



TEST REPORT

REPORT NUMBER: I10GC0567-HAC-RF

ON

Type of Equipment: GSM/GPRS/EGPRS mobile phone
Type of Designation: Sonim XP3300-A-R1
Type Number: P25C005AA
Manufacturer: Sonim Technologies, Inc

ACCORDING TO

ANSI C63.19-2007 American National Standard Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids, RF section

China Telecommunication Technology Labs.

Month date, year
Nov 18, 2010

Signature



He Guili
Director

FCC ID WYPP25C005AA
IC ID: 8090A-P25C005AA

Test Firm Name: China Telecommunication Technology Labs
FCC Registration Number: 840587
IC number: 8426A

Statement

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported tests were carried out on a sample equipment to demonstrate limited compliance with ANSI C63.19-2007 M3 requirements. The sample tested was found to comply with the requirements defined in the applied rules.

Table of Contents

1. General Information	4
1.1 NOTES	4
1.2 TESTERS	5
1.3 TESTING LABORATORY INFORMATION	6
1.4 DETAILS OF APPLICANT OR MANUFACTURER	7
2 Test Item	8
2.1 GENERAL INFORMATION	8
2.2 OUTLINE OF EUT	8
2.3 MODIFICATIONS INCORPORATED IN EUT	8
2.4 EQUIPMENT CONFIGURATION.....	8
2.5 OTHER INFORMATION	8
2.6 EUT PHOTOGRAPHS	9
3 Test Configurations	10
3.1 HAC MEASUREMENT SYSTEM	10
3.2 HAC MEASUREMENT SYSTEM SPECIFICATIONS	11
3.3 TEST EQUIPMENTS LIST	13
3.4 TEST CONDITION	13
3.5 EUT SETUP.....	14
3.6 EUT POWER.....	17
4 Test Results	18
4.1 APPLICABLE CATEGORY REGULATIONS	18
4.2 GENERAL CONCLUSIONS	18
5 System Validations	19
5.1 VALIDATION PROCEDURE:	19
5.2 VALIDATION RESULTS	19
6 Probe Modulation Factor Measurements	20
6.1 PMF TEST PROCEDURES	20
6.2 PMF TEST RESULTS	21
7 RF Emission Measurements	22
7.1 TEST PROCEDURES	22
7.2 RF EMISSION MEASUREMENT DATA	23
7.3 MEASUREMENT UNCERTAINTY	24
ANNEX A Photographs	25
ANNEX B Validation Graphical Results	26
Annex C PMF Measurements Graphical Results	34
ANNEX D RF Emission Graphical Results	58
ANNEX E Probes Calibration Certificates	86
ANNEX F Deviations from Prescribed Test Methods	106

1. General Information

1.1 Notes

All reported tests were carried out on a sample equipment to demonstrate limited compliance with the requirements of ANSI C63.19-2007 M3 requirements.

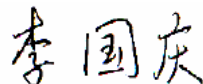
The test results of this test report relate exclusively to the item(s) tested as specified in section 2.

The following deviations from, additions to, or exclusions from the test specifications have been made. See Annex F.

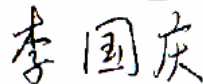
China Telecommunication Technology Labs.(CTTL) authorizes the applicant or manufacturer (see section 1.4) to reproduce this report provided, and the test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CTTL Mr. He Guili.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. CTTL accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

1.2 Testers

Name: Li Guoqing
Position: Engineer
Department: Department of EMC test
Signature: 

Editor of this test report:

Name: Li Guoqing
Position: Engineer
Department: Department of EMC test
Date: 2010-11-18
Signature: 

Technical responsibility for testing:

Name: Zou Dongyi
Position: Manager
Department: Department of EMC test
Date: 2010-11-18
Signature: 

1.3 Testing Laboratory information

1.3.1 Location

Name: China Telecommunication Technology Labs.
Address: No. 11, Yue Tan Nan Jie, Xi Cheng District,
BEIJING
P. R. CHINA, 100045
Tel: +86 10 68094053
Fax: +86 10 68011404
Email: emc@chinattl.com

1.3.2 Details of accreditation status

Accredited by: China National Accreditation Service for Conformity
Assessment (CNAS)
Registration number: CNAS Registration No. CNAS L0570
Standard: ISO/IEC 17025:2005

1.3.3 Test location, where different from section 1.3.1

Name: -----
Address: -----

1.4 Details of applicant or manufacturer

1.4.1 Applicant

Name: Sonim Technologies, Inc
Address 1875 S. Grant Street, Suite 800 San Mateo, CA 94402
Country: United States
Telephone: +1 650 504 4411
Fax: +1 650 378 8190
Contact: Jasen Kolev
Telephone: +1 650 504 4411
Email jasen@sonimtech.com

1.4.2 Manufacturer (if different from applicant in section 1.4.1)

Name: --
Address: --

1.4.3 Manufactory (if different from applicant in section 1.4.1)

Name: --
Address: --

2 Test Item

2.1 General Information

Manufacturer: Sonim Technologies, Inc
 Model Name: Sonim XP3300-A-R1
 Type Number: P25C005AA
 Product Name: GSM/GPRS/EGPRS mobile phone
 Serial Number: 001080000240078
 Production Status: Product
 Receipt date of test item: 2010-11-01

2.2 Outline of EUT

EUT is a cellular and PCS band GSM mobile phone, supporting GPRS and EGPRS with multi-time of class 12.

2.3 Modifications Incorporated in EUT

The EUT has not been modified from what is described by the brand name and unique type identification stated above.

2.4 Equipment Configuration

Equipment configuration list:

Item	Generic Description	Manufacturer	Type	Serial No.	Remarks
A	handset	Sonim Technologies, Inc	Sonim XP3300-A-R1	001080000 240078	--
B	adapter	Dee Van Enterprises Co., Ltd.	DSA-3RNA-05 FUS 050065	--	--
C	battery	Sunwoda Electronic Co., Ltd.	XP-0001100	WD100500 1383	--
D	Earphone	MINAMI ACOUSTICS LIMITED	ME-816B5-C	--	--

2.5 Other Information

Version of hardware and software:

HW Version: A

SW Version: S3001_V07_2

Adaptor information:

Input: 100-240VAC 0.3A

Output: 5.0V 0.65A

Battery information: 1750mAh Nominal Voltage: 3.7V

2.6 EUT Photographs



Face view



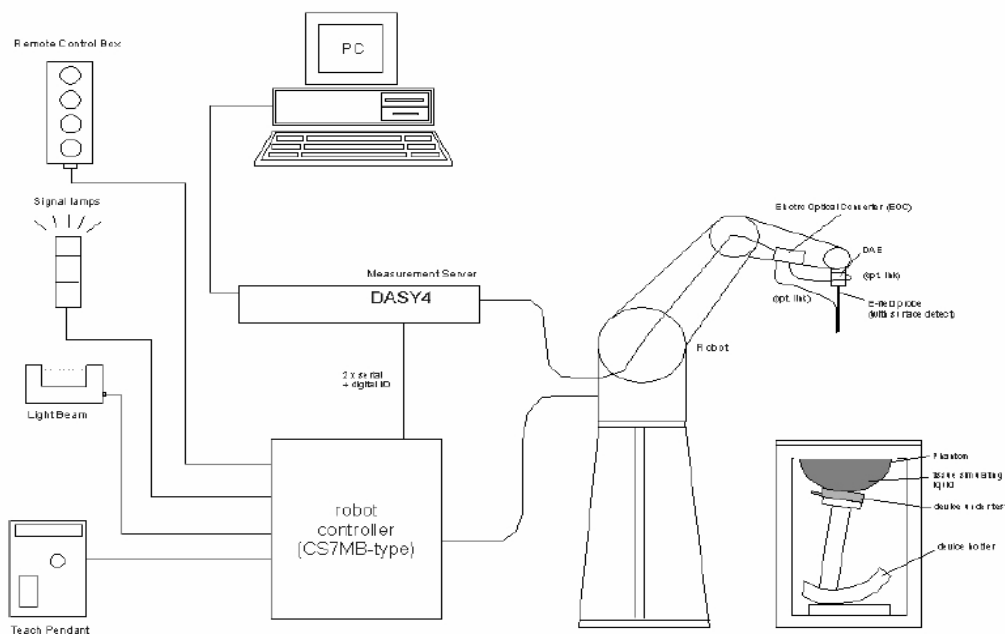
Back view

3 Test Configurations

3.1 HAC Measurement System

All measurements were performed using the automated near-field scanning system, DASY5, from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision industrial robot which positions the probes with a positional repeatability of better than 0.02mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines (length =300mm) to the data acquisition unit.

A cell controller system containing the power supply, robot controller, teach pendant (Joystick) and remote control, is used to drive the robot motors. The PC consists of the Intel ® Core™ 2 Duo CPU E6750 @ 2.66 GHz with Windows XP SP3 system and HAC Measurement Software DASY5, A/D interface card, monitor, mouse, and keyboard. The Stäubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc., which is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical signal to digital electric signal of the DAE and transfers data to the PC plug-in card.



Demonstration of measurement system setup

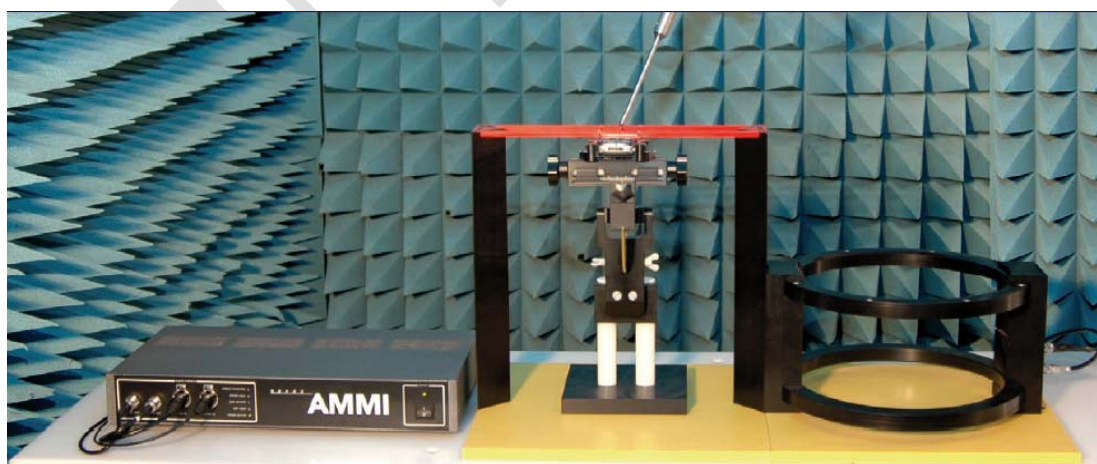
The DAE4 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is

accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built-in VME-bus computer.

3.2 HAC Measurement System Specifications

Item	Description
Test Arch	
function:	enables easy and well defined positioning of the phone and calibration dipoles as well as simple teaching of the robot
dimensions:	370 mm x 370 mm x 375 mm
Device Holder	
function:	supports accurate positioning of any phone
effect on near-field:	< +/- 0.5dB
Broadband Calibration Dipoles CD835 / CD1880 / CD 2450 including holder and transportation box	
frequency bands:	800 - 960 / 1710 - 2000 / 2250 - 2650 MHz
return loss:	>15 / >18 / >18 dB over frequency band
calibrated at:	835 / 1880 / 2450 MHz (return loss >20 dB)
Audio Magnetic Field Probe AM1D	
frequency range:	0.1 - 20 kHz (RF sensitivity <-100 dB, fully RF shielded)
sensitivity:	<-50 dB A/m @ 1 kHz
pre-amplifier:	40 dB, symmetric
dimensions:	tip diameter / length: 6 / 290 mm, sensor according to ANSI-PC63.19
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
dimensions:	482 x 65 x 270 mm
Helmholtz Calibration Coil (AMCC)	
Dimensions:	370 x 370 x 196 mm, according to ANSI-PC63.19

Item	Description
HAC Extension Software for DASY5	
precise teaching:	easy teaching with adaptive distance verification
measurement area:	flexible selection of measurement area, predefined according to ANSI-PC63.19
RF evaluation:	automatic exclusion of high-level areas
ABM evaluation:	spectral processing, filtering, weighting and evaluation according to ANSI-PC63.19
report:	documentation ready for compliance report
Isotropic H-Field Probe H3D	
frequency band:	200 - 3000 MHz (free space)
dynamic range:	10 mA/m to 2 A/m at 1 GHz
linearity:	± 0.2 dB (100 MHz to 3 GHz)
directivity:	± 0.25 dB (spherical isotropy error)
dimensions:	tip diameter / length: 6 / 330 mm
Isotropic E-Field Probe ER3D	
frequency:	100 - 6000 MHz
dynamic range:	2 V/m to > 1000 V/m
linearity:	± 0.2 dB (100 MHz to 6 GHz)
directivity:	± 0.2 dB in air (rotation around probe axis), ± 0.4 dB in air (rotation normal to probe axis)
dimensions:	tip diameter / length: 8 / 330 mm



3.3 Test Equipments List

ITEM	TYPE	S/N	CALIBRATION DATE	DUE DATE
E-field probe	ER3DV6	2435	2010-05-20	2011-05-19
H-field	H3DV6	6268	2010-05-21	2011-05-20
DAE	DAE4	797	2009-11-26	2010-11-25
Dipole	CD835V3	1090	2010-05-17	2011-05-16
Dipole	CD1880V3	1089	2010-05-17	2011-05-16
Power Meter	E4417A	GB41050460	2010-05-25	2012-05-20
Radio Communication Analyzer	CMU200	1100000802	2010-06-01	2011-05-31
Signal Generator	SMP04	100064	2010-05-24	2011-05-23
Power Sensor	E9327A	US40440198	2010-07-13	2011-07-12
Power Sensor	E9327A	US40440326	2010-07-26	2011-07-25
Power Amplifier	150W1000	150W1000	NA	NA
Frequency Spectrum Analyzer	E7405A	US41160321	2010-08-20	2010-08-19
Attenuator	20dB	836471/003	NA	NA
Attenuator	20dB	836471/004	NA	NA
Attenuator	2	BL1250	NA	NA
Attenuator	2	BK774	NA	NA
Dual directional coupler	4242-20	04200	NA	NA
Probe kit	85070E	3G-S-00139	NA	NA
Network Analyzer	8753ES	MY40002093	2010-05-26	2011-05-25

3.4 Test Condition

Specifications ANSI C63.19-2007
Date of Tests from 2010-11-02 to 2010-11-03
Operation Mode TX at the highest output peak power level
Method of measurement: ANSI C63.19-2007

Date:	Ambient Temperature (°C)	Ambient Humidity (%)
	20~25	30~70
2010-11-02	22.3	32
2010-11-03	23.1	33

3.5 EUT Setup

3.5.1 RF Emission Reference Plane

Following figures illustrate the references and reference plane that shall be used in the EUT emissions measurement.

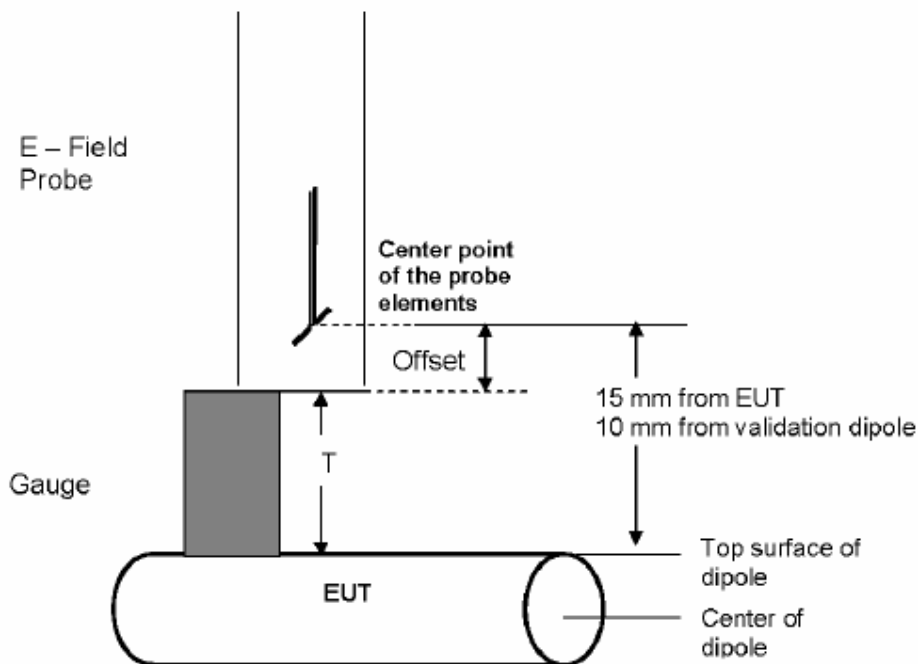
- The grid is 50.0 mm by 50.0 mm area that is divided into nine evenly sized blocks or sub-grids.
- The grid is centered on the audio frequency output transducer of the EUT (speaker or T-Coil).
- The grid is in a reference plane, which is defined as the planar area that contains the highest point in 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 EUT handset, which, in normal handset use, rest against the ear.
- The measurement plane is parallel to, and 10.0 mm in front of, the reference plane.



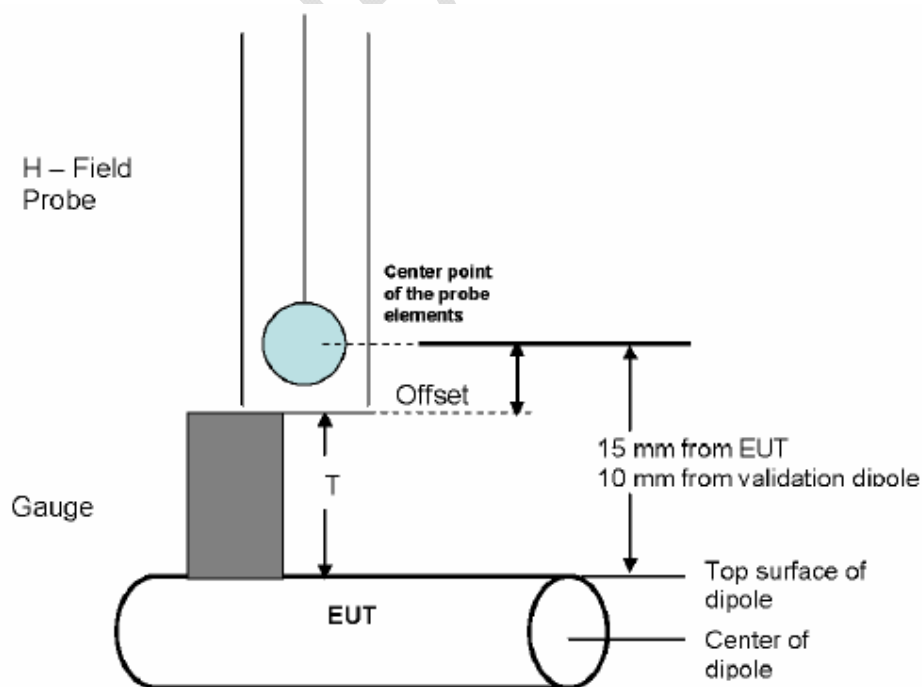
RF Emission Reference Plane

3.5.2 Measurement Distance to Probe

The following figures show the RF emission measurement distances between the EUT or dipoles and probes.



E-field measurement

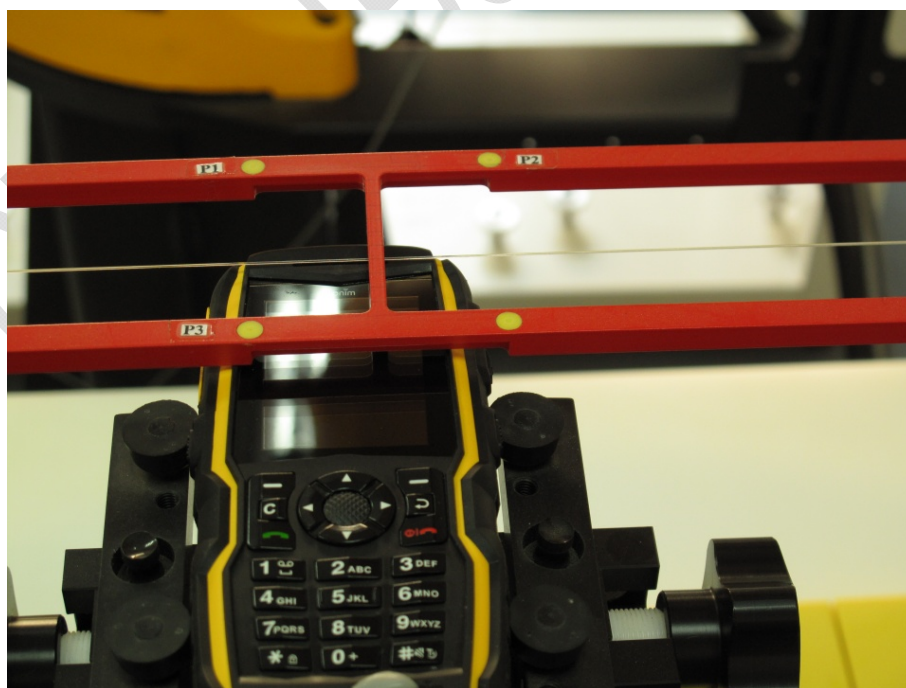


H-field measurement

3.5.3 EUT Setup photos



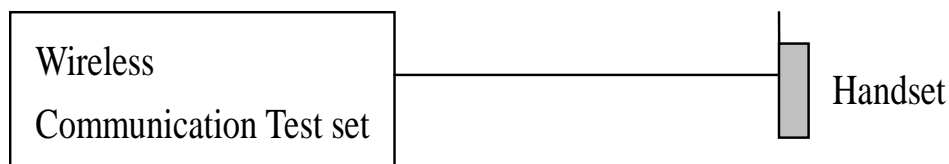
EUT Receiver Position



EUT Setup

3.6 EUT Power

The output power measurement test setup is demonstrated as following figure.



Demonstration of Conducted power measurement

The power control level settings and measurement value are as following table.

Conducted Power Measurement

System and Channel	PCL	Power (dBm)
GSM850 Ch128	5	31.23
GSM850 Ch190	5	31.40
GSM850 Ch251	5	31.34
PCS1900 Ch512	0	29.09
PCS1900 Ch661	0	27.85
PCS1900 Ch810	0	28.71

4 Test Results

4.1 Applicable Category Regulations

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 0.34
	-5	47.3 - 84.1	0.14 - 0.25
M4	0	<63.1	<0.19
	-5	<47.3	<0.14

Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5	<149.6	<0.45

4.2 General Conclusions

The EUT complies with the category M3.

