TEST REPORT

HEARING AID COMPATIBILITY

T-Coil TEST REPORT

Model No.	:	RM-375
Applicant	:	Nokia Inc.
Address of Applicant	:	12278 Scripps Summit Dr.San Diego CA92131 USA
FCC ID		QMNRM-375
Date of Receipt	:	2009-01-06
Date of Test(s)	:	2009-01-13 ~ 2009-01-15
Date of Issue	:	2009-01-16

EUT Type	CDMA 2000 1xRTT Mobile Phone
Tx Frequency	CDMA Cellular (824.70 MHz ~ 848.31 MHz) CDMA AWS (1711.25 MHz ~ 1753.75 MHz) CDMA PCS (1851.25 MHz ~ 1908.75 MHz)
FCC Classification	Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s)	§ 20.19(b), §6.3(v), §7.3(v)
HAC Standard	ANSI PC63.19 – 2007

C63.19-2007 HAC Category : T4 (T CATEGORY)

Tested by	**:**	**Leo Kim**	**2009-01-16**
Approved by	**:**	**Charles Kim**	**2009-01-16**

Contents

1. General Information

1.1 Testing Laboratory

SGS Testing Korea Co., Ltd.

Wireless Div. 2FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea 435-040

Telephone : +82 +31 428 5700

FAX : +82 +31 427 2371

Homepage : www.electrolab.kr.sgs.com

1.2 Details of Applicant

Applicant : Nokia Inc.

Address : 12278 Scripps Summit Dr.San Diego CA92131 USA

Contact Person : Stephen Walmsley

Phone No. : +1 604 456 5544

Fax No. : -

1.3 Version of Report

Version Number	Date	Revision
00	2009-01-16	Initial issue

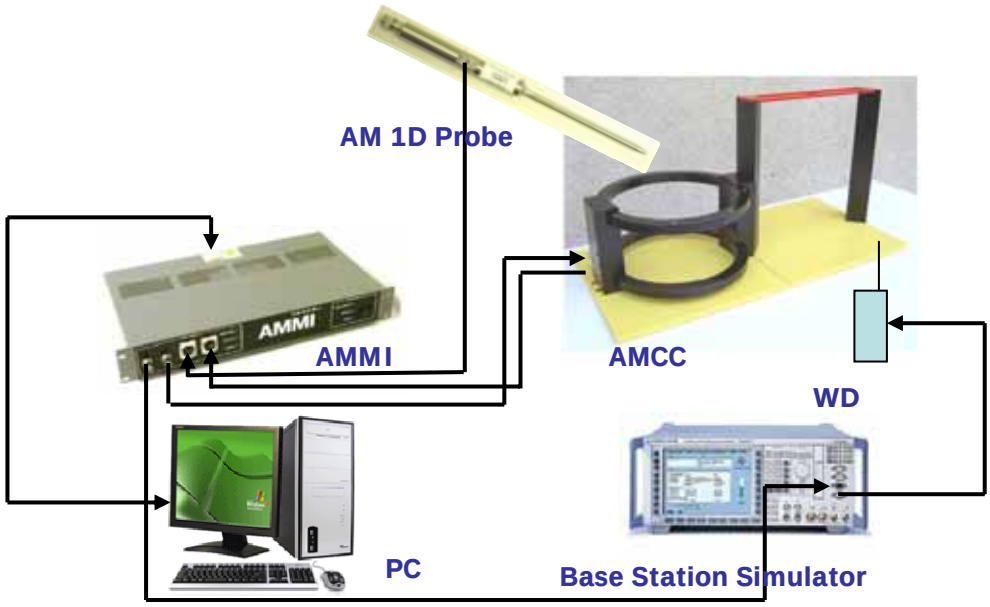
1.4 Description of EUT(s)

EUT Type	: CDMA2000 1xRTT Mobile Phone
Model	: RM-375
FCC ID	: QMNRM-375
Hardware Version	: 6001
Software Version	: DS_4453B_GEN
Mode of Operation	: CDMA Cellular, CDMA AWS, CDMA PCS
Serial Number (MEID)	: A000000126A3C5
Max Conducted Power	: CDMA Cellular (24.35 dBm) , CDMA AWS (23.69 dBm) CDMA PCS (23.75 dBm)
Duty Cycle	: 100%
Tx Frequency Range	: CDMA Cellular : 824.7 ~ 848.31 MHz CDMA AWS : 1711.25 MHz ~ 1753.75 MHz CDMA PCS : 1851.25 ~ 1908.75 MHz
Antenna	: Fixed Internal

1.5 Test Environment

Ambient temperature	: 22.2 ° C ± 2
Tissue Simulating Liquid	: 22.2 ° C ± 2
Relative Humidity	: < 60 %

1.6 T-Coil Measurement System



<Figure-1> HAC T-Coil Test Measurement Set-up

The WD is mounted on the Test Arch phantom (provided with the HAC RF extension). Its acoustic center is centered and represents the reference for the combination of ABM and RF field evaluation. The ABM fields of the WD (frequency range < 20 kHz) are scanned with a fully RF shielded active 1D probe. The probe axis is oriented in the space diagonal to the three orthogonal axes, and its single sensor can be oriented to the axes by 120° rotation. The probe signal is evaluated by an Audio Magnetic Measurement Instrument (AMMI) which is interfaced to the DASY4 computer via USB. The AMMI also provides test and calibration signals and interfaces to the Helmholtz Audio Magnetic Calibration Coil (AMCC). Predefined or user-definable audio signals for injection into the WD during the test are available at a connector of the AMMI.

The new T-Coil measurement job allows flexible control of scan, rotation, measurement duration, as well as selection of the measurement mode and signal source for all ABM measurements. Filtering as required by the standard is applied to the sampled signal resulting in the signal level, (weighted) noise level and a third-octave resolution spectrum for the frequency slope. This information is represented numerically and graphically during the scans and graphically evaluated in the postprocessor. The superposition of the quantities (signal level, frequency slope, signal to noise ratio) leads to an overall classification according to ANSI-C63.19. Coarse, fine and point scan together with user selectable test signals, minimize the time for the manufacturer to find the “optimal point” with the highest class for the WD.

1.7 System Components

Test Arch (enables easy and well defined positioning of the phone and calibration dipoles as well as simple teaching of the robot)	370 x 370 mm x 375 mm
Device Holder / Positioner (supports accurate positioning of any phone) effect on near-field	<+/- 0.5dB
Audio Magnetic Field Probe AM1D frequency range sensitivity pre-amplifier dimensions	 0.1 - 20 kHz(RF sensitivity <-100 dB, fully RF shielded) <-50 dB A/m @ 1 kHz 40 dB, symmetric tip diameter / length: 6 / 290 mm, sensor according to ANSI-PC63.19
Audio Magnetic Measurement Instrument (AMMI) sampling rate dynamic range test signal generation calibration dimensions	 48 kHz / 24 bit 85 dB user selectable and predefined (via PC) auto-calibration / full system calibration using AMCC with monitor output 482 x 65 x 270 mm
Helmholtz Calibration Coil (AMCC) dimensions	 370 x 370 x 196 mm, according to ANSI-PC63.19

1.8 Signal Verification

According to ANSI C63.19-2007, the normal speech input level for HAC T-coil tests shall be set to -16 dBm0 for GSM and UMTS (WCDMA), and to -18 dBm0 for other standards. This technical note shows a possibility to evaluate and set the correct level with the HAC T-Coil setup with a Rohde & Schwarz communication tester CMU200.

Establish a call from the CMU200 to a wireless device. The calibration signals are only available while the call is connected.

Get the internal reference level of the CMU200 (in dBm0) Select CMU200 Network. Bitstream." Decoder Cal" to have a 1 kHz signal with a level of 3.14 dBm0 at the speech output. Run the measurement job and read the voltage level at the multimeter display "Coil signal". The "peak" voltage shall not be limited (i.e. no yellow error symbol shown). Read the RMS voltage corresponding to 3.14 dBm0 and note it. Calculate the desired signal levels of -16 dBm0 and -18 dBm0:

3.14 dBm0 = -2.61 dBV

-18 dBm0 - 21.14 dB = -23.75 dBV

Determine the 1 kHz input level to generate the desired signal level of -18 dBm0 Select CMU200 Network. Bitstream. "Codec Cal" to loop the input via the codec to the output. Run the measurement job (AMMI 1kHz signal with gain 10 inserted) and read the voltage level at the multimeter display "Coil signal". Calculate the required gain setting for the above levels:

gain 10 = -32.67 dBV

difference for -18 dBm0 = -23.75 - (- 32.67) = 8.92 dB

gain factor 10^[(8.92) / 20] = 2.792

resulting gain 10 * (2.792) = 27.92

Run the measurement with the gain and verify the level . Adjust if necessary.

The gain settings were adjusted to achieve the same average level for other signal types.

Signal	Duration[s]	Peak to RMS [dB]	RMS [dB]	Gain Factor	Gain Setting
1 kHz	1	16.2	- 12.7	4.33	**27.8**
300 Hz – 3000 Hz	2	21.6	- 18.6	8.48	**55.2**

1.9 DUT Positioning and Test Procedure

<Figure-2> illustrate the references and reference plane that shall be used in the WD emissions measurement.

- The grid is 5 cm by 5 cm area that is divided into 9 evenly sized blocks or sub-grids.
- The grid is centered on the audio frequency output transducer of the WD (speaker or T-coil).
- The grid is in a reference plane, which is defined as the planar area that contains the highest point in the area of the phone that normally rests against the user's ear. It is parallel to the centerline of the receiver area of the phone and is defined by the points of the receiver-end of the WD handset, which, in normal handset use, rest against the ear.
- The measurement plane is parallel to, and 1.0 cm in front of, the reference plane.

<Figure- 2 > WD reference and plane for T-Coil measurements

- Geometry and Signal check
- Background noise measurement. The background noise is measured at the center of the listening area.
- Coarse resolution axial scan (narrowband signal, 1 sec measurement times, 50 * 50 mm). Only ABM1 is measured in order to find the location of the T-Coil source.
- Fine resolution axial, radial-transverse and radial-longitudinal scans, positioned appropriately based on optimal ABM1 of

coarse resolution axial scan (narrowband signal, 1 sec measurement times, variable grid size with 2 mm spacing). Both ABM1 and ABM2 are measured in order to find the location of the SNR point. ABM1 and ABM2 point measurements in axial, radial-transverse and radial-longitudinal coil orientations, positioned appropriately based on optimal signal quality of fine resolution scans. SNR is calculated for each coil orientation.

- Frequency response point measurement is axial coil orientation, positioned appropriately based on optimal signal quality of fine resolution axial scan.

1.10 Minimum Requirements

1.10.1 Signal Quality Categories

Category	Telephone parameters WD signal quality ((signal + noise) to noise ratio in dB)
Category T1	0 to 10 dB
Category T2	10 to 20 dB
Category T3	20 to 30 dB
Category T4	> 30 dB
Magnetic Coupling Parameters	

1.10.2 The delta between Ambient Noise and ABM2 measurement should be greater than 10 dB

1.10.3 Field Intensity

- Greater or equal to -18 dB A/m

1.11 WD Radio Configuration Selection

- The device was chosen to be tested in the worst-case.

