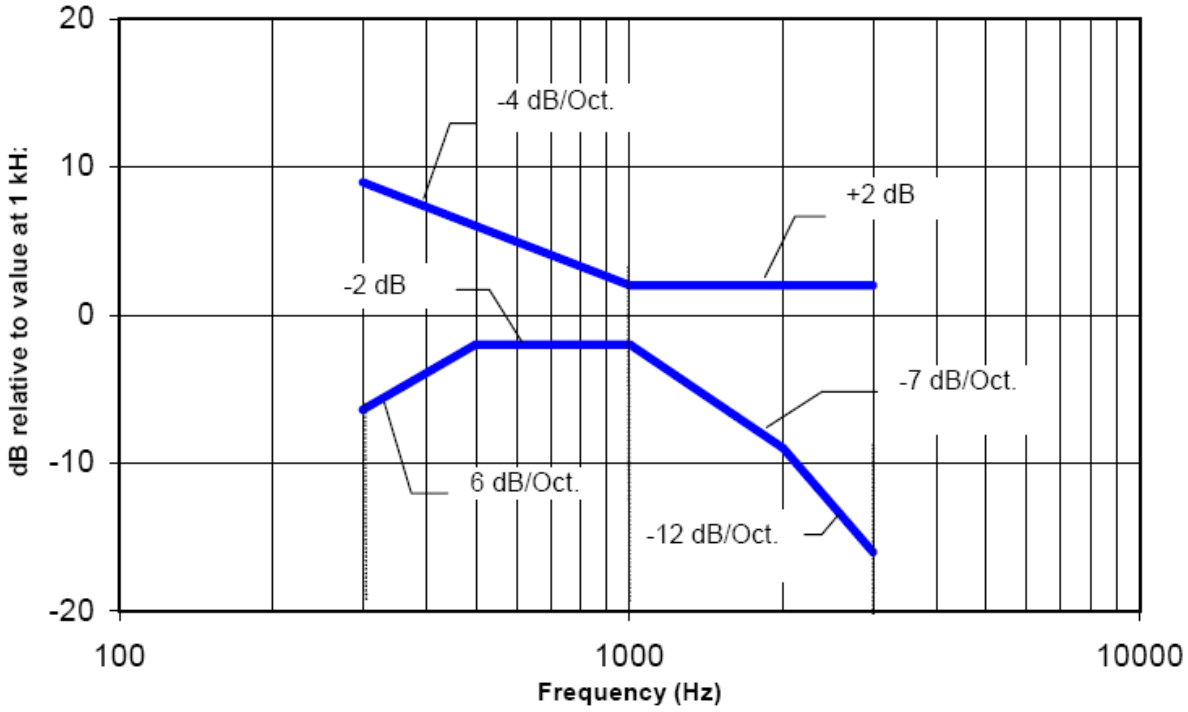


Figure 4. Magnetic field frequency response for WDs with a field that exceeds -15 dB(A/m) at 1 kHz

Signal Quality

The worst result of three T-coil signal measurements is used to define WD Hearing Aid T-category according to the category limits:

Category	Telephone parameters WD signal quality [(signal + noise)-to-noise ratio in decibels]
T1	0 dB to 10 dB
T2	10 dB to 20 dB
T3	20 dB to 30 dB
T4	> 30 dB

Table 1. T-Coil signal quality categories

2.6 Measurement Uncertainty

Measurement uncertainty budget presented in Appendix B.

3. Description of The Test Equipment

3.1 Measurement system and components

The measurements were performed using an automated near-field scanning system, DASY5 software version 5.0, manufactured by Schmid & Partner Engineering AG (SPEAG) in Switzerland.

Components and signal paths of used measurement system are pictured below:

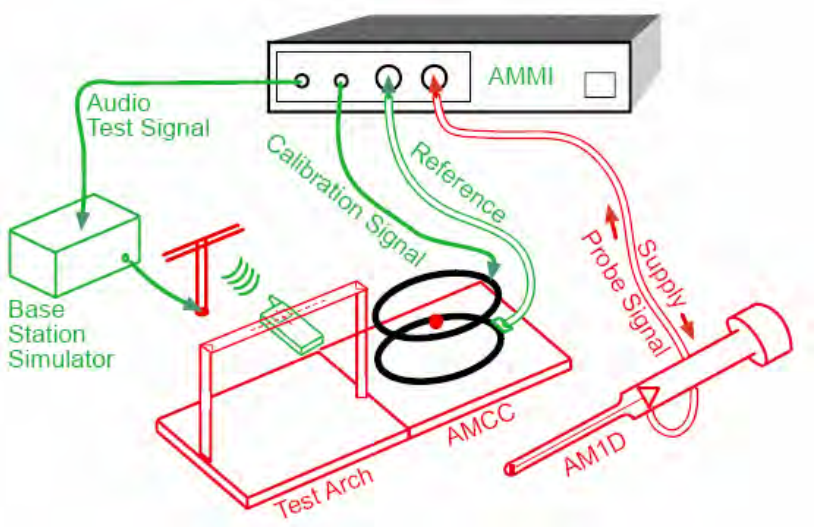


Figure 5. T-Coil Measurement system

The following table lists calibration dates of measurement equipment：

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	Data Acquisition Electronics	DAE4	779	Nov. 30, 2007	Nov. 30, 2008
SPEAG	Audio Magnetic 1D Field Probe AM1DV2	SP AM1 001 AF	1017	May. 15, 2008	May. 15, 2009
SPEAG	Device Holder	N/A	N/A	NCR	NCR
SPEAG	AMCC	SD HAC P02 AB	1011	NCR	NCR
SPEAG	AMMI	SE UMS 010AA	1001	NCR	NCR
SPEAG	Software	DASY5 V5.0 Build 119	N/A	NCR	NCR
SPEAG	Software	SEMCAD X V13.2 Build 87	N/A	NCR	NCR
SPEAG	Measurement Server	SE UMS 011 AA	1025	NCR	NCR
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	112387	Oct. 24, 2007	Oct. 24, 2008
Brüel & Kjær	Frequency Analyzer	2144	2102727	Mar. 04, 2008	Mar. 04, 2009