Note:

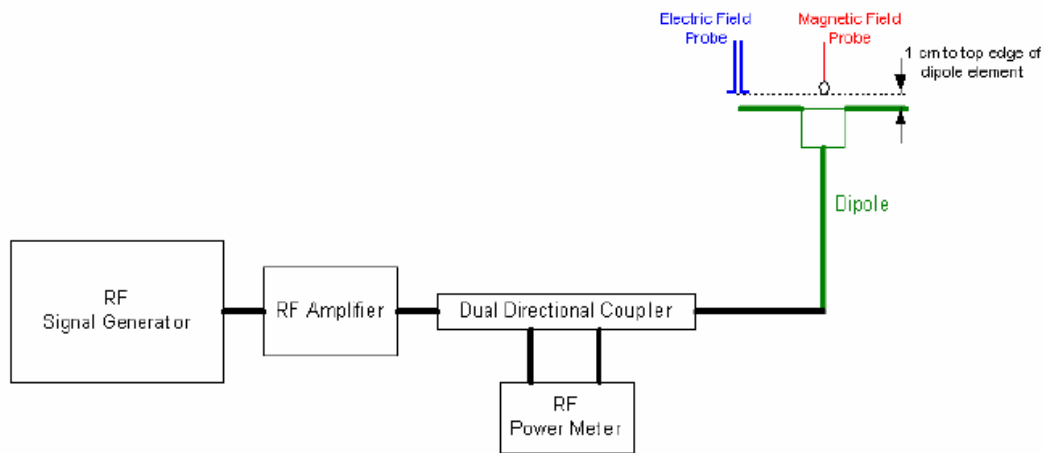
All measurements are traceable to national standards.

5 System Validations

5.1 Validation Procedure:

Place a dipole antenna meeting the requirements given in ANSI C63.19 D.5 in the position normally occupied by the WD. The dipole antenna serves as a known source for an electrical and magnetic output. Position the E-field and H-field probes so that:

- The probes and their cables are parallel to the coaxial feed of the dipole antenna
- The probe cables and the coaxial feed of the dipole antenna approach the measurement area from opposite directions
- The center point of the probe element(s) are 10 mm from the closest surface of the dipole elements.



Validation Setup

5.2 Validation Results

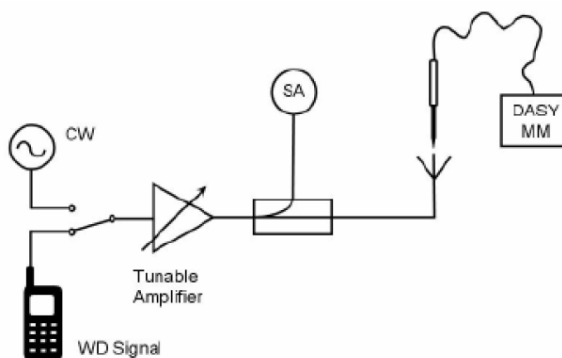
E-field Validation					
Item	Reference value	Tolerance limit	Output power at antenna	Measured value	Error [%]
CW835MHz	165.8 V/m	±10%	100mW	161.5 V/m	-2.6
CW1880MHz	140.3 V/m	±10%	100mW	129.7 V/m	-7.6
H-field Validation					
Item	Reference value	Tolerance limit	Output power at antenna	Measured value	Error [%]
CW835MHz	0.456 A/m	±10%	100mW	0.443 A/m	-2.8
CW1880MHz	0.465A/m	±10%	100mW	0.450 A/m	-3.2

6 Probe Modulation Factor Measurements

The Probe Modulation Factor (PMF) is defined as the ratio of the field readings for a CW and a modulated signal with the equivalent Field Envelope Peak as defined in ANSI C63.19 (Chapter C.3.1). Calibration shall be made of the modulation response of the probe and its instrumentation chain. This Calibration shall be performed with the field probe, attached to the instrumentation that is to be used with it during the measurement. The response of the probe system to a CW field at the frequency(s) of interest is compared to its response to a modulated signal with equal peak amplitude. The field level of the test signals shall be more than 10dB above the ambient level and the noise floor of the instrumentation being used. The ratio of the CW reading to that taken with a modulated field shall be applied to the readings taken of modulated fields of the specified type.

6.1 PMF Test Procedures

1. Fix the field probe in a set location relative to a field generating device, such as the reference dipole antenna, as illustrated in following figure.
2. Illuminate the probe using the wireless device connected to the reference dipole with a test signal at the intended measurement frequency, Ensure there is sufficient field coupling between the probe and the antenna so the resulting reading is greater than 10 dB above the probe system noise floor but within the systems operating range.
3. Record the amplitude applied to the antenna during transmission and the field strength measured by the E-field probe located near the tip of the dipole antenna
4. Replace the wireless device with an RF signal generator producing an unmodulated CW signal and set to the wireless device operating frequency.
5. Set the amplitude of the unmodulated signal to equal that recorded from the wireless device.
6. Record the reading of the probe measurement system of the unmodulated signal.
7. The ratio, in linear units, of the probe reading in Step 6) to the reading in Step 3) is the E-field modulation factor. $PMFE = ECW/Emod$ ($PMFH = HCW/Hmod$)
8. Repeat the previous steps using the H-field probe, except locate the probe at the center of the dipole.



PMF Test Setup

6.2 PMF Test Results

6.2.1 E-field probe

6.2.1.1 Frequency 835MHz

signal	Output power at antenna	E-field Value
CW	20dBm	213.00 V/m
80%AM	20dBm	132.20 V/m
GMSK	20dBm	76.03 V/m
PMF=2.80		

6.2.1.2 Frequency 1880MHz

signal	Output power at antenna	E-field Value
CW	20dBm	171.90 V/m
80%AM	20dBm	107.00 V/m
GMSK	20dBm	59.98 V/m
PMF=2.87		

6.2.2 H-field Probe

6.2.2.1 Frequency 835MHz

signal	Output power at antenna	H-field Value
CW	20dBm	0.5843 A/m
80%AM	20dBm	0.3199 A/m
GMSK	20dBm	0.2188 A/m
PMF=2.67		

6.2.2.2 Frequency 1880MHz

signal	Output power at antenna	H-field Value
CW	20dBm	0.5395 A/m
80%AM	20dBm	0.3350 A/m
GMSK	20dBm	0.2383 A/m
PMF=2.26		

7 RF Emission Measurements

7.1 Test Procedures

The evaluation was performed with the following procedure:

- 1) Confirm proper operation of the field probe, probe measurement system and other instrumentation and the positioning system.
- 2) Position the WD in its intended test position. The gauge block can simplify this positioning. Note that a separate E-field and H-field gauge block will be needed if the center of the probe sensor elements are at different distances from the tip of the probe.
- 3) Configure the WD normal operation for maximum rated RF output power, at the desired channel and other operating parameters (e.g., test mode), as intended for the test.
- 4) The center sub-grid shall be centered on the center of the T-Coil mode axial measurement point or the acoustic output, as appropriate. Locate the field probe at the initial test position in the 50 mm by 50 mm grid, which is contained in the measurement plane. If the field alignment method is used, align the probe for maximum field reception.
- 5) Record the reading.
- 6) Scan the entire 50 mm by 50 mm region in equally spaced increments and record the reading at each measurement point. The distance between measurement points shall be sufficient to assure the identification of the maximum reading.
- 7) Identify the five contiguous sub-grids around the center sub-grid with the lowest maximum field strength readings. Thus the six areas to be used to determine the WD's highest emissions are identified and outlined for the final manual scan. Please note that a maximum of five blocks can be excluded for both E-field and H-field measurements for the WD output being measured. Stated another way, the center sub-grid and three others must be common to both the E-field and H-field measurements.
- 8) Identify the maximum field reading within the non-excluded sub-grids identified in Step 7)
- 9) Convert the maximum field strength reading identified in Step 8) to V/m or A/m, as appropriate. For probes which require a probe modulation factor, this conversion shall be done using the appropriate probe modulation factor and the calibration.
- 10) Repeat step 1) to 10) for both E-field and H-field measurements.
- 11) Compare this reading to the categories in ANSI C63.19 Clause 7 and record the resulting category. The lowest category number listed in 7.2, Table 7.4, or Table 7.5 obtained in Step 10) for either E- or H-field determines the M category for the audio coupling mode assessment. Record the WD category rating.

7.2 RF Emission Measurement Data

7.2.1 E-field Measurement

GSM 850 band:

Channel and frequency	AWF	Measured Value (V/m)	Power Drift (dB)	Category
Low: 128/824.2MHz	-5	188.9	-0.102	M3
Mid: 190/836.6MHz	-5	185.1	-0.023	M3
High: 251/848.8MHz	-5	189.6	-0.009	M3

PCS 1900 band:

Channel and frequency	AWF	Measured Value (V/m)	Power Drift (dB)	Category
Low: 512/1850.2MHz	-5	52.0	0.057	M3
Mid: 661/1880.0MHz	-5	58.5	-0.031	M3
High: 810/1909.9MHz	-5	60.0	-0.016	M3

7.2.2 H-field Measurement

GSM 850 band:

Channel and frequency	AWF	Measured Value (A/m)	Power Drift (dB)	Category
Low: 128/824.2MHz	-5	0.358	-0.081	M3
Mid: 190/836.6MHz	-5	0.332	0.170	M3
High: 251/848.8MHz	-5	0.333	0.068	M3

PCS 1900 band:

Channel and frequency	AWF	Measured Value (V/m)	Power Drift (dB)	Category
Low: 512/1850.2MHz	-5	0.149	0.071	M3
Mid: 661/1880.0MHz	-5	0.181	-0.089	M3
High: 810/1909.9MHz	-5	0.188	0.094	M3

7.3 Measurement uncertainty

Error Description	Unc. value, ±%	Prob. Dist.	Div.	c _i E	c _i H	Std.Unc. E ±%	Std.Unc. H ±%
Measurement System							
Probe Calibration	5.1	N	1	1	1	5.1	5.1
Axial Isotropy	4.7	R	$\sqrt{3}$	1	1	2.7	2.7
Sensor Displacement	16.5	R	$\sqrt{3}$	1	0.145	9.5	1.4
Test Arch	7.2	R	$\sqrt{3}$	1	0	4.1	0.0
Linearity	4.7	R	$\sqrt{3}$	1	1	2.7	2.7
Scaling to Peak Envelope Power	0.0	R	$\sqrt{3}$	1	1	0.0	0.0
System Detection Limit	1.0	R	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	0.3	N	1	1	1	0.3	0.3
Response Time	0.8	R	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	2.6	R	$\sqrt{3}$	1	1	1.5	1.5
RF Ambient Conditions	3.0	R	$\sqrt{3}$	1	1	6.9	6.9
RF Reflections	12.0	R	$\sqrt{3}$	1	1	0.9	0.9
Probe Positioner	1.2	R	$\sqrt{3}$	1	0.67	0.7	0.5
Probe Positioning	4.7	R	$\sqrt{3}$	1	0.67	2.7	1.8
Extrapolation. And Interpolation	1.0	R	$\sqrt{3}$	1	1	0.6	0.6
Test Sample Related							
Device Positioning Vertical	4.7	R	$\sqrt{3}$	1	0.67	2.7	1.8
Device Positioning Lateral	1.0	R	$\sqrt{3}$	1	1	0.6	0.6
Device Holder and Phantom	2.4	R	$\sqrt{3}$	1	1	1.4	1.4
Power Drift	5.0	R	$\sqrt{3}$	1	1	2.9	2.9
Phantom and Setup Related							
Phantom Thickness	2.4	R	$\sqrt{3}$	1	0.67	1.4	0.9
Combined Std Uncertainty						±15.2%	±10.8%
Expanded Std Uncertainty on Power						±30.4%	±21.6%
Expanded Std Uncertainty on Field						±15.2%	±10.8%

ANNEX A Photographs



Picture 1 test layout

ANNEX B Validation Graphical Results

B.1 E-field at 835MHz

Test Laboratory: CTTL

HAC_RF_E_Vali835MHz

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: --

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY4 Configuration:

- Probe: ER3DV6 - SN2435; ConvF(1, 1, 1); Calibrated: 2010-5-20
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

E Scan - measurement distance from the probe sensor center to CD835

Dipole = 10mm/Hearing Aid Compatibility Test (5x37x1): Measurement grid:

dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 117.5 V/m; Power Drift = -0.045 dB

Maximum value of Total (measured) = 165.4 V/m

E Scan - measurement distance from the probe sensor center to CD835

Dipole = 10mm/Hearing Aid Compatibility Test (41x361x1): Measurement

grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 153.3 V/m

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 117.5 V/m; Power Drift = -0.045 dB

Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak E-field in V/m

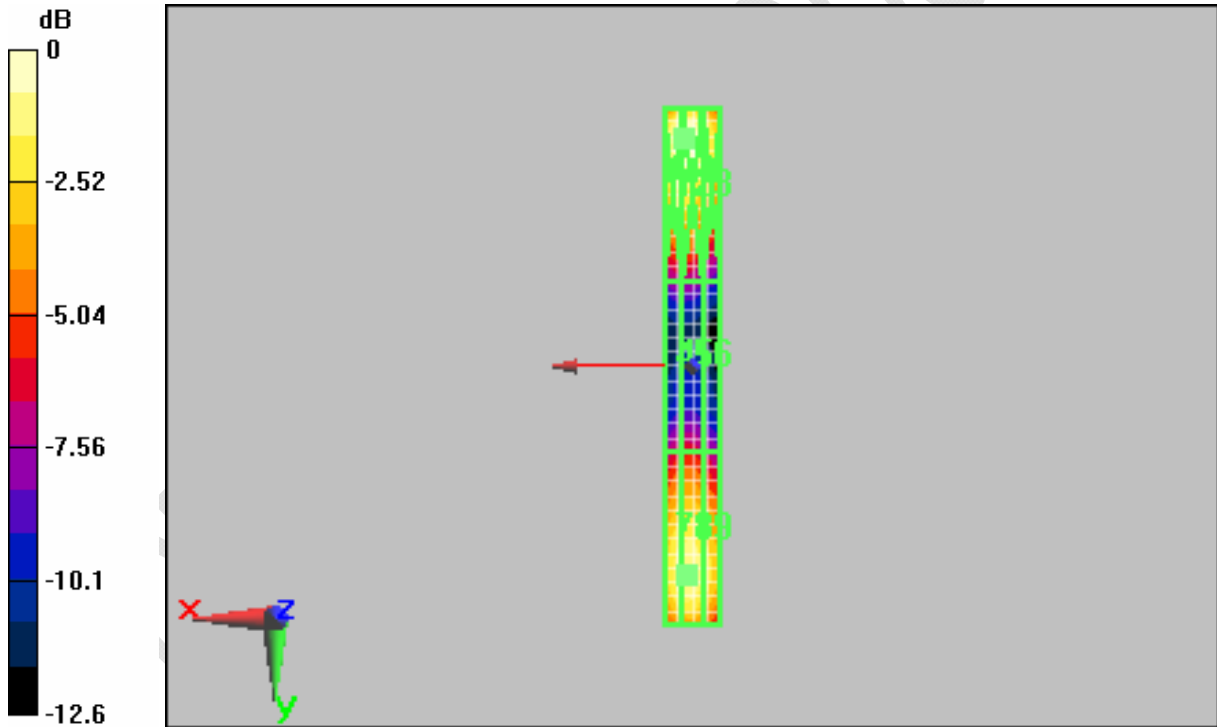
Grid 1	Grid 2	Grid 3
169.3 M4	169.7 M4	152.0 M4
Grid 4	Grid 5	Grid 6
85.6 M4	86.3 M4	79.5 M4
Grid 7	Grid 8	Grid 9
151.7 M4	153.3 M4	140.4 M4

Cursor:

Total = 169.7 V/m

E Category: M4

Location: 3, -79.5, 4.7 mm



0 dB = 169.7V/m

B.2 E-field at 1880MHz

Test Laboratory: CTTL

HAC_RF_E_Vali1880MHz

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: --

Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: ER3DV6 - SN2435; ConvF(1, 1, 1); Calibrated: 2010-5-20
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

E Scan - measurement distance from the probe sensor center to CD1880 Dipole = 10mm/Hearing Aid Compatibility Test (5x19x1): Measurement grid:

dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 137.4 V/m; Power Drift = -0.011 dB

Maximum value of Total (measured) = 133.4 V/m

E Scan - measurement distance from the probe sensor center to CD1880 Dipole = 10mm/Hearing Aid Compatibility Test (41x181x1): Measurement

grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 123.0 V/m

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 137.4 V/m; Power Drift = -0.011 dB

Hearing Aid Near-Field Category: M2 (AWF 0 dB)

Peak E-field in V/m

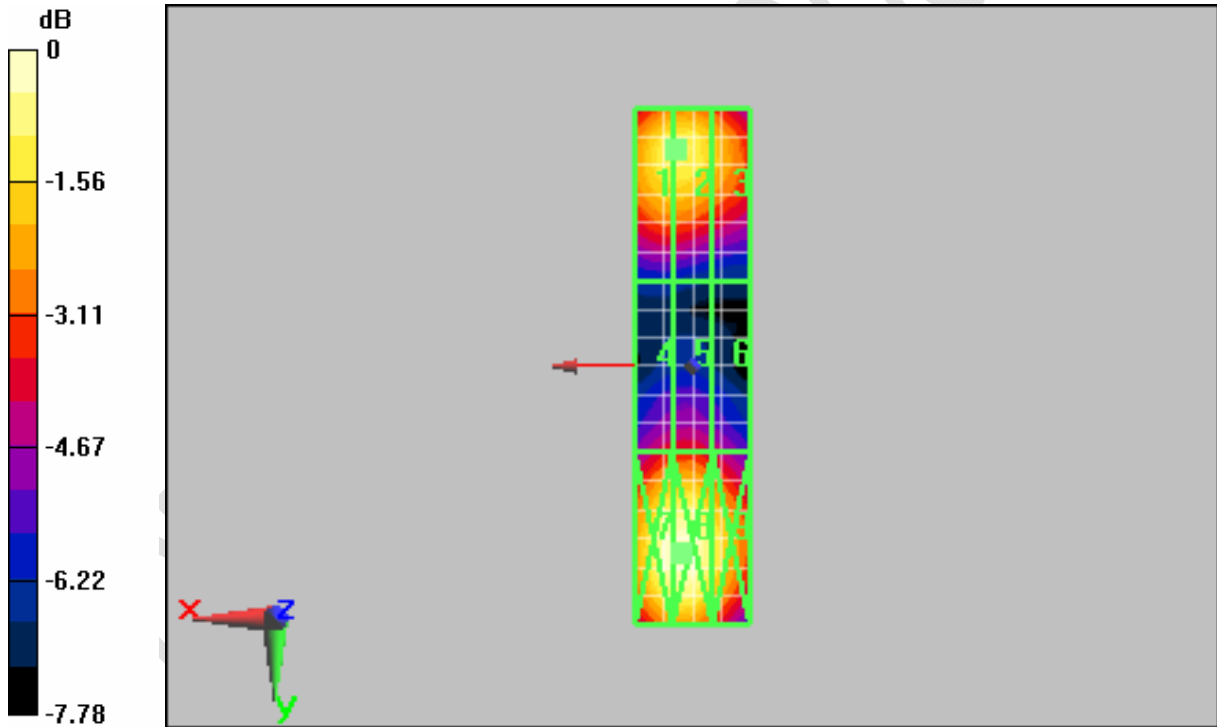
Grid 1 122.7 M2	Grid 2 123.0 M2	Grid 3 112.4 M2
Grid 4 90.8 M3	Grid 5 91.8 M3	Grid 6 85.2 M3
Grid 7 135.1 M2	Grid 8 136.3 M2	Grid 9 121.3 M2

Cursor:

Total = 136.3 V/m

E Category: M2

Location: 2, 32.5, 4.7 mm



0 dB = 136.3V/m

B.3 H-field at 835MHz

Test Laboratory: CTTL

HAC_RF_H_Vali835MHz

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: --

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: H3DV6 - SN6268; ; Calibrated: 2010-5-21
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

H Scan - measurement distance from the probe sensor center to CD835

Dipole = 10mm/Hearing Aid Compatibility Test (5x37x1): Measurement grid:

dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.468 A/m; Power Drift = -0.00832 dB

Maximum value of Total (measured) = 0.443 A/m

H Scan - measurement distance from the probe sensor center to CD835

Dipole = 10mm/Hearing Aid Compatibility Test (41x361x1): Measurement

grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.443 A/m

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.468 A/m; Power Drift = -0.00832 dB

Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak H-field in A/m

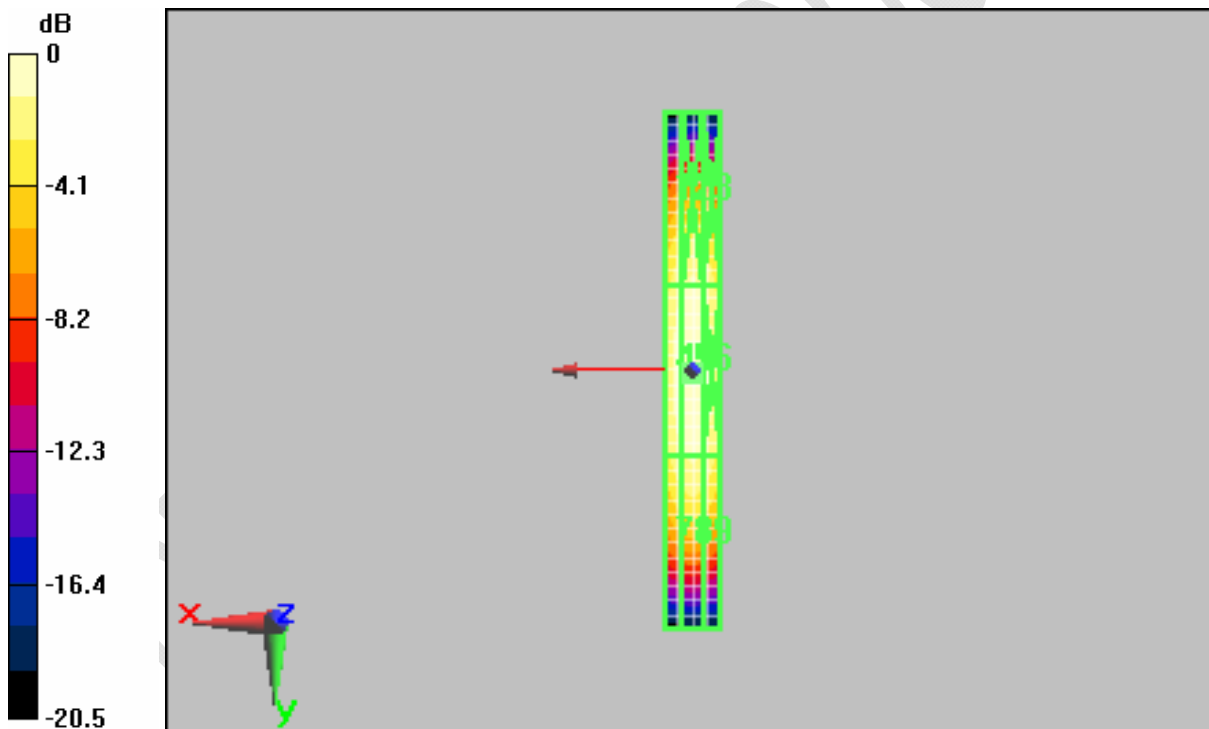
Grid 1 0.374 M4	Grid 2 0.391 M4	Grid 3 0.375 M4
Grid 4 0.423 M4	Grid 5 0.443 M4	Grid 6 0.423 M4
Grid 7 0.372 M4	Grid 8 0.388 M4	Grid 9 0.373 M4

Cursor:

Total = 0.443 A/m

H Category: M4

Location: 0, 0.5, 4.7 mm



0 dB = 0.443A/m

B.4 H-field at 1880MHz

Test Laboratory: CTTL

HAC_RF_H_Vali1880MHz

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: --

Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: H3DV6 - SN6268; ; Calibrated: 2010-5-21
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

