

# Hearing Aid Compatibility (HAC)

## TEST REPORT

### <For RF-Emission Measurement>

Applicant Name	Sony Mobile Communications AB
Address of Applicant	Nya Vattentornet 22188 Lund/SWEDEN
EUT Name	Mobile Phone
Marketing Name	C2104
Brand Name	Sony
Model No.	PM-0300-BV
FCC ID	PY7PM-0300
Date of receive	Oct. 31, 2012
Date of Test(s)	Nov. 12, 2012; Dec. 03, 2012
Date of Issue	May. 01, 2013

Standards:

### ANSI C63.19-2007

**FCC RULE PART(S): 47 CFR PART 20.19(B)**
**HAC CATEGORY: M3 (M Category)**

In the configuration tested, the EUT complied with the standards specified above.

**Remarks:**

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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**Signed on behalf of SGS**
**Sr. Engineer**

**John Yeh**
**Date: May. 01, 2013**
**Asst. Manager**

**Nick Hsu**
**Date: May. 01, 2013**

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### Revision Version

Report Number	Revision	Date	Memo
ES/2012/A0009	00	2013/01/16	Initial creation of test report.
ES/2012/A0009	01	2013/04/03	1 <sup>st</sup> modification
ES/2012/A0009	02	2013/04/26	2 <sup>nd</sup> modification
ES/2012/A0009	03	2013/05/01	3 <sup>rd</sup> modification

**This test report contains a reference to the previous version test report that it replaces.**

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# 1. Introduction

The purpose of the Hearing Aid Compatibility extension is to enable measurements of the near electric and magnetic fields generated by wireless communication devices in the region controlled for use by a hearing aid in accordance with ANSI-C63.19-2007

FCC has granted a request for waiver of the HAC rules in section 20.19 for dual band GSM handsets. The waiver has specific conditions, as stated in the order (FCC 05-166) and expires 1 August 2006.

The purpose of this standard is to establish categories for hearing aids and for WD (wireless communications devices) that can indicate to health care practitioners and hearing aid users which hearing aids are compatible with which WD, and to provide tests that can be used to assess the electromagnetic characteristics of hearing aids and WD and assign them to these categories. The various parameters required, in order to demonstrate compatibility and accessibility are measured. The design of the standard is such that when a hearing aid and WD achieve one of the categories specified, as measured by the methodology of this standard, the indicated performance is realized.

In order to provide for the usability of a hearing aid with a WD, several factors must be coordinated:

- a) Radio frequency (RF) measurements of the near-field electric and magnetic fields emitted by a WD to categorize these emissions for correlation with the RF immunity of a hearing aid.

Hence, the following are measurements made for the WD:

- a) RF E-Field emissions
- b) RF H-Field emissions

The measurement plane is parallel to, and 1.5cm in front of, the reference plane.

Applications for certification of equipment operation under part 20, that a manufacturer is seeking to certify as hearing aid compatible, as set forth in §20.19 of that part, shall include a statement indicating compliance with the test requirements of §20.19 and indicating the appropriate U-rating for the equipment. The manufacturer of the equipment shall be responsible for maintaining the test results.

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## 2. Testing Laboratory

Company Name	SGS Taiwan Ltd. Electronics & Communication Laboratory
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Website	http://www.tw.sgs.com/

## 3. Details of Applicant

Applicant Name	Sony Mobile Communications AB
Applicant Address	Nya Vattentornet 22188 Lund/SWEDEN

## 4. Description of EUT

EUT Name	Mobile Phone
Marketing Name	C2104
Brand Name	Sony
Model No.	PM-0300-BV
HW Version	A
SW Version	15.0.A.1.1
FCC ID	PY7PM-0300
Serial No.	463849633
IMEI Code	004402146156256
Mode of Operation	<input checked="" type="checkbox"/> GSM <input checked="" type="checkbox"/> GPRS <input checked="" type="checkbox"/> EDGE <input checked="" type="checkbox"/> WCDMA <input checked="" type="checkbox"/> HSDPA <input checked="" type="checkbox"/> HSUPA <input checked="" type="checkbox"/> WLAN802.11 a/b/g/n (20M/40M)

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Duty Cycle	GSM	1/8.3		
	GPRS / EDGE (support multi class 12 max)	1/2 (1Dn4UP) 1/2.76 (1Dn3UP) 1/4.1 (1Dn2UP) 1/8.3 (1Dn1UP)		
	WCDMA	1		
	WLAN 802.11 a/b/g/n(20M/40M)	1		
	Bluetooth	1		
TX Frequency Range (MHz)	GSM850	824.2	—	848.8
	GSM1900	1850.2	—	1909.8
	WCDMA Band II	1852.4	—	1907.6
	WCDMA Band IV	1712.4	—	1752.6
	WCDMA Band V	826.4	—	846.6
	WLAN 802.11 b/g/n(20M)	2412	—	2462
	WLAN802.11 a 5.2G	5180	—	5240
	WLAN802.11 a 5.3G	5260	—	5320
	WLAN802.11 a 5.5G	5500	—	5700
	WLAN802.11 a 5.8G	5745	—	5825
	WLAN802.11 n (20M) 5.2G	5180	—	5240
	WLAN802.11 n (20M) 5.3G	5260	—	5320
	WLAN802.11 n (20M) 5.5G	5500	—	5700
	WLAN802.11 n (20M) 5.8G	5745	—	5825
	WLAN802.11 n (40M) 5.2G	5190	—	5230
	WLAN802.11 n (40M) 5.3G	5270	—	5310
	WLAN802.11 n (40M) 5.5G	5510	—	5670
WLAN802.11 n (40M) 5.8G	5755	—	5795	
Bluetooth	2402	—	2480	

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Channel Number (ARFCN)	GSM850	128	—	251
	GSM1900	512	—	810
	WCDMA Band II	9262	—	9538
	WCDMA Band IV	1312	—	1513
	WCDMA Band V	4132	—	4233
	WLAN 802.11 b/g/n(20M)	1	—	11
	WLAN802.11 a 5.2G	36	—	48
	WLAN802.11 a 5.3G	52	—	64
	WLAN802.11 a 5.5G	100	—	140
	WLAN802.11 a 5.8G	149	—	165
	WLAN802.11 n (20M) 5.2G	36	—	48
	WLAN802.11 n (20M) 5.3G	52	—	64
	WLAN802.11 n (20M) 5.5G	100	—	140
	WLAN802.11 n (20M) 5.8G	149	—	165
	WLAN802.11 n (40M) 5.2G	38	—	46
	WLAN802.11 n (40M) 5.3G	54	—	62
	WLAN802.11 n (40M) 5.5G	102	—	134
WLAN802.11 n (40M) 5.8G	151	—	159	
Bluetooth	0	—	78	
VOIP Function	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			

## 5. Test Environment

Ambient Temperature	21.7° C
Relative Humidity	<60 %

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## 6. System Specifications of DASY4

### 6.1 Measurement system Diagram for SPEAG Robotic

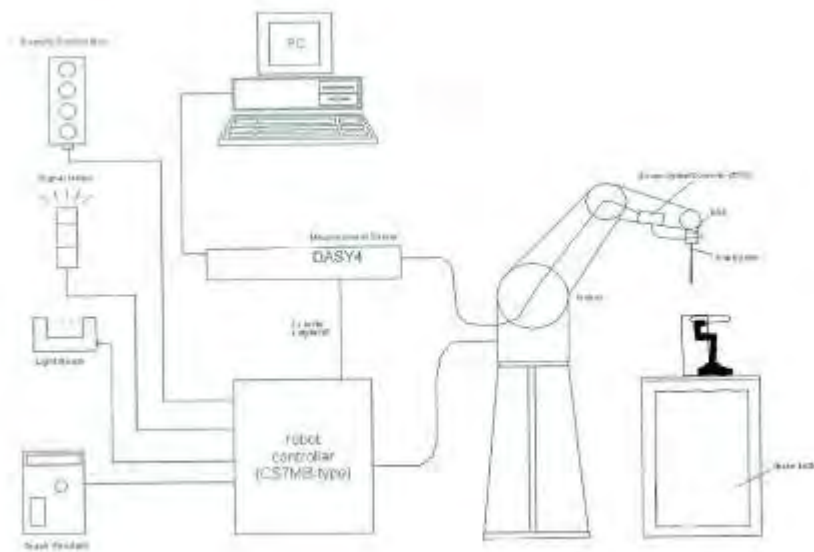


Fig.1 The SPEAG Robotic Diagram

The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Staubli RX family) with controller, teach pendant and software. An arm extension is for accommodating the data acquisition electronics (DAE).
- E and H Field probe.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows XP.