Cellular Band

Radio Configuration	Service Option	Voice Coder	Channel	Power(dBm)
RC1	SO3	8k Enhanced Low	1013	24.13
		8k Enhanced Low	384	24.35
		8k Enhanced Low	777	23.93
RC3	SO3	8k Enhanced Low	384	24.25
RC43	SO3	8k Enhanced Low	384	24.31

AWS Band

Radio Configuration	Service Option	Voice Coder	Channel	Power(dBm)
RC1	SO3	8k Enhanced Low	25	23.37
		8k Enhanced Low	425	23.41
		8k Enhanced Low	875	23.69
RC3	SO3	8k Enhanced Low	875	23.47
RC43	SO3	8k Enhanced Low	875	23.48

PCS Band

Radio Configuration	Service Option	Voice Coder	Channel	Power(dBm)
RC1	SO3	8k Enhanced Low	25	23.73
		8k Enhanced Low	600	23.74
		8k Enhanced Low	1175	23.75
RC3	SO3	8k Enhanced Low	1175	23.52
RC43	SO3	8k Enhanced Low	1175	23.49

2. Measurement Equipment

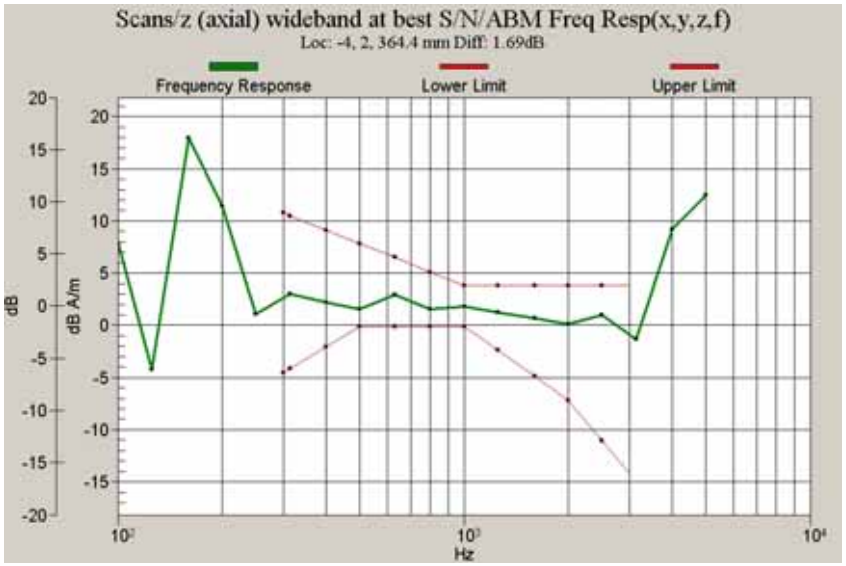
Manufacturer	Device	Type	Serial Number	Due date of Calibration
Stäubli	Robot	RX90BL	F03/5W05A1/A/01	N/A
SPEAG	Probe	AM1DV2	1025	September 18, 2009
SPEAG	Data acquisition Electronics	DAE3	567	September 24, 2009
SPEAG	Software	DASY 4 V4.7	-	N/A
SPEAG	Test Arch	SD HAC P01 BB	-	N/A
R & S	Universal Radio Communication Tester	CMU 200	109495	October 2, 2009
SPEAG	Audio Magnetic Calibration Coil	AMCC	1065	N/A
SPEAG	Audio Measuring Instrument	AMMI	1026	N/A