H Scan - measurement distance from the probe sensor center to CD835

Dipole = 10mm/Hearing Aid Compatibility Test (5x37x1): Measurement grid:

dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.476 A/m; Power Drift = -0.00401 dB

Maximum value of Total (measured) = 0.450 A/m

H Scan - measurement distance from the probe sensor center to CD835

Dipole = 10mm/Hearing Aid Compatibility Test (41x361x1): Measurement

grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.450 A/m

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.476 A/m; Power Drift = -0.00401 dB

Hearing Aid Near-Field Category: M2 (AWF 0 dB)

Peak H-field in A/m

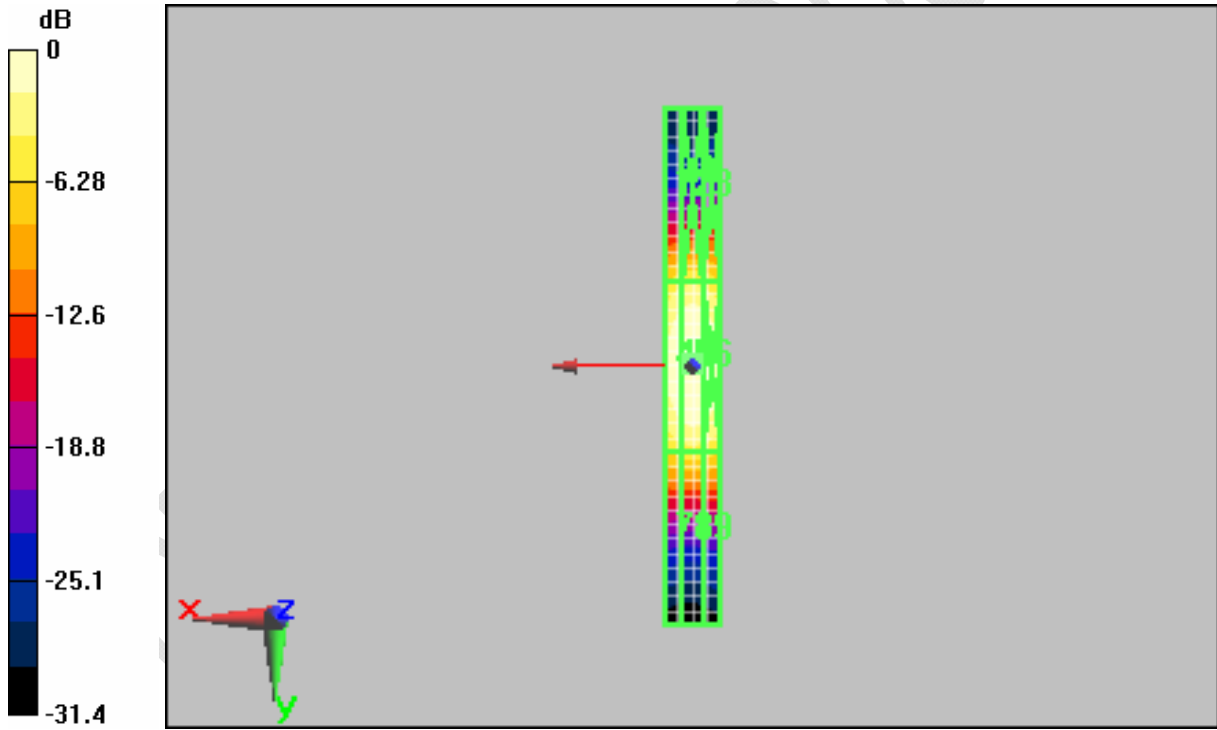
Grid 1 0.253 M3	Grid 2 0.266 M3	Grid 3 0.256 M3
Grid 4 0.430 M2	Grid 5 0.450 M2	Grid 6 0.433 M2
Grid 7 0.243 M3	Grid 8 0.255 M3	Grid 9 0.247 M3

Cursor:

Total = 0.450 A/m

H Category: M2

Location: 0, -0.5, 4.7 mm



0 dB = 0.450A/m

Annex C PMF Measurements Graphical Results

C.1 E-field CW at 835 MHz

Test Laboratory: CTTL

HAC_RF_E_PMF_835MHz_CW_20dBm

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: --

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: ER3DV6 - SN2435; ConvF(1, 1, 1); Calibrated: 2010-5-20
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

E Scan - measurement distance from the probe sensor center to CD835

Dipole = 10mm/Hearing Aid Compatibility Test (5x37x1): Measurement grid:

dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 147.8 V/m; Power Drift = 0.020 dB

Maximum value of Total (measured) = 207.5 V/m

E Scan - measurement distance from the probe sensor center to CD835

Dipole = 10mm/Hearing Aid Compatibility Test (41x361x1): Measurement

grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 193.2 V/m

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 147.8 V/m; Power Drift = 0.020 dB

Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak E-field in V/m

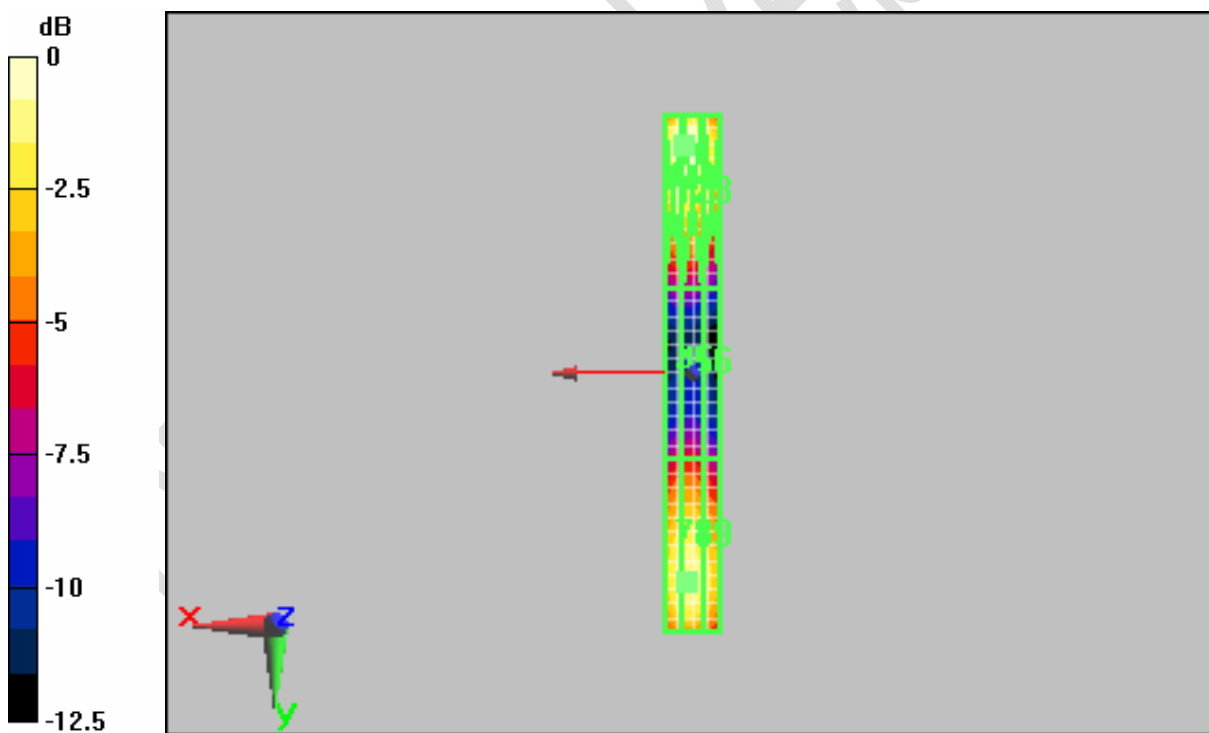
Grid 1 212.6 M3	Grid 2 213.0 M3	Grid 3 191.6 M4
Grid 4 107.7 M4	Grid 5 108.8 M4	Grid 6 100.2 M4
Grid 7 190.8 M4	Grid 8 193.2 M4	Grid 9 176.5 M4

Cursor:

Total = 213.0 V/m

E Category: M3

Location: 3, -79.5, 4.7 mm



0 dB = 213.0V/m

C.2 E-field 80% AM wave at 835 MHz

Test Laboratory: CTTL

HAC_RF_E_PMF_835MHz_AM80%_20dBm

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: --

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: ER3DV6 - SN2435; ConvF(1, 1, 1); Calibrated: 2010-5-20
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

E Scan - measurement distance from the probe sensor center to CD835

Dipole = 10mm/Hearing Aid Compatibility Test (5x37x1): Measurement grid:

dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 91.7 V/m; Power Drift = 0.030 dB

Maximum value of Total (measured) = 129.0 V/m

E Scan - measurement distance from the probe sensor center to CD835

Dipole = 10mm/Hearing Aid Compatibility Test (41x361x1): Measurement

grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 120.3 V/m

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 91.7 V/m; Power Drift = 0.030 dB

Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak E-field in V/m

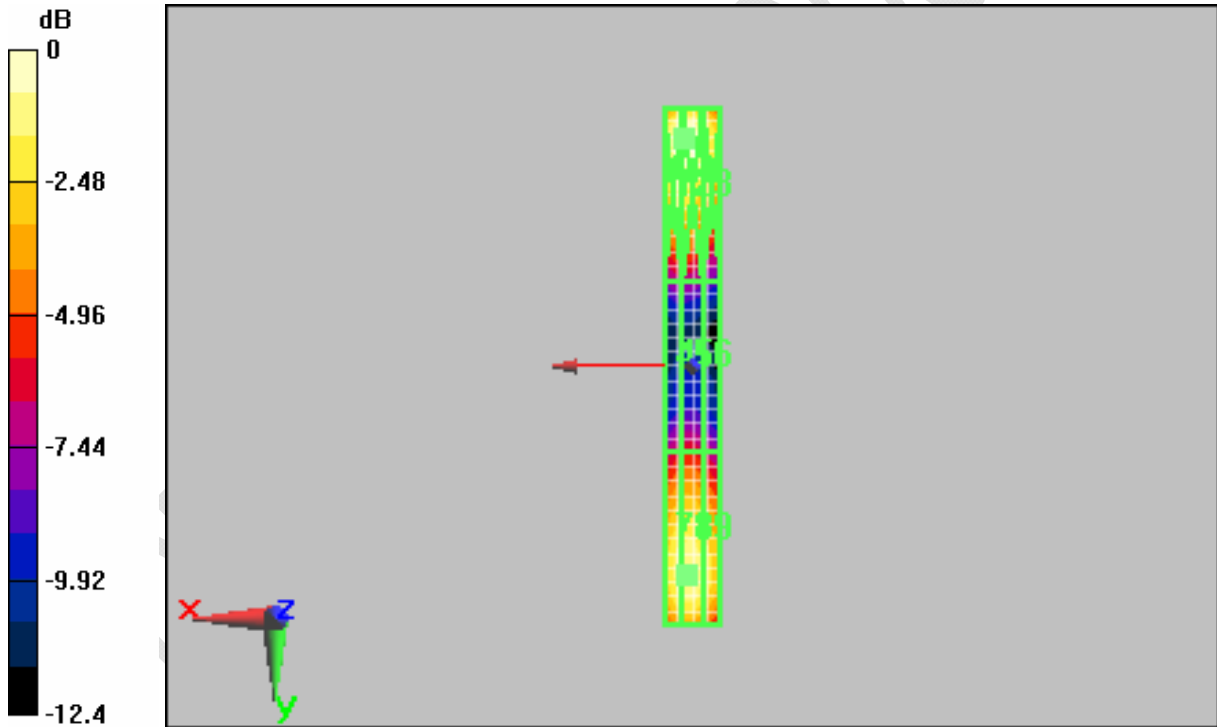
Grid 1 132.2 M4	Grid 2 132.2 M4	Grid 3 118.7 M4
Grid 4 68 M4	Grid 5 68.6 M4	Grid 6 63.3 M4
Grid 7 118.7 M4	Grid 8 120.3 M4	Grid 9 110.5 M4

Cursor:

Total = 132.2 V/m

E Category: M4

Location: 3, -79.5, 4.7 mm



0 dB = 132.2V/m

C.3 E-field GSM signal at 835 MHz

Test Laboratory: CTTL

HAC_RF_E_PMF_835MHz_GSM_20dBm

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: --

Communication System: GSM Signal; Frequency: 835 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: ER3DV6 - SN2435; ConvF(1, 1, 1); Calibrated: 2010-5-20
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

E Scan - measurement distance from the probe sensor center to CD835 Dipole = 10mm/Hearing Aid Compatibility Test (5x37x1): Measurement grid:

dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 52.9 V/m; Power Drift = -0.032 dB

Maximum value of Total (measured) = 74.3 V/m

E Scan - measurement distance from the probe sensor center to CD835 Dipole = 10mm/Hearing Aid Compatibility Test (41x361x1): Measurement

grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 69.2 V/m

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 52.9 V/m; Power Drift = -0.032 dB

Hearing Aid Near-Field Category: M4 (AWF -5 dB)

Peak E-field in V/m

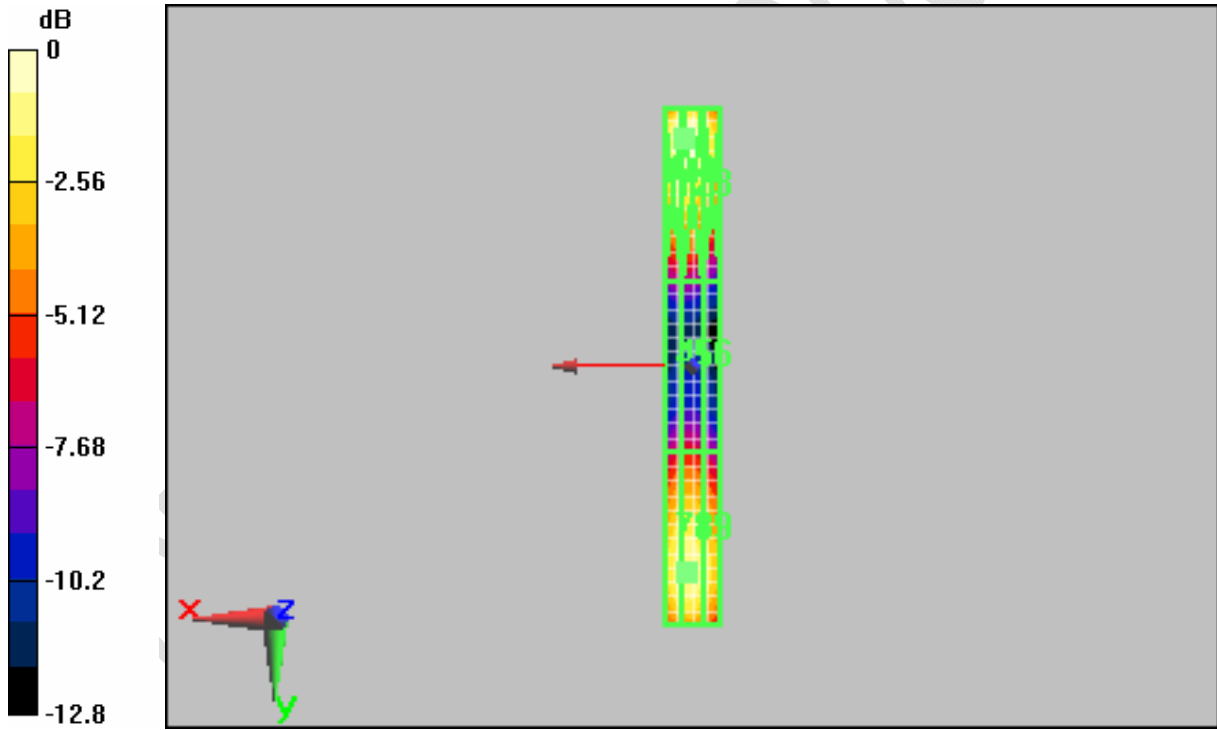
Grid 1	Grid 2	Grid 3
75.8 M4	76 M4	68 M4
Grid 4	Grid 5	Grid 6
37.9 M4	38.5 M4	35.4 M4
Grid 7	Grid 8	Grid 9
68.2 M4	69.2 M4	63.2 M4

Cursor:

Total = 76 V/m

E Category: M4

Location: 2.5, -79, 4.7 mm



0 dB = 76V/m

C.4 E-field CW at 1880 MHz

Test Laboratory: CTTL

HAC_RF_E_PMF_1880MHz_CW_20dBm

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: --

Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: ER3DV6 - SN2435; ConvF(1, 1, 1); Calibrated: 2010-5-20
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

E Scan - measurement distance from the probe sensor center to CD1880 Dipole = 10mm/Hearing Aid Compatibility Test (5x19x1): Measurement grid:

dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 173.3 V/m; Power Drift = -0.00635 dB

Maximum value of Total (measured) = 168.3 V/m

E Scan - measurement distance from the probe sensor center to CD1880 Dipole = 10mm/Hearing Aid Compatibility Test (41x181x1): Measurement

grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 155.1 V/m

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 173.3 V/m; Power Drift = -0.00635 dB

Hearing Aid Near-Field Category: M2 (AWF 0 dB)

Peak E-field in V/m

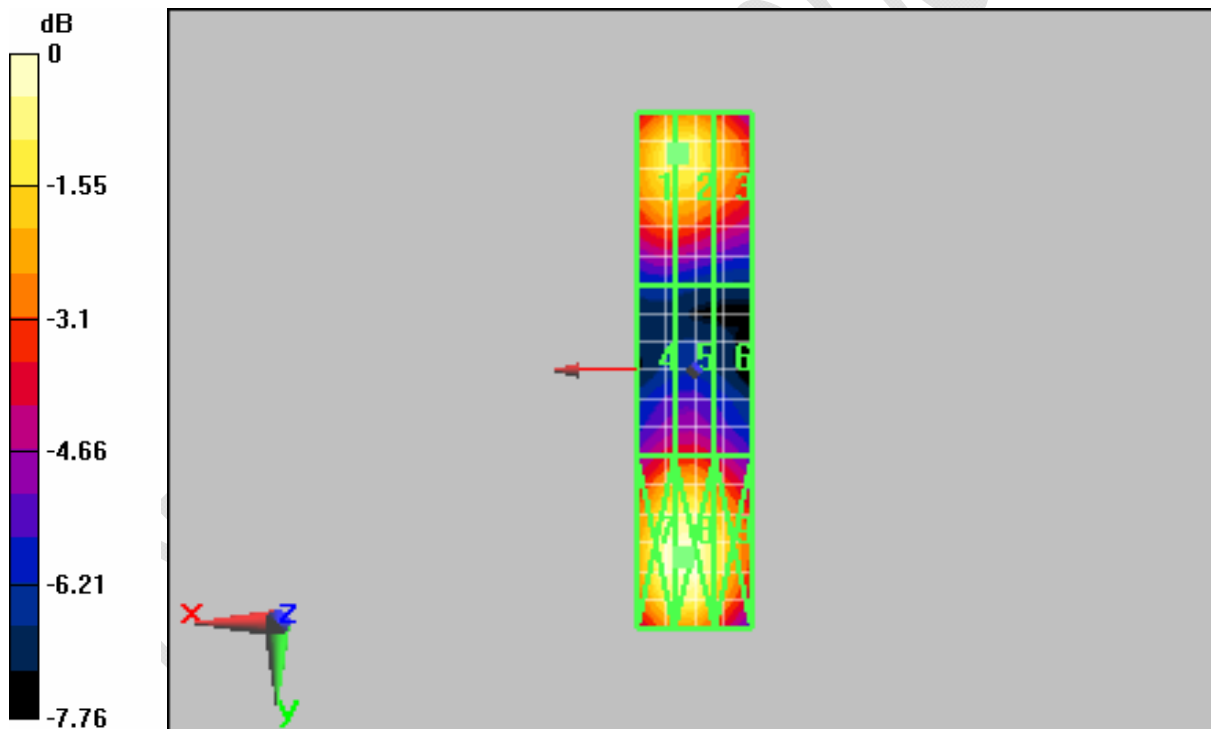
Grid 1 154.8 M2	Grid 2 155.1 M2	Grid 3 141.8 M2
Grid 4 114.5 M2	Grid 5 115.8 M2	Grid 6 107.5 M3
Grid 7 170.4 M2	Grid 8 171.9 M2	Grid 9 153.0 M2

Cursor:

Total = 171.9 V/m

E Category: M2

Location: 2, 32.5, 4.7 mm



0 dB = 171.9V/m

C.5 E-field 80% AM wave at 1880 MHz

Test Laboratory: CTTL

HAC_RF_E_PMF_1880MHz_AM80%_20dBm

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: --

Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: ER3DV6 - SN2435; ConvF(1, 1, 1); Calibrated: 2010-5-20
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

E Scan - measurement distance from the probe sensor center to CD1880 Dipole = 10mm/Hearing Aid Compatibility Test (5x19x1): Measurement grid:

dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 108.2 V/m; Power Drift = -0.00285 dB

Maximum value of Total (measured) = 104.4 V/m

E Scan - measurement distance from the probe sensor center to CD1880 Dipole = 10mm/Hearing Aid Compatibility Test (41x181x1): Measurement

grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 96.9 V/m

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 108.2 V/m; Power Drift = -0.00285 dB

Hearing Aid Near-Field Category: M3 (AWF 0 dB)

Peak E-field in V/m

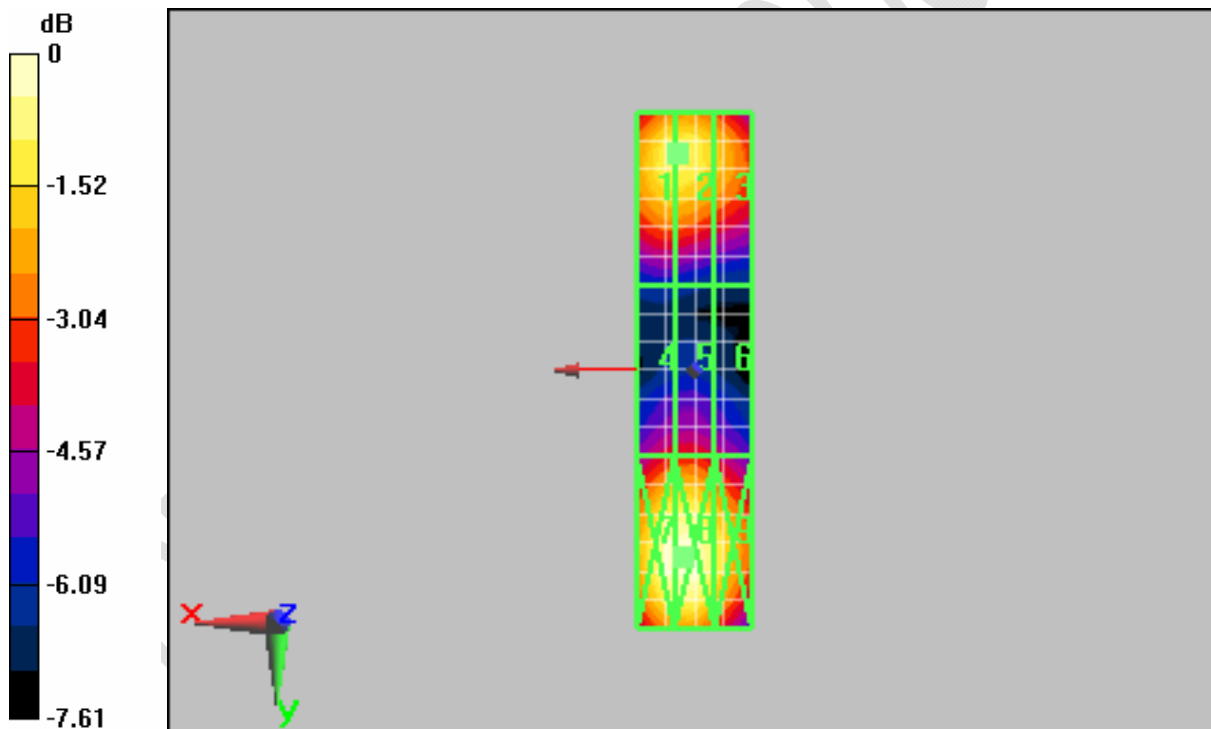
Grid 1	Grid 2	Grid 3
96.8 M3	96.9 M3	88.8 M3
Grid 4	Grid 5	Grid 6
72.1 M3	72.8 M3	67.7 M3
Grid 7	Grid 8	Grid 9
106.2 M3	107.0 M3	95.4 M3