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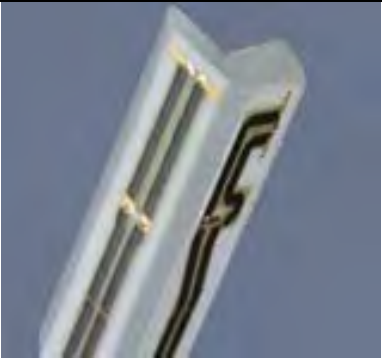

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- DASY4 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The Test Arch phantom.
- The device holder for handheld mobile phones.
- Validation dipole kits allowing to validate the proper functioning of the system.

## 6.2 E and H Field Probe

Construction	One dipole parallel, two dipoles normal to probe axis Built-in shielding against static charges PEEK enclosure material	 ER3DV6 E-Field Probe
Calibration	In air from 100 MHz to 3.0 GHz (absolute accuracy $\pm 6.0\%$ , $k=2$ )	
Frequency	(extended to 20 MHz for MRI), Linearity: $\pm 0.2$ dB (100 MHz to 3 GHz)	
Directivity	$\pm 0.2$ dB in air (rotation around probe axis) $\pm 0.4$ dB in air (rotation normal to probe axis)	
Dynamic Range	2 V/m to > 1000 V/m; Linearity: $\pm 0.2$ dB	
Dimensions	Tip diameter: 8 mm Distance from probe tip to dipole centers: 2.5 mm	
Construction	Three concentric loop sensors with 3.8 mm loop diameters Resistively loaded detector diodes for linear response Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycoether)	 H3DV6 H-Field Probe
Frequency	200 MHz to 3 GHz (absolute accuracy $\pm 6.0\%$ , $k=2$ ); Output linearized	
Directivity	$\pm 0.2$ dB (spherical isotropy error)	
Dynamic Range	10 mA/m to 2 A/m at 1 GHz	
E-Field Interference	< 10% at 3 GHz (for plane wave)	

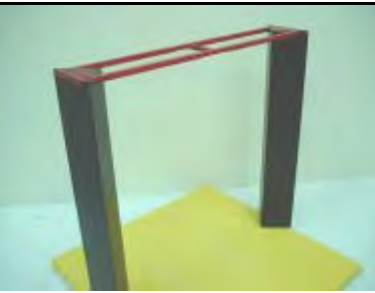
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Dimensions	Tip diameter: 6 mm Distance from probe tip to dipole centers: 3 mm
Application	General magnetic near-field measurements up to 3 GHz (in air or liquids) Field component measurements Surface current measurements Low interaction with the measured field

### 6.3 Test Arch

Description	Enables easy and well defined positioning of the phone and validation dipoles as well as simple teaching of the robot.	
Dimensions	length: 370 mm width: 370 mm height: 370 mm	

Test Arch

### 6.4 Phone Holder

Description	Supports accurate and reliable positioning of any phone Effect on near field < +/- 0.5 dB	
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Phone Holder

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## 7. Measurement Procedure

The following illustrate a typical RF emissions test scan over a wireless communications device:

1. Proper operation of the field probe, probe measurement system, other instrumentation, and the positioning system was confirmed.
2. WD is positioned in its intended test position, acoustic output point of the device perpendicular to the field probe.
3. The WD operation for maximum rated RF output power was configured and confirmed with the base station simulator, at the test channel and other normal operating parameters as intended for the test. The battery was ensured to be fully charged before each test.
4. The center sub-grid was centered over the center of the acoustic output (also audio band magnetic output, if applicable). The WD audio output was positioned tangent (as physically possible) to the measurement plane.
5. A surface calibration was performed before each setup change to ensure repeatable spacing and proper maintenance of the measurement plane using the HAC Phantom.
6. The measurement system measured the field strength at the reference location.
7. Measurements at 5 mm increments in the 5 × 5 cm region were performed and recorded. A 360° rotation about the azimuth axis at the maximum interpolated position was measured. For the worst-case condition, the peak reading from this rotation was used in re-evaluating the HAC category.
8. The system performed a drift evaluation by measuring the field at the reference location.
9. Steps 1-8 were done for both the E and H-Field measurements.

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**Note.**

#.The WLAN and Bluetooth maybe activated by 3rd party software applications, Per KDB 285076 D01 v03 section 10)a, during RF-emission testing, concurrent transmission is disabled. Per ANSI C63.19\_2007, WLAN and Bluetooth were not tested for M- rating.

Air- Interface	Band (MHZ)	Type Transport	C63.19/tested	Simultaneous Transmissions Note:Not to be tested	Reduced Power	Voice Over Digital Transpot(Data)
GSM	850	VO	Yes	Yes,WiFi or Bluetooth	No	No
	1900	VO	Yes	Yes,WiFi or Bluetooth	No	No
	GPRS/EDGE	DT	NA	Yes,WiFi or Bluetooth	No	Yes
WCDMA	850	V/D	Yes	Yes,WiFi or Bluetooth	No	No
	1700	V/D	Yes	Yes,WiFi or Bluetooth	No	No
	1900	V/D	Yes	Yes,WiFi or Bluetooth	No	No
	HSPA	DT	NA	Yes,WiFi or Bluetooth	No	Yes
WiFi	2450/5G	DT	NA	Yes,GSM/WCDMA	No	Yes
Bluetooth	2450	DT	NA	Yes,GSM/WCDMA	No	No
Type Transport VO: Voice Only DT: Digital data-Not intended for CMRS service						

**Fig.2 Air Interface**

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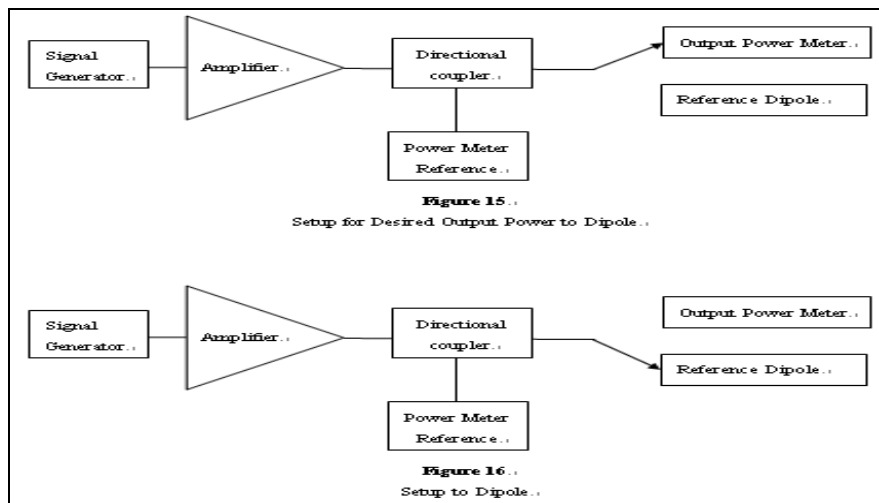
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## 8. System Verification

A dipole antenna meeting the requirements given in C63.19 was placed in the position normally occupied by the WD.

The length of the dipole was scanned with both E-field and H-field probes and the maximum values for each were recorded.



### For H-Field Scan

Mode	Frequency	Input Power	Measured Value(A/m)	Target Value(A/m)	Measured Date
CW	835	20	0.453	0.4557	Nov. 12, 2012
CW	1880	20	0.464	0.459	Nov. 12, 2012
CW	1880	20	0.458	0.459	Dec. 03, 2012

### For E-Field Scan

Mode	Frequency (MHz)	Input Power(dBm)	Measured Value(V/m)	Target Value(V/m)	Measured Date
CW	835	20	167.7	170.5	Nov. 12, 2012
CW	1880	20	140.2	141.7	Nov. 12, 2012
CW	1880	20	140.6	141.7	Dec. 03, 2012

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## 9. Probe Modulation Factor

The measurement setup for determination of the PMF is given in DASY4 manual section 28.2.

The following points describe the installation, the measurement procedure and the evaluation.

1. Install the field probe in the DASY4 window setup.
2. Mount a validation dipole for the appropriate frequency band under the Test Arch. Move the probe manually to a point of high field strength for the specific field type. The probe maybe very close to the dipole and might even touch it. During the fine adjustment of the probe with a signal applied to the dipole, read the x, y and z channel amplitudes in a multimeter job. They should all show a similar amplitude.
3. For comparing the peak amplitudes of modulated and CW signal, the same spectrum analyzer settings are required. The signal path (and setup geometry) between spectrum analyzer and probe must not be changed during the evaluation of the PMF! Only signal type and amplitudes as well as DASY4 settings may be varied.