3. Measurement Result

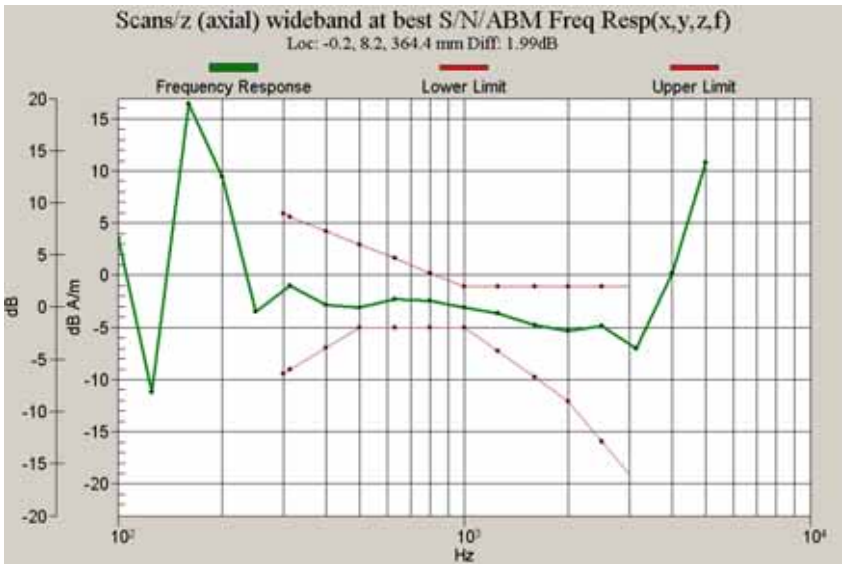
3.1 T-Coil Measurement Result

3.1.1 Frequency Response

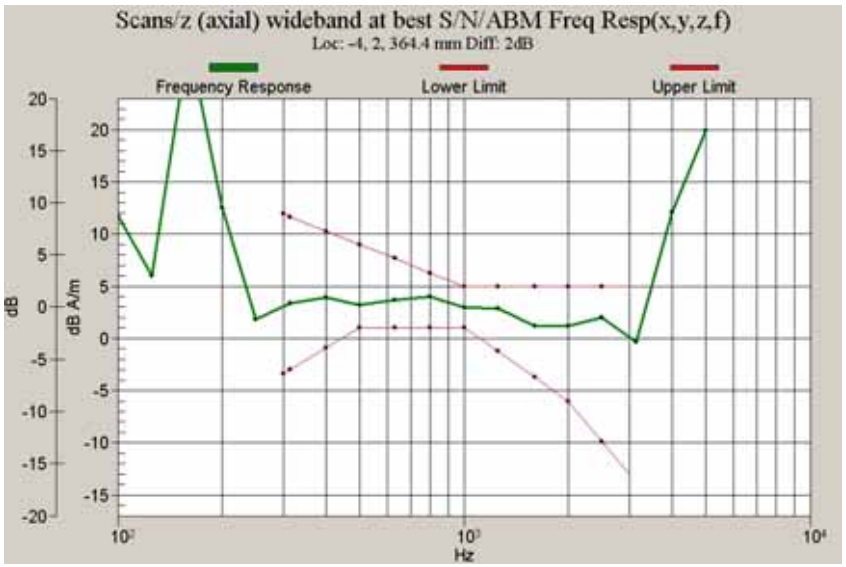
Cellular Low Channel



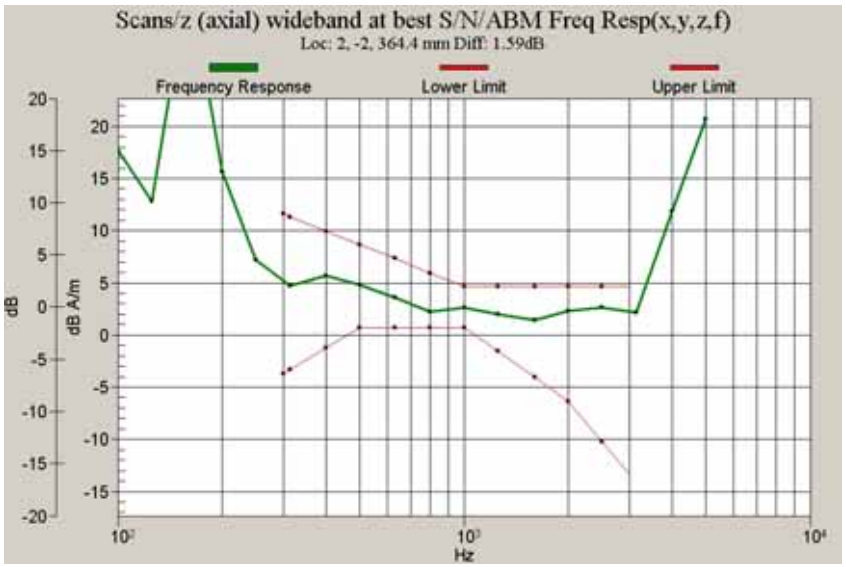
Cellular Middle Channel



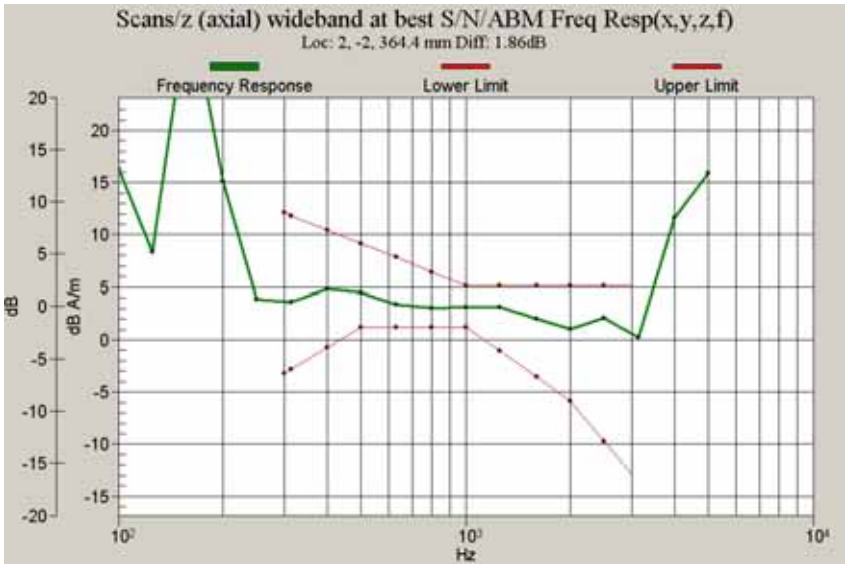
Cellular High Channel



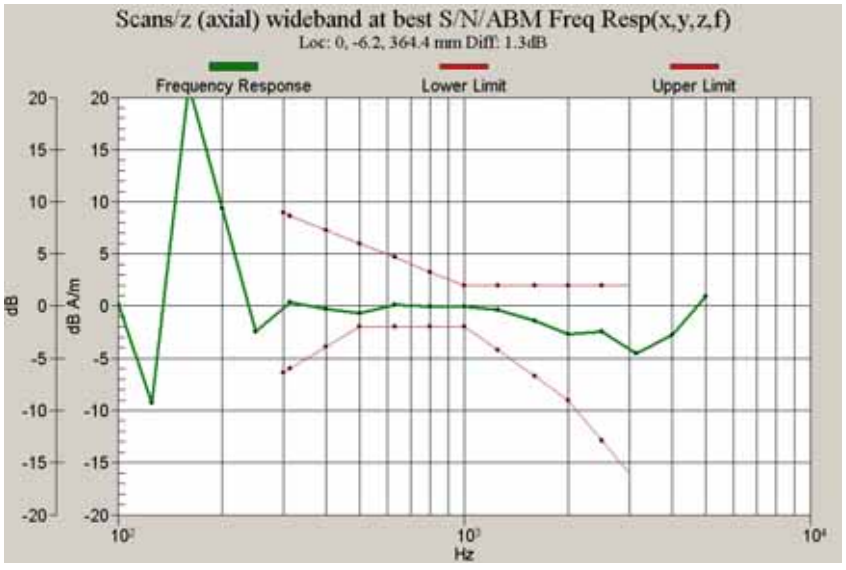
AWS Low Channel



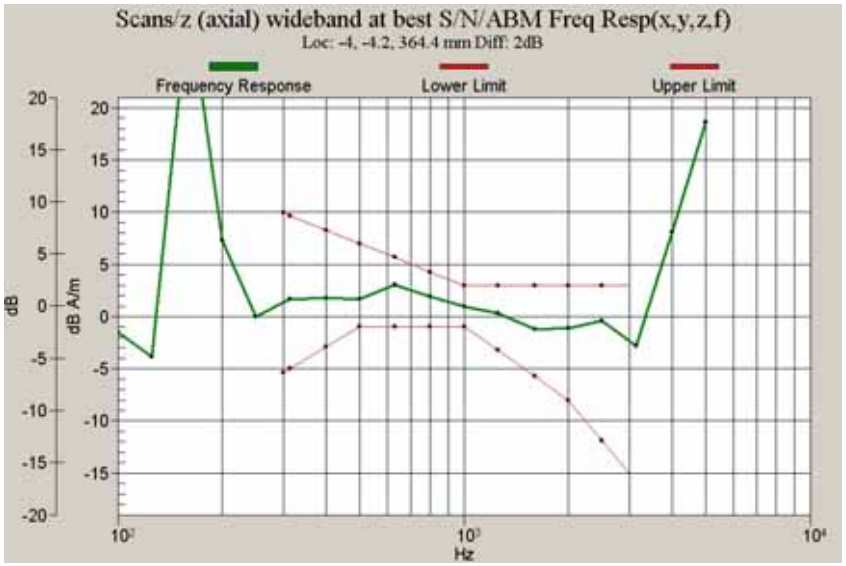
AWS Mid Channel



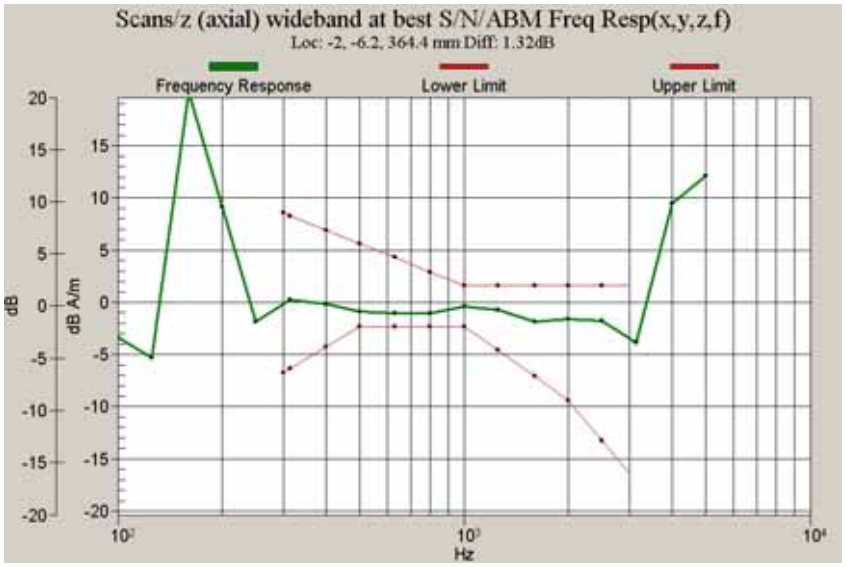
AWS High Channel



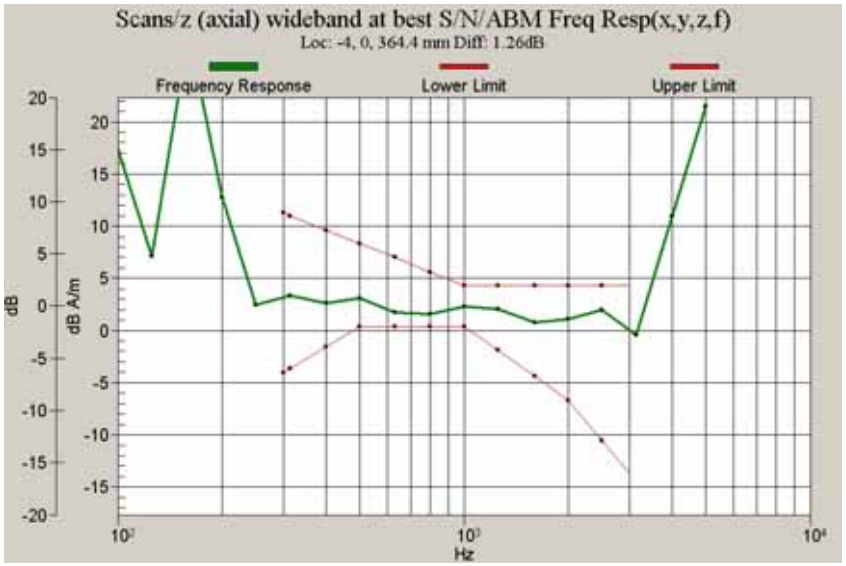
PCS Low Channel



PCS Middle Channel



PCS High Channel



3.1.2 T-Coil Field Intensity & SNR

Probe Position	Frequency Band	Channel	Measured Point Location (x mm, y mm)	Ambient Background Noise (dB A/m)	ABM2 (dB A/m)	ABM2 – Ambient Background Noise (dB)	ABM1 (dB A/m)	SNR (dB)	T-Coil Rating
Axial	Cellular	1013	-4, 2	-58.73	-39.13	19.6	4.72	47.7	T4
		384	-0.2, 8.2	-58.83	-39.58	19.25	-0.518	46.6	T4
		777	-4, 2	-58.53	-38.08	20.45	3.89	46.9	T4
	AWS	25	2, -2	-58.86	-39.99	18.87	5.01	45.6	T4
		425	2, -2	-59.59	-36.72	22.87	5.86	47.5	T4
		875	0, -6.2	-59.17	-40.59	18.58	1.35	46.1	T4
	PCS	25	-4, -4.2	-59.00	-38.7	20.3	1.70	46.6	T4
		600	-2, -6.2	-58.68	-38.81	19.87	0.643	46.5	T4
		1175	-4, 0	-58.74	-39.72	19.02	5.44	47.9	T4
Radial1 (Longitudinal)	Cellular	1013	3.7, -1.2	-59.03	-47.53	11.5	-3.53	44.6	T4
		384	8.5, 0	-58.83	-47.19	11.64	-4.27	43.7	T4
		777	-9.5, -1.2	-59.07	-47.39	11.68	-3.57	44.2	T4
	AWS	25	-9.5, 1.2	-58.78	-47.58	11.2	-2.34	45.2	T4
		425	-12.7, 3	-59.36	-46.14	13.22	-5.34	44.5	T4
		875	5.5, 3	-58.92	-46.8	12.12	-3.48	43.7	T4
	PCS	25	-14.3, -3	-59.22	-48.79	10.43	-6.78	45.1	T4
		600	-12.5, -7.2	-58.97	-48.66	10.31	-6.37	45.8	T4
		1175	6.7, 3	-59.15	-46.63	12.52	-4.50	46.6	T4
Radial2 (Transversal)	Cellular	1013	1.2, -7.2	-59.17	-49.17	10.0	-4.07	45.1	T4
		384	-3, -5.3	-59.25	-47.43	11.82	-3.23	46.9	T4
		777	-3, -4.2	-59.36	-48.18	11.18	-2.99	47.6	T4
	AWS	25	1.2, -2.5	-59.08	-48.21	10.87	-5.06	46.1	T4
		425	3, -7.2	-59.62	-36.69	22.93	-3.05	47.0	T4
		875	0, -6.7	-59.27	-49.0	10.27	-3.03	46.4	T4
	PCS	25	3, 11.3	-59.40	-49.12	10.28	-5.27	46.3	T4
		600	-3, -13.2	-59.12	-47.76	11.36	-7.77	45.2	T4
		1175	-3, 12.7	-59.47	-48.62	10.85	-6.49	45.2	T4

3.2 Summary of Result

Probe Position	Frequency Band	Channel	ABM1	Frequency Response	T-Rating
Axial	Cellular	1013	Pass	Pass	T4
		384	Pass	Pass	T4
		777	Pass	Pass	T4
	AWS	25	Pass	Pass	T4
		425	Pass	Pass	T4
		875	Pass	Pass	T4
	PCS	25	Pass	Pass	T4
		600	Pass	Pass	T4
		1175	Pass	Pass	T4
Radial1 (Longitudinal)	Cellular	1013	Pass		T4
		384	Pass		T4
		777	Pass		T4
	AWS	25	Pass		T4
		425	Pass		T4
		875	Pass		T4
	PCS	25	Pass		T4
		600	Pass		T4
		1175	Pass		T4
Radial2 (Transversal)	Cellular	1013	Pass		T4
		384	Pass		T4
		777	Pass		T4
	AWS	25	Pass		T4
		425	Pass		T4
		875	Pass		T4
	PCS	25	Pass		T4
		600	Pass		T4
		1175	Pass		T4

APPENDIX

A. Test Setup Photo

- See the attachment

APPENDIX

B. DASY4 HAC Report

Cellular Low Axial

Date/Time: 2009-01-15 6:57:35

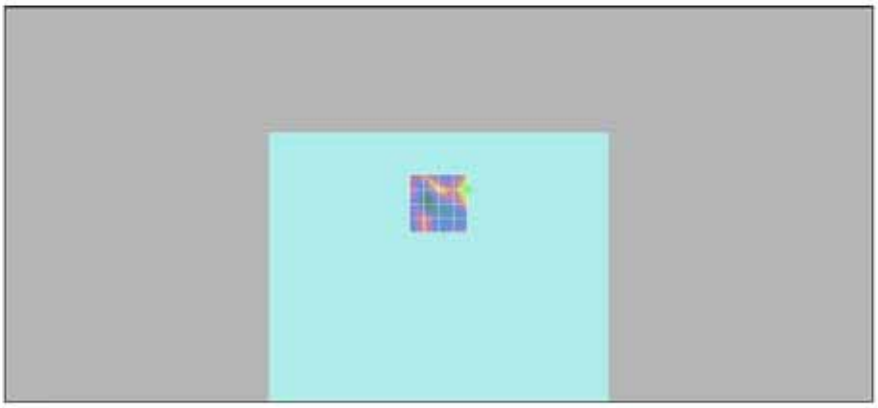
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_Cell_Low.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: CDMA 835MHz; Frequency: 824.7 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 47.7 dB
ABM1 comp = 4.72 dB A/m
BWC Factor = 0.150005 dB
Location: -4, 2, 364.4 mm