Table 2. Equipment List

3.1.1 Audio Magnetic Probe AM1DV2

Construction	Fully RF shielded metal construction (RF sensitivity < -100dB)
Calibration	Calibrated using Helmholtz coil
Frequency	0.1 - 20 kHz Sensitivity < -50 dB A/m
Dimensions	Overall length: 290 mm; Tip diameter: 6 mm

3.1.2 Audio Magnetic Measurement Instrument AMMI

Sampling	Rate 48 kHz/ 24 bit
Dynamic Range	85 dB
Test Signal Generation	User selectable and predefined (via PC)
Calibration	Auto-calibration / full system calibration using AMCC with monitor output

3.1.3 Audio Magnetic Calibration Coil AMCC

Dimensions	370 x 370 x 196 mm (ANSI-C63.19 compliant)

3.1.4 WD position

The WD position and Test Arch are manufactured by Speag (http://www.dasy4.com/hac). Test arch is used for all tests i.e. for both validation testing and device testing. The position and test arch conforms to the requirements of ANSI C63.19.

The SPEAG device holder (see Section 2.1) was used to position the test device in all tests.

3.1.5 Verification of the System

Audio Magnetic Probe AM1D is calibrated in AMCC Helmholtz Audio Magnetic Calibration Coil before each measurement procedure using calibration and reference signals.

4. Test Conditions

4.1 Temperature and Humidity

Ambient temperature (℃):	19 to 25
Ambient humidity (RH %):	40 to 70

Table 3. Temperature and Humidity

4.2 WD Control

The transmitter of the device was put into operation by using a call tester. Communications between the device and the call tester were established by air link. EFR speech codec was used during testing.

The device output power was set to maximum power level for all tests; a fully charged battery was used for every test sequence.

In all operating bands the measurements were performed on middle channel.

4.3 WD Parameters

HAC mode was switched on from the WD user interface, volume setting was 1/10 and microphone was muted.

4.4 Audio Band Magnetic

The purpose of the HAC T-Coil Extension is to add the capability of Audio Band Magnetic (ABM) measurements according to standard ANSI-C63.19 [1]. Together with the HAC RF extension, it allows complete characterization of the emissions of a wireless device (WD). The signals measured during these tests represent the field picked up by the T-Coil of a hearing aid. This application note describes the measurements required for the Wireless device T-Coil signal test that is described in ANSI-C63.19

4.5 System Specifications

Active Audio Magnetic Field Probe (AM1DV2) Description

The Audio Magnetic Field Probe is a fully shielded magnetic field probe for the frequency range from 100 Hz to 20 kHz. The pickup coil is compliant with the dimensional requirements of [1]. The probe includes a symmetric 40dB low noise amplifier for the signal available at the shielded 3 pin connector at the side. Power is supplied via the same connector (phantom power supply) and monitored via the LED near the connector. The 7 pin connector at the end of the probe does not carry any signals, but determines angle of sensor when mounted on the DAE. The probe supports mechanical detection of the surface. The single sensor in the probe is arranged in a tilt angle allowing measurement of 3 orthogonal field components when rotating the probe by 120◦ Around its axis. It is aligned with the perpendicular component of the field, if the probe axis is tilted 35.3 above the measurement plane, using the connector rotation below.

Figure 6.
Audio Magnetic Field Probe

The probe is fully RF shielded when operated with the matching signal cable (shielded) and allows measurement of audio magnetic fields in the close vicinity of RF emitting wireless devices according to [1] without additional shielding.

5. Summary of HAC T-Coil Signal Test Report

5.1 Summary of T-Coil Test Results

5.1.1 Results

Measurement position coordinates are defined as deviation from earpiece center in millimeters. Coordinate system is defined in chapter 4.2

Axial measurement location was defined by the manufacturer of the device.

GSM

	Radial 1 (longitudinal)		Radial 2 (transversal)		Axial	
Mode	GSM 850	PCS 1900	GSM 850	PCS 1900	GSM 850	PCS 1900
Measurement position (x,y) [mm]	-6, 2	8, 2	2, -6	0, -6	0, 2	0, 2
Signal strength [dB A/m]	1.45	1.7	2.33	2.4	9.63	9.59
Ambient back round noise ABM [dB A/m]	-57.49	-28.28	-52.1	-50.71	-54.77	-40.03
ABM2 [dB A/m]	-27.8	-24.11	-41.98	-43.69	-32.45	-34.54
Signal quality [dB]	29.3	25.8	44.3	46.1	42.1	44.1

WCDMA

	Radial 1 (longitudinal)		Radial 2 (transversal)		Axial	
Mode	Band V	Band II	Band V	Band II	Band V	Band II
Measurement position (x,y) [mm]	-6, 0	-6, 2	2, -6	2, -6	2, 0	0, 0
Signal strength [dB A/m]	-9.33	-8.29	-9.45	-7.23	-1.04	-0.174
Ambient back round noise ABM [dB A/m]	-50.72	-50.28	-52.56	-51.73	-53.37	-53.12
ABM2 [dB A/m]	-50.12	-50.78	-51.51	-50.65	-47.06	-48.35
Signal quality [dB]	40.8	42.5	42.1	43.4	46	48.2

Table 4. Test Results

Plots of the signal strength Measurement scans are presented in Appendix A.

Frequency Responses:

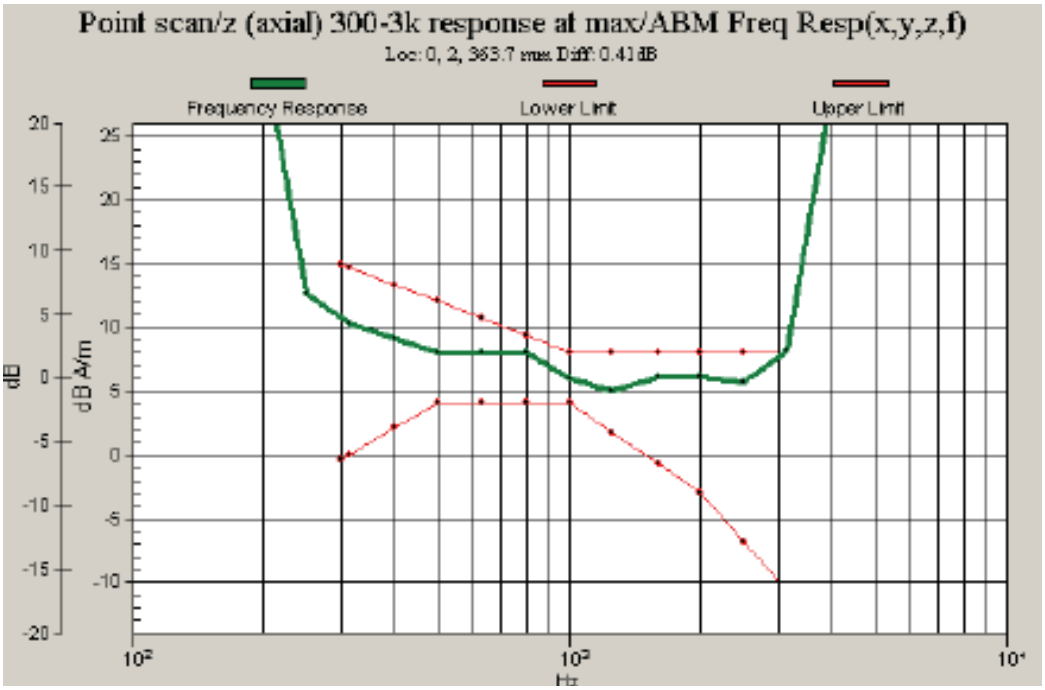


Figure 7. Frequency Response in GSM 850

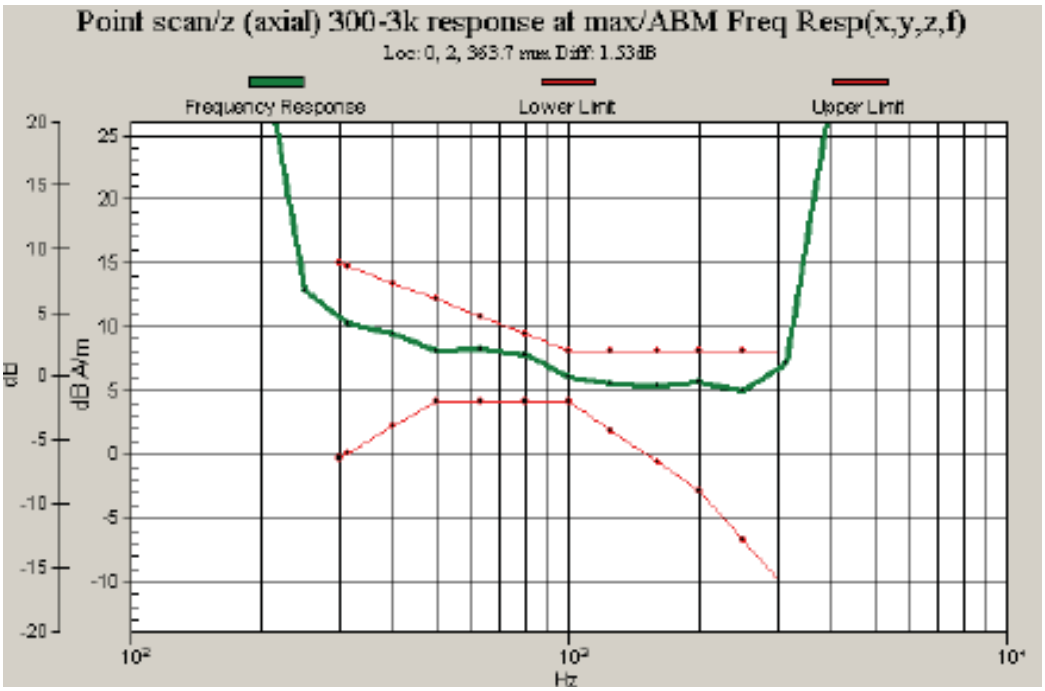


Figure 8. Frequency Response in PCS 1900

Frequency Responses:

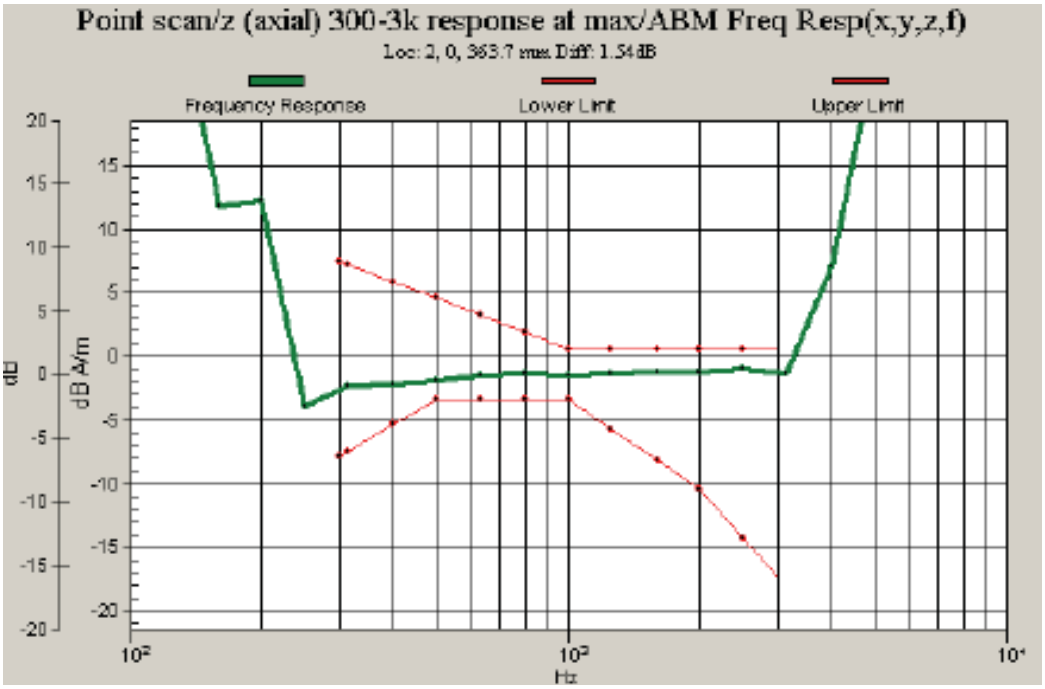


Figure 9. Frequency Response in WCDMA Band V

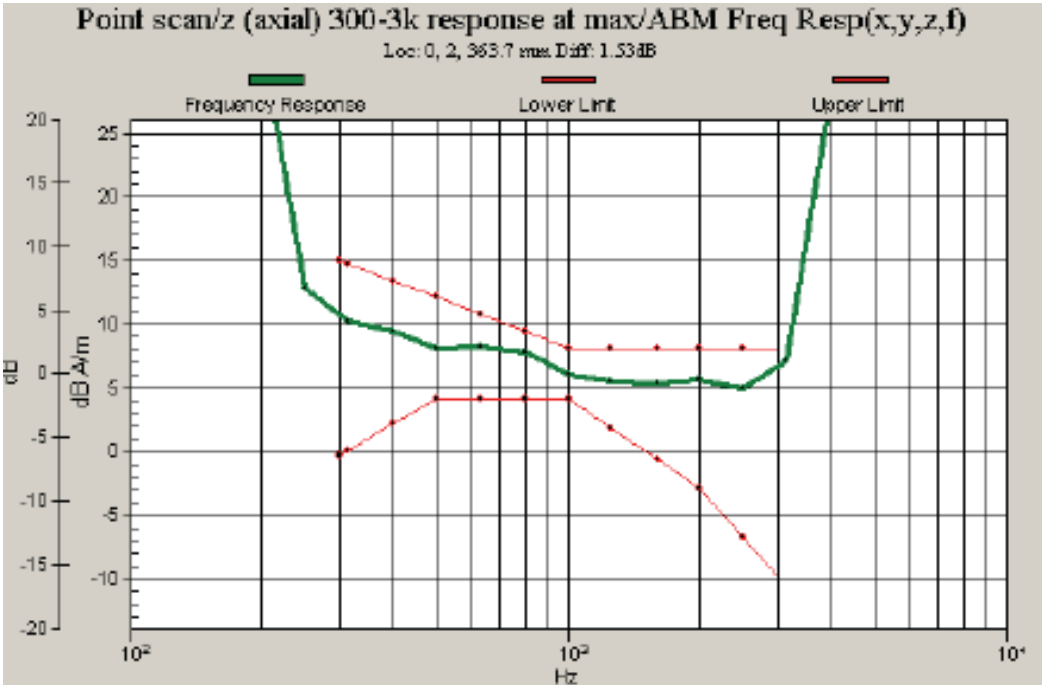


Figure 10. Frequency Response in WCDMA Band II

5.1.2 T-Coil Coupling Field Intensity

5.1.2.1. Axial Field Intensity

Cell Phone Mode	Minimum limit [dB (A/m)]	Result [dB (A/m)]	Verdict
GSM 850	-18	9.630	Pass
PCS 1900	-18	9.590	Pass
WCDMA Band V	-18	-1.040	Pass
WCDMA Band II	-18	-0.174	Pass

5.1.2.2. Radial Field Intensity

Cell Phone Mode	Minimum limit [dB (A/m)]	Result [dB (A/m)]	Verdict
GSM 850	-18	1.45	Pass
PCS 1900	-18	1.70	Pass
WCDMA Band V	-18	-9.45	Pass
WCDMA Band II	-18	-8.29	Pass

5.1.3 Frequency Response at Axial Measurement Point

Cell Phone Mode	Verdict
GSM 850	Pass
PCS 1900	Pass
WCDMA Band V	Pass
WCDMA Band II	Pass

5.1.4 Signal Quality

Cell Phone Mode	Minimum Limit [dB]				Minimum Result [dB]	Category
	T1	T2	T3	T4		
GSM 850	0 to 10	10 to 20	20 to 30	>30	29.3	T3
PCS 1900	0 to 10	10 to 20	20 to 30	>30	25.8	T3
WCDMA Band V	0 to 10	10 to 20	20 to 30	>30	40.8	T4
WCDMA Band II	0 to 10	10 to 20	20 to 30	>30	42.5	T4

5.2 Description of the Device under Test (DUT)

Modes and Bands of Operation	GSM 850	PCS 1900	WCDMA Band V	WCDMA Band II
Modulation Mode	GMSK	GMSK	QPSK	QPSK
Duty Cycle	1/8.3	1/8.3	1/1	1/1
Transmitter Frequency Range (MHz)	824.2 - 848.8	1850.2 - 1909.8	826.4 - 846.6	1852.4 - 1907.6

5.2.1 Picture of Device

Top view

Back view

Figure 11. EUT Picture

5.2.2 Picture of Accessories

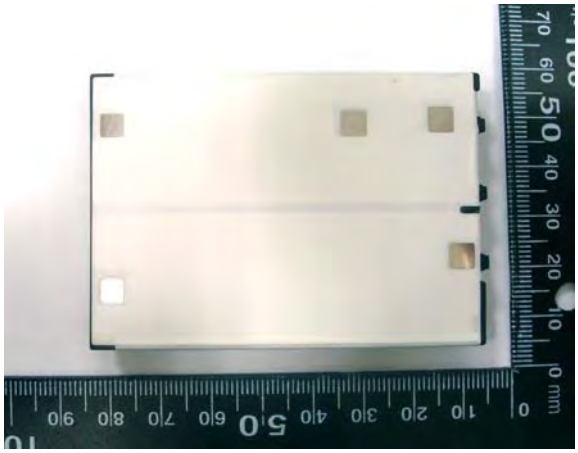


Figure 12. Battery (HSTNH-K18B-H 3.7V 3180mAh)