Cursor:

Total = 107.0 V/m

E Category: M3

Location: 2, 32.5, 4.7 mm



0 dB = 107.0V/m

C.6 E-field GSM signal at 1880 MHz

Test Laboratory: CTTL

HAC_RF_E_PMF_1880MHz_GSM_20dBm

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: --

Communication System: GSM Signal; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY4 Configuration:

- Probe: ER3DV6 - SN2435; ConvF(1, 1, 1); Calibrated: 2010-5-20
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

E Scan - measurement distance from the probe sensor center to CD1880 Dipole = 10mm/Hearing Aid Compatibility Test (5x19x1): Measurement grid:

dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 60.2 V/m; Power Drift = -0.010 dB

Maximum value of Total (measured) = 58.9 V/m

E Scan - measurement distance from the probe sensor center to CD1880 Dipole = 10mm/Hearing Aid Compatibility Test (41x181x1): Measurement

grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 54.1 V/m

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 60.2 V/m; Power Drift = -0.010 dB

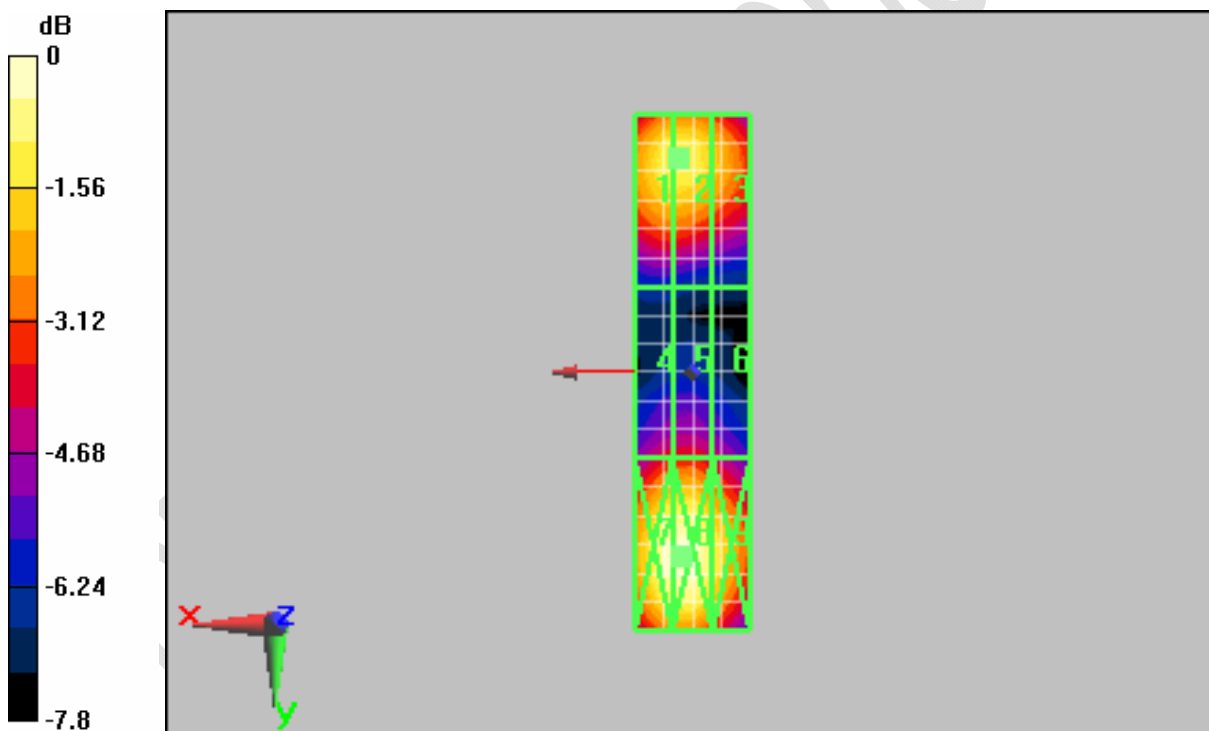
Hearing Aid Near-Field Category: M3 (AWF -5 dB)

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
53.9 M3	54.1 M3	49.5 M3
Grid 4	Grid 5	Grid 6
39.8 M4	40.3 M4	37.4 M4
Grid 7	Grid 8	Grid 9
59.3 M3	60 M3	53.3 M3

Cursor:

Total = 60 V/m
 E Category: M3
 Location: 2, 32, 4.7 mm



0 dB = 60V/m

C.7 H-field CW at 835 MHz

Test Laboratory: CTTL

HAC_RF_H_PMF_835MHz_CW_20dBm

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: --

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: H3DV6 - SN6268; ; Calibrated: 2010-5-21
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

H Scan - measurement distance from the probe sensor center to CD835

Dipole = 10mm pwr=-25.84/Hearing Aid Compatibility Test (5x37x1):

Measurement grid: dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.622 A/m; Power Drift = -0.025 dB

Maximum value of Total (measured) = 0.584 A/m

H Scan - measurement distance from the probe sensor center to CD835

Dipole = 10mm pwr=-25.84/Hearing Aid Compatibility Test (41x361x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.584 A/m

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.622 A/m; Power Drift = -0.025 dB

Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak H-field in A/m

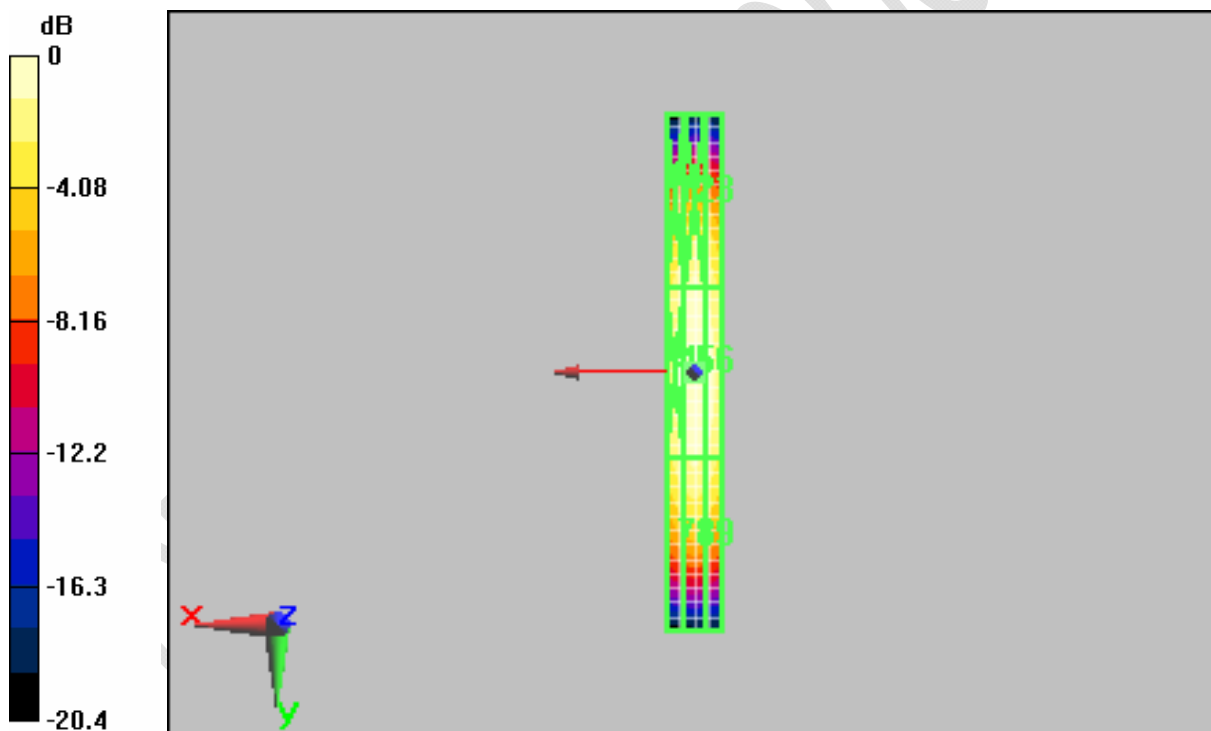
Grid 1 0.495 M4	Grid 2 0.519 M4	Grid 3 0.494 M4
Grid 4 0.558 M4	Grid 5 0.584 M4	Grid 6 0.557 M4
Grid 7 0.493 M4	Grid 8 0.515 M4	Grid 9 0.492 M4

Cursor:

Total = 0.584 A/m

H Category: M4

Location: 0, 0, 4.7 mm



0 dB = 0.584A/m

C.8 H-field 80% AM wave at 835 MHz

Test Laboratory: CTTL

HAC_RF_H_PMF_835MHz_AM80%_20dBm

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: --

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: H3DV6 - SN6268; ; Calibrated: 2010-5-21
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

H Scan - measurement distance from the probe sensor center to CD835

Dipole = 10mm/Hearing Aid Compatibility Test (5x37x1): Measurement grid:

dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.340 A/m; Power Drift = -0.00183 dB

Maximum value of Total (measured) = 0.320 A/m

H Scan - measurement distance from the probe sensor center to CD835

Dipole = 10mm/Hearing Aid Compatibility Test (41x361x1): Measurement

grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.320 A/m

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.340 A/m; Power Drift = -0.00183 dB

Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak H-field in A/m

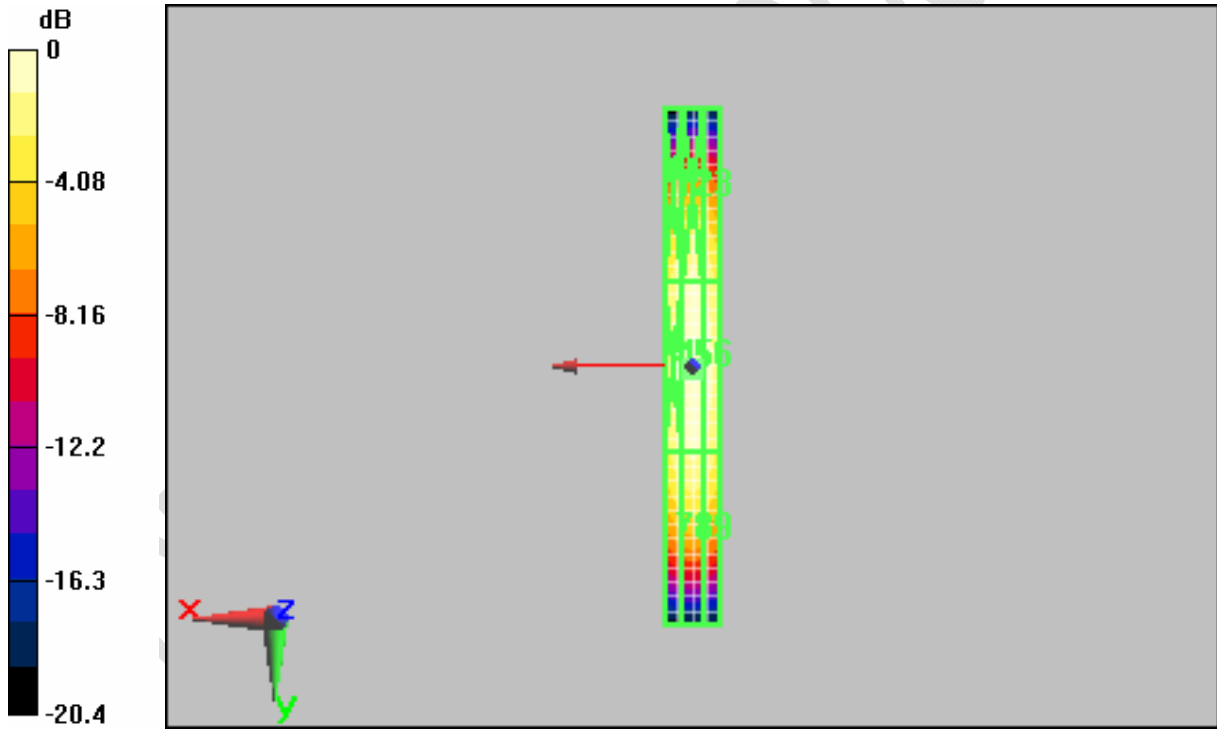
Grid 1 0.272 M4	Grid 2 0.284 M4	Grid 3 0.271 M4
Grid 4 0.307 M4	Grid 5 0.320 M4	Grid 6 0.307 M4
Grid 7 0.271 M4	Grid 8 0.282 M4	Grid 9 0.271 M4

Cursor:

Total = 0.320 A/m

H Category: M4

Location: 0, 0.5, 4.7 mm



0 dB = 0.320A/m

C.9 H-field GSM signal at 835 MHz

Test Laboratory: CTTL

HAC_RF_H_PMF_835MHz_GSM_20dBm

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: --

Communication System: GSM Signal; Frequency: 835 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: H3DV6 - SN6268; ; Calibrated: 2010-5-21
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

H Scan - measurement distance from the probe sensor center to CD835 Dipole = 10mm 2/Hearing Aid Compatibility Test (5x37x1): Measurement

grid: dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.234 A/m; Power Drift = -0.00413 dB

Maximum value of Total (measured) = 0.219 A/m

H Scan - measurement distance from the probe sensor center to CD835

Dipole = 10mm 2/Hearing Aid Compatibility Test (41x361x1): Measurement

grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.219 A/m

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.234 A/m; Power Drift = -0.00413 dB

Hearing Aid Near-Field Category: M4 (AWF -5 dB)

Peak H-field in A/m

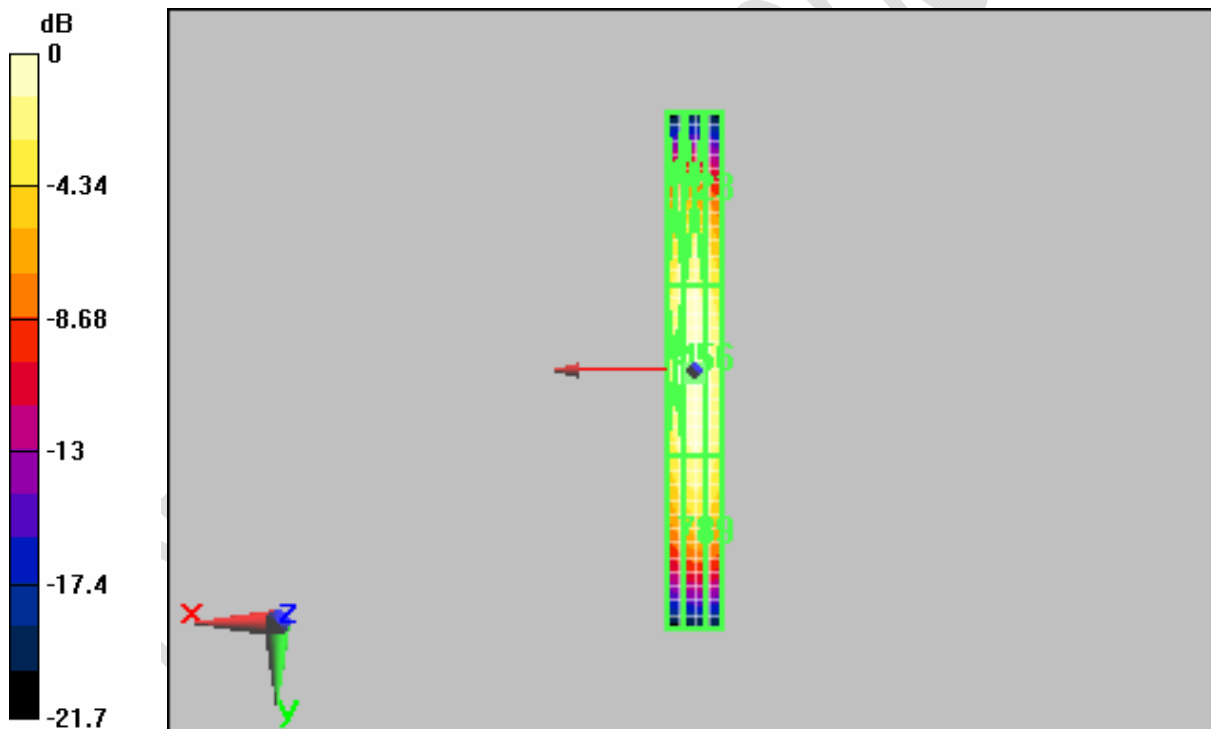
Grid 1 0.183 M4	Grid 2 0.191 M4	Grid 3 0.170 M4
Grid 4 0.205 M4	Grid 5 0.219 M4	Grid 6 0.204 M4
Grid 7 0.171 M4	Grid 8 0.188 M4	Grid 9 0.180 M4

Cursor:

Total = 0.219 A/m

H Category: M4

Location: 0, 0.5, 4.7 mm



0 dB = 0.219A/m

C.10 H-field CW at 1880 MHz

Test Laboratory: CTTL

HAC_RF_H_PMF_1880MHz_CW_20dBm

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: --

Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: H3DV6 - SN6268; ; Calibrated: 2010-5-21
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

H Scan - measurement distance from the probe sensor center to CD835 Dipole = 10mm 2/Hearing Aid Compatibility Test (5x37x1):

Measurement grid: dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.568 A/m; Power Drift = -0.00471 dB

Maximum value of Total (measured) = 0.539 A/m

H Scan - measurement distance from the probe sensor center to CD835 Dipole = 10mm 2/Hearing Aid Compatibility Test (41x361x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.539 A/m

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.568 A/m; Power Drift = -0.00471 dB

Hearing Aid Near-Field Category: M2 (AWF 0 dB)

Peak H-field in A/m

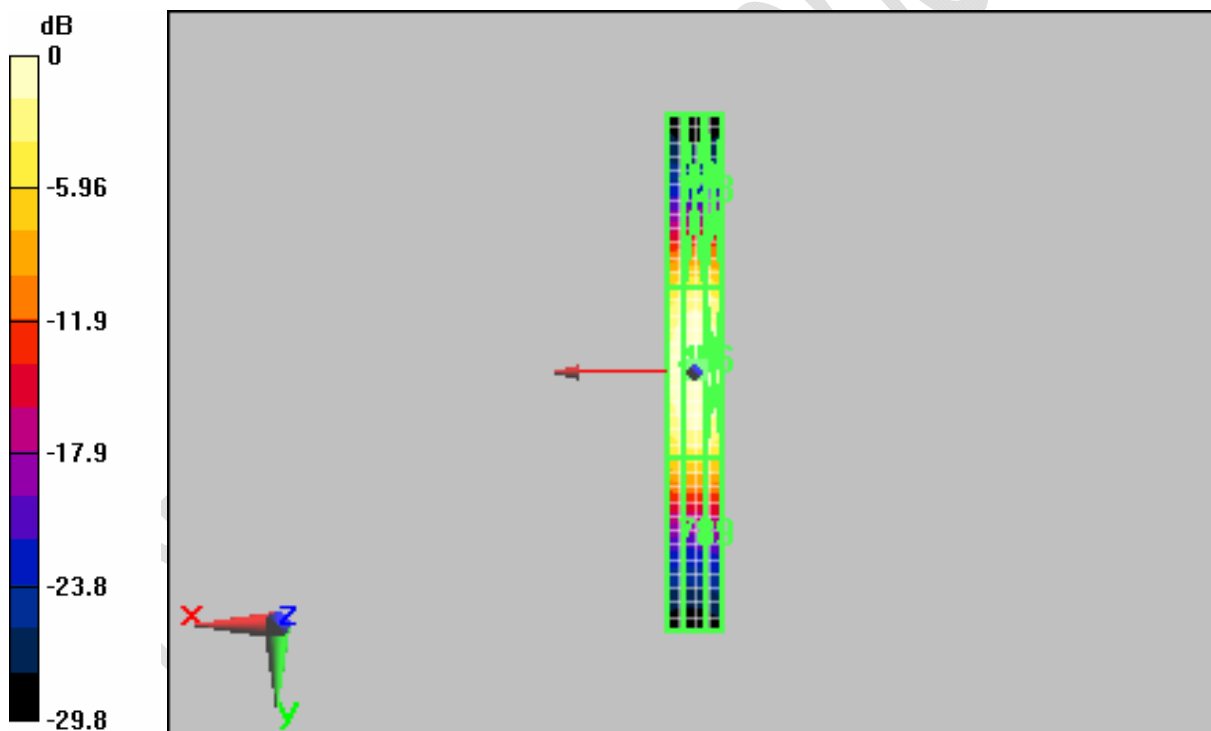
Grid 1 0.311 M3	Grid 2 0.329 M3	Grid 3 0.318 M3
Grid 4 0.515 M2	Grid 5 0.539 M2	Grid 6 0.522 M2
Grid 7 0.288 M3	Grid 8 0.299 M3	Grid 9 0.293 M3

Cursor:

Total = 0.539 A/m

H Category: M2

Location: -0.5, -1, 4.7 mm



0 dB = 0.539A/m

C.11 H-field 80% AM wave at 1880 MHz

Test Laboratory: CTTL

HAC_RF_H_PMF_1880MHz_AM80%_20dBm

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: --

Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: H3DV6 - SN6268; ; Calibrated: 2010-5-21
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

H Scan - measurement distance from the probe sensor center to CD835 Dipole = 10mm 2/Hearing Aid Compatibility Test (5x37x1): Measurement

grid: dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.353 A/m; Power Drift = 0.026 dB

Maximum value of Total (measured) = 0.335 A/m

H Scan - measurement distance from the probe sensor center to CD835

Dipole = 10mm 2/Hearing Aid Compatibility Test (41x361x1): Measurement

grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.335 A/m

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.353 A/m; Power Drift = 0.026 dB

Hearing Aid Near-Field Category: M3 (AWF 0 dB)