Spectrum analyzer settings:

- Center Frequency: nominal center frequency of channel
  - Span: zero
  - Resolution bandwidth  $\geq$  emission bandwidth
  - Video bandwidth  $\geq$  20kHz
  - Detection: RMS detection
  - Trigger: Video or IF trigger, adjusted to give a stable display of the transmission
  - Sweep rate: Set to show a complete transmission cycle
  - Line max hold may be used temporarily to ease the peak reading.
4. Define a DASY4 document and set the procedure properties (frequency as above, modulation frequency and crest factor for the modulated signal) according to the measured signal. Define a multimeter job (continuous mode) for the field reading. The probe shall not move. A predefined document is available.
  5. Define a DASY4 document with a procedure for the evaluation of the CW signal (frequency, modulation frequency = 0, crest factor = 1) with a multimeter job.

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The HAC measurement procedure is as follows:

6. Prepare the evaluation sheet for the installed field probe, frequency and modulation type.
7. Modulated signal measurement: Connect the modulated signal using the appropriate frequency via the cable to the setup. Do not move the setup between the following measurements.
8. Run the multimeter job in the procedure with the corresponding modulation setting in continuous mode.
9. Adjust the signal amplitude to achieve the the desired field level display in the multimeter.(A number of levels over the full dynamic range of the probe in the desired range shall be set, including the values read during the WD scans.)
10. Read the total field for the modulated signal.
11. Read the peak envelope signal on the spectrum analyzer.
12. Repeat these readings for other amplitude settings.
13. Switch the signal source off and verify that the ambient and instrumentation noise level is at least 10dB lower (a factor of 3 in field).
14. CW measurement: Change the signal to CW at the same center frequency, without touching or moving dipole or probe in the setup.
15. Adjust the CW signal amplitude to a similar range of peak levels on the spectrum analyzer.
16. Run the multimeter in the CW procedure in continuous mode.
17. Read the multimeter total field display.
18. Read the signal on the spectrum analyzer.
19. Repeat these readings for other amplitude settings.
20. Select the correct type of predefined Excel calculation sheet and insert the readings into the appropriate measurement columns. Conversion from linear DASY readings to logarithmic will be automatically made. The diagrams contain fitting curves for the logarithmic quantities. CW and E-field values will be fitted by linear trend lines, H-field values by quadratic.

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## 10. Test Standards and Limits

The measurements were performed to ensure compliance to the ANSI C63.19-2007 standard,

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

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## 11. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration	Date of next calibration
Schmid & Partner Engineering AG	E-Field and H-Field Probe	H3DV6	6142	Apr.25,2012	Apr.24,2013
		ER3DV6	2306	Apr.25,2012	Apr.24,2013
Schmid & Partner Engineering AG	835/1880 MHz System Validation Dipole	CD835V3	1052	Apr.19,2012	Apr.18,2013
		CD1880V3	1044	Apr.19,2012	Apr.18,2013
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	547	Jun.01.2012	May31.2013
Schmid & Partner Engineering AG	Software	DASY 4 V4.7	N/A	Calibration not required	Calibration not required
Agilent	Dielectric Probe Kit	85070D	US01440168	Calibration not required	Calibration not required
Agilent	Dual-directional coupler	778D	50313	Aug.16.2012	Aug.15.2013
Agilent	RF Signal Generator	N5181A	MY50141235	Jan.06,2012	Jan.05,2013
R&S	Radio Communication Test	CMU200	113505	May11,2012	May10,2013
Schmid & Partner Engineering AG	Test Arch SD HAC	P01	1047	Calibration not required	Calibration not required
Agilent	Power meter	U2001B	MY48100169	May12,2012	May11,2013

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## 12. Summary of Results

### H-Field

H-Field Emission	Channel	Modulation Factor	Conducted Power (dBm)	Measured Drift (%)	Time Avg. Field (A/m)	RESULT	Excl Blocks per 4.3.1.2.2
GSM850	128	2.98	33.48	-0.044	0.289	M4	147
	190	2.98	33.48	0.038	0.266	M4	147
	251	2.98	33.33	0.055	0.233	M4	147
H-Field Emission	Channel	Modulation Factor	Conducted Power (dBm)	Measured Drift (%)	Time Avg. Field (V/m)	RESULT	Excl Blocks per 4.3.1.2.2
GSM1900	512	2.78	30.24	0.005	0.169	M3	147
	661	2.78	30.35	0.002	0.182	M3	147
	810	2.78	30.23	0.037	0.185	M3	147
H-Field Emission	Channel	Modulation Factor	Conducted Power (dBm)	Measured Drift (%)	Time Avg. Field (V/m)	RESULT	Excl Blocks per 4.3.1.2.2
WCDMA Band II	9262	1	23.29	-0.066	0.096	M4	147
	9400	1	23.21	0.027	0.097	M4	124
	9538	1	23.26	-0.111	0.098	M4	147
E-Field Emission	Channel	Modulation Factor	Conducted Power (dBm)	Measured Drift (%)	Time Avg. Field (V/m)	RESULT	Excl Blocks per 4.3.1.2.2
WCDMA Band IV	1312	1	23.72	-0.078	0.074	M4	147
	1412	1	23.75	-0.03	0.069	M4	124
	1513	1	23.68	0.151	0.065	M4	123
H-Field Emission	Channel	Modulation Factor	Conducted Power (dBm)	Measured Drift (%)	Time Avg. Field (V/m)	RESULT	Excl Blocks per 4.3.1.2.2
WCDMA Band V	4132	1	23.76	0.022	0.065	M4	147
	4183	1	23.74	0.1	0.068	M4	147
	4233	1	23.79	-0.036	0.051	M4	147

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## E-Field

E-Field Emission	Channel	Modulation Factor	Conducted Power (dBm)	Measured Drift (%)	Time Avg. Field (V/m)	RESULT	Excl Blocks per 4.3.1.2.2
GSM850	128	2.83	33.48	0.021	186.2	M3	789
	190	2.83	33.48	-0.022	171.8	M3	789
	251	2.83	33.33	-0.025	149.9	M3	789
E-Field Emission	Channel	Modulation Factor	Conducted Power (dBm)	Measured Drift (%)	Time Avg. Field (V/m)	RESULT	Excl Blocks per 4.3.1.2.2
GSM1900	512	2.94	30.24	0.042	63.6	M3	689
	661	2.94	30.35	-0.044	64.2	M3	689
	810	2.94	30.23	0.011	68.2	M3	689
E-Field Emission	Channel	Modulation Factor	Conducted Power (dBm)	Measured Drift (%)	Time Avg. Field (V/m)	RESULT	Excl Blocks per 4.3.1.2.2
WCDMA Band II	9262	1	23.29	-0.153	36.1	M4	689
	9400	1	23.21	-0.035	33.6	M4	689
	9538	1	23.26	-0.066	35.1	M4	689
E-Field Emission	Channel	Modulation Factor	Conducted Power (dBm)	Measured Drift (%)	Time Avg. Field (V/m)	RESULT	Excl Blocks per 4.3.1.2.2
WCDMA Band IV	1312	1	23.72	-0.144	32	M4	789
	1412	1	23.75	-0.042	32	M4	789
	1513	1	23.68	0.041	35.5	M4	789
E-Field Emission	Channel	Modulation Factor	Conducted Power (dBm)	Measured Drift (%)	Time Avg. Field (V/m)	RESULT	Excl Blocks per 4.3.1.2.2
WCDMA Band V	4132	1	23.76	0.028	53.3	M4	789
	4183	1	23.74	-0.014	59.1	M4	789
	4233	1	23.79	0.049	48.2	M4	789

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### 13. Measurement Data

Date: 2012/11/12

#### HAC\_H\_GSM 850\_CH128

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Device Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

#### H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm  
 Maximum value of peak Total field = 0.289 A/m  
 Probe Modulation Factor = 2.98  
 Device Reference Point: 0.000, 0.000, 353.7 mm  
 Reference Value = 0.070 A/m; Power Drift = -0.044 dB  
**Hearing Aid Near-Field Category: M4 (AWF -5 dB)**

Peak H-field in A/m

Grid 1 <b>0.369 M4</b>	Grid 2 <b>0.265 M4</b>	Grid 3 <b>0.170 M4</b>
Grid 4 <b>0.368 M4</b>	Grid 5 <b>0.265 M4</b>	Grid 6 <b>0.165 M4</b>
Grid 7 <b>0.403 M4</b>	Grid 8 <b>0.289 M4</b>	Grid 9 <b>0.182 M4</b>

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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