Figure 13. AC Adapter

5.2.3 Test Setup Photo

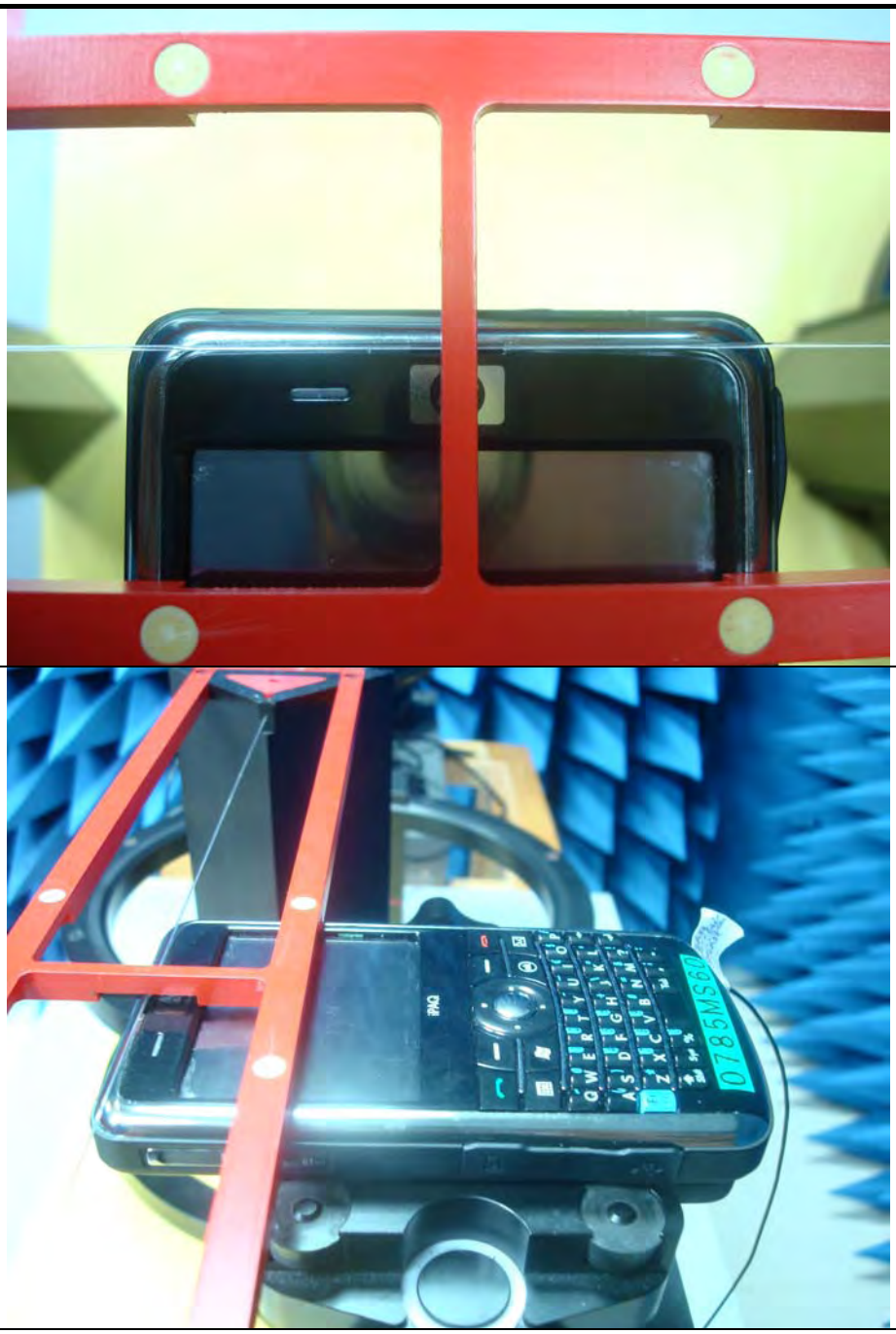


Figure 14. Setup Photo

Appendix A - Measurement Scans

See following Attached Pages for measurement scans.

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 8/22/2008 6:06:21 PM

T-Coil_GSM 850 CH190_x (longitudinal)

DUT: HSTNH-I18C; Type: PDA Phone; Serial: 351602000125260

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: AMB with Coil Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: AM1DV2 - 1017; ; Calibrated: 5/15/2008
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: HAC Test Arch with Coil; Type: SD_HAC_P02_AB; Serial: 1011
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

Coarse Scans/x (axial) scan 50 x 50 (grid 10) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 0.299 dB A/m
BWC Factor = 0.155979 dB
Location: -5, 5, 363.7 mm

Fine scan/x (longitudinal) scan 10 x 10 (grid 2) with noise 2/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 1.47 dB A/m
BWC Factor = 0.155979 dB
Location: -6, 2, 363.7 mm

Point scan/x (longitudinal) scan at point with noise/ABM SNR(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 29.3 dB
ABM1 comp = 1.45 dB A/m
BWC Factor = 0.155979 dB
Location: -6, 2, 363.7 mm

Point scan/x (longitudinal) scan at point with noise/ABM Signal(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 1.45 dB A/m
BWC Factor = 0.155979 dB
Location: -6, 2, 363.7 mm

0 dB = 1A/m

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 8/22/2008 6:07:51 PM

T-Coil_GSM 850 CH190_y (transversal)

DUT: HSTNH-I18C; Type: PDA Phone; Serial: 351602000125260

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: AMB with Coil Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: AM1DV2 - 1017; ; Calibrated: 5/15/2008
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: HAC Test Arch with Coil; Type: SD_HAC_P02_AB; Serial: 1011
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

Coarse Scans/y (axial) scan 50 x 50 (grid 10) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 0.914 dB A/m
BWC Factor = 0.155979 dB
Location: 5, -5, 363.7 mm

Fine scan/y (transversal) scan 10 x 10 (grid 2) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 2.48 dB A/m
BWC Factor = 0.155979 dB
Location: 2, -6, 363.7 mm

Point scan/y (transversal) scan at point with noise/ABM SNR(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 44.3 dB
ABM1 comp = 2.33 dB A/m
BWC Factor = 0.155979 dB
Location: 2, -6, 363.7 mm

Point scan/y (transversal) scan at point with noise/ABM Signal(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 2.33 dB A/m
BWC Factor = 0.155979 dB
Location: 2, -6, 363.7 mm

0 dB = 1A/m

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 8/22/2008 6:04:48 PM

T-Coil_GSM 850 CH190_z (axial)

DUT: HSTNH-I18C; Type: PDA Phone; Serial: 351602000125260

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: AMB with Coil Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: AM1DV2 - 1017; ; Calibrated: 5/15/2008
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: HAC Test Arch with Coil; Type: SD_HAC_P02_AB; Serial: 1011
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