Peak H-field in A/m

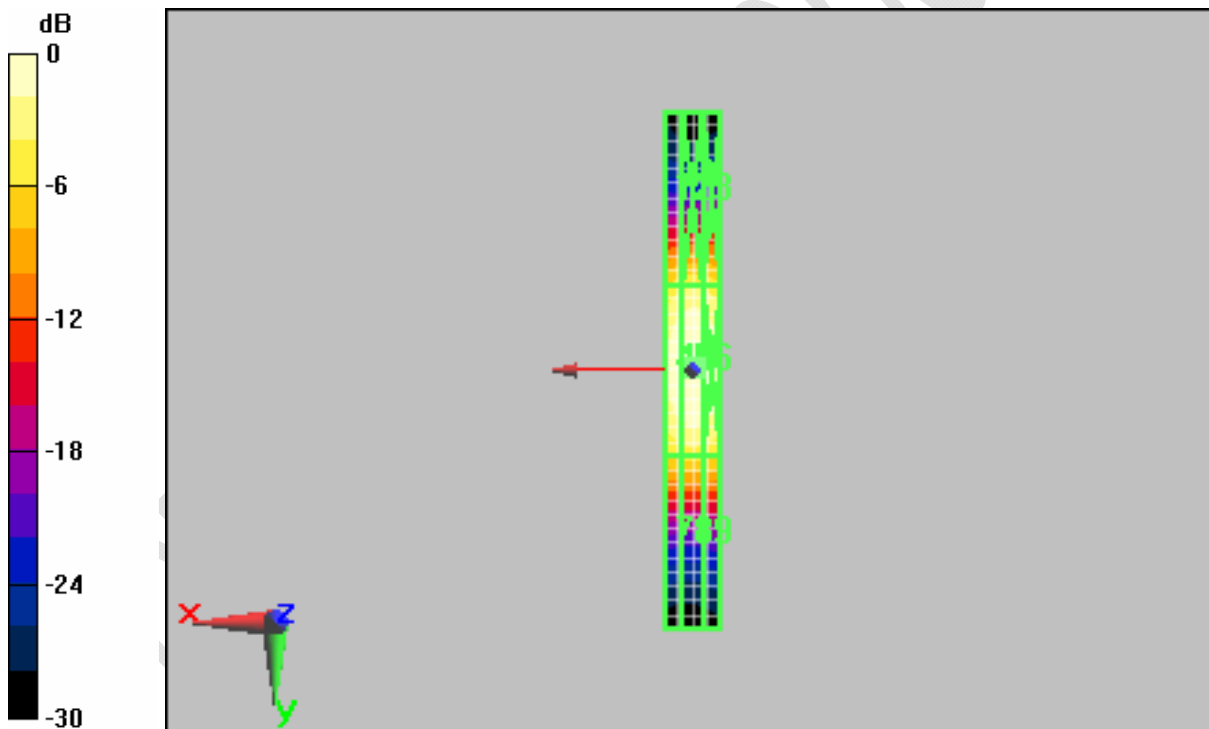
Grid 1 0.194 M3	Grid 2 0.204 M3	Grid 3 0.198 M3
Grid 4 0.319 M3	Grid 5 0.335 M3	Grid 6 0.324 M3
Grid 7 0.179 M4	Grid 8 0.185 M4	Grid 9 0.181 M4

Cursor:

Total = 0.335 A/m

H Category: M3

Location: -0.5, -1, 4.7 mm



0 dB = 0.335A/m

C.12 H-field GSM signal at 1880 MHz

Test Laboratory: CTTL

HAC_RF_H_PMF_1880MHz_GSM_20dBm

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: --

Communication System: GSM Signal; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY4 Configuration:

- Probe: H3DV6 - SN6268; ; Calibrated: 2010-5-21
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

H Scan - measurement distance from the probe sensor center to CD1880

Dipole = 10mm 3/Hearing Aid Compatibility Test (5x37x1): Measurement

grid: dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.255 A/m; Power Drift = 0.00731 dB

Maximum value of Total (measured) = 0.238 A/m

H Scan - measurement distance from the probe sensor center to CD1880

Dipole = 10mm 3/Hearing Aid Compatibility Test (41x361x1): Measurement

grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.238 A/m

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.255 A/m; Power Drift = 0.00731 dB

Hearing Aid Near-Field Category: M3 (AWF -5 dB)

Peak H-field in A/m

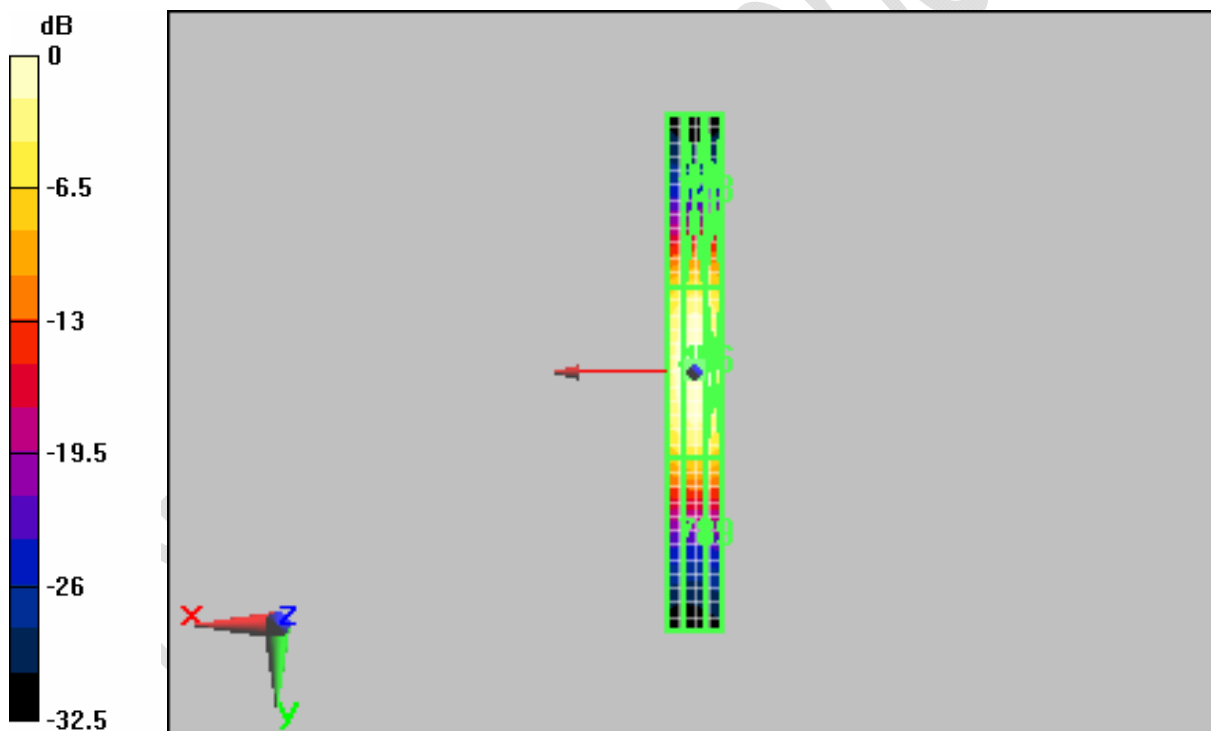
Grid 1 0.119 M4	Grid 2 0.128 M4	Grid 3 0.121 M4
Grid 4 0.220 M3	Grid 5 0.238 M3	Grid 6 0.223 M3
Grid 7 0.108 M4	Grid 8 0.115 M4	Grid 9 0.110 M4

Cursor:

Total = 0.238 A/m

H Category: M3

Location: 0, -1, 4.7 mm



0 dB = 0.238A/m

ANNEX D RF Emission Graphical Results

D.1 E-field GSM850 band Low Channel

Test Laboratory: CTTL

HAC_RF_E_GSM850_Low

DUT: SONIM XP 1300-A; Type: SONIM XP 1300-A; Serial: --

Communication System: GSM 850; Frequency: 824.2 MHz
Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY4 Configuration:

- Probe: ER3DV6 - SN2435; ConvF(1, 1, 1); Calibrated: 2010-5-20
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: --
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

E Scan - ER3D - 2007: 15 mm from Probe Center to the Device/Hearing Aid

Compatibility Test (11x11x1): Measurement grid: dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 90.3 V/m; Power Drift = -0.102 dB

Maximum value of Total (measured) = 69.9 V/m

E Scan - ER3D - 2007: 15 mm from Probe Center to the Device High/Hearing

Aid Compatibility Test (101x101x1): Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 188.9 V/m

Probe Modulation Factor = 2.8

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 85.8 V/m; Power Drift = -0.00234 dB

Hearing Aid Near-Field Category: M3 (AWF -5 dB)

Peak E-field in V/m

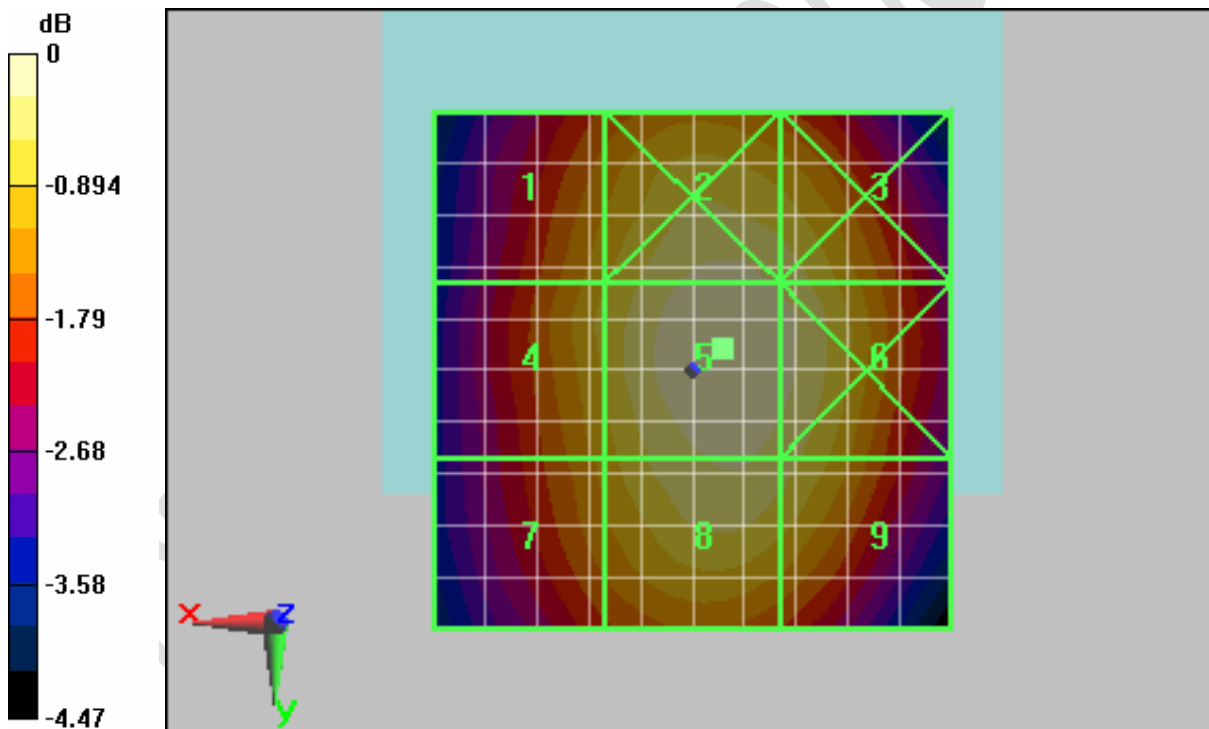
Grid 1	Grid 2	Grid 3
169.8 M3	185.0 M3	181.4 M3
Grid 4	Grid 5	Grid 6
172.7 M3	188.9 M3	185.2 M3
Grid 7	Grid 8	Grid 9
167.4 M3	183.4 M3	179.7 M3

Cursor:

Total = 188.9 V/m

E Category: M3

Location: -3, -2, 8.7 mm



0 dB = 188.9V/m

D.2 E-field GSM850 band Middle Channel

Test Laboratory: CTTL

HAC_RF_E_GSM850_Middle

DUT: SONIM XP 1300-A; Type: SONIM XP 1300-A; Serial: --

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: ER3DV6 - SN2435; ConvF(1, 1, 1); Calibrated: 2010-5-20
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: --
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

E Scan - ER3D - 2007: 15 mm from Probe Center to the Device

Middle/Hearing Aid Compatibility Test (11x11x1): Measurement grid:

dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 84.4 V/m; Power Drift = -0.023 dB

Maximum value of Total (measured) = 65.8 V/m

E Scan - ER3D - 2007: 15 mm from Probe Center to the Device

Middle/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 185.1 V/m

Probe Modulation Factor = 2.8

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 84.4 V/m; Power Drift = -0.023 dB

Hearing Aid Near-Field Category: M3 (AWF -5 dB)

Peak E-field in V/m

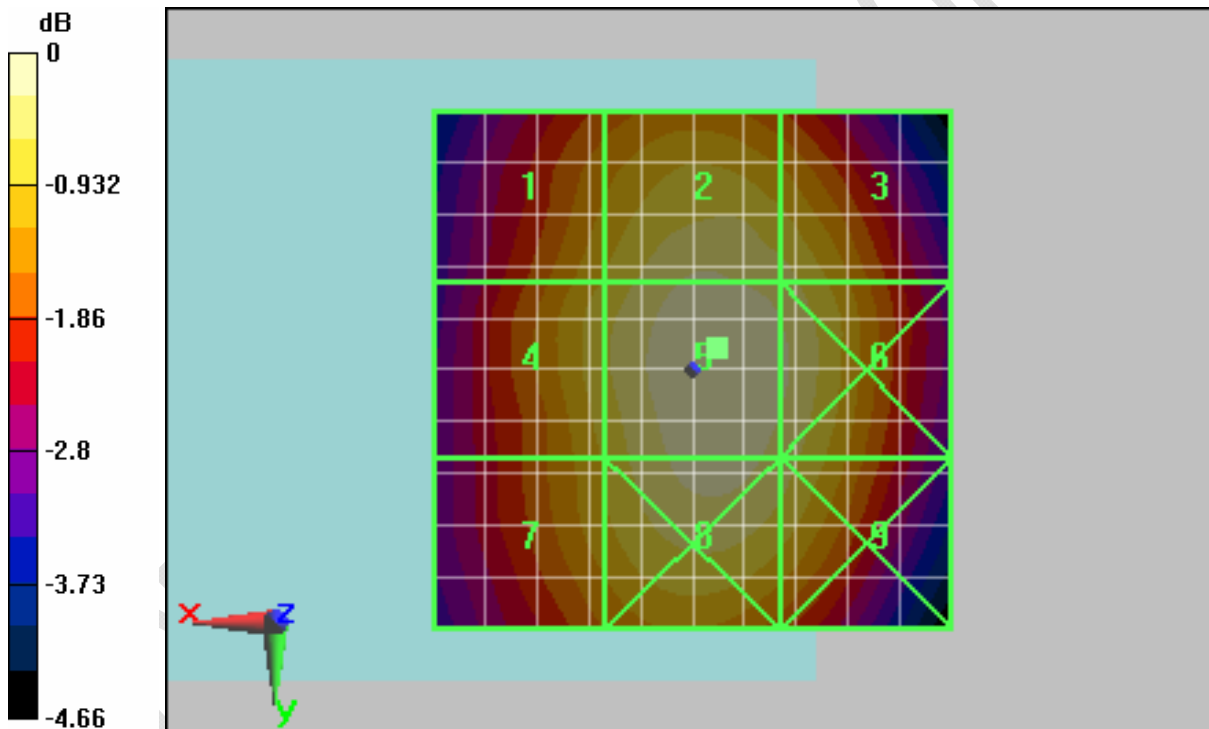
Grid 1 167.2 M3	Grid 2 179.9 M3	Grid 3 175.2 M3
Grid 4 171.3 M3	Grid 5 185.1 M3	Grid 6 180.1 M3
Grid 7 167.2 M3	Grid 8 181.6 M3	Grid 9 176.0 M3

Cursor:

Total = 185.1 V/m

E Category: M3

Location: -2.5, -2, 8.7 mm



0 dB = 185.1V/m

D.3 E-field GSM850 band High Channel

Test Laboratory: CTTL

HAC_RF_E_GSM850_High_Roll

DUT: SONIM XP 1300-A; Type: SONIM XP 1300-A; Serial: --

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY4 Configuration:

- Probe: ER3DV6 - SN2435; ConvF(1, 1, 1); Calibrated: 2010-5-20
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: --
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

E Scan - ER3D - 2007: 15 mm from Probe Center to the Device High/Hearing Aid Compatibility Test (11x11x1):

Measurement grid: dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 85.8 V/m; Power Drift = -0.00913 dB

Maximum value of Total (measured) = 67.3 V/m

E Scan - ER3D - 2007: 15 mm from Probe Center to the Device High/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 189.6 V/m

Probe Modulation Factor = 2.8

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 85.8 V/m; Power Drift = -0.00913 dB

Hearing Aid Near-Field Category: M3 (AWF -5 dB)

Peak E-field in V/m

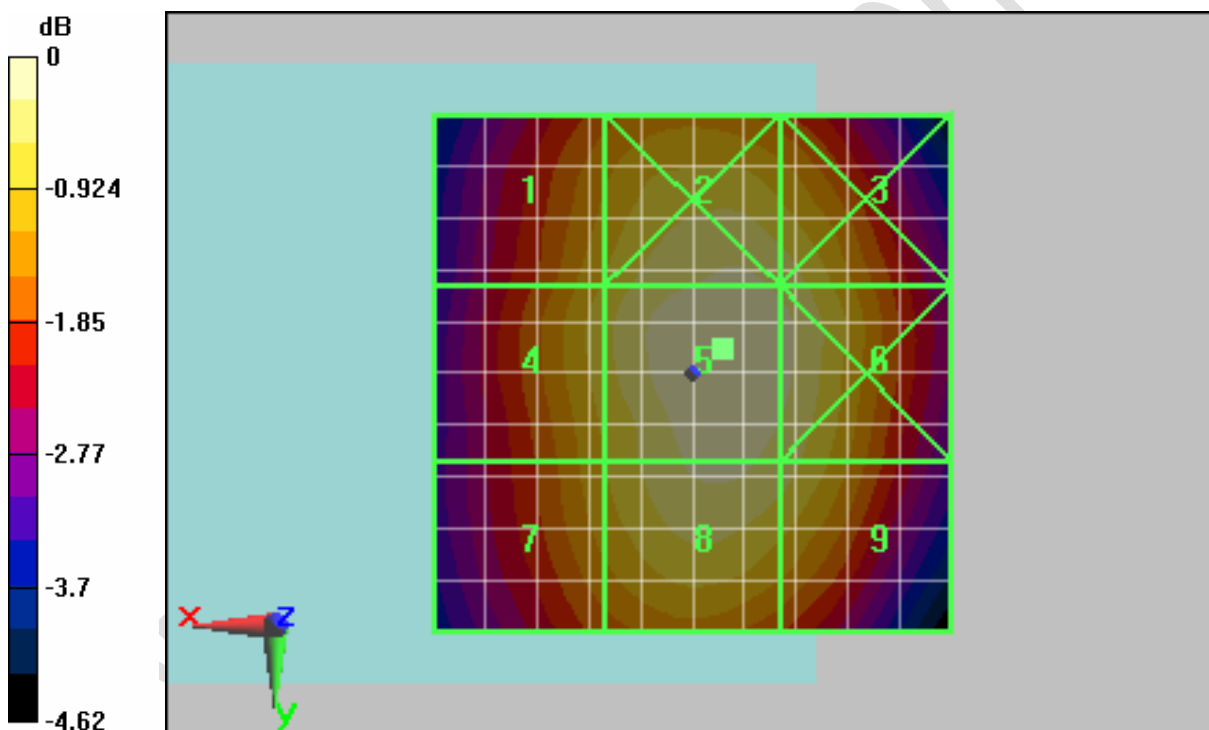
Grid 1 171.6 M3	Grid 2 185.2 M3	Grid 3 181.6 M3
Grid 4 175.1 M3	Grid 5 189.6 M3	Grid 6 185.5 M3
Grid 7 170.5 M3	Grid 8 184.8 M3	Grid 9 180.3 M3

Cursor:

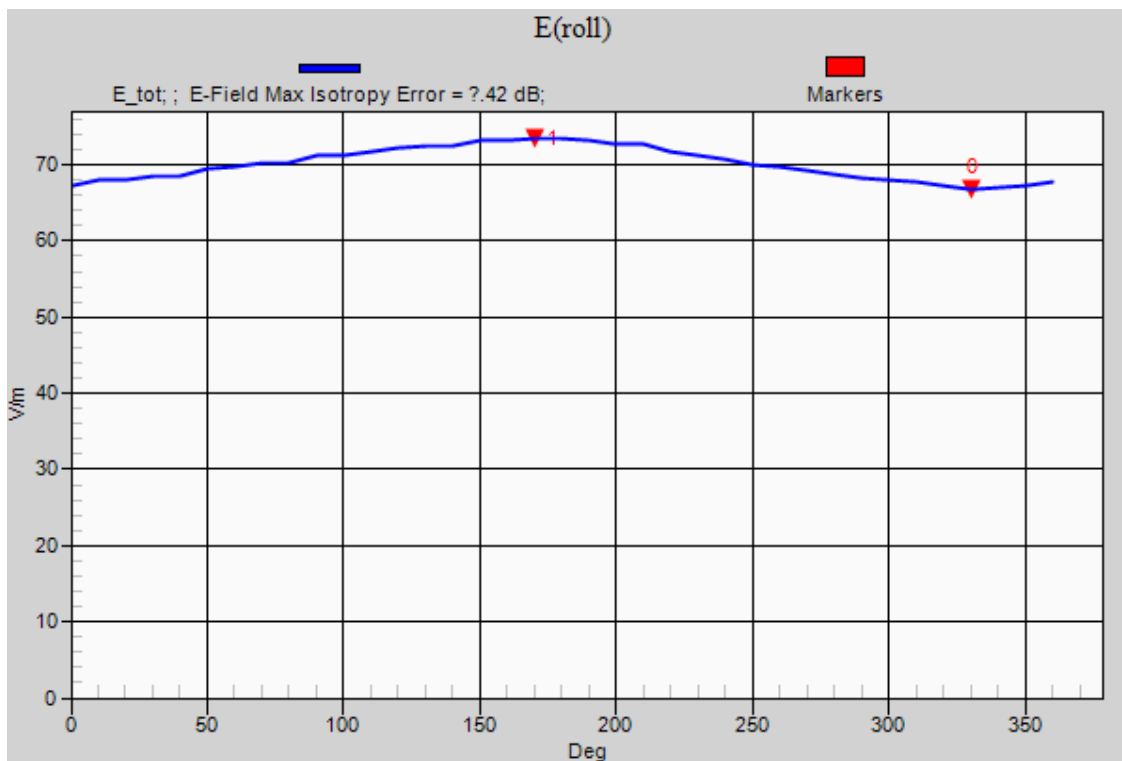
Total = 189.6 V/m

E Category: M3

Location: -3, -2.5, 8.7 mm



0 dB = 189.6V/m



D.4 E-field PCS1900 band Low Channel

Test Laboratory: CTTL

HAC_RF_E_GSM1900_Low

DUT: SONIM XP 1300-A; Type: SONIM XP 1300-A; Serial: --

Communication System: PCS 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: ER3DV6 - SN2435; ConvF(1, 1, 1); Calibrated: 2010-5-20
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: --
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

E Scan - ER3D - 2007: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (11x11x1):

Measurement grid: dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 13.1 V/m; Power Drift = 0.057 dB