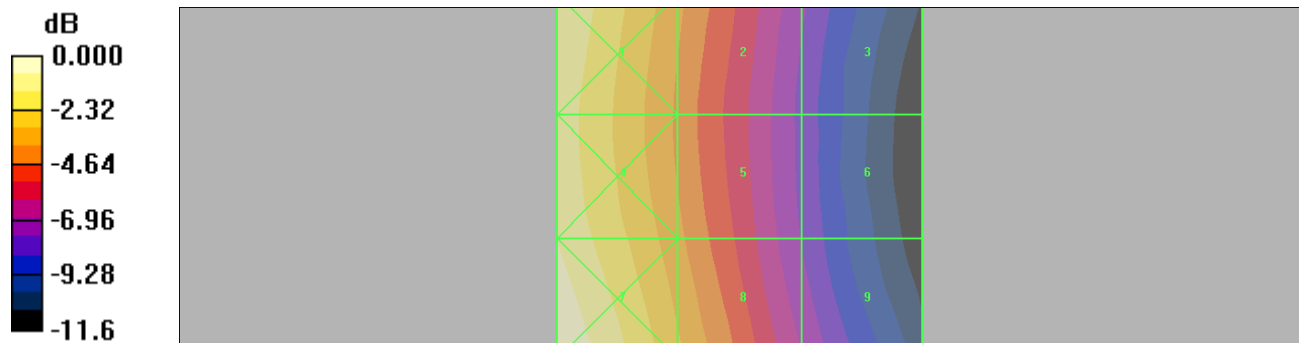
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.403 A/m

H Category: M4

Location: 25, 25, 368.7 mm



0 dB = 0.403A/m

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Date: 2012/11/12

## HAC\_H\_GSM 850\_CH190

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Device Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 0.266 A/m

Probe Modulation Factor = 2.98

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.064 A/m; Power Drift = 0.038 dB

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

Peak H-field in A/m

Grid 1 <b>0.338 M4</b>	Grid 2 <b>0.244 M4</b>	Grid 3 <b>0.158 M4</b>
Grid 4 <b>0.334 M4</b>	Grid 5 <b>0.242 M4</b>	Grid 6 <b>0.151 M4</b>
Grid 7 <b>0.371 M4</b>	Grid 8 <b>0.266 M4</b>	Grid 9 <b>0.169 M4</b>

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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

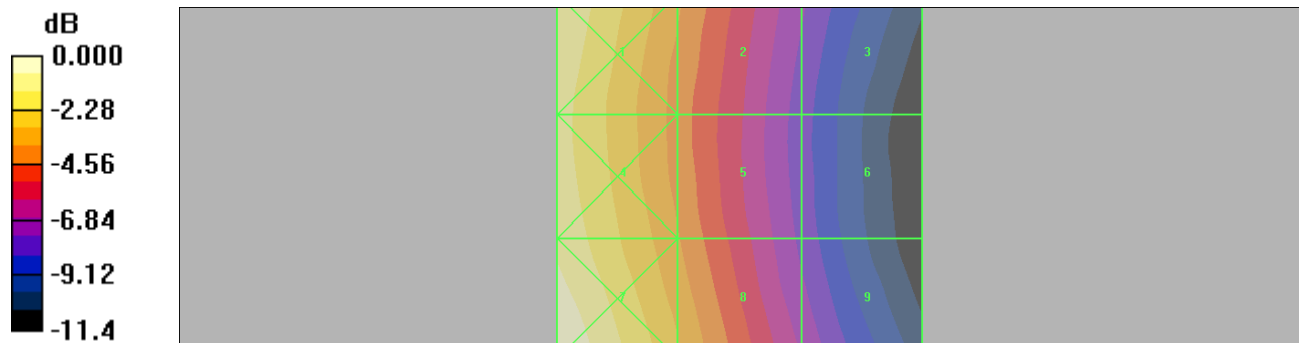
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.371 A/m

H Category: M4

Location: 25, 25, 368.7 mm



0 dB = 0.371A/m

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Date: 2012/11/12

## HAC\_H\_GSM 850\_CH251

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Device Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 0.233 A/m

Probe Modulation Factor = 2.98

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.057 A/m; Power Drift = 0.055 dB

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

Peak H-field in A/m

Grid 1 <b>0.300 M4</b>	Grid 2 <b>0.215 M4</b>	Grid 3 <b>0.142 M4</b>
Grid 4 <b>0.294 M4</b>	Grid 5 <b>0.212 M4</b>	Grid 6 <b>0.135 M4</b>
Grid 7 <b>0.324 M4</b>	Grid 8 <b>0.233 M4</b>	Grid 9 <b>0.149 M4</b>

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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

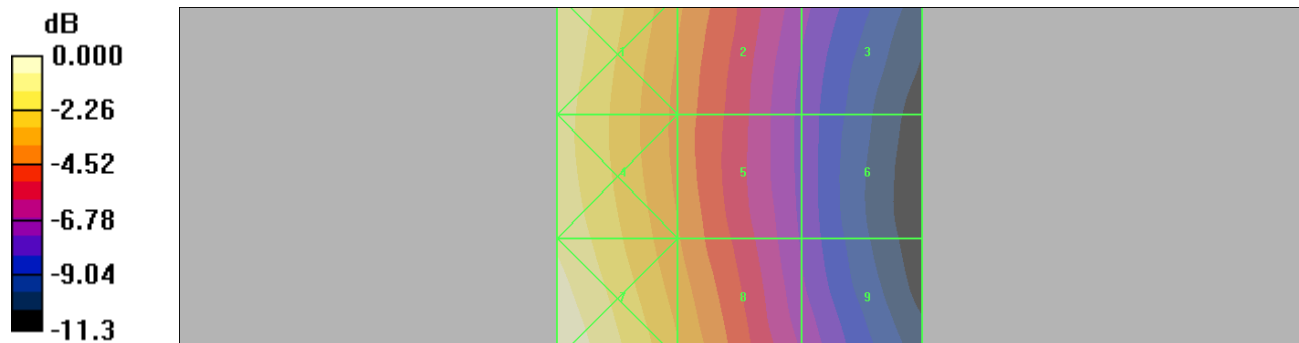
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.324 A/m

H Category: M4

Location: 25, 25, 368.7 mm



0 dB = 0.324A/m

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Date: 2012/11/12

## HAC\_H\_GSM 1900\_CH512

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Device Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 0.169 A/m

Probe Modulation Factor = 2.78

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.058 A/m; Power Drift = 0.005 dB

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

Peak H-field in A/m

Grid 1 <b>0.178 M3</b>	Grid 2 <b>0.169 M3</b>	Grid 3 <b>0.150 M3</b>
Grid 4 <b>0.162 M3</b>	Grid 5 <b>0.161 M3</b>	Grid 6 <b>0.146 M3</b>
Grid 7 <b>0.181 M3</b>	Grid 8 <b>0.155 M3</b>	Grid 9 <b>0.126 M4</b>

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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

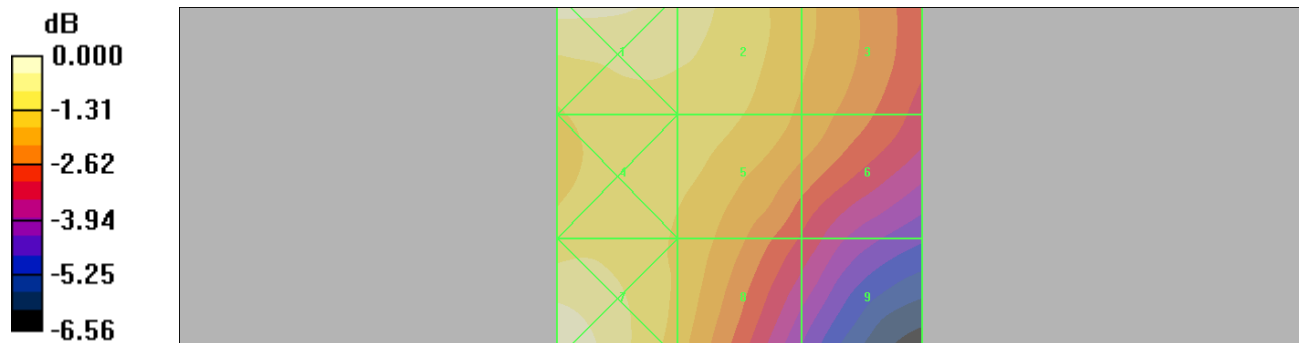
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.181 A/m

H Category: M3

Location: 25, 25, 368.7 mm



0 dB = 0.181A/m

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Date: 2012/11/12

## HAC\_H\_GSM 1900\_CH661

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Device Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 0.182 A/m

Probe Modulation Factor = 2.78

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.059 A/m; Power Drift = 0.002 dB

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

Peak H-field in A/m

Grid 1 <b>0.187 M3</b>	Grid 2 <b>0.182 M3</b>	Grid 3 <b>0.160 M3</b>
Grid 4 <b>0.169 M3</b>	Grid 5 <b>0.168 M3</b>	Grid 6 <b>0.150 M3</b>
Grid 7 <b>0.186 M3</b>	Grid 8 <b>0.159 M3</b>	Grid 9 <b>0.125 M4</b>