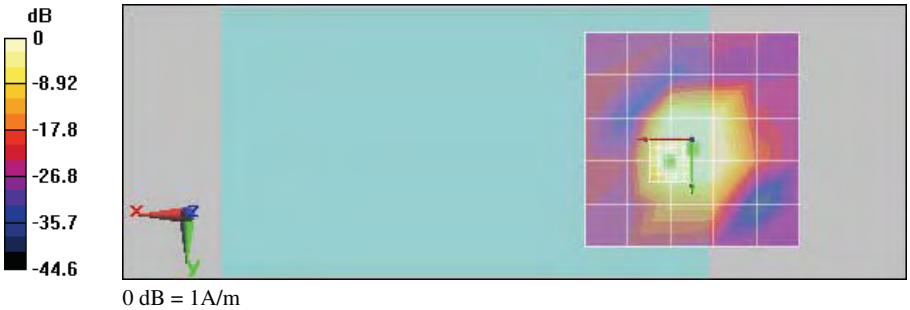
Coarse Scans/z (axial) scan 50 x 50 (grid 10) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 4.95 dB A/m
BWC Factor = 0.155979 dB
Location: 5, 5, 363.7 mm

Fine scan/z (axial) scan 10 x 10 (grid 2) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 9.67 dB A/m
BWC Factor = 0.155979 dB
Location: 0, 2, 363.7 mm

Point scan/z (axial) 300-3k response at max/ABM Freq Resp(x,y,z,f) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
Diff = 0.408 dB
BWC Factor = 10.8 dB
Location: 0, 2, 363.7 mm

Point scan/z (axial) scan at point with noise/ABM SNR(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 42.1 dB
ABM1 comp = 9.63 dB A/m
BWC Factor = 0.155979 dB
Location: 0, 2, 363.7 mm

Point scan/z (axial) scan at point with noise/ABM Signal(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 9.63 dB A/m
BWC Factor = 0.155979 dB
Location: 0, 2, 363.7 mm



0 dB = 1A/m

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 8/22/2008 6:54:58 PM

T-Coil_PCS CH661_x (longitudinal)

DUT: HSTNH-I18C; Type: PDA Phone; Serial: 351602000125260

Communication System: PCS; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: AMB with Coil Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

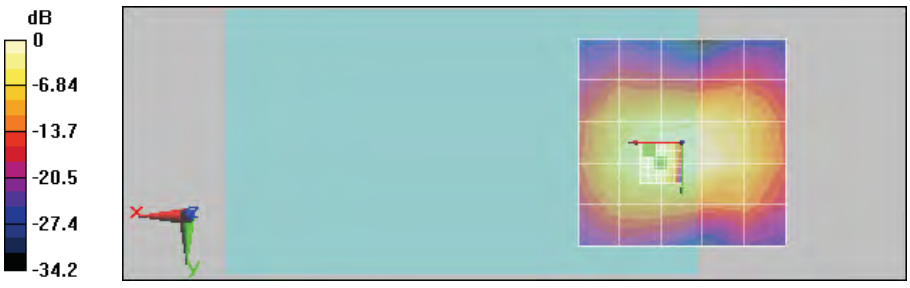
- Probe: AM1DV2 - 1017; ; Calibrated: 5/15/2008
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: HAC Test Arch with Coil; Type: SD_HAC_P02_AB; Serial: 1011
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

Coarse Scans/x (axial) scan 50 x 50 (grid 10) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 0.249 dB A/m
BWC Factor = 0.155041 dB
Location: 5, 5, 363.7 mm

Fine scan/x (longitudinal) scan 10 x 10 (grid 2) with noise 2/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 1.75 dB A/m
BWC Factor = 0.155041 dB
Location: 8, 2, 363.7 mm

Point scan/x (longitudinal) scan at point with noise/ABM SNR(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 25.8 dB
ABM1 comp = 1.7 dB A/m
BWC Factor = 0.155979 dB
Location: 8, 2, 363.7 mm

Point scan/x (longitudinal) scan at point with noise/ABM Signal(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 1.7 dB A/m
BWC Factor = 0.155979 dB
Location: 8, 2, 363.7 mm



0 dB = 1A/m

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 8/22/2008 6:56:28 PM

T-Coil_PCS CH661_y (transversal)

DUT: HSTNH-I18C; Type: PDA Phone; Serial: 351602000125260

Communication System: PCS; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: AMB with Coil Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: AM1DV2 - 1017; ; Calibrated: 5/15/2008
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: HAC Test Arch with Coil; Type: SD_HAC_P02_AB; Serial: 1011
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

Coarse Scans/y (axial) scan 50 x 50 (grid 10) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 0.863 dB A/m
BWC Factor = 0.155041 dB
Location: 5, -5, 363.7 mm

Fine scan/y (transversal) scan 10 x 10 (grid 2) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 2.49 dB A/m
BWC Factor = 0.155041 dB
Location: 0, -6, 363.7 mm

Point scan/y (transversal) scan at point with noise/ABM SNR(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 46.1 dB
ABM1 comp = 2.4 dB A/m
BWC Factor = 0.155979 dB
Location: 0, -6, 363.7 mm

Point scan/y (transversal) scan at point with noise/ABM Signal(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 2.4 dB A/m
BWC Factor = 0.155979 dB
Location: 0, -6, 363.7 mm

0 dB = 1A/m

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 8/22/2008 6:53:24 PM

T-Coil_PCS CH661_z (axial)

DUT: HSTNH-I18C; Type: PDA Phone; Serial: 351602000125260

Communication System: PCS; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: AMB with Coil Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: AM1DV2 - 1017; ; Calibrated: 5/15/2008
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: HAC Test Arch with Coil; Type: SD_HAC_P02_AB; Serial: 1011
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

Coarse Scans/z (axial) scan 50 x 50 (grid 10) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 4.92 dB A/m
BWC Factor = 0.155041 dB
Location: 5, 5, 363.7 mm

Fine scan/z (axial) scan 10 x 10 (grid 2) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 9.68 dB A/m
BWC Factor = 0.155041 dB
Location: 0, 2, 363.7 mm