Maximum value of Total (measured) = 20.2 V/m

E Scan - ER3D - 2007: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 52 V/m

Probe Modulation Factor = 2.87

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 13.1 V/m; Power Drift = 0.057 dB

Hearing Aid Near-Field Category: M3 (AWF -5 dB)

Peak E-field in V/m

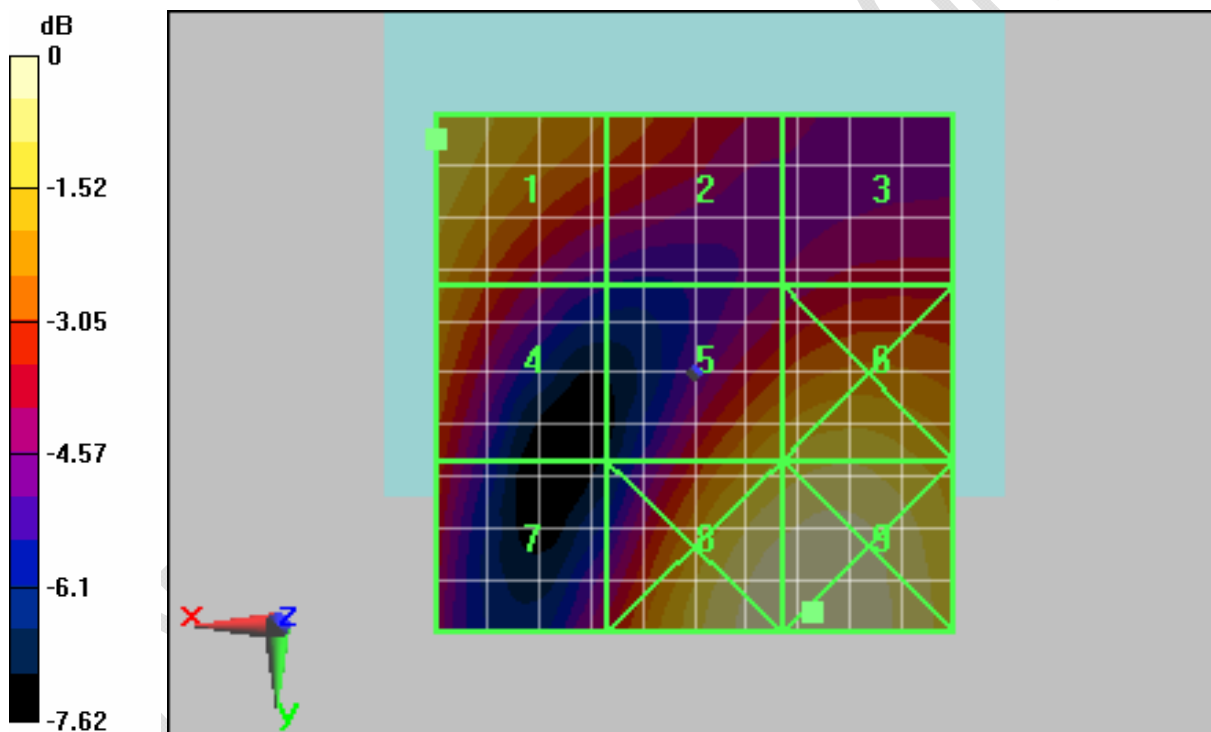
Grid 1 52 M3	Grid 2 43.4 M4	Grid 3 37.8 M4
Grid 4 47.3 M3	Grid 5 49.1 M3	Grid 6 51.5 M3
Grid 7 41 M4	Grid 8 57.5 M3	Grid 9 58.1 M3

Cursor:

Total = 58.1 V/m

E Category: M3

Location: -11.5, 23, 8.7 mm



0 dB = 58.1V/m

D.5 E-field PCS1900 band Middle Channel

Test Laboratory: CTTL

HAC_RF_E_GSM1900_Middle

DUT: SONIM XP 1300-A; Type: SONIM XP 1300-A; Serial: --

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY4 Configuration:

- Probe: ER3DV6 - SN2435; ConvF(1, 1, 1); Calibrated: 2010-5-20
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: --
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

E Scan - ER3D - 2007: 15 mm from Probe Center to the Device

Middle/Hearing Aid Compatibility Test (11x11x1): Measurement grid:

dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 16.3 V/m; Power Drift = -0.031 dB

Maximum value of Total (measured) = 23.5 V/m

E Scan - ER3D - 2007: 15 mm from Probe Center to the Device

Middle/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 58.5 V/m

Probe Modulation Factor = 2.87

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 16.3 V/m; Power Drift = -0.031 dB

Hearing Aid Near-Field Category: M3 (AWF -5 dB)

Peak E-field in V/m

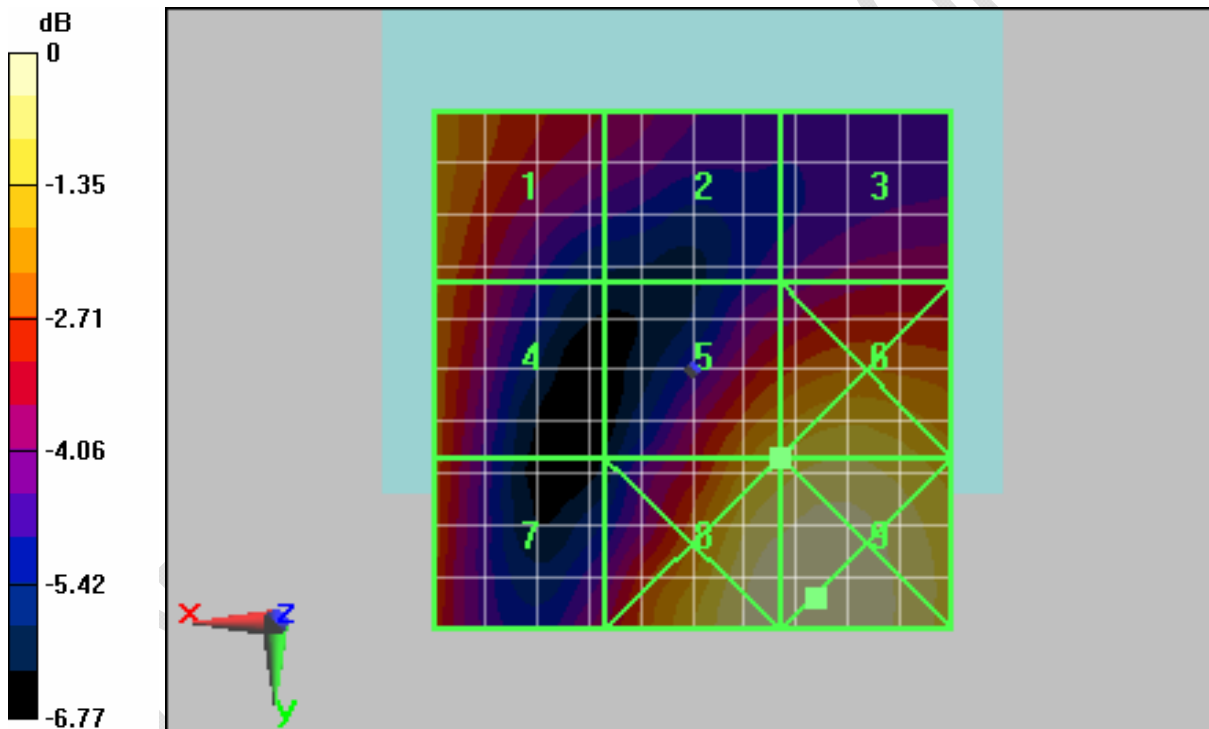
Grid 1	Grid 2	Grid 3
54.5 M3	44.9 M4	44.9 M4
Grid 4	Grid 5	Grid 6
53.4 M3	58.5 M3	61.3 M3
Grid 7	Grid 8	Grid 9
52.2 M3	67.2 M3	68 M3

Cursor:

Total = 68 V/m

E Category: M3

Location: -12, 22, 8.7 mm



0 dB = 68V/m

D.6 E-field PCS1900 band High Channel

Test Laboratory: CTTL

HAC_RF_E_GSM1900_High_Roll

DUT: SONIM XP 1300-A; Type: SONIM XP 1300-A; Serial: --

Communication System: PCS 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY4 Configuration:

- Probe: ER3DV6 - SN2435; ConvF(1, 1, 1); Calibrated: 2010-5-20
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: --
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

E Scan - ER3D - 2007: 15 mm from Probe Center to the Device High/Hearing Aid Compatibility Test (11x11x1):

Measurement grid: dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 16.9 V/m; Power Drift = -0.015 dB

Maximum value of Total (measured) = 23.3 V/m

E Scan - ER3D - 2007: 15 mm from Probe Center to the Device High/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 60 V/m

Probe Modulation Factor = 2.87

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 16.9 V/m; Power Drift = -0.015 dB

Hearing Aid Near-Field Category: M3 (AWF -5 dB)

Peak E-field in V/m

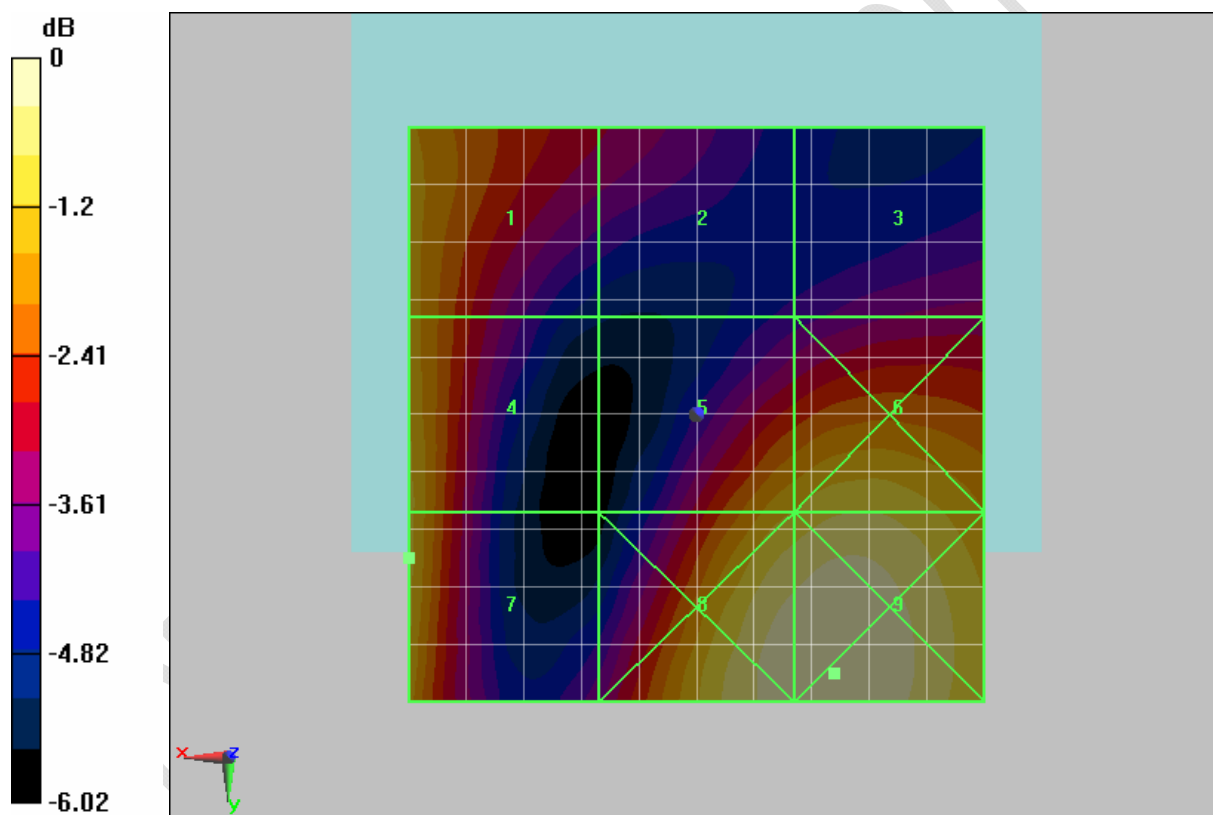
Grid 1 57.6 M3	Grid 2 46.8 M4	Grid 3 45.2 M4
Grid 4 59.8 M3	Grid 5 58.7 M3	Grid 6 61.2 M3
Grid 7 60 M3	Grid 8 66.2 M3	Grid 9 67.1 M3

Cursor:

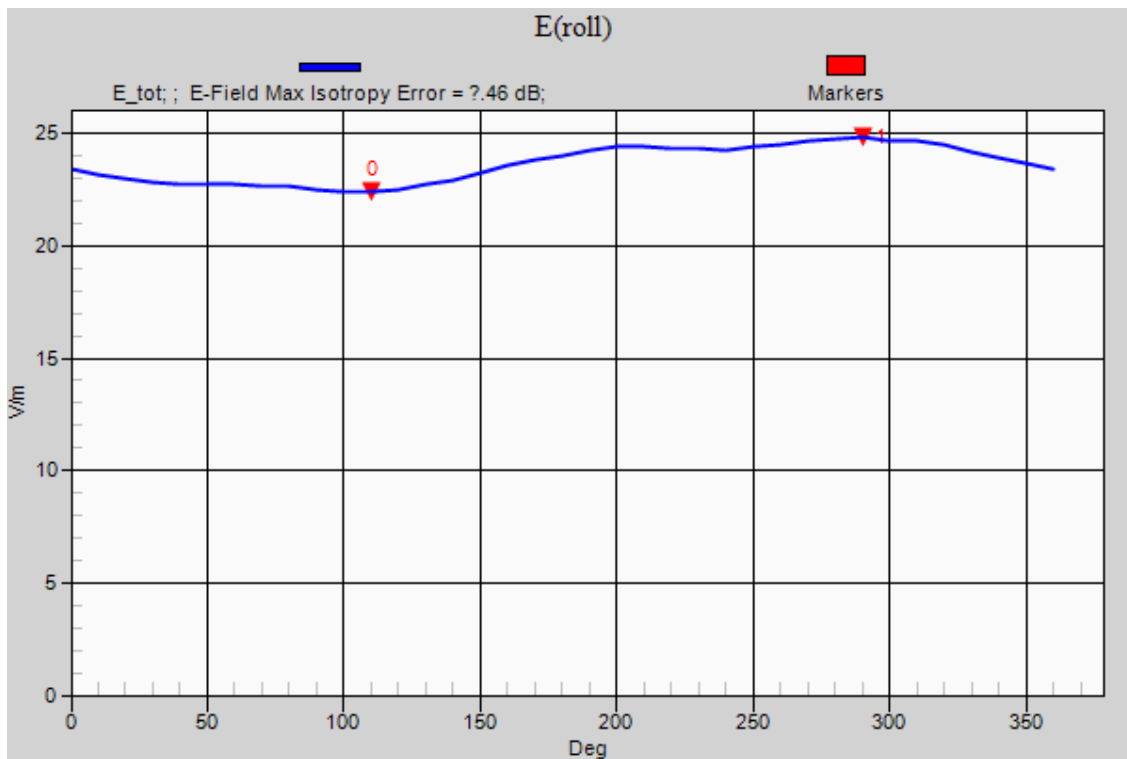
Total = 67.1 V/m

E Category: M3

Location: -12, 22.5, 8.7 mm



0 dB = 67.1V/m



D.7 H-field GSM850 band Low Channel

Test Laboratory: CTTL

HAC_RF_H_GSM850_Low_Roll

DUT: SONIM XP 1300-A; Type: SONIM XP 1300-A; Serial: --

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY4 Configuration:

- Probe: H3DV6 - SN6268; ; Calibrated: 2010-5-21
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: --
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (11x11x1):

Measurement grid: dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.117 A/m; Power Drift = -0.081 dB

Maximum value of Total (measured) = 0.181 A/m

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.358 A/m

Probe Modulation Factor = 2.67

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.117 A/m; Power Drift = -0.081 dB

Hearing Aid Near-Field Category: M4 (AWF -5 dB)

Peak H-field in A/m

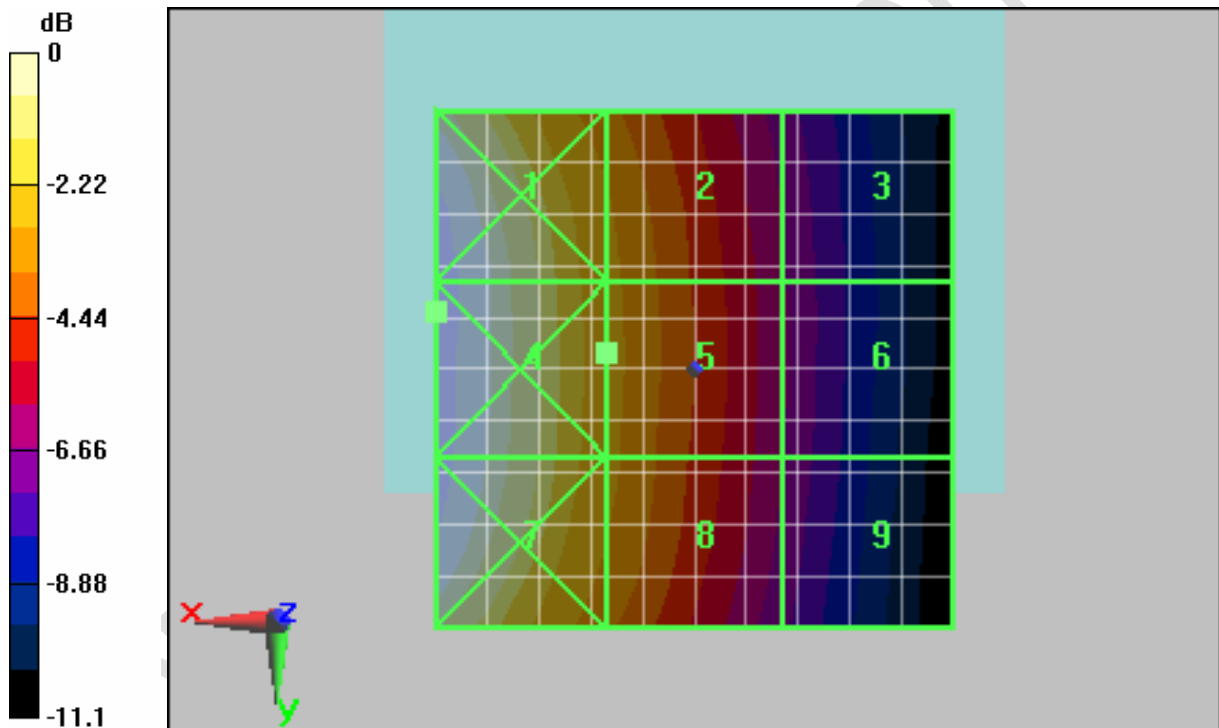
Grid 1 0.483 M3	Grid 2 0.355 M4	Grid 3 0.227 M4
Grid 4 0.483 M3	Grid 5 0.358 M4	Grid 6 0.229 M4
Grid 7 0.478 M3	Grid 8 0.354 M4	Grid 9 0.226 M4

Cursor:

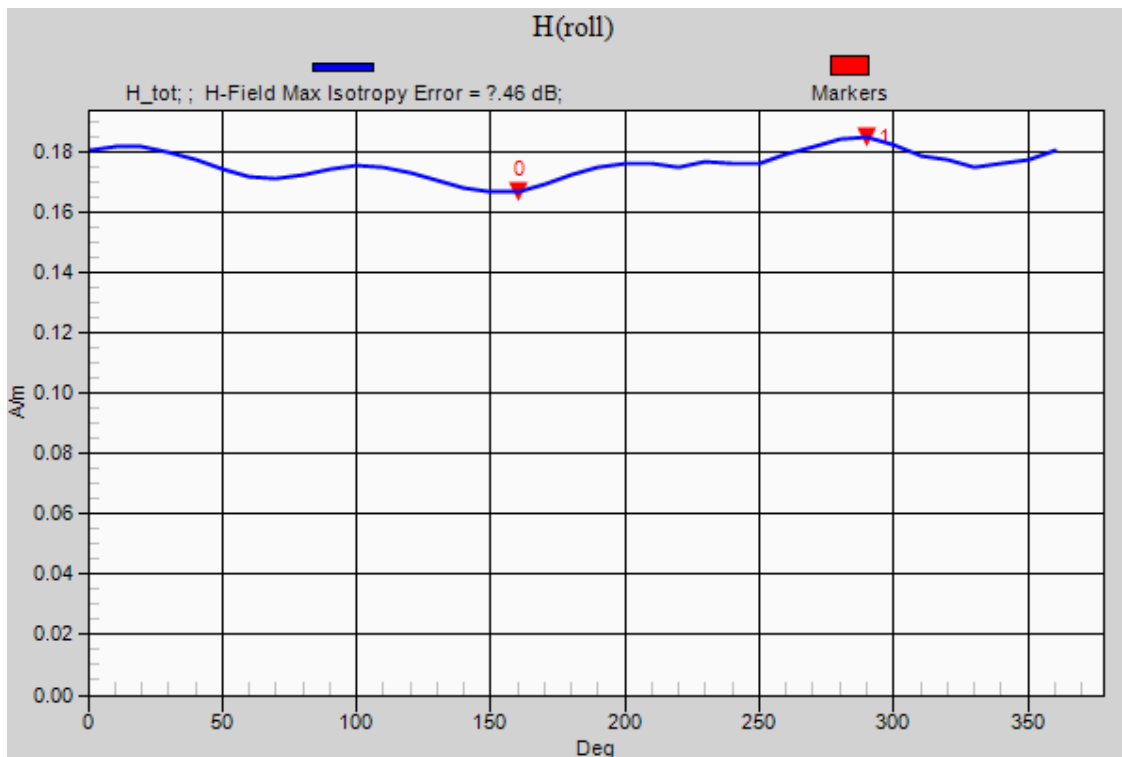
Total = 0.483 A/m

H Category: M3

Location: 25, -5.5, 8.7 mm



0 dB = 0.483A/m



D.8 H-field GSM850 band Middle Channel

Test Laboratory: CTTL

HAC_RF_H_GSM850_Middle

DUT: SONIM XP 1300-A; Type: SONIM XP 1300-A; Serial: --

Communication System: GSM 850; Frequency: 836.6 MHz; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY4 Configuration:

- Probe: H3DV6 - SN6268; ; Calibrated: 2010-5-21
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: --
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device

Middle/Hearing Aid Compatibility Test (11x11x1): Measurement grid:

dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.110 A/m; Power Drift = 0.030 dB

Maximum value of Total (measured) = 0.169 A/m

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device

High/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.332 A/m

Probe Modulation Factor = 2.67

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.109 A/m; Power Drift = -0.070 dB

Hearing Aid Near-Field Category: M4 (AWF -5 dB)