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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

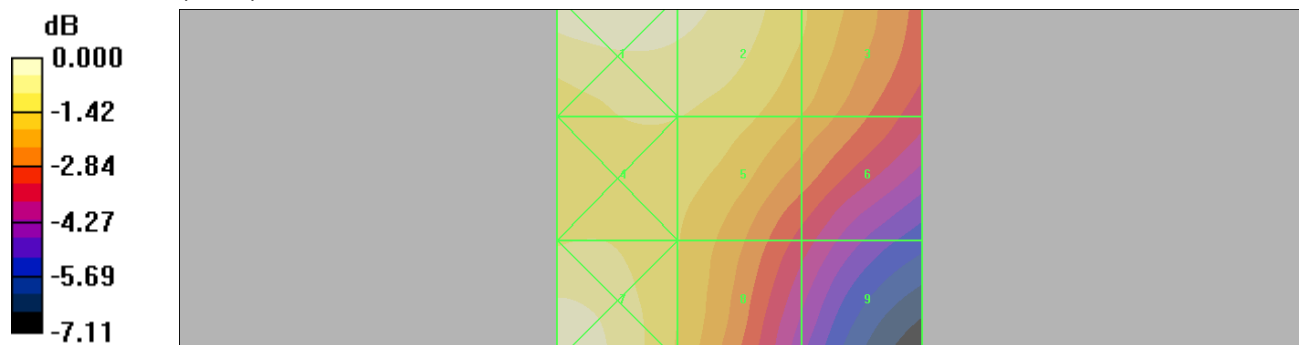
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.187 A/m

H Category: M3

Location: 19, -25, 368.7 mm



0 dB = 0.187A/m

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Date: 2012/11/12

## HAC\_H\_GSM 1900\_CH810

Communication System: GSM1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Device Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 0.185 A/m

Probe Modulation Factor = 2.78

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.062 A/m; Power Drift = 0.037 dB

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

Peak H-field in A/m

Grid 1 <b>0.188 M3</b>	Grid 2 <b>0.185 M3</b>	Grid 3 <b>0.170 M3</b>
Grid 4 <b>0.172 M3</b>	Grid 5 <b>0.172 M3</b>	Grid 6 <b>0.161 M3</b>
Grid 7 <b>0.189 M3</b>	Grid 8 <b>0.165 M3</b>	Grid 9 <b>0.132 M4</b>

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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

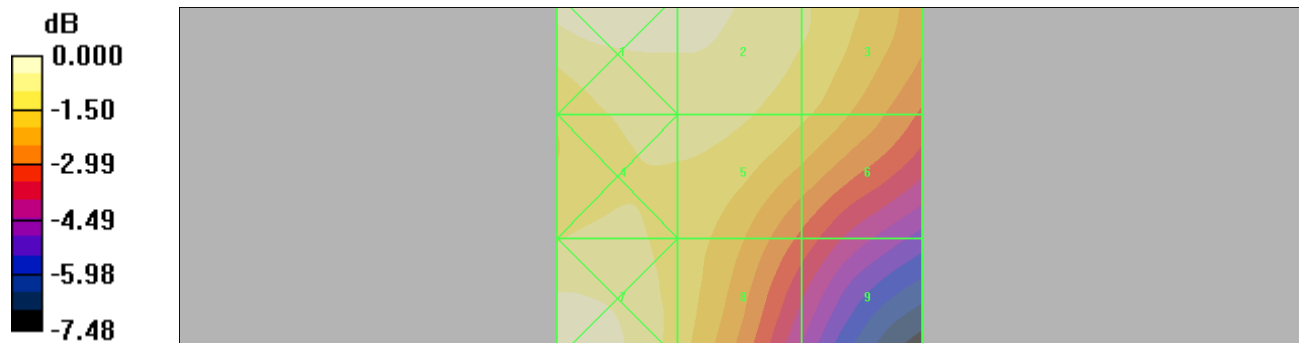
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.189 A/m

H Category: M3

Location: 25, 25, 368.7 mm



0 dB = 0.189A/m

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Date: 2012/12/03

## HAC\_H\_WCDMA BAND II\_CH9262

Communication System: WCDMA Band II; Frequency: 1852.4 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Device Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 0.096 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.087 A/m; Power Drift = -0.066 dB

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

Peak H-field in A/m

Grid 1 <b>0.099 M4</b>	Grid 2 <b>0.096 M4</b>	Grid 3 <b>0.083 M4</b>
Grid 4 <b>0.089 M4</b>	Grid 5 <b>0.089 M4</b>	Grid 6 <b>0.079 M4</b>
Grid 7 <b>0.099 M4</b>	Grid 8 <b>0.084 M4</b>	Grid 9 <b>0.065 M4</b>

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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

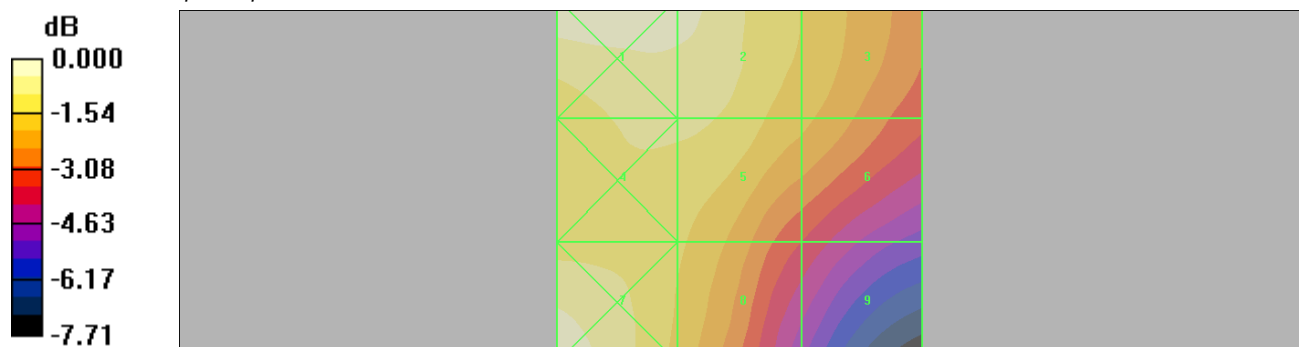
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.099 A/m

H Category: M4

Location: 25, -25, 368.7 mm



0 dB = 0.099A/m

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Date: 2012/12/03

## HAC\_H\_WCDMA BAND II\_CH9400

Communication System: WCDMA Band II; Frequency: 1880 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Device Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 0.097 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.088 A/m; Power Drift = 0.027 dB

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

Peak H-field in A/m

Grid 1 <b>0.101 M4</b>	Grid 2 <b>0.098 M4</b>	Grid 3 <b>0.085 M4</b>
Grid 4 <b>0.091 M4</b>	Grid 5 <b>0.091 M4</b>	Grid 6 <b>0.081 M4</b>
Grid 7 <b>0.097 M4</b>	Grid 8 <b>0.085 M4</b>	Grid 9 <b>0.067 M4</b>

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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

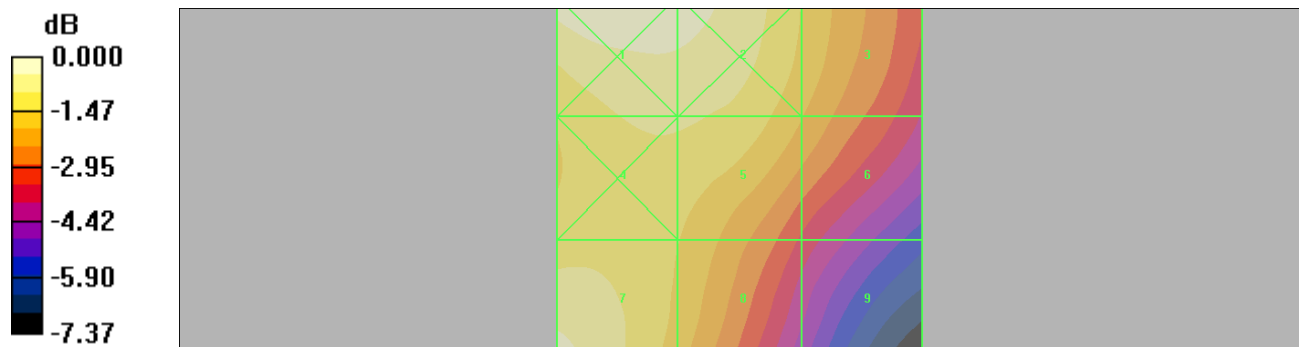
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.101 A/m