Point scan/z (axial) 300-3k response at max/ABM Freq Resp(x,y,z,f) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
Diff = 1.53 dB
BWC Factor = 10.8 dB
Location: 0, 2, 363.7 mm

Point scan/z (axial) scan at point with noise/ABM SNR(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 44.1 dB
ABM1 comp = 9.59 dB A/m
BWC Factor = 0.155979 dB
Location: 0, 2, 363.7 mm

Point scan/z (axial) scan at point with noise/ABM Signal(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 9.59 dB A/m
BWC Factor = 0.155979 dB
Location: 0, 2, 363.7 mm

0 dB = 1A/m

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 8/22/2008 8:26:54 PM

T-Coil_WCDMA Band V CH4183_x (longitudinal)

DUT: HSTNH-I18C; Type: PDA Phone; Serial: 351602000125260

Communication System: WCDMA Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: AMB with Coil Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: AM1DV2 - 1017; ; Calibrated: 5/15/2008
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: HAC Test Arch with Coil; Type: SD_HAC_P02_AB; Serial: 1011
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

Coarse Scans/x (axial) scan 50 x 50 (grid 10) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -11.3 dB A/m
BWC Factor = 0.155041 dB
Location: -5, 5, 363.7 mm

Fine scan/x (longitudinal) scan 10 x 10 (grid 2) with noise 2/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -9.28 dB A/m
BWC Factor = 0.155041 dB
Location: -6, 0, 363.7 mm

Point scan/x (longitudinal) scan at point with noise/ABM SNR(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 40.8 dB
ABM1 comp = -9.33 dB A/m
BWC Factor = 0.155041 dB
Location: -6, 0, 363.7 mm

Point scan/x (longitudinal) scan at point with noise/ABM Signal(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -9.33 dB A/m
BWC Factor = 0.155041 dB
Location: -6, 0, 363.7 mm

0 dB = 1A/m

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 8/22/2008 8:28:23 PM

T-Coil_WCDMA Band V CH4183_y (transversal)

DUT: HSTNH-I18C; Type: PDA Phone; Serial: 351602000125260

Communication System: WCDMA Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: AMB with Coil Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: AM1DV2 - 1017; ; Calibrated: 5/15/2008
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: HAC Test Arch with Coil; Type: SD_HAC_P02_AB; Serial: 1011
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

Coarse Scans/y (axial) scan 50 x 50 (grid 10) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -11 dB A/m
BWC Factor = 0.155041 dB
Location: 5, -5, 363.7 mm

Fine scan/y (transversal) scan 10 x 10 (grid 2) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -9.48 dB A/m
BWC Factor = 0.155041 dB
Location: 2, -6, 363.7 mm

Point scan/y (transversal) scan at point with noise/ABM SNR(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 42.1 dB
ABM1 comp = -9.45 dB A/m
BWC Factor = 0.155041 dB
Location: 2, -6, 363.7 mm

Point scan/y (transversal) scan at point with noise/ABM Signal(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -9.45 dB A/m
BWC Factor = 0.155041 dB
Location: 2, -6, 363.7 mm

0 dB = 1A/m

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 8/22/2008 8:25:20 PM

T-Coil_WCDMA Band V CH4183_z (axial)

DUT: HSTNH-I18C; Type: PDA Phone; Serial: 351602000125260

Communication System: WCDMA Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: AMB with Coil Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: AM1DV2 - 1017; ; Calibrated: 5/15/2008
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: HAC Test Arch with Coil; Type: SD_HAC_P02_AB; Serial: 1011
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

Coarse Scans/z (axial) scan 50 x 50 (grid 10) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -4.92 dB A/m
BWC Factor = 0.155041 dB
Location: 5, 5, 363.7 mm

Fine scan/z (axial) scan 10 x 10 (grid 2) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -0.949 dB A/m
BWC Factor = 0.155041 dB
Location: 2, 0, 363.7 mm

Point scan/z (axial) 300-3k response at max/ABM Freq Resp(x,y,z,f) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
Diff = 1.54 dB
BWC Factor = 10.8 dB
Location: 2, 0, 363.7 mm

Point scan/z (axial) scan at point with noise/ABM SNR(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 46 dB
ABM1 comp = -1.04 dB A/m
BWC Factor = 0.155041 dB
Location: 2, 0, 363.7 mm

Point scan/z (axial) scan at point with noise/ABM Signal(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -1.04 dB A/m
BWC Factor = 0.155041 dB
Location: 2, 0, 363.7 mm

0 dB = 1A/m

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 8/22/2008 7:30:46 PM

T-Coil_WCDMA Band II CH9400_x (longitudinal)

DUT: HSTNH-I18C; Type: PDA Phone; Serial: 351602000125260

Communication System: WCDMA Band II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: AMB with Coil Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

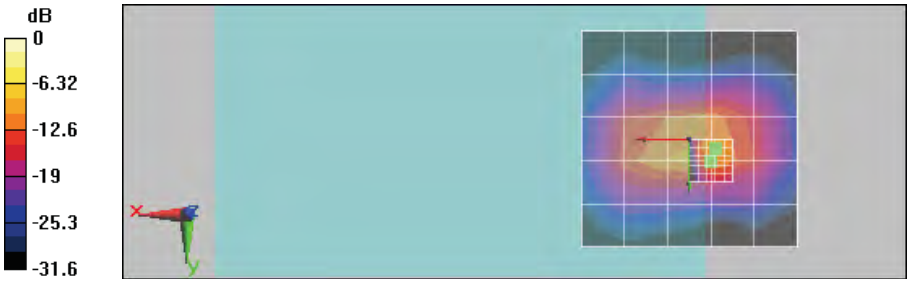
- Probe: AM1DV2 - 1017; ; Calibrated: 5/15/2008
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: HAC Test Arch with Coil; Type: SD_HAC_P02_AB; Serial: 1011
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

Coarse Scans/x (axial) scan 50 x 50 (grid 10) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -9.71 dB A/m
BWC Factor = 0.155979 dB
Location: -5, 5, 363.7 mm

Fine scan/x (longitudinal) scan 10 x 10 (grid 2) with noise 2/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -8.12 dB A/m
BWC Factor = 0.155979 dB
Location: -6, 2, 363.7 mm