0 dB = 241.8

Cellular Low Radial1

Date/Time: 2009-01-15 7:00:21

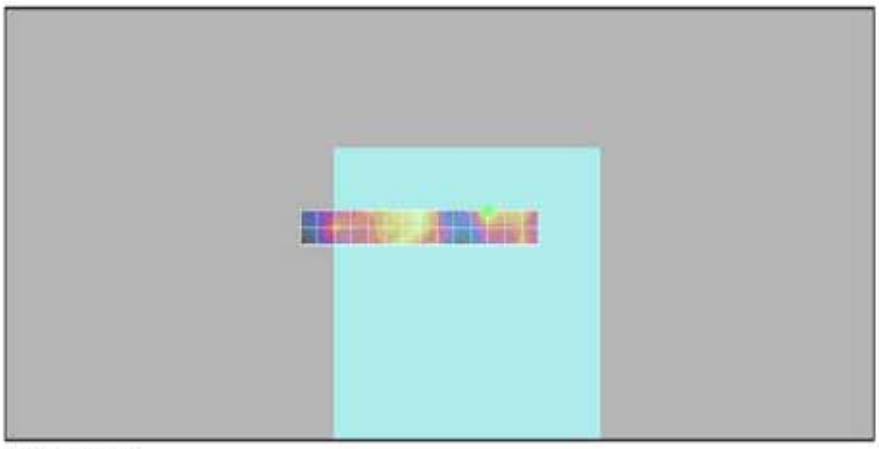
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_Cell_Low.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: CDMA 835MHz; Frequency: 824.7 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 44.6 dB
ABM1 comp = -3.53 dB A/m
BWC Factor = 0.150005 dB
Location: 3.7, -1.2, 364.4 mm



0 dB = 170.2

Cellular Low Radial2

Date/Time: 2009-01-15 7:04:28

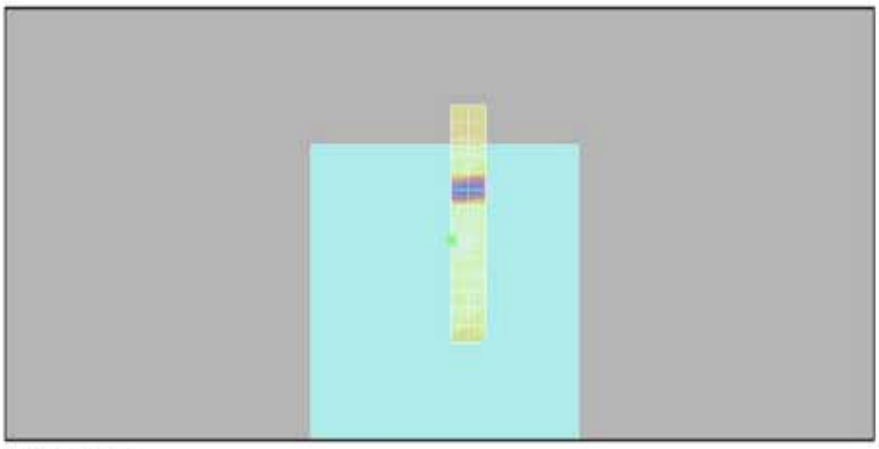
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_Cell_Low.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: CDMA 835MHz; Frequency: 824.7 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 45.1 dB
ABM1 comp = -4.07 dB A/m
BWC Factor = 0.150005 dB
Location: 1.2, -7.2, 364.4 mm



0 dB = 179.9

Cellular Middle Axial

Date/Time: 2009-01-15 6:15:45

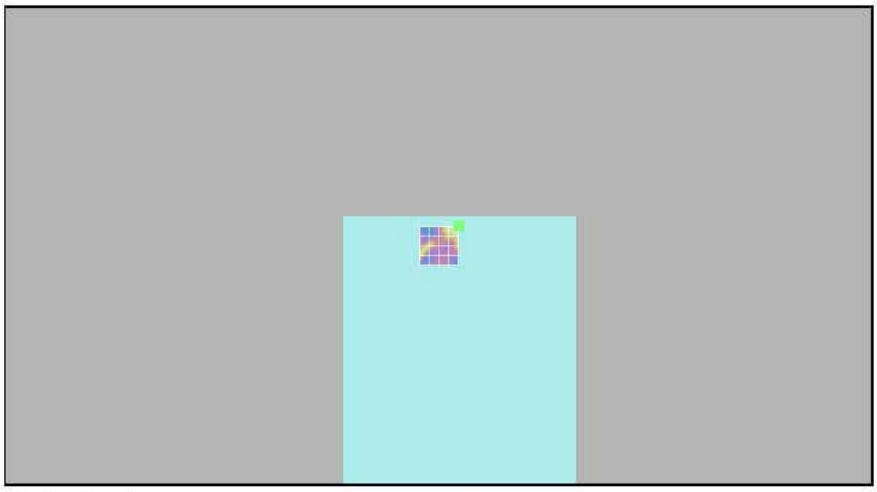
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_Cell_Mid.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: CDMA 835MHz; Frequency: 836.52 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 46.6 dB
ABM1 comp = -0.518 dB A/m
BWC Factor = 0.15103 dB
Location: -0.2, 8.2, 364.4 mm



0 dB = 213.6

Cellular Middle Radial1

Date/Time: 2009-01-15 6:18:31

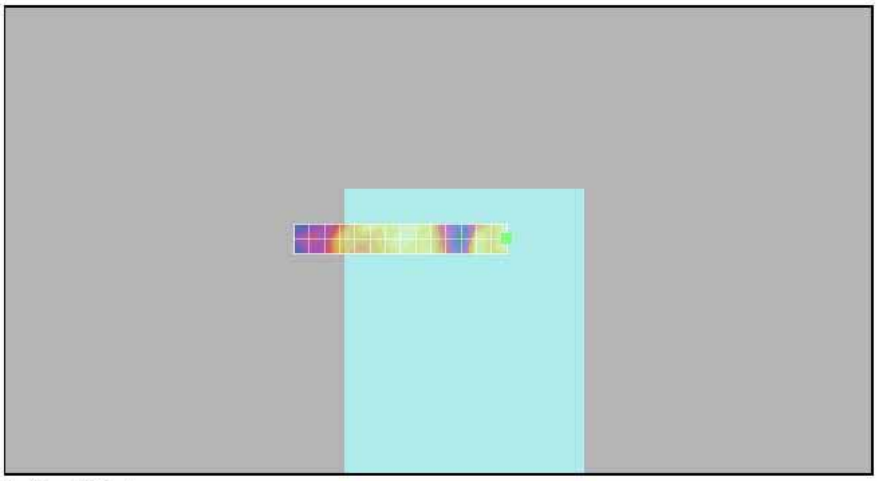
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_Cell_Mid.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: CDMA 835MHz; Frequency: 836.52 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 43.7 dB
ABM1 comp = -4.27 dB A/m
BWC Factor = 0.15103 dB
Location: 8.5, 0, 364.4 mm



0 dB = 152.6

Cellular Middle Radial2

Date/Time: 2009-01-15 6:22:37

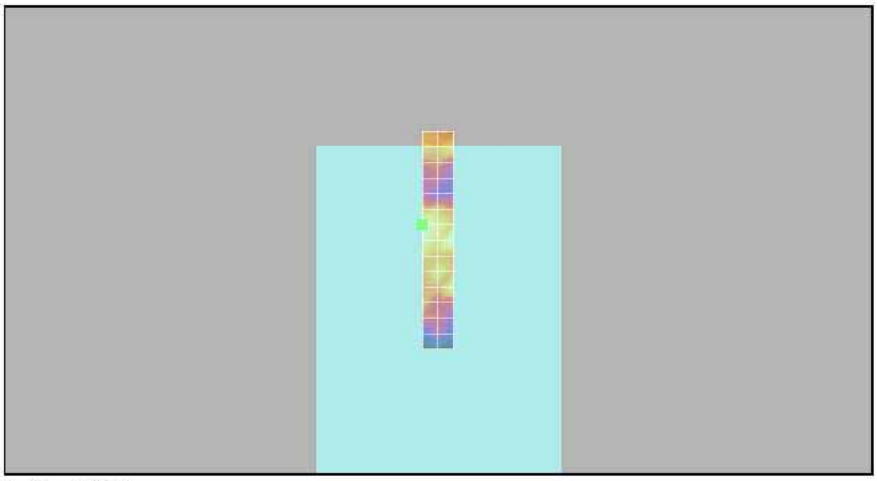
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_Cell_Mid.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: CDMA 835MHz; Frequency: 836.52 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 46.9 dB
ABM1 comp = -3.23 dB A/m
BWC Factor = 0.15103 dB
Location: -3, -5.3, 364.4 mm



0 dB = 222.0

Cellular High Axial

Date/Time: 2009-01-15 8:20:08

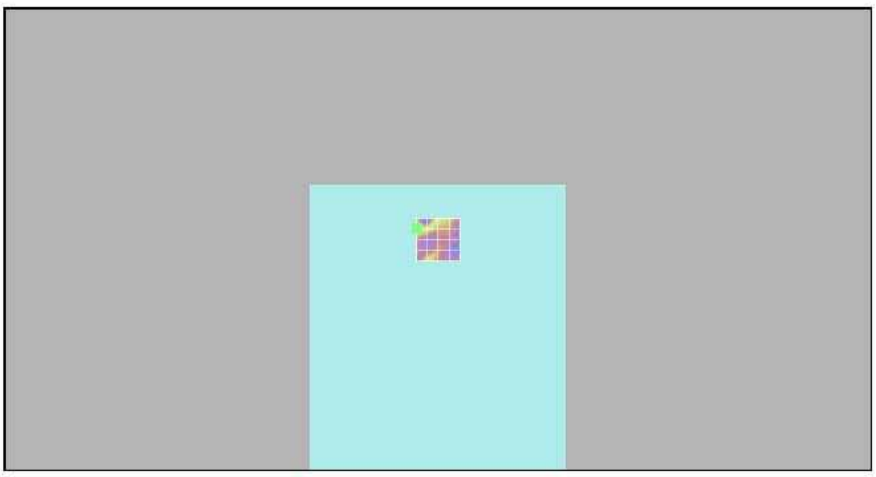
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_Cell_High.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: CDMA 835MHz; Frequency: 848.31 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 46.9 dB
ABM1 comp = 3.89 dB A/m
BWC Factor = 0.150005 dB
Location: -4, 2, 364.4 mm