H Category: M4

Location: 18, -25, 368.7 mm



0 dB = 0.101A/m

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Date: 2012/12/03

## HAC\_H\_WCDMA BAND II\_CH9538

Communication System: WCDMA Band II; Frequency: 1907.6 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Device Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 0.098 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.092 A/m; Power Drift = -0.111 dB

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

Peak H-field in A/m

Grid 1 <b>0.100 M4</b>	Grid 2 <b>0.098 M4</b>	Grid 3 <b>0.089 M4</b>
Grid 4 <b>0.091 M4</b>	Grid 5 <b>0.091 M4</b>	Grid 6 <b>0.085 M4</b>
Grid 7 <b>0.099 M4</b>	Grid 8 <b>0.086 M4</b>	Grid 9 <b>0.069 M4</b>

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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

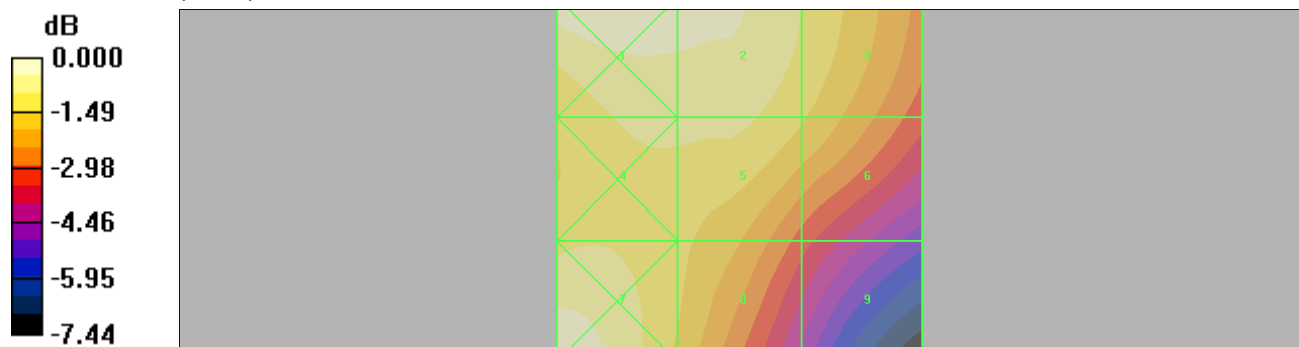
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.100 A/m

H Category: M4

Location: 17, -25, 368.7 mm



0 dB = 0.100A/m

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Date: 2012/11/12

## HAC\_H\_WCDMA Band IV\_CH1312

Communication System: WCDMA BAND4; Frequency: 1712.4 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Device Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 0.074 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.068 A/m; Power Drift = -0.078 dB

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

Peak H-field in A/m

Grid 1 <b>0.076 M4</b>	Grid 2 <b>0.074 M4</b>	Grid 3 <b>0.064 M4</b>
Grid 4 <b>0.075 M4</b>	Grid 5 <b>0.072 M4</b>	Grid 6 <b>0.060 M4</b>
Grid 7 <b>0.078 M4</b>	Grid 8 <b>0.065 M4</b>	Grid 9 <b>0.049 M4</b>

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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

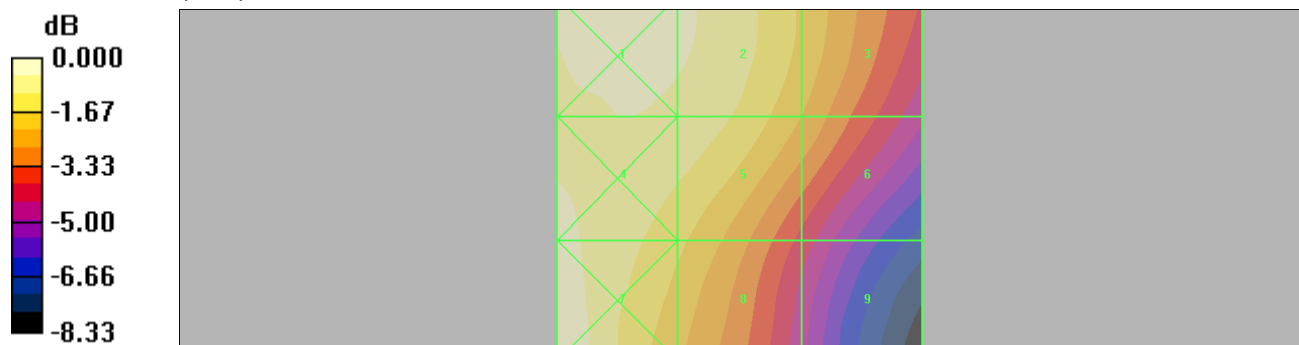
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.078 A/m

H Category: M4

Location: 25, 25, 368.7 mm



0 dB = 0.078A/m

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Date: 2012/11/12

## HAC\_H\_WCDMA Band IV\_CH1412

Communication System: WCDMA BAND4; Frequency: 1732.4 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Device Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 0.069 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.068 A/m; Power Drift = -0.030 dB

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

Peak H-field in A/m

Grid 1 <b>0.075 M4</b>	Grid 2 <b>0.072 M4</b>	Grid 3 <b>0.062 M4</b>
Grid 4 <b>0.071 M4</b>	Grid 5 <b>0.069 M4</b>	Grid 6 <b>0.060 M4</b>
Grid 7 <b>0.069 M4</b>	Grid 8 <b>0.061 M4</b>	Grid 9 <b>0.048 M4</b>

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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

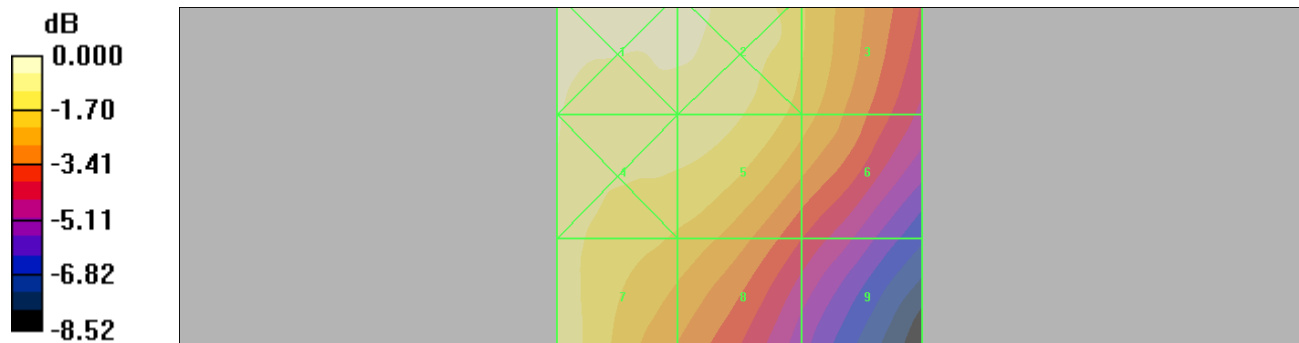
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.075 A/m

H Category: M4

Location: 20.5, -25, 368.7 mm



0 dB = 0.075A/m

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Date: 2012/11/12

## HAC\_H\_WCDMA Band IV\_CH1513

Communication System: WCDMA BAND4; Frequency: 1752.6 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Device Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 0.065 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.064 A/m; Power Drift = 0.151 dB

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

Peak H-field in A/m

Grid 1 <b>0.065 M4</b>	Grid 2 <b>0.068 M4</b>	Grid 3 <b>0.065 M4</b>
Grid 4 <b>0.064 M4</b>	Grid 5 <b>0.065 M4</b>	Grid 6 <b>0.063 M4</b>
Grid 7 <b>0.061 M4</b>	Grid 8 <b>0.056 M4</b>	Grid 9 <b>0.050 M4</b>

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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

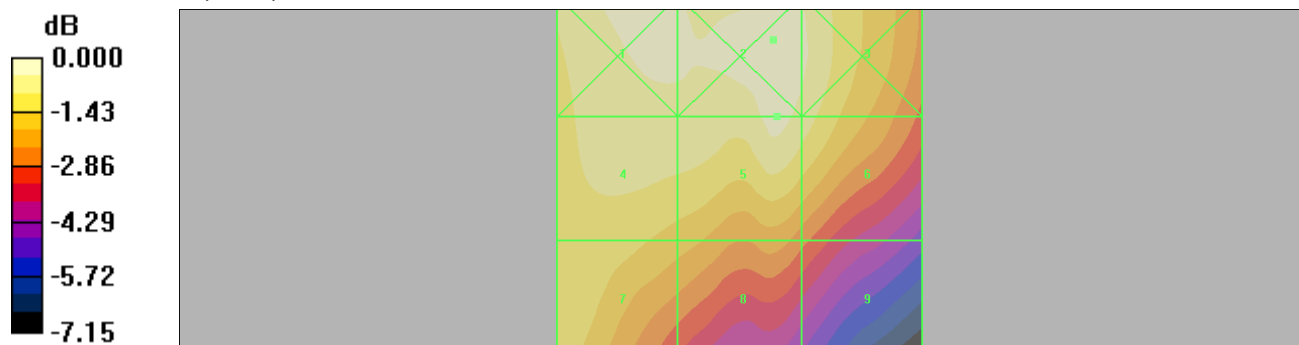
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.068 A/m