Point scan/x (longitudinal) scan at point with noise/ABM SNR(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 42.5 dB
ABM1 comp = -8.29 dB A/m
BWC Factor = 0.155041 dB
Location: -6, 2, 363.7 mm

Point scan/x (longitudinal) scan at point with noise/ABM Signal(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -8.29 dB A/m
BWC Factor = 0.155041 dB
Location: -6, 2, 363.7 mm



0 dB = 1A/m

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 8/22/2008 7:32:17 PM

T-Coil_WCDMA Band II CH9400_y (transversal)

DUT: HSTNH-I18C; Type: PDA Phone; Serial: 351602000125260

Communication System: WCDMA Band II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: AMB with Coil Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: AM1DV2 - 1017; ; Calibrated: 5/15/2008
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: HAC Test Arch with Coil; Type: SD_HAC_P02_AB; Serial: 1011
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

Coarse Scans/y (axial) scan 50 x 50 (grid 10) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -8.82 dB A/m
BWC Factor = 0.155979 dB
Location: 5, -5, 363.7 mm

Fine scan/y (transversal) scan 10 x 10 (grid 2) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -7.09 dB A/m
BWC Factor = 0.155979 dB
Location: 2, -6, 363.7 mm

Point scan/y (transversal) scan at point with noise/ABM SNR(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 43.4 dB
ABM1 comp = -7.23 dB A/m
BWC Factor = 0.155041 dB
Location: 2, -6, 363.7 mm

Point scan/y (transversal) scan at point with noise/ABM Signal(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -7.23 dB A/m
BWC Factor = 0.155041 dB
Location: 2, -6, 363.7 mm

0 dB = 1A/m

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 8/22/2008 7:29:13 PM

T-Coil_WCDMA Band II CH9400_z (axial)

DUT: HSTNH-I18C; Type: PDA Phone; Serial: 351602000125260

Communication System: WCDMA Band II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: AMB with Coil Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: AM1DV2 - 1017; ; Calibrated: 5/15/2008
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: HAC Test Arch with Coil; Type: SD_HAC_P02_AB; Serial: 1011
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

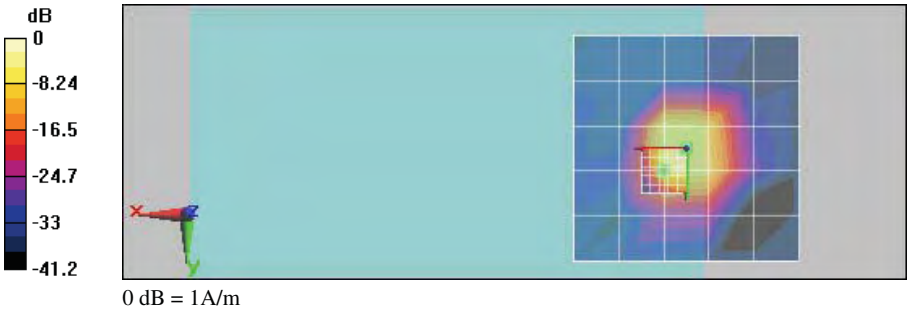
Coarse Scans/z (axial) scan 50 x 50 (grid 10) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -4.82 dB A/m
BWC Factor = 0.155979 dB
Location: 5, 5, 363.7 mm

Fine scan/z (axial) scan 10 x 10 (grid 2) with noise/ABM Signal(x,y,z) (6x6x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -0.092 dB A/m
BWC Factor = 0.155979 dB
Location: 0, 0, 363.7 mm

Point scan/z (axial) 300-3k response at max/ABM Freq Resp(x,y,z,f) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
Diff = 1.32 dB
BWC Factor = 10.8 dB
Location: 0, 0, 363.7 mm

Point scan/z (axial) scan at point with noise/ABM SNR(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 48.2 dB
ABM1 comp = -0.174 dB A/m
BWC Factor = 0.155041 dB
Location: 0, 0, 363.7 mm

Point scan/z (axial) scan at point with noise/ABM Signal(x,y,z) (1x1x1):
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -0.174 dB A/m
BWC Factor = 0.155041 dB
Location: 0, 0, 363.7 mm



0 dB = 1A/m

Appendix B - Measurement Uncertainty

Error Description	Uncertainty value[%]	Prob. Dist.	Div.	c ABM1	c ABM2	Std. Unc. ABM1	Std. Unc. ABM2
PROBE SENSITIVITY							
Reference level	3.0	N	1.0	1	1	3.0	3.0
AMCC geometry	0.4	R	1.7	1	1	0.2	0.2
AMCC current	0.6	R	1.7	1	1	0.4	0.4
Probe positioning during calibration	1.0	R	1.7	1	1	0.6	0.6
Noise contribution	0.7	R	1.7	0.014	1	0.0	0.4
Frequency slope	5.9	R	1.7	0.1	1.0	0.3	3.5
PROBE SYSTEM							
Repeatability / Drift	1.0	R	1.7	1	1	0.6	0.6
Linearity / Dynamic range	0.6	R	1.7	1	1	0.4	0.4
Acoustic noise	1.0	R	1.7	0.1	1	0.1	0.6
Probe angle	2.3	R	1.7	1	1	1.4	1.4
Spectral processing	0.9	R	1.7	1	1	0.5	0.5
Integration time	0.6	N	1.0	1	5	0.6	3.0
Field disturbation	0.2	R	1.7	1	1	0.1	0.1
TESTT SIGNAL							
Reference signal spectral response	0.6	R	1.7	0	1	0.0	0.4
POSITIONING							
Probe positioning	1.9	R	1.7	1	1	1.1	1.1
Phantom thickness	0.9	R	1.7	1	1	0.5	0.5
DUT positioning	1.9	R	1.7	1	1	1.1	1.1
EXTERNAL CONTRIBUTIONS							
RF interference	0.0	R	1.7	1	1	0.0	0.0
Test signal variation	2.0	R	1.7	1	1	1.2	1.2
COMBINED UNCERTAINTY							
Combined td. Uncertainty (ABM field)						4.1	6.2
Expanded Std. Uncertainty [%]						8.2	12.3

Table 5. Draft T-Coil Uncertainty Budget, provided by SPEAG Jun. 07, 2006