0 dB = 220.4

Cellular High Radial1

Date/Time: 2009-01-15 8:22:56

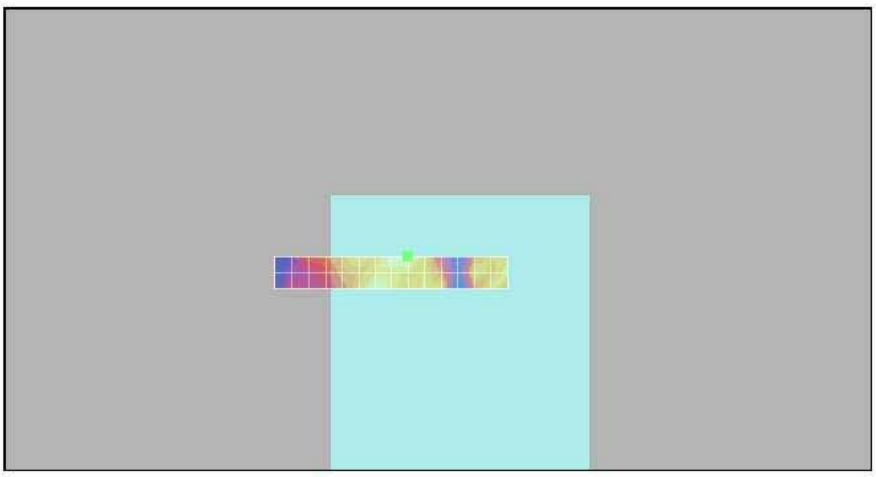
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_Cell_High.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: CDMA 835MHz; Frequency: 848.31 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 44.2 dB
ABM1 comp = -3.57 dB A/m
BWC Factor = 0.150005 dB
Location: -9.5, -1.2, 364.4 mm



0 dB = 162.1

Cellular High Radial2

Date/Time: 2009-01-15 8:27:13

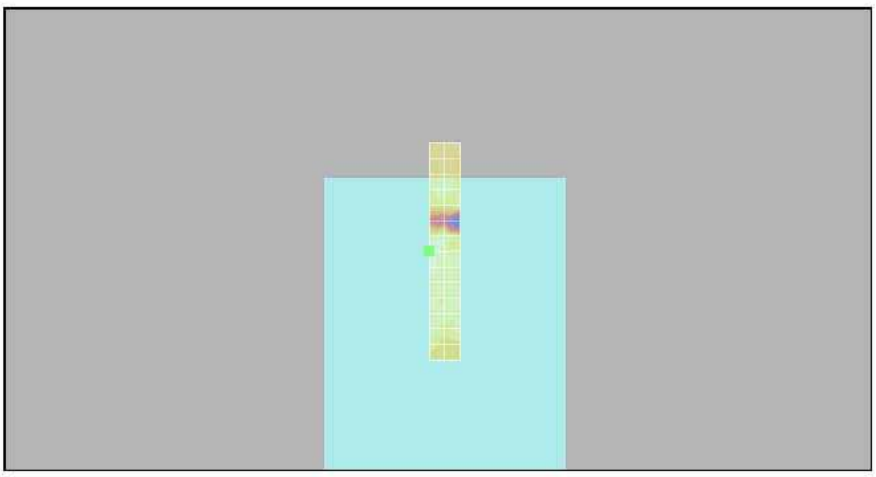
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_Cell_High.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: CDMA 835MHz; Frequency: 848.31 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 47.6 dB
ABM1 comp = -2.99 dB A/m
BWC Factor = 0.150005 dB
Location: -3, -4.2, 364.4 mm



0 dB = 239.7

AWS Low Axial

Date/Time: 2009-01-15 3:53:34

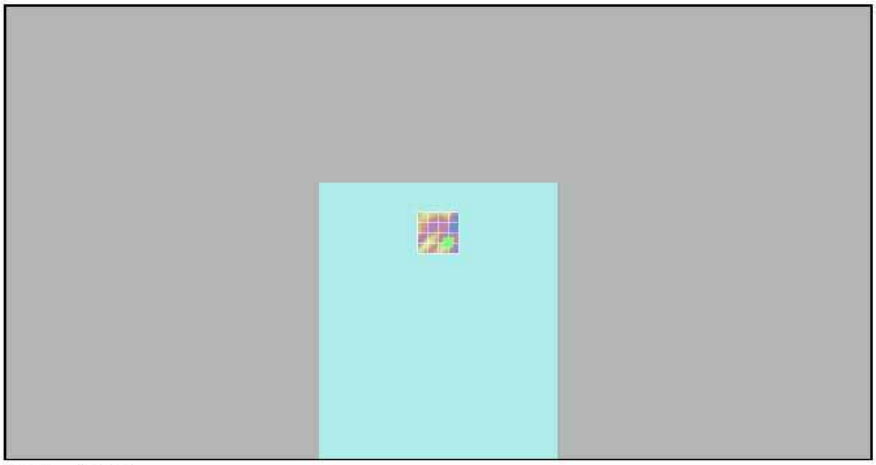
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_AWS_Low.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: AWS; Frequency: 1711.25 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 45.6 dB
ABM1 comp = 5.01 dB A/m
BWC Factor = 0.150005 dB
Location: 2, -2, 364.4 mm



0 dB = 189.8

AWS Low Radial1

Date/Time: 2009-01-15 3:56:19

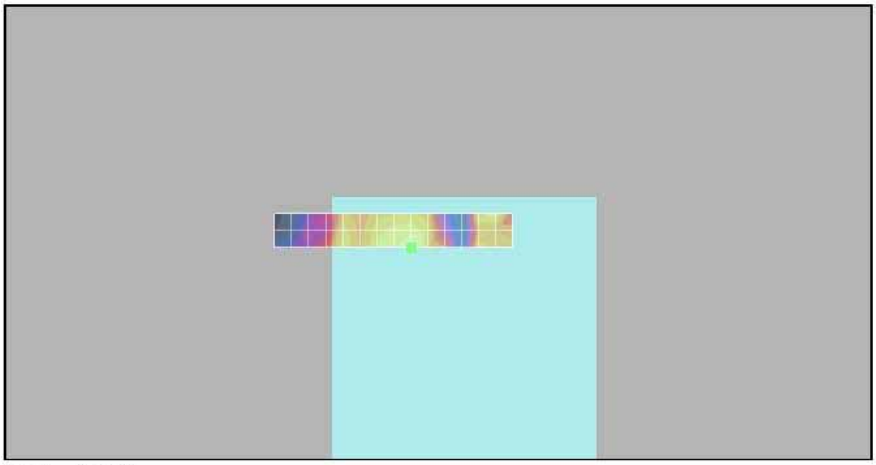
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_AWS_Low.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: AWS; Frequency: 1711.25 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 45.2 dB
ABM1 comp = -2.34 dB A/m
BWC Factor = 0.150005 dB
Location: -9.5, 1.2, 364.4 mm



0 dB = 182.7

AWS Low Radial2

Date/Time: 2009-01-15 4:02:58

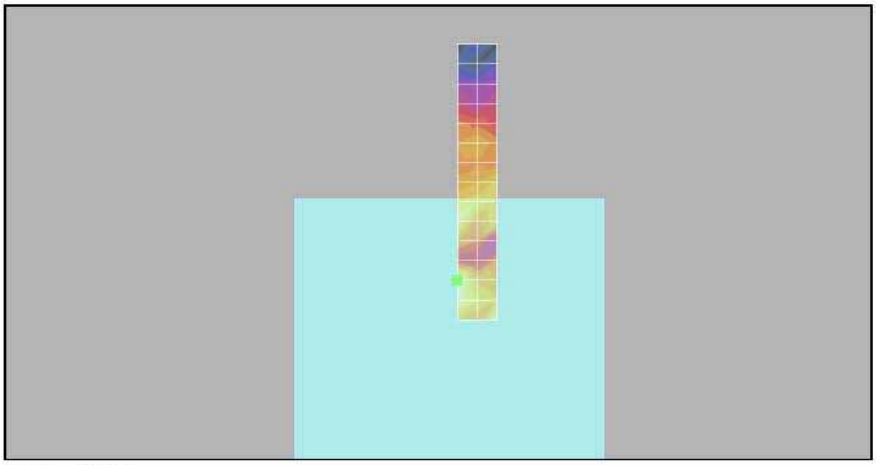
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_AWS_Low.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: AWS; Frequency: 1711.25 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 46.1 dB
ABM1 comp = -5.06 dB A/m
BWC Factor = 0.150005 dB
Location: 1.2, -2.5, 364.4 mm



0 dB = 201.2

AWS Middle Axial

Date/Time: 2009-01-15 4:39:56

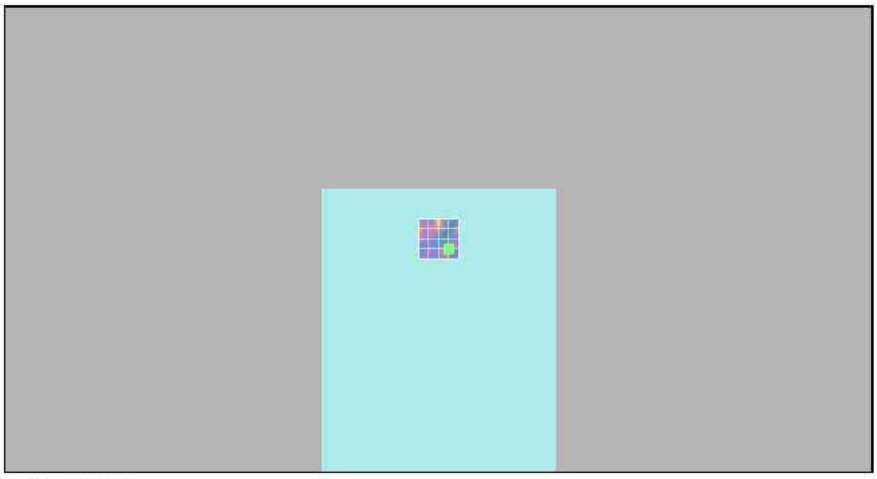
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_AWS_Mid.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: AWS; Frequency: 1731.25 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 47.5 dB
ABM1 comp = 5.86 dB A/m
BWC Factor = 0.15103 dB
Location: 2, -2, 364.4 mm



0 dB = 236.4

AWS Middle Radial1

Date/Time: 2009-01-15 4:42:42

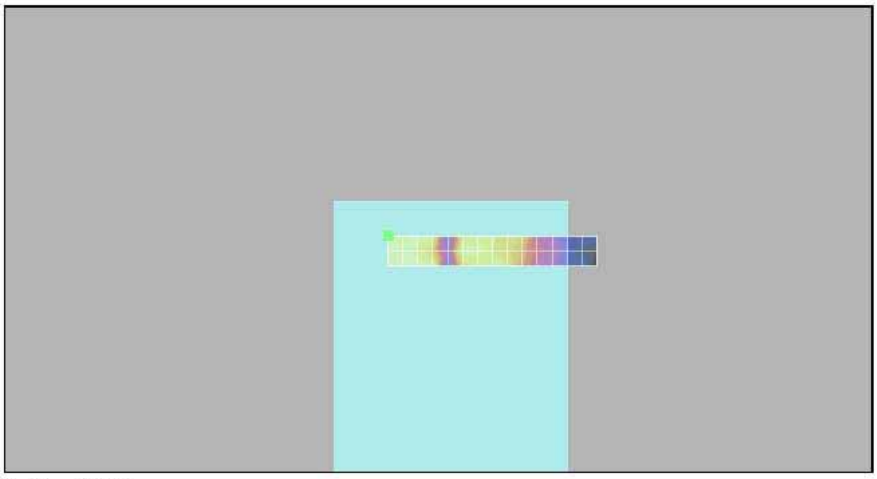
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_AWS_Mid.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: AWS; Frequency: 1731.25 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 44.5 dB
ABM1 comp = -5.34 dB A/m
BWC Factor = 0.15103 dB
Location: -12.7, 3, 364.4 mm