H Category: M4

Location: -4.5, -19, 368.7 mm



0 dB = 0.068A/m

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Date: 2012/11/12

## HAC\_H\_WCDMA Band V\_CH4132

Communication System: WCDMA Band V; Frequency: 826.4 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Device Section

### DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 0.065 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.049 A/m; Power Drift = 0.022 dB

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

Peak H-field in A/m

Grid 1 <b>0.077 M4</b>	Grid 2 <b>0.059 M4</b>	Grid 3 <b>0.041 M4</b>
Grid 4 <b>0.080 M4</b>	Grid 5 <b>0.060 M4</b>	Grid 6 <b>0.041 M4</b>
Grid 7 <b>0.088 M4</b>	Grid 8 <b>0.065 M4</b>	Grid 9 <b>0.048 M4</b>

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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

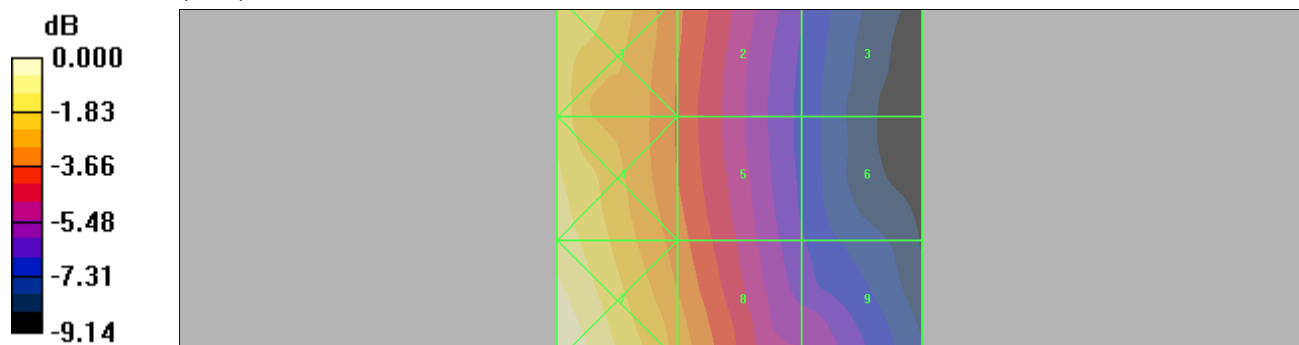
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.088 A/m

H Category: M4

Location: 25, 25, 368.7 mm



0 dB = 0.088A/m

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Date: 2012/11/12

## HAC\_H\_WCDMA Band V\_CH4183

Communication System: WCDMA Band V; Frequency: 836.6 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Device Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 0.068 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.050 A/m; Power Drift = 0.100 dB

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

Peak H-field in A/m

Grid 1 <b>0.075 M4</b>	Grid 2 <b>0.055 M4</b>	Grid 3 <b>0.043 M4</b>
Grid 4 <b>0.074 M4</b>	Grid 5 <b>0.061 M4</b>	Grid 6 <b>0.042 M4</b>
Grid 7 <b>0.086 M4</b>	Grid 8 <b>0.068 M4</b>	Grid 9 <b>0.046 M4</b>

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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

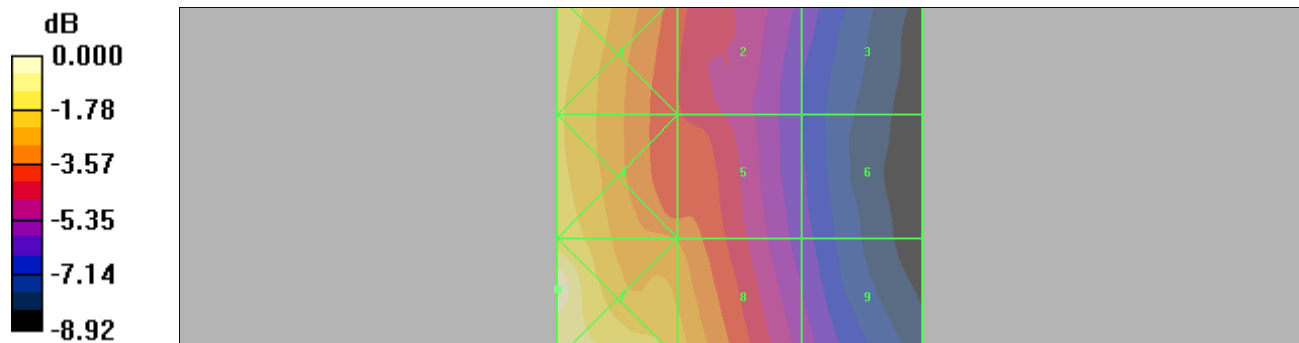
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.086 A/m

H Category: M4

Location: 25, 15.5, 368.7 mm



0 dB = 0.086A/m

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Date: 2012/11/12

## HAC\_H\_WCDMA Band V\_CH4233

Communication System: WCDMA Band V; Frequency: 846.6 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Device Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 0.051 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.040 A/m; Power Drift = -0.036 dB

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

Peak H-field in A/m

Grid 1 <b>0.057 M4</b>	Grid 2 <b>0.047 M4</b>	Grid 3 <b>0.034 M4</b>
Grid 4 <b>0.062 M4</b>	Grid 5 <b>0.047 M4</b>	Grid 6 <b>0.036 M4</b>
Grid 7 <b>0.068 M4</b>	Grid 8 <b>0.051 M4</b>	Grid 9 <b>0.039 M4</b>

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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

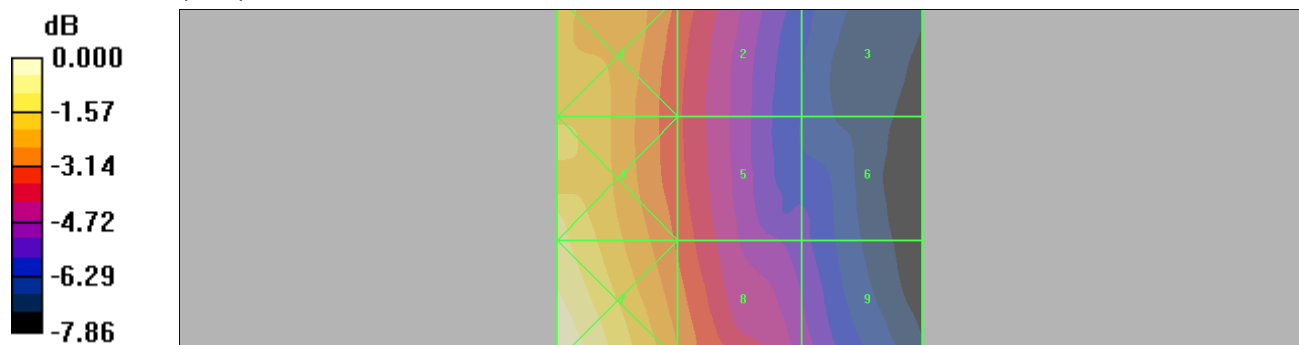
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.068 A/m

H Category: M4

Location: 25, 25, 368.7 mm



0 dB = 0.068A/m

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Date: 2012/11/12

## HAC\_E\_GSM850\_CH128

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 186.2 V/m

Probe Modulation Factor = 2.83

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 83.9 V/m; Power Drift = 0.021 dB

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

Peak E-field in V/m

Grid 1 <b>165.7 M3</b>	Grid 2 <b>176.4 M3</b>	Grid 3 <b>169.3 M3</b>
Grid 4 <b>177.1 M3</b>	Grid 5 <b>186.2 M3</b>	Grid 6 <b>177.9 M3</b>
Grid 7 <b>185.1 M3</b>	Grid 8 <b>191.2 M3</b>	Grid 9 <b>180.7 M3</b>

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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