Peak H-field in A/m

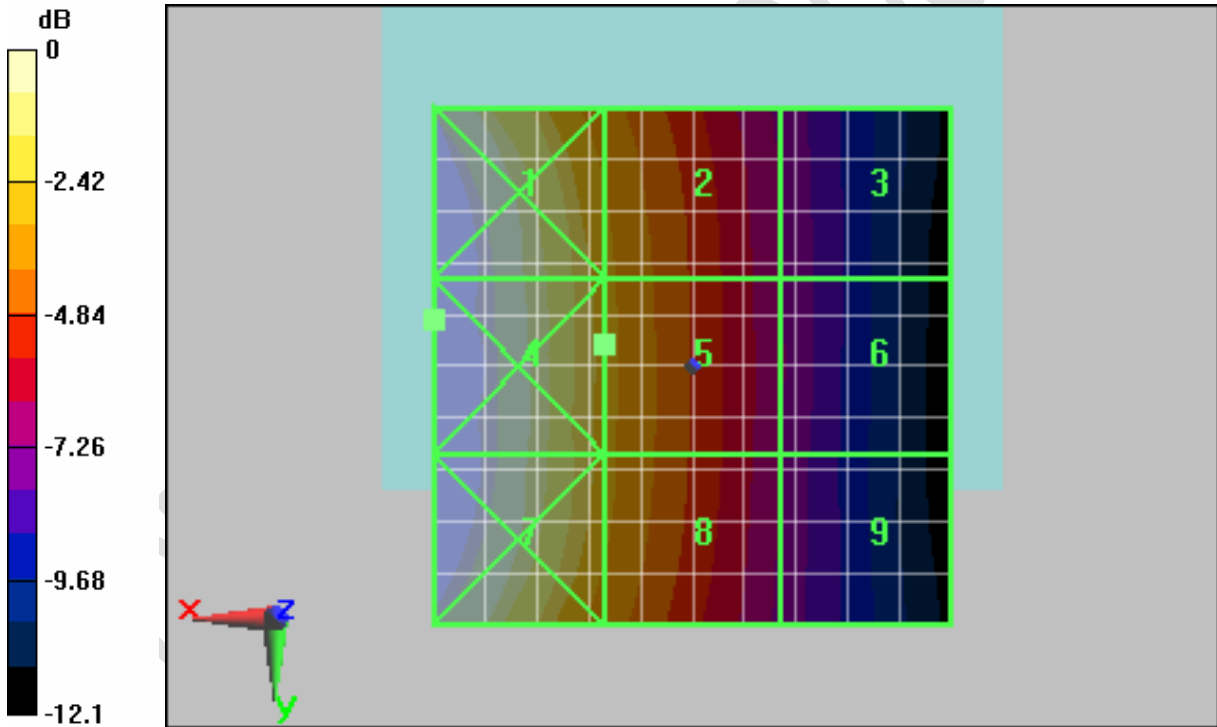
Grid 1 0.462 M3	Grid 2 0.330 M4	Grid 3 0.204 M4
Grid 4 0.466 M3	Grid 5 0.332 M4	Grid 6 0.205 M4
Grid 7 0.461 M3	Grid 8 0.331 M4	Grid 9 0.203 M4

Cursor:

Total = 0.466 A/m

H Category: M3

Location: 25, -4.5, 8.7 mm



0 dB = 0.466A/m

D.9 H-field GSM850 band High Channel

Test Laboratory: CTTL

HAC_RF_H_GSM850_High

DUT: SONIM XP 1300-A; Type: SONIM XP 1300-A; Serial: --

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: H3DV6 - SN6268; ; Calibrated: 2010-5-21
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: --
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device High

2/Hearing Aid Compatibility Test (11x11x1): Measurement grid: dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.107 A/m; Power Drift = 0.068 dB

Maximum value of Total (measured) = 0.171 A/m

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device High

2/Hearing Aid Compatibility Test (101x101x1): Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.333 A/m

Probe Modulation Factor = 2.67

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.107 A/m; Power Drift = 0.068 dB

Hearing Aid Near-Field Category: M4 (AWF -5 dB)

Peak H-field in A/m

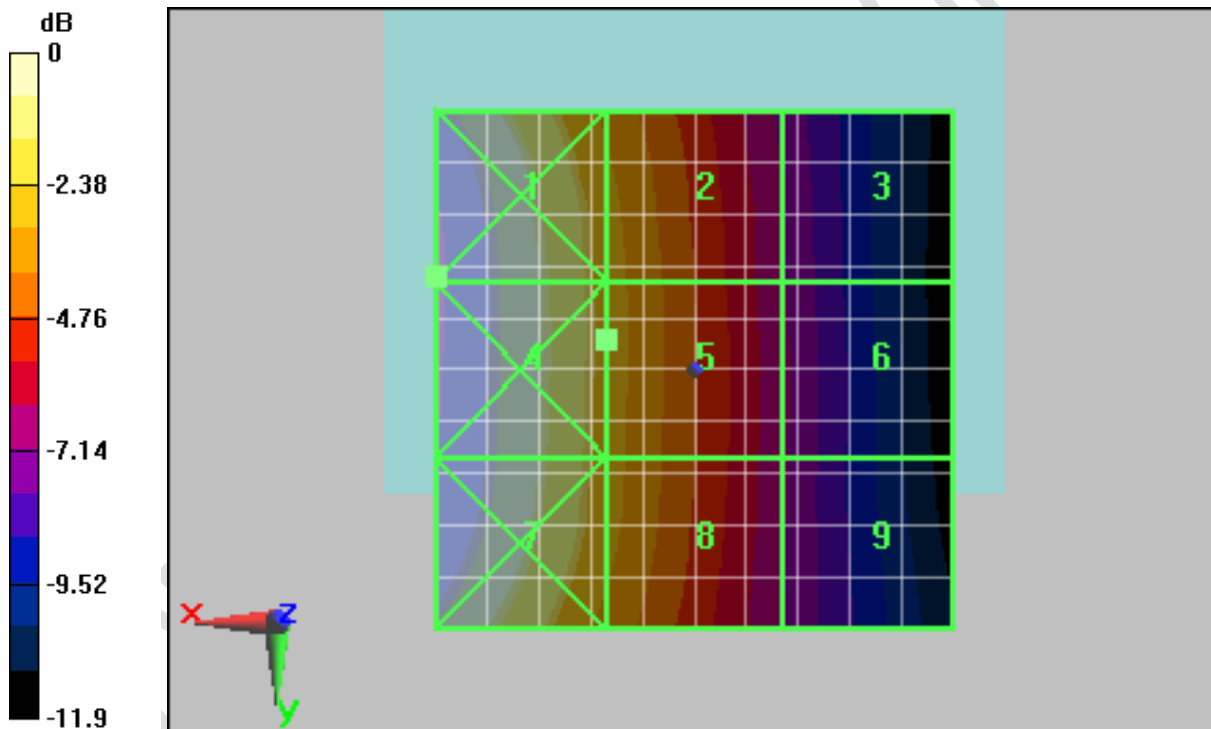
Grid 1 0.456 M3	Grid 2 0.331 M4	Grid 3 0.203 M4
Grid 4 0.456 M3	Grid 5 0.333 M4	Grid 6 0.206 M4
Grid 7 0.449 M4	Grid 8 0.330 M4	Grid 9 0.204 M4

Cursor:

Total = 0.456 A/m

H Category: M3

Location: 25, -9, 8.7 mm



0 dB = 0.456A/m

D.10 H-field PCS1900 band Low Channel

Test Laboratory: CTTL

HAC_RF_H_GSM1900_LowI

DUT: SONIM XP 1300-A; Type: SONIM XP 1300-A; Serial: --

Communication System: PCS 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: H3DV6 - SN6268; ; Calibrated: 2010-5-21
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: --
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (11x11x1):

Measurement grid: dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.071 A/m; Power Drift = 0.112 dB

Maximum value of Total (measured) = 0.071 A/m

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.149 A/m

Probe Modulation Factor = 2.26

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.071 A/m; Power Drift = 0.112 dB

Hearing Aid Near-Field Category: M3 (AWF -5 dB)

Peak H-field in A/m

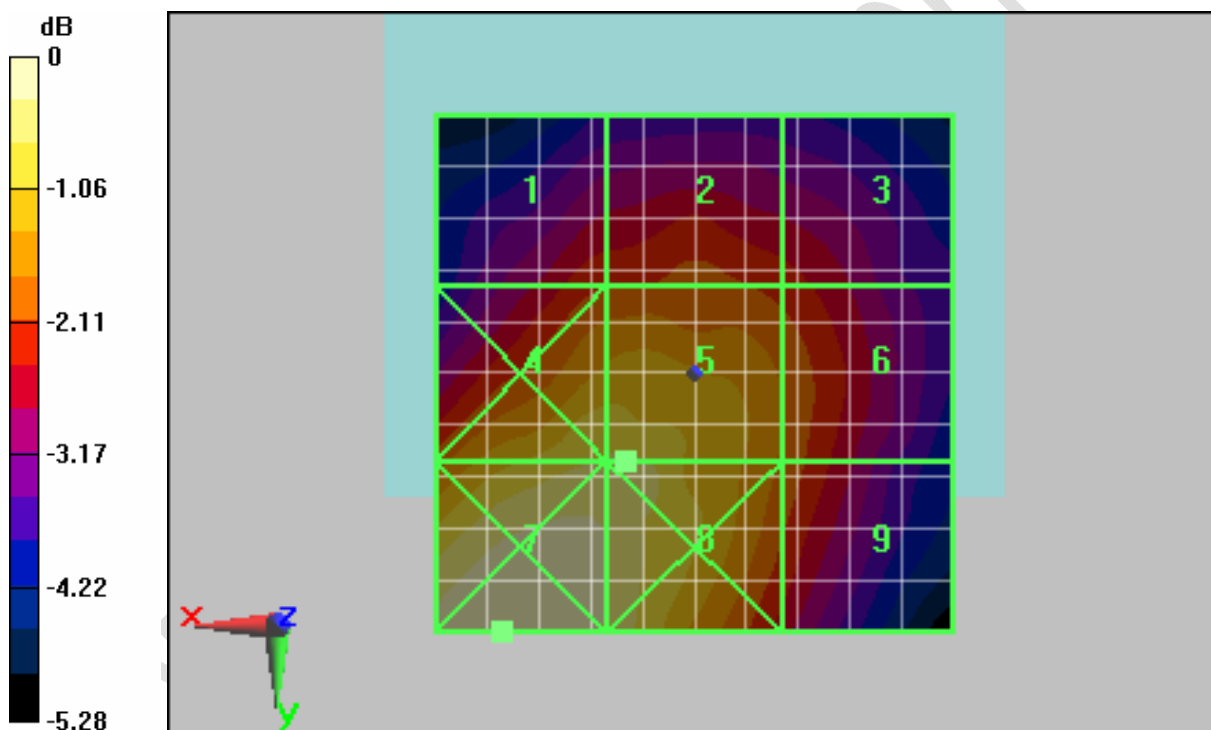
Grid 1 0.126 M4	Grid 2 0.128 M4	Grid 3 0.123 M4
Grid 4 0.148 M3	Grid 5 0.149 M3	Grid 6 0.131 M4
Grid 7 0.160 M3	Grid 8 0.154 M3	Grid 9 0.130 M4

Cursor:

Total = 0.160 A/m

H Category: M3

Location: 18.5, 25, 8.7 mm



0 dB = 0.160A/m

D.11 H-field PCS1900 band Middle Channel

Test Laboratory: CTTL

HAC_RF_H_GSM1900_Middle

DUT: SONIM XP 1300-A; Type: SONIM XP 1300-A; Serial: --

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Phantom section: RF Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: H3DV6 - SN6268; ; Calibrated: 2010-5-21
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: --
- Measurement SW: DASYS, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device

Middle/Hearing Aid Compatibility Test (11x11x1): Measurement grid:

dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.082 A/m; Power Drift = -0.089 dB

Maximum value of Total (measured) = 0.088 A/m

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device

Middle/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.181 A/m

Probe Modulation Factor = 2.26

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.082 A/m; Power Drift = -0.089 dB

Hearing Aid Near-Field Category: M3 (AWF -5 dB)

Peak H-field in A/m

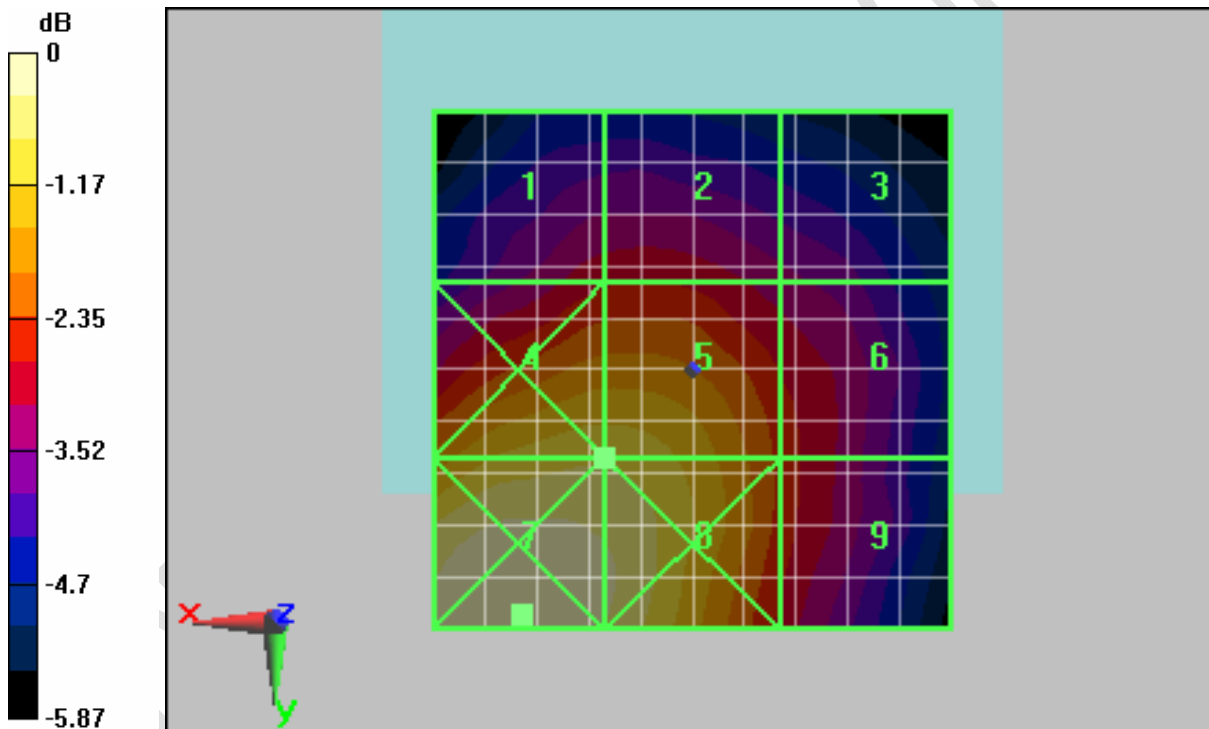
Grid 1 0.145 M3	Grid 2 0.146 M3	Grid 3 0.136 M4
Grid 4 0.181 M3	Grid 5 0.181 M3	Grid 6 0.151 M3
Grid 7 0.200 M3	Grid 8 0.193 M3	Grid 9 0.151 M3

Cursor:

Total = 0.200 A/m

H Category: M3

Location: 16.5, 23.5, 8.7 mm



0 dB = 0.200A/m

D.12 H-field PCS1900 band High Channel

Test Laboratory: CTTL

HAC_RF_H_GSM1900_High_Roll

DUT: SONIM XP 1300-A; Type: SONIM XP 1300-A; Serial: --

Communication System: PCS 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY4 Configuration:

- Probe: H3DV6 - SN6268; ; Calibrated: 2010-5-21
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn797; Calibrated: 2009-11-26
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: --
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device

High/Hearing Aid Compatibility Test (11x11x1): Measurement grid: dx=5mm, dy=5mm

Probe Modulation Factor = 1

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.084 A/m; Power Drift = 0.026 dB

Maximum value of Total (measured) = 0.093 A/m

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device

High/Hearing Aid Compatibility Test (101x101x1): Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.188 A/m

Probe Modulation Factor = 2.26

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.084 A/m; Power Drift = 0.026 dB

Hearing Aid Near-Field Category: M3 (AWF -5 dB)

Peak H-field in A/m

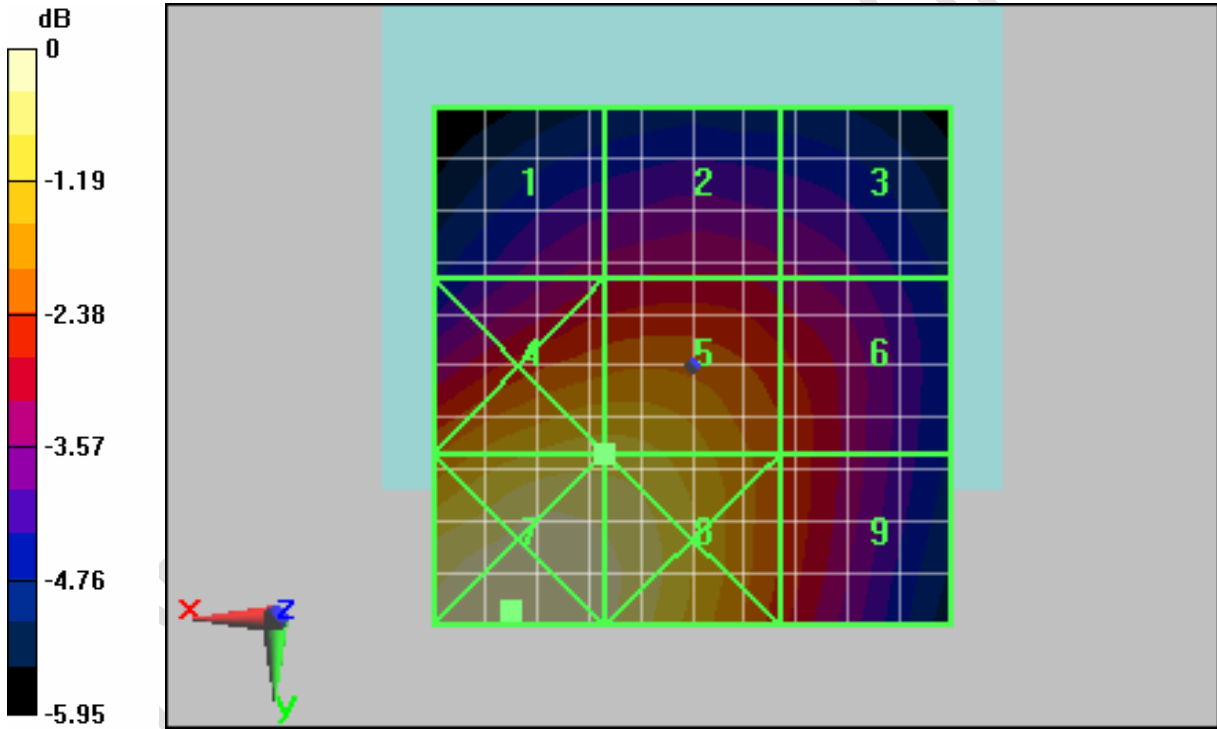
Grid 1 0.145 M3	Grid 2 0.148 M3	Grid 3 0.143 M3
Grid 4 0.188 M3	Grid 5 0.188 M3	Grid 6 0.161 M3
Grid 7 0.211 M3	Grid 8 0.204 M3	Grid 9 0.161 M3

Cursor:

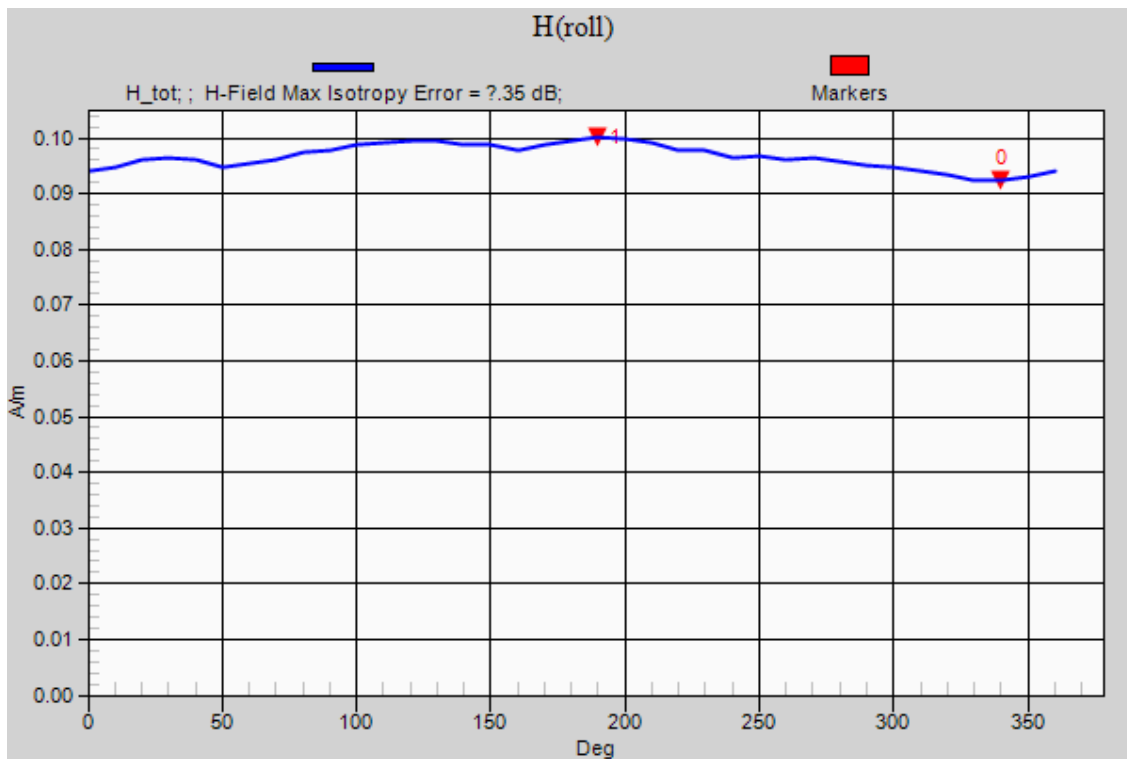
Total = 0.211 A/m

H Category: M3

Location: 17.5, 23.5, 8.7 mm





0 dB = 0.211A/m



ANNEX E Probes Calibration Certificates

E.1 E-field Probe 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) Accreditation No.: **SCS 108**
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Client: **CTTL** Certificate No: **ER3-2435_May10**

CALIBRATION CERTIFICATE

Object: **ER3DV6 - SN:2435**

Calibration procedure(s): **QA CAL-02.v5 and QA CAL-25.v2
 Calibration procedure for E-field probes optimized for close near field evaluations in air**

Calibration date: **May 20, 2010**

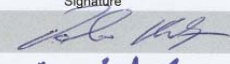

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

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
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ER3DV6	SN: 2328	3-Oct-09 (No. ER3-2328_Oct09)	Oct-10
DAE4	SN: 789	23-Dec-09 (No. DAE4-789_Dec09)	Dec-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

Calibrated by:	Name Katja Pokovic	Function Technical Manager	Signature 
Approved by:	Niels Kuster	Quality Manager	

Issued: May 22, 2010

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

Certificate No: ER3-2435_May10

Page 1 of 10

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



S Schweizerischer Kalibrierdienst
S Service suisse d'étalonnage
C 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**

Glossary:

NORM _{x,y,z}	sensitivity in free space
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1309-2005, "IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", December 2005.

Methods Applied and Interpretation of Parameters:

- *NORM_{x,y,z}*: Assessed for E-field polarization $\vartheta = 0$ for XY sensors and $\vartheta = 90$ for Z sensor ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide).
- *NORM(f)_{x,y,z}* = *NORM_{x,y,z}* * *frequency_response* (see Frequency Response Chart).
- *DCP_{x,y,z}*: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}*: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *Spherical isotropy (3D deviation from isotropy)*: in a locally homogeneous field realized using an open waveguide setup.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORM_x* (no uncertainty required).