0 dB = 167.9

AWS Middle Radial2

Date/Time: 2009-01-15 4:46:48

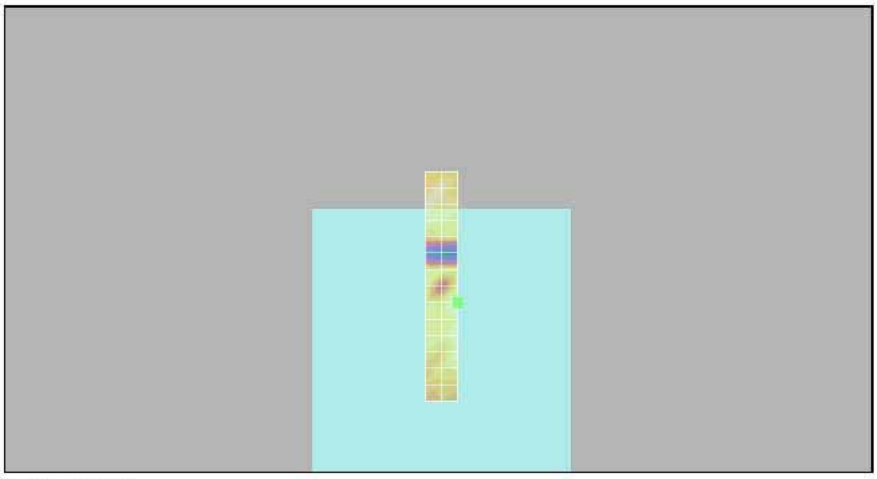
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_AWS_Mid.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: AWS; Frequency: 1731.25 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 47.0 dB
ABM1 comp = -3.05 dB A/m
BWC Factor = 0.15103 dB
Location: 3, -7.2, 364.4 mm



0 dB = 224.2

AWS High Axial

Date/Time: 2009-01-15 5:30:34

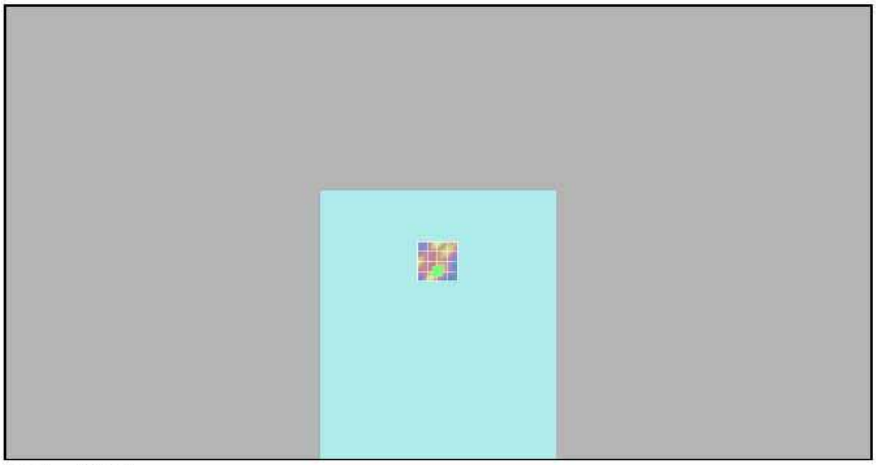
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_AWS_High.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: AWS; Frequency: 1753.75 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 46.1 dB
ABM1 comp = 1.35 dB A/m
BWC Factor = 0.150005 dB
Location: 0, -6.2, 364.4 mm



0 dB = 200.9

AWS High Radial1

Date/Time: 2009-01-15 5:33:19

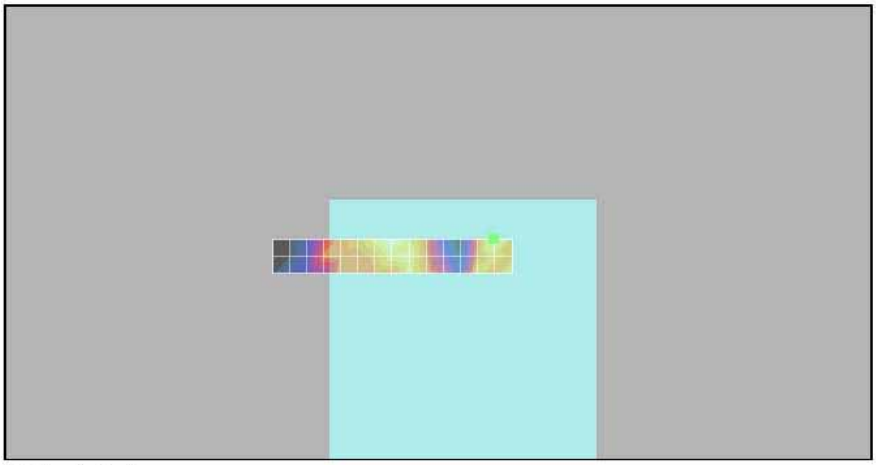
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_AWS_High.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: AWS; Frequency: 1753.75 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 43.7 dB
ABM1 comp = -3.48 dB A/m
BWC Factor = 0.150005 dB
Location: 5.5, 3, 364.4 mm



0 dB = 152.6

AWS High Radial2

Date/Time: 2009-01-15 5:37:38

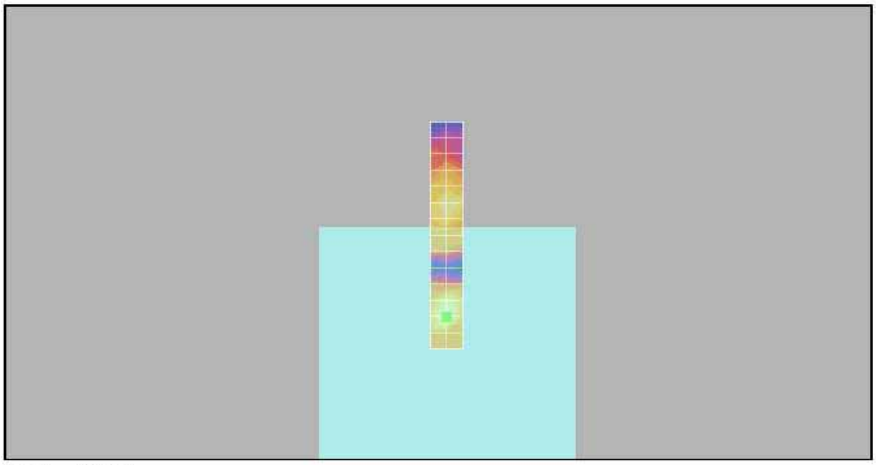
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_AWS_High.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: AWS; Frequency: 1753.75 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 46.4 dB
ABM1 comp = -3.03 dB A/m
BWC Factor = 0.150005 dB
Location: 0, -6.7, 364.4 mm



0 dB = 209.2

PCS Low Axial

Date/Time: 2009-01-15 11:18:22

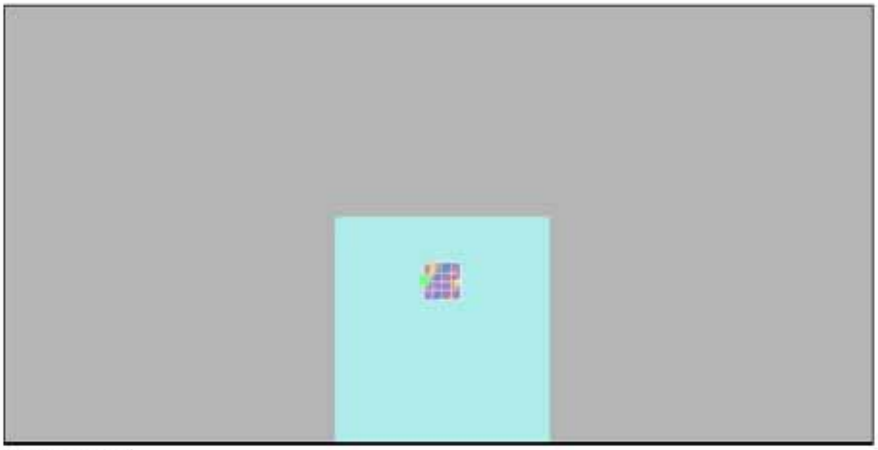
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_PCS_Low.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: PCS 1900; Frequency: 1851.25 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 46.6 dB
ABM1 comp = 1.70 dB A/m
BWC Factor = 0.150005 dB
Location: -4, -4.2, 364.4 mm



0 dB = 214.3

PCS Low Radial1

Date/Time: 2009-01-15 11:21:08

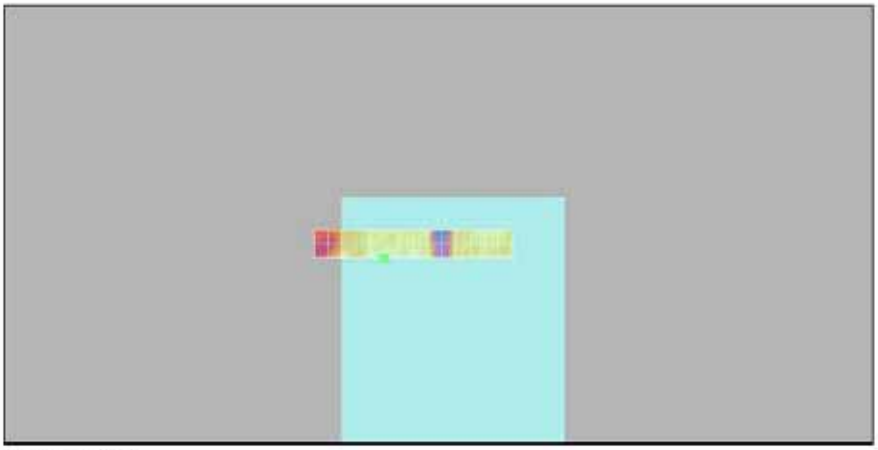
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_PCS_Low.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: PCS 1900; Frequency: 1851.25 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 45.1 dB
ABM1 comp = -6.78 dB A/m
BWC Factor = 0.150005 dB
Location: -14.3, -3, 364.4 mm



0 dB = 179.4

PCS Low Radial2

Date/Time: 2009-01-15 11:25:15

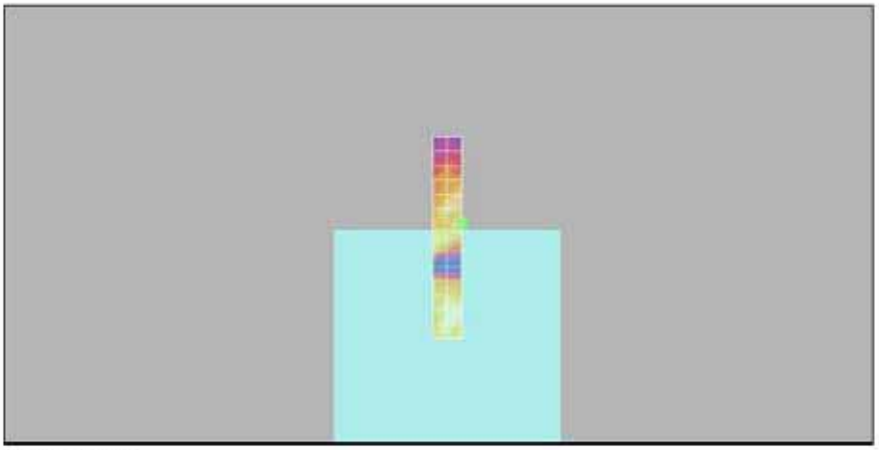
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_PCS_Low.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: PCS 1900; Frequency: 1851.25 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 46.3 dB
ABM1 comp = -5.27 dB A/m
BWC Factor = 0.150005 dB
Location: 3, 11.3, 364.4 mm



0 dB = 207.6

PCS Middle Axial

Date/Time: 2009-01-15 9:17:31

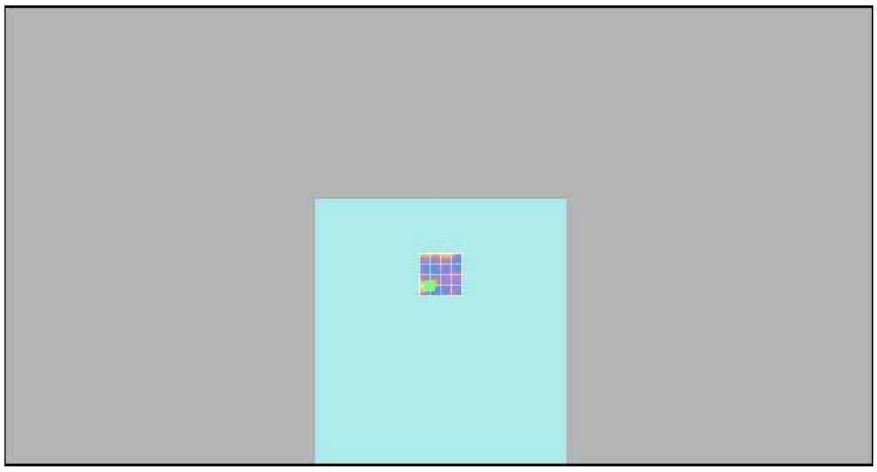
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_PCS_Mid.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: PCS 1900; 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 46.5 dB
ABM1 comp = 0.643 dB A/m
BWC Factor = 0.150005 dB
Location: -2, -6.2, 364.4 mm



0 dB = 212.1

PCS Middle Radial1

Date/Time: 2009-01-15 9:20:28

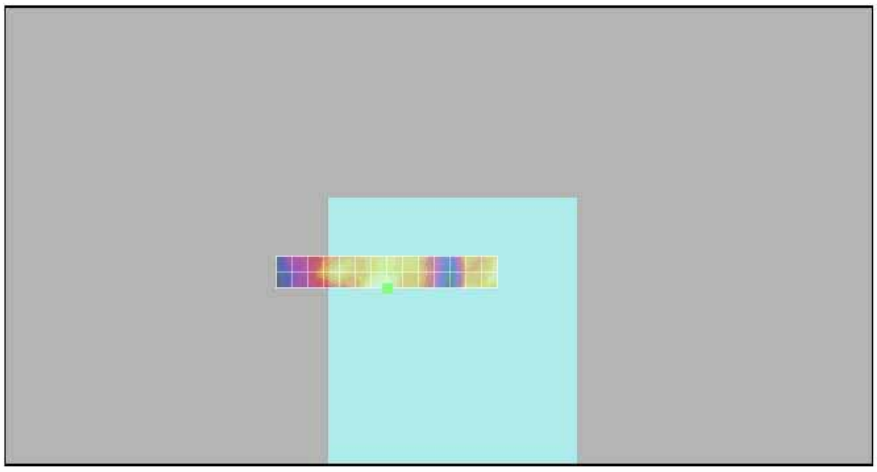
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_PCS_Mid.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: PCS 1900; 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 45.8 dB
ABM1 comp = -6.37 dB A/m
BWC Factor = 0.150005 dB
Location: -12.5, -7.2, 364.4 mm



0 dB = 195.3

PCS Middle Radial2

Date/Time: 2009-01-15 9:24:57

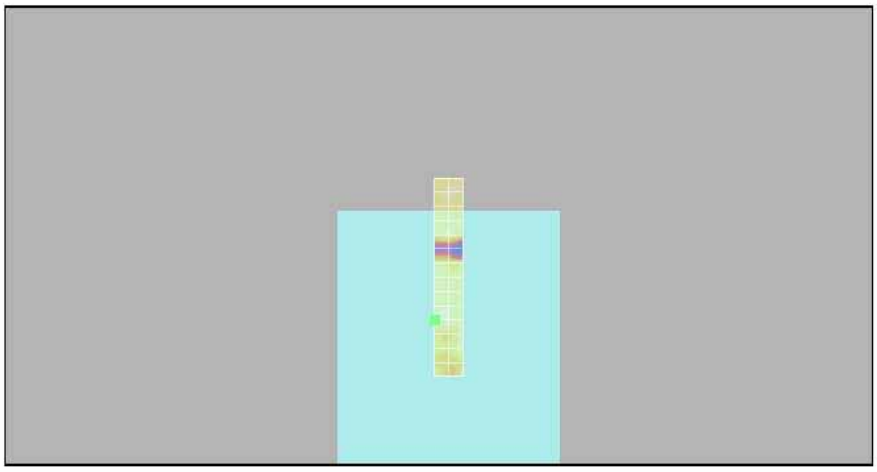
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_PCS_Mid.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: PCS 1900; 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 45.2 dB
ABM1 comp = -7.77 dB A/m
BWC Factor = 0.150005 dB
Location: -3, -13.2, 364.4 mm



0 dB = 181.4

PCS High Axial

Date/Time: 2009-01-15 10:41:52

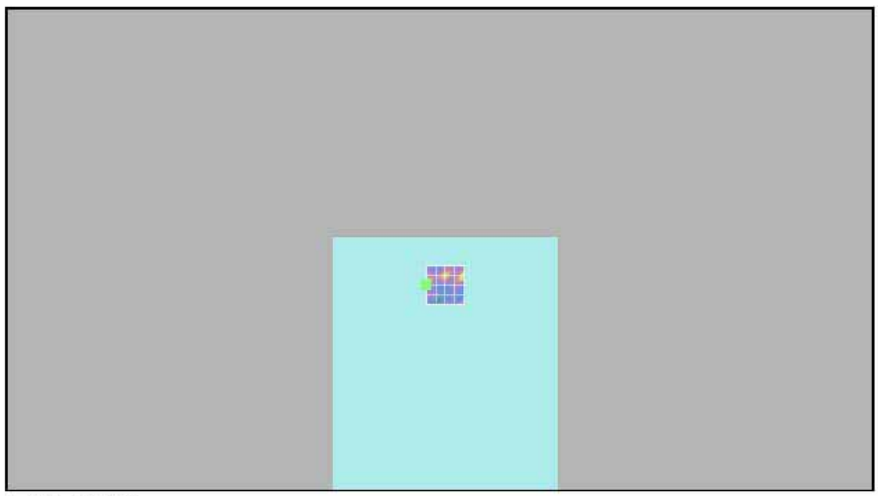
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_PCS_High.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: PCS 1900; Frequency: 1908.75 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 47.9 dB
ABM1 comp = 5.44 dB A/m
BWC Factor = 0.150005 dB
Location: -4, 0, 364.4 mm



0 dB = 247.5

PCS High Radial1

Date/Time: 2009-01-15 10:44:44

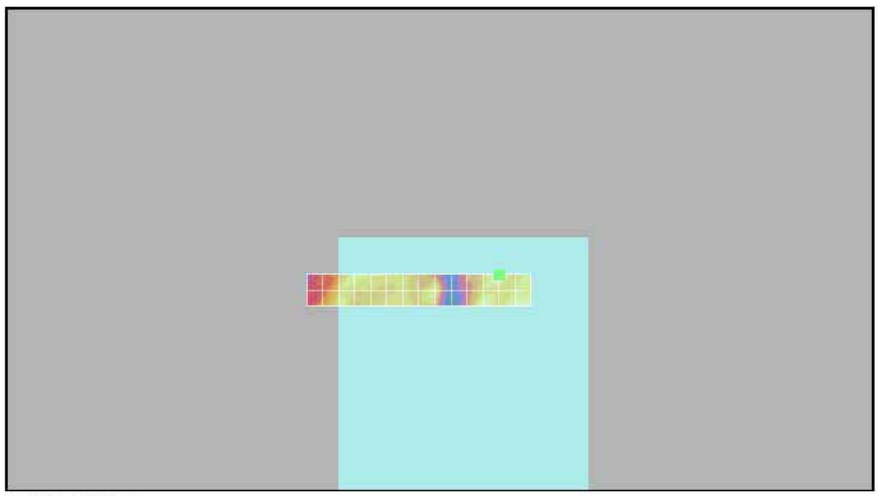
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_PCS_High.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: PCS 1900; Frequency: 1908.75 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 46.6 dB
ABM1 comp = -4.50 dB A/m
BWC Factor = 0.150005 dB
Location: 6.7, 3, 364.4 mm



0 dB = 214.5

PCS High Radial2

Date/Time: 2009-01-15 10:48:55

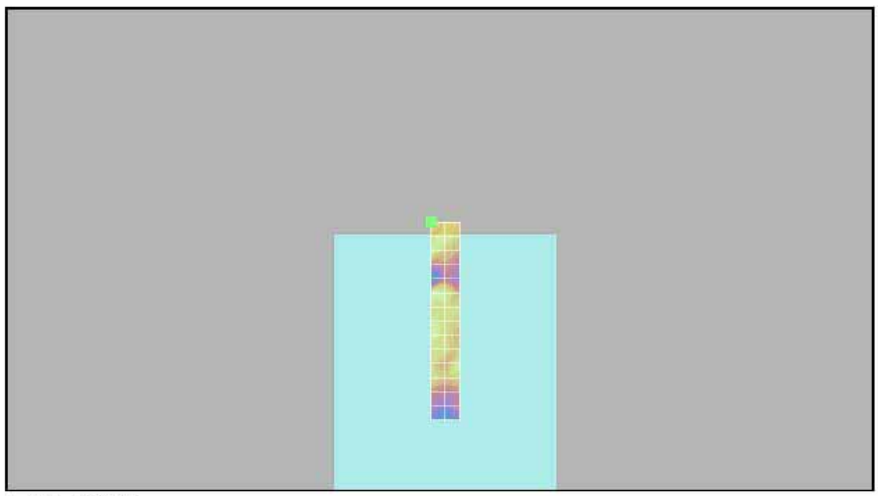
Test Laboratory: SGS Testing Korea
File Name: HAC_TCoil_PCS_High.da4