ER3DV6 SN:2435

May 20, 2010

Probe ER3DV6

SN:2435

Manufactured:	November 27, 2007
Last calibrated:	April 15, 2009
Recalibrated:	May 20, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: ER3-2435_May10

Page 3 of 10

ER3DV6 SN:2435

May 20, 2010

DASY/EASY - Parameters of Probe: ER3DV6 SN:2435

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)	1.41	1.64	1.89	$\pm 10.1\%$
DCP (mV) ^A	91.5	93.5	95.9	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300	$\pm 1.5\%$
			Y	0.00	0.00	1.00	300	
			Z	0.00	0.00	1.00	300	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A numerical linearization parameter: uncertainty not required

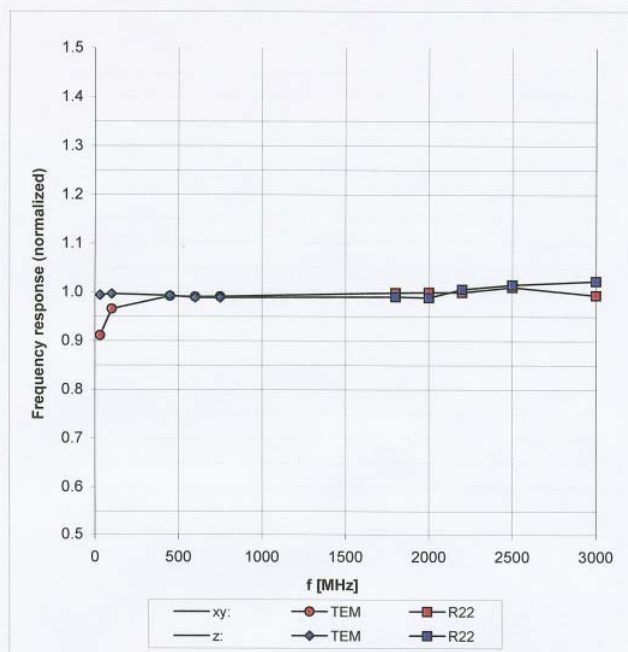
^E Uncertainty is determined using the maximum deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

ER3DV6 SN:2435

May 20, 2010

Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide R22)

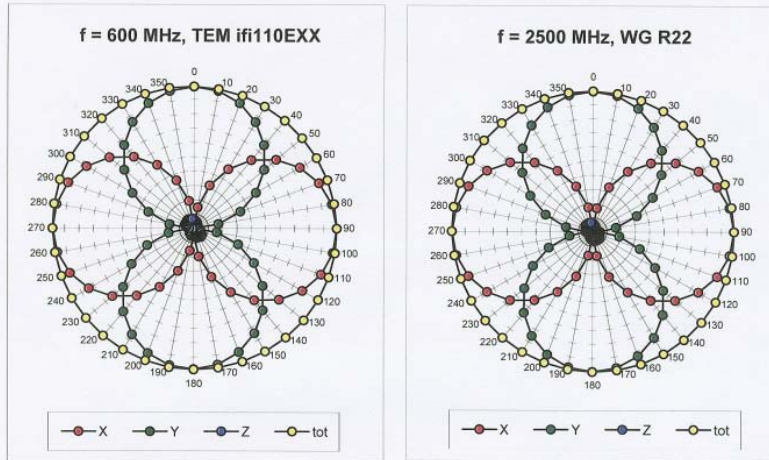


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

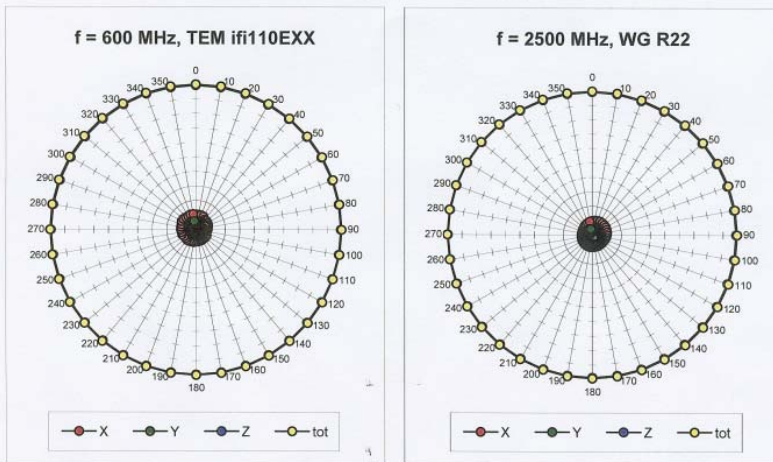
ER3DV6 SN:2435

May 20, 2010

Receiving Pattern (ϕ), $\vartheta = 0^\circ$



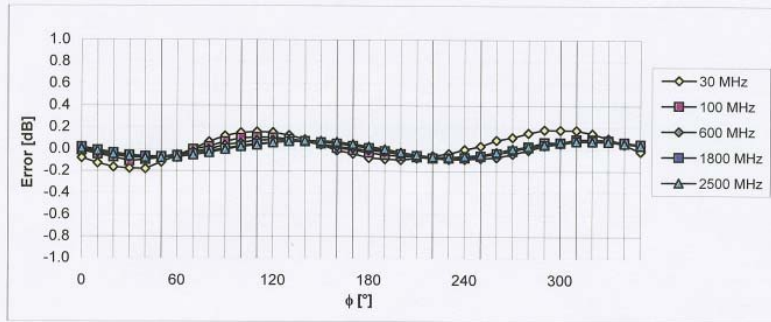
Receiving Pattern (ϕ), $\vartheta = 90^\circ$



ER3DV6 SN:2435

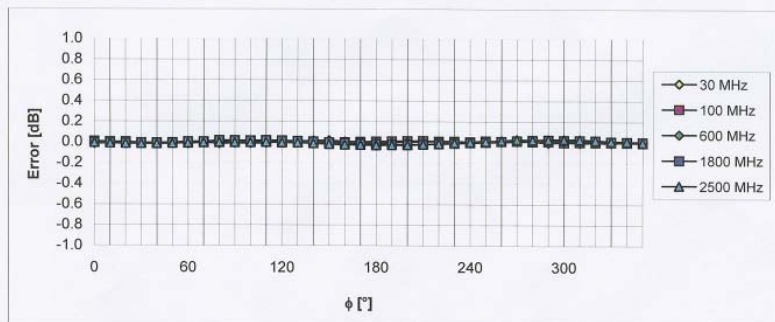
May 20, 2010

Receiving Pattern (ϕ), $\vartheta = 0^\circ$



Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

Receiving Pattern (ϕ), $\vartheta = 90^\circ$

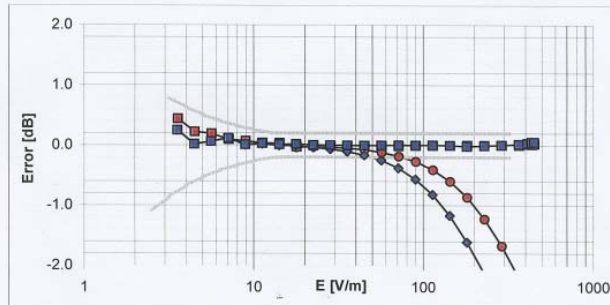
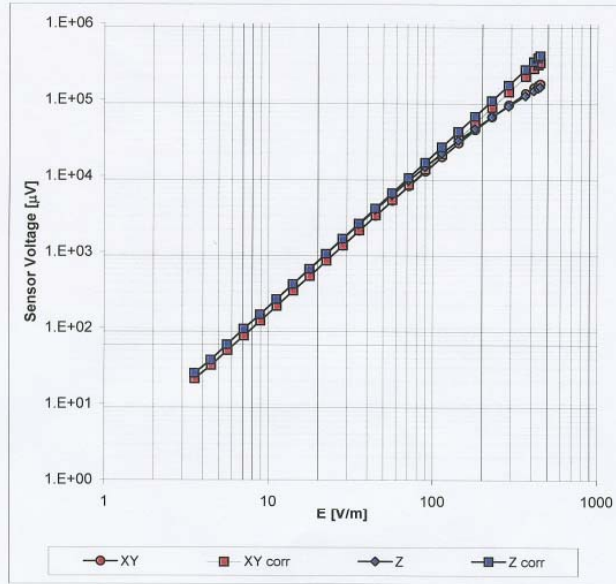


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

ER3DV6 SN:2435

May 20, 2010

Dynamic Range f(E-field) (Waveguide R22, f = 1800 MHz)

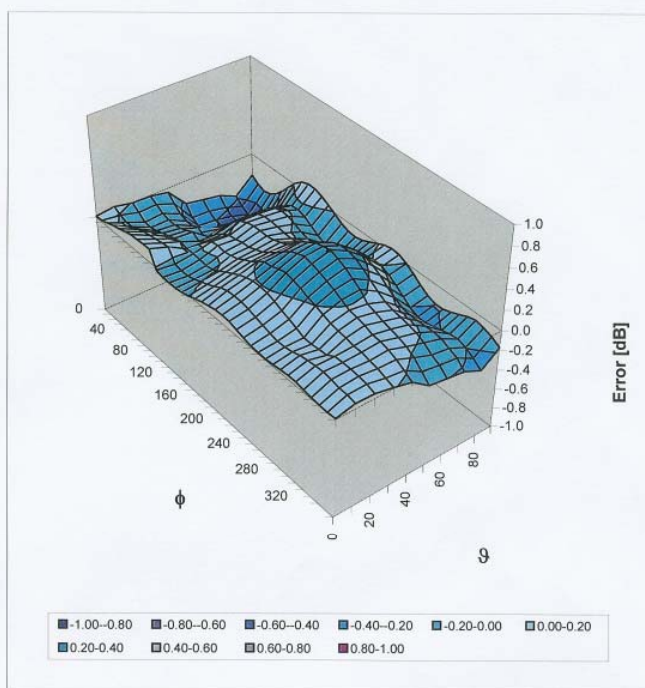


Uncertainty of Linearity Assessment: $\pm 0.6\%$ (k=2)

ER3DV6 SN:2435

May 20, 2010

Deviation from Isotropy in Air Error (ϕ, ϑ), $f = 900$ MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)

ER3DV6 SN:2435

May 20, 2010

Other Probe Parameters

Sensor Arrangement	Rectangular
Connector Angle (°)	-229.7
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	8.0 mm
Probe Tip to Sensor X Calibration Point	2.5 mm
Probe Tip to Sensor Y Calibration Point	2.5 mm
Probe Tip to Sensor Z Calibration Point	2.5 mm

E.2 H-field Probe

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



S Schweizerischer Kalibrierdienst
S Service suisse d'étalonnage
C 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 **CTTL**

Certificate No: **H3-6268_May10**

CALIBRATION CERTIFICATE

Object: **H3DV6 - SN:6268**

Calibration procedure(s): **QA CAL-03.v5 and QA CAL-25.v2
Calibration procedure for H-field probes optimized for close near field
evaluations in air**



Calibration date: **May 21, 2010**

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
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe H3DV6	SN: 6182	3-Oct-09 (No. H3-6182_Oct09)	Oct-10
DAE4	SN: 789	23-Dec-09 (No. DAE4-789_Dec09)	Dec-10
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 22, 2010

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

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**

Glossary:

NORM _{x,y,z}	sensitivity in free space
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1309-2005, " IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", December 2005.

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}: Assessed for E-field polarization $\vartheta = 0$ for XY sensors and $\vartheta = 90$ for Z sensor ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide).
- $X, Y, Z(f)_{a0a1a2} = X, Y, Z_{a0a1a2} \cdot \text{frequency_response}$ (see Frequency Response Chart).
- DCP_{x,y,z}: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- Spherical isotropy (3D deviation from isotropy): in a locally homogeneous field realized using an open waveguide setup.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the X_{a0a1a2} (no uncertainty required).

H3DV6 SN:6268

May 21, 2010

Probe H3DV6

SN:6268

Manufactured:	November 30, 2007
Last calibrated:	April 15, 2009
Recalibrated:	May 21, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

H3DV6 SN:6268

May 21, 2010

DASY/EASY - Parameters of Probe: H3DV6 SN:6268

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (A/m / $\sqrt{\mu V}$) a0	2.54E-3	2.49E-3	2.92E-3	± 5.1%
Norm (A/m / $\sqrt{\mu V}$) a1	-5.47E-5	-7.82E-5	-1.17E-4	± 5.1%
Norm (A/m / $\sqrt{\mu V}$) a2	1.09E-5	-4.09E-6	3.05E-5	± 5.1%
DCP (mV) ^A	86.1	93.5	83.4	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300	± 1.5 %
			Y	0.00	0.00	1.00	300	
			Z	0.00	0.00	1.00	300	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A numerical linearization parameter: uncertainty not required

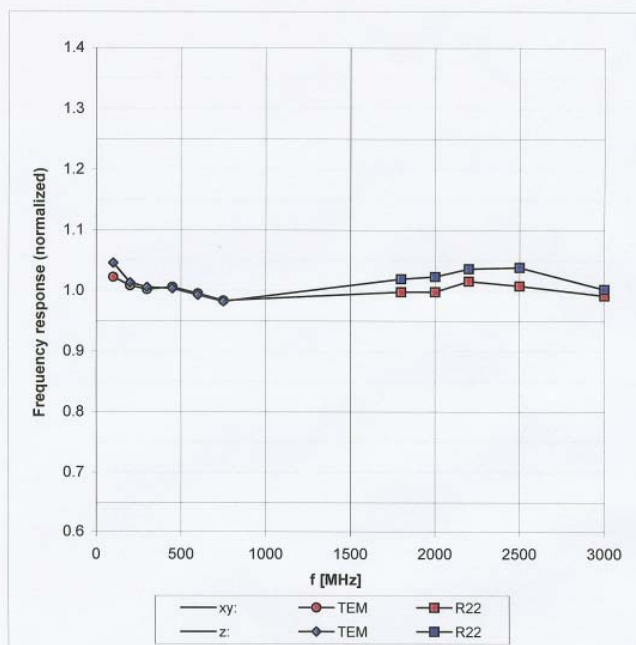
^E Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

H3DV6 SN:6268

May 21, 2010

Frequency Response of H-Field

(TEM-Cell:ifi110 EXX, Waveguide R22)

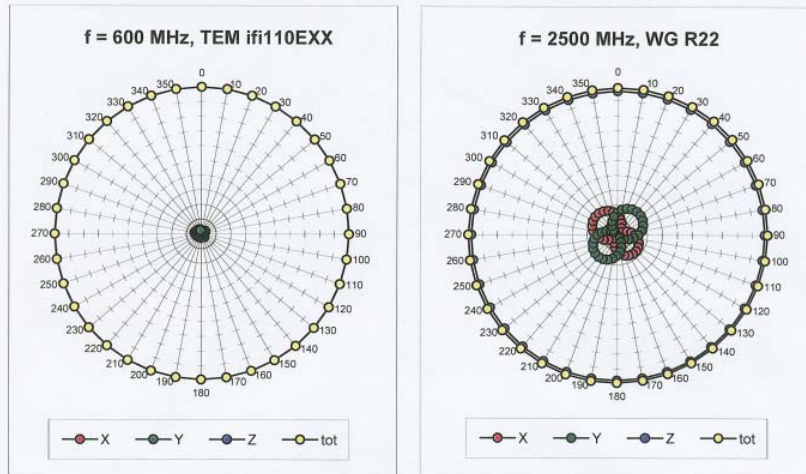


Uncertainty of Frequency Response of H-field: $\pm 6.3\%$ (k=2)

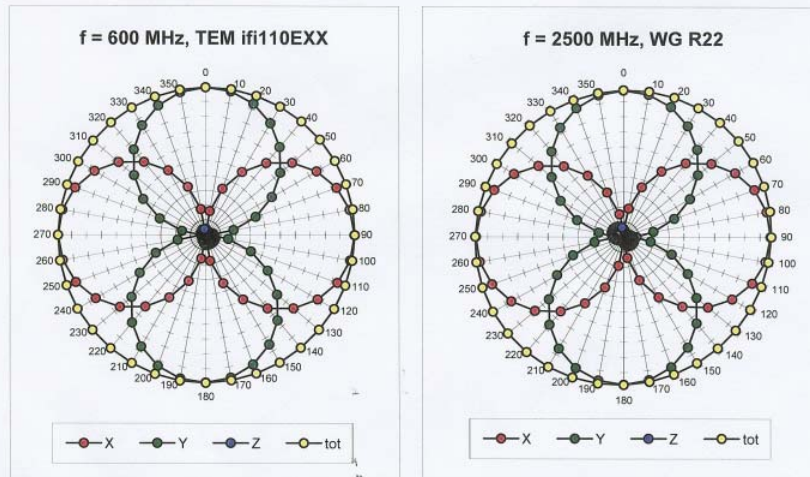
H3DV6 SN:6268

May 21, 2010

Receiving Pattern (ϕ), $\vartheta = 90^\circ$



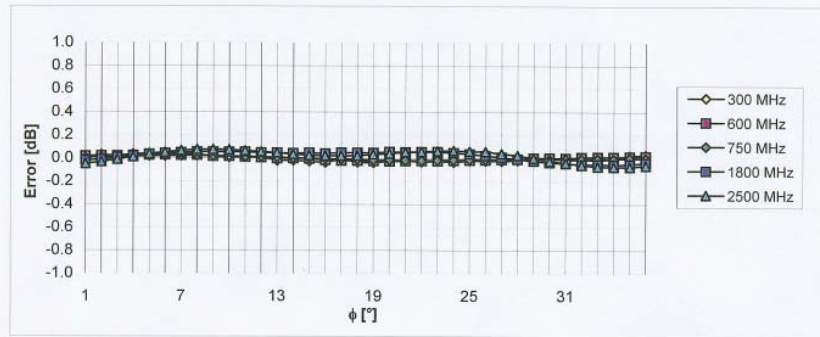
Receiving Pattern (ϕ), $\vartheta = 0^\circ$



H3DV6 SN:6268

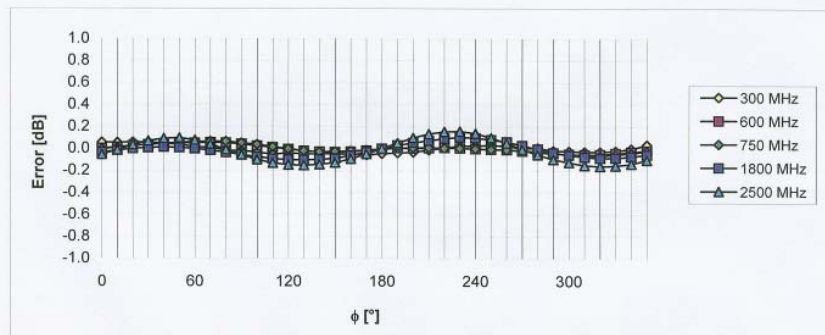
May 21, 2010

Receiving Pattern (ϕ), $\vartheta = 90^\circ$



Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

Receiving Pattern (ϕ), $\vartheta = 0^\circ$

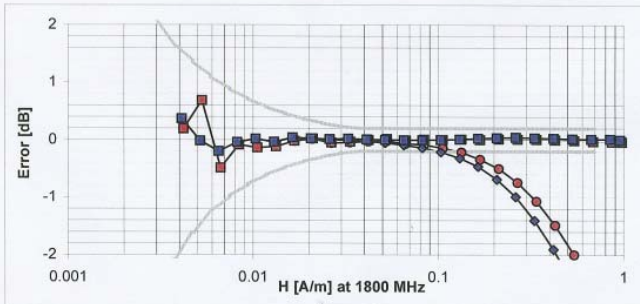
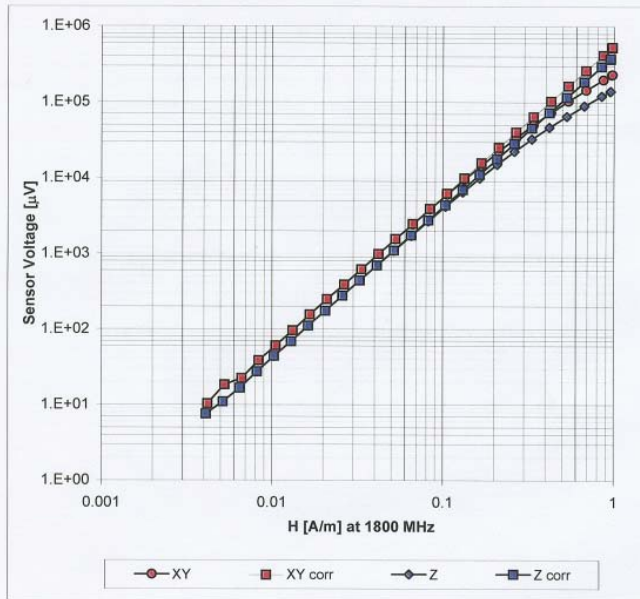


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

H3DV6 SN:6268

May 21, 2010

Dynamic Range f(H-field) (Waveguide R22, f = 1800 MHz)

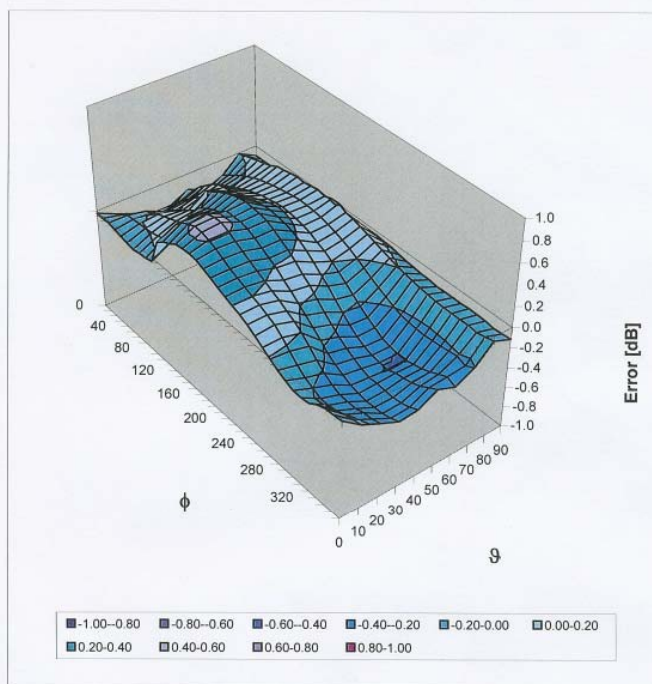


Uncertainty of Linearity Assessment: $\pm 0.6\%$ (k=2)

H3DV6 SN:6268

May 21, 2010

Deviation from Isotropy in Air Error (ϕ, ϑ), $f = 900$ MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)

H3DV6 SN:6268

May 21, 2010

Other Probe Parameters

Sensor Arrangement	Rectangular
Connector Angle (°)	-224.8
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	20 mm
Tip Diameter	6.0 mm
Probe Tip to Sensor X Calibration Point	3 mm
Probe Tip to Sensor Y Calibration Point	3 mm
Probe Tip to Sensor Z Calibration Point	3 mm

ANNEX F Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

————— **The End of this Report** —————

CTTL Test Report