DUT: RM-375; Type: Folder; Serial: A000000126A3C5
Program Name: HAC_TCoil_WD_Emission

Communication System: PCS 1900; Frequency: 1908.75 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

DASY4 Configuration:
- Probe: AM1DV2 - 1025; ; Calibrated: 2008-09-18
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cursor:
ABM1/ABM2 = 45.2 dB
ABM1 comp = -6.49 dB A/m
BWC Factor = 0.150005 dB
Location: -3, 12.7, 364.4 mm



0 dB = 181.3

APPENDIX

C. Uncertainty Analysis

Uncertainty of Audio Band Magnetic Measurements

Error Description	Uncertainty Value	Prob. Dist.	Div.	(Ci) ABM1	(Ci) ABM2	Std. Unc. ABM1	Std. Unc. ABM2
Probe Sensitivity							
Reference Level	± 3.0 %	N	1	1	1	± 3.0 %	± 3.0 %
AMCC Geometry	± 0.4 %	R	$\sqrt{3}$	1	1	± 0.2 %	± 0.2 %
AMCC Current	± 0.6 %	R	$\sqrt{3}$	1	1	± 0.4 %	± 0.4 %
Probe Positioning during Calibr.	± 0.1 %	R	$\sqrt{3}$	1	1	± 0.1 %	± 0.1 %
Noise Contribution	± 0.7 %	R	$\sqrt{3}$	0.0143	1	± 0.0 %	± 0.4 %
Frequency Slope	± 5.9 %	R	$\sqrt{3}$	0.1	1.0	± 0.3 %	± 3.5 %
Probe System							
Repeatability / Drift	± 1.0 %	R	$\sqrt{3}$	1	1	± 0.6 %	± 0.6 %
Linearity / Dynamic Range	± 0.6 %	R	$\sqrt{3}$	1	1	± 0.4 %	± 0.4 %
Acoustic Noise	± 1.0 %	R	$\sqrt{3}$	0.1	1	± 0.1 %	± 0.1 %
Probe Angle	± 2.3 %	R	$\sqrt{3}$	1	1	± 1.4 %	± 1.4 %
Spectral Processing	± 0.9 %	R	$\sqrt{3}$	1	1	± 0.5 %	± 0.5 %
Integration Time	± 0.6 %	N	1	1	5	± 0.6 %	± 0.6 %
Field Disturbation	± 0.2 %	R	$\sqrt{3}$	1	1	± 0.1 %	± 0.1 %
Test Signal							
Ref. Signal Spectral Response	± 0.6 %	R	$\sqrt{3}$	0	1	± 0.0%	± 0.0 %
Positioning							
Probe Positioning	± 1.9 %	R	$\sqrt{3}$	1	1	± 1.1 %	± 1.1 %
Phantom Thickness	± 0.9 %	R	$\sqrt{3}$	1	1	± 0.5 %	± 0.5 %
DUT Positioning	± 1.9 %	R	$\sqrt{3}$	1	1	± 1.1 %	± 1.1 %
External Contributions							
RF Interference	± 0.0 %	R	$\sqrt{3}$	1	0.3	± 0.0 %	± 0.0 %
Test Signal Variation	± 2.0 %	R	$\sqrt{3}$	1	1	± 1.2 %	± 1.2 %
Combined Uncertainty							
Combined Std. Uncertainty (ABM Field)						± 4.1 %	± 6.1 %
Expanded Std. Uncertainty						± 8.1 %	± 12.3 %

APPENDIX

D. Calibration certificate

-AM1DV2 Probe

-DAE

AM1DV2 Probe Calibration Certificate

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client SGS (Dymstec)

Certificate No: AM1DV2-1025_Sep08

CALIBRATION CERTIFICATE

Object	AM1DV2 - SN: 1025
Calibration procedure(s)	QA CAL-24.v2 Calibration procedure for AM1D magnetic field probes and TMFS in the audio range
Calibration date:	September 18, 2008
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-07 (No: 6465)	Oct-08
Reference Probe AM1DV2	SN: 1008	23-Jan-08 (No. AM1D-1008_Jan08)	Jan-09
DAE4	SN: 781	2-Oct-07 (No. DAE4-781_Oct07)	Oct-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
AMCC	1050	15-Aug-08 (in house check Aug-08)	Aug-09

	Name	Function	Signature
Calibrated by:	Mike Meili	RF Technician	M. Meili
Approved by:	Fin Bomholt	R&D Director	F. Bomholt

Issued: September 18, 2008

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: AM1D-1025_Sep08 Page 1 of 3

References

[1] ANSI C63.19-2007
American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.
[2] DASY4 manual, Chapter: Hearing Aid Compatibility (HAC) T-Coil Extension

Description of the AM1D probe

The AM1D 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 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 the angle of the 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 nominally 35.3° above the measurement plane, using the connector rotation and sensor angle stated below.
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.

Handling of the item

The probe is manufactured from stainless steel. In order to maintain the performance and calibration of the probe, it must not be opened. The probe is designed for operation in air and shall not be exposed to humidity or liquids. For proper operation of the surface detection and emergency stop functions in a DASY system, the probe must be operated with the special probe cup provided (larger diameter).

Methods Applied and Interpretation of Parameters

- *Coordinate System:* The AM1D probe is mounted in the DASY system for operation with a HAC Test Arch phantom with AMCC Helmholtz calibration coil according to [2], with the tip pointing to "southwest" orientation.
- *Functional Test:* The functional test preceding calibration includes test of
  Noise level
  RF immunity (1kHz AM modulated signal). The shield of the probe cable must be well connected.
  Frequency response verification from 100 Hz to 5 kHz.
- *Connector Rotation:* The connector at the end of the probe does not carry any signals and is used for fixation to the DAE only. The probe is operated in the center of the AMCC Helmholtz coil using a 1 kHz magnetic field signal. Its angle is determined from the two minima at nominally +120° and –120° rotation, so the sensor in the tip of the probe is aligned to the vertical plane in z-direction, corresponding to the field maximum in the AMCC Helmholtz calibration coil.
- *Sensor Angle:* The sensor tilting in the vertical plane from the ideal vertical direction is determined from the two minima at nominally +120° and –120°. DASY system uses this angle to align the sensor for radial measurements to the x and y axis in the horizontal plane.
- *Sensitivity:* With the probe sensor aligned to the z-field in the AMCC, the output of the probe is compared to the magnetic field in the AMCC at 1 kHz. The field in the AMCC Helmholtz coil is given by the geometry and the current through the coil, which is monitored on the precision shunt resistor of the coil.

AM1D probe identification and configuration data

Item	**AM1DV2** Audio Magnetic 1D Field Probe
Type No	SP AM1 001 AE
Serial No	**1025**

Overall length	296 mm
Tip diameter	6.0 mm (at the tip)
Sensor offset	3.0 mm (centre of sensor from tip)
Internal Amplifier	40 dB

Manufacturer / Origin	Schmid & Partner Engineering AG, Zürich, Switzerland
Manufacturing date	Jul-2006
Last calibration date	September 19, 2007

Calibration data

Connector rotation angle	(in DASY system)	**150.2** °	+/- 3.6 ° (k=2)
Sensor angle	(in DASY system)	**-0.45** °	+/- 0.5 ° (k=2)
Sensitivity at 1 kHz	(in DASY system)	**0.0649 V / (A/m)**	+/- 2.2 % (k=2)

DAE Calibration Certificate

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client SGS (Dymstec)

Certificate No: DAE3-567_Sep08

CALIBRATION CERTIFICATE

Object	DAE3 - SD 000 D03 AA - SN: 567
Calibration procedure(s)	QA CAL-06.v12 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	September 24, 2008
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Fluke Process Calibrator Type 702	SN: 6295803	04-Oct-07 (No: 6467)	Oct-08
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-07 (No: 6465)	Oct-08
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	06-Jun-08 (in house check)	In house check: Jun-09

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	
Approved by:	Fin Bomholt	R&D Director	

Issued: September 24, 2008

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: DAE3-567_Sep08 Page 1 of 5

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range:	1LSB =	6.1μV ,	full range =	-100...+300 mV
Low Range:	1LSB =	61nV ,	full range =	-1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	404.676 ± 0.1% (k=2)	404.415 ± 0.1% (k=2)	404.505 ± 0.1% (k=2)
Low Range	3.95084 ± 0.7% (k=2)	3.95932 ± 0.7% (k=2)	3.95189 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	85 ° ± 1 °

Appendix

1. DC Voltage Linearity

High Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	200000	200000.4	0.00
Channel X	+ Input	20000	20004.42	0.02
Channel X	- Input	20000	-19999.98	0.00
Channel Y	+ Input	200000	200000	0.00
Channel Y	+ Input	20000	20003.82	0.02
Channel Y	- Input	20000	-20001.54	0.01
Channel Z	+ Input	200000	200000.2	0.00
Channel Z	+ Input	20000	20001.02	0.01
Channel Z	- Input	20000	-20001.77	0.01

Low Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	2000	2000.1	0.00
Channel X	+ Input	200	200.08	0.04
Channel X	- Input	200	-200.46	0.23
Channel Y	+ Input	2000	2000.1	0.00
Channel Y	+ Input	200	199.44	-0.28
Channel Y	- Input	200	-200.67	0.33
Channel Z	+ Input	2000	1999.9	0.00
Channel Z	+ Input	200	198.93	-0.53
Channel Z	- Input	200	-201.01	0.50

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	4.45	3.07
	- 200	-1.97	-3.12
Channel Y	200	0.63	0.75
	- 200	-1.46	-2.02
Channel Z	200	5.71	5.24
	- 200	-6.82	-7.33

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	1.58	0.47
Channel Y	200	0.86	-	2.06
Channel Z	200	-2.64	0.26	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	16354	16104
Channel Y	16145	17163
Channel Z	15912	15586

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	-0.07	-1.16	0.99	0.42
Channel Y	-0.59	-1.54	0.25	0.31
Channel Z	-0.69	-1.63	0.02	0.32

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance

	Zeroing (MOhm)	Measuring (MOhm)
Channel X	0.2001	201.2
Channel Y	0.2001	200.7
Channel Z	0.2001	199.3

8. Low Battery Alarm Voltage (verified during pre test)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (verified during pre test)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.0	+6	+14
Supply (- Vcc)	-0.01	-8	-9