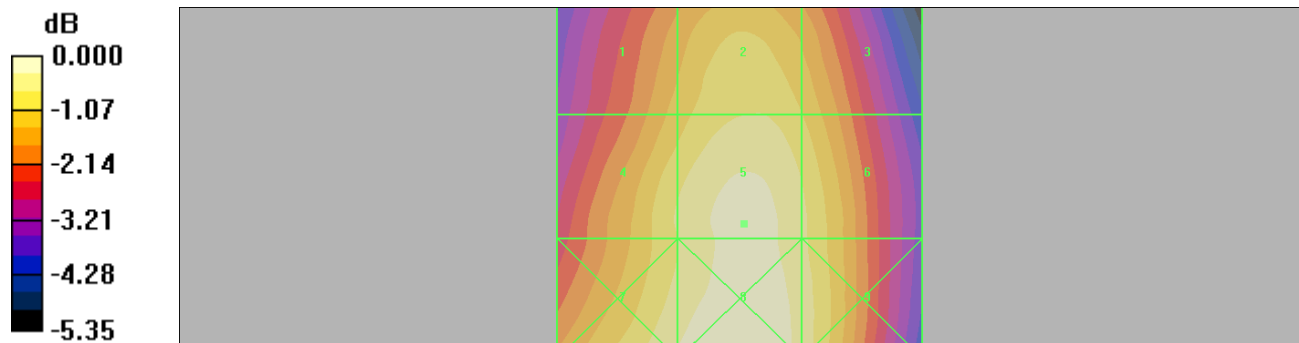
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 191.2 V/m

E Category: M3

Location: 0.5, 25, 368.7 mm



0 dB = 191.2V/m

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Date: 2012/11/12

## HAC\_E\_GSM850\_CH190

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 171.8 V/m

Probe Modulation Factor = 2.83

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 76.8 V/m; Power Drift = -0.022 dB

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

Peak E-field in V/m

Grid 1 <b>147.4 M4</b>	Grid 2 <b>161.8 M3</b>	Grid 3 <b>153.6 M3</b>
Grid 4 <b>159.2 M3</b>	Grid 5 <b>171.8 M3</b>	Grid 6 <b>163.0 M3</b>
Grid 7 <b>167.8 M3</b>	Grid 8 <b>174.4 M3</b>	Grid 9 <b>167.5 M3</b>

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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

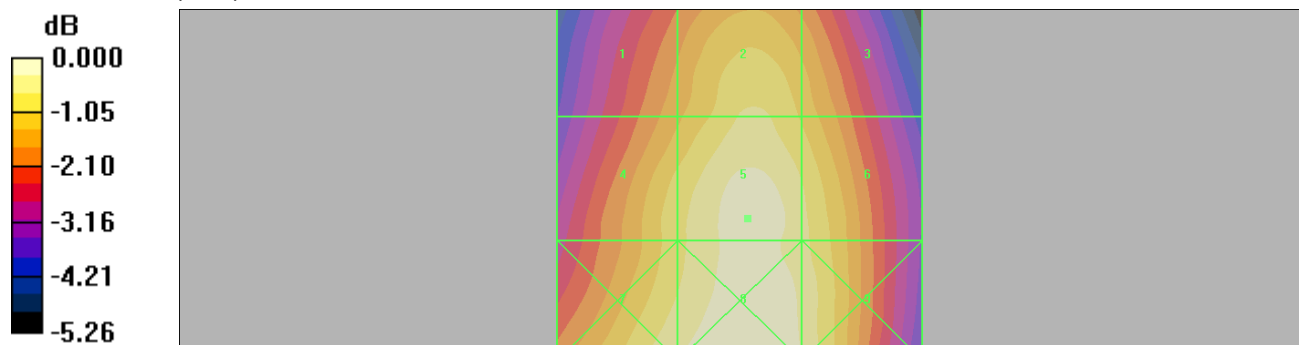
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 174.4 V/m

E Category: M3

Location: -3, 25, 368.7 mm



0 dB = 174.4V/m

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Date: 2012/11/12

## HAC\_E\_GSM850\_CH251

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 149.9 V/m

Probe Modulation Factor = 2.83

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 67.4 V/m; Power Drift = -0.025 dB

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

Peak E-field in V/m

Grid 1 <b>129.3 M4</b>	Grid 2 <b>140.7 M4</b>	Grid 3 <b>135.2 M4</b>
Grid 4 <b>139.5 M4</b>	Grid 5 <b>149.9 M3</b>	Grid 6 <b>144.5 M4</b>
Grid 7 <b>148.7 M4</b>	Grid 8 <b>155.3 M3</b>	Grid 9 <b>147.1 M4</b>

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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

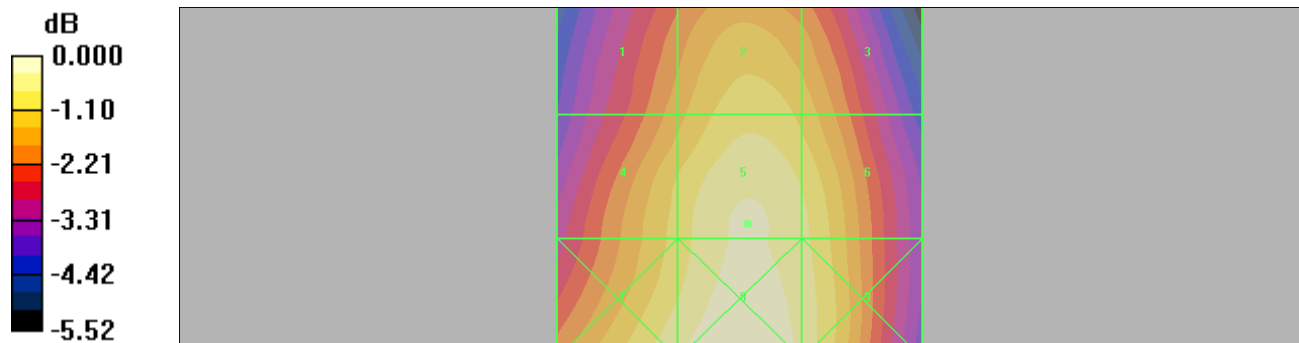
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 155.3 V/m

E Category: M3

Location: 0, 25, 368.7 mm



0 dB = 155.3V/m

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Date: 2012/11/12

## HAC\_E\_GSM1900\_CH512

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 63.6 V/m

Probe Modulation Factor = 2.94

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 22.2 V/m; Power Drift = 0.042 dB

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

Peak E-field in V/m

Grid 1 <b>57.1 M3</b>	Grid 2 <b>54.6 M3</b>	Grid 3 <b>53.2 M3</b>
Grid 4 <b>43.6 M4</b>	Grid 5 <b>63.6 M3</b>	Grid 6 <b>63.4 M3</b>
Grid 7 <b>54.1 M3</b>	Grid 8 <b>68.4 M3</b>	Grid 9 <b>67.4 M3</b>

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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

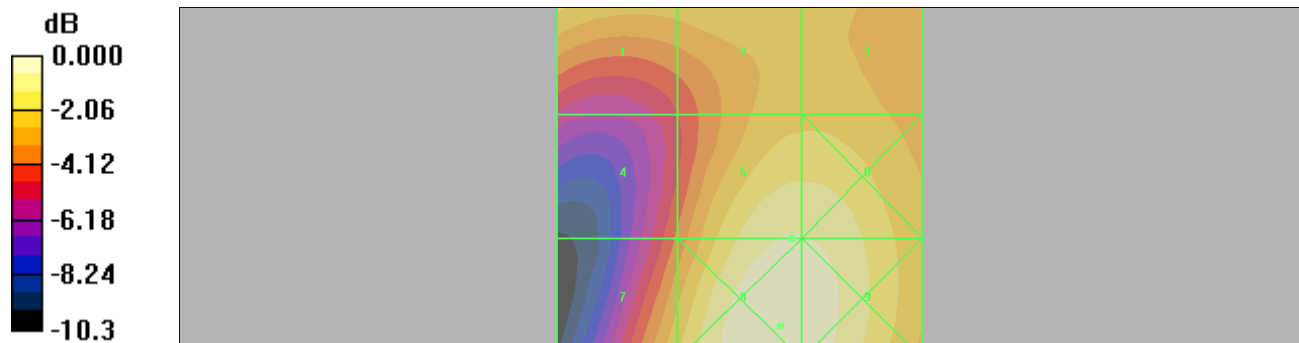
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 68.4 V/m

E Category: M3

Location: -5.5, 20.5, 368.7 mm



0 dB = 68.4V/m

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Date: 2012/11/12

## HAC\_E\_GSM1900\_CH661

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 64.2 V/m

Probe Modulation Factor = 2.94

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 23.1 V/m; Power Drift = -0.044 dB

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

Peak E-field in V/m

Grid 1 <b>58.8 M3</b>	Grid 2 <b>53.3 M3</b>	Grid 3 <b>53.4 M3</b>
Grid 4 <b>45.5 M4</b>	Grid 5 <b>64.2 M3</b>	Grid 6 <b>64.1 M3</b>
Grid 7 <b>53.3 M3</b>	Grid 8 <b>66.8 M3</b>	Grid 9 <b>66.0 M3</b>

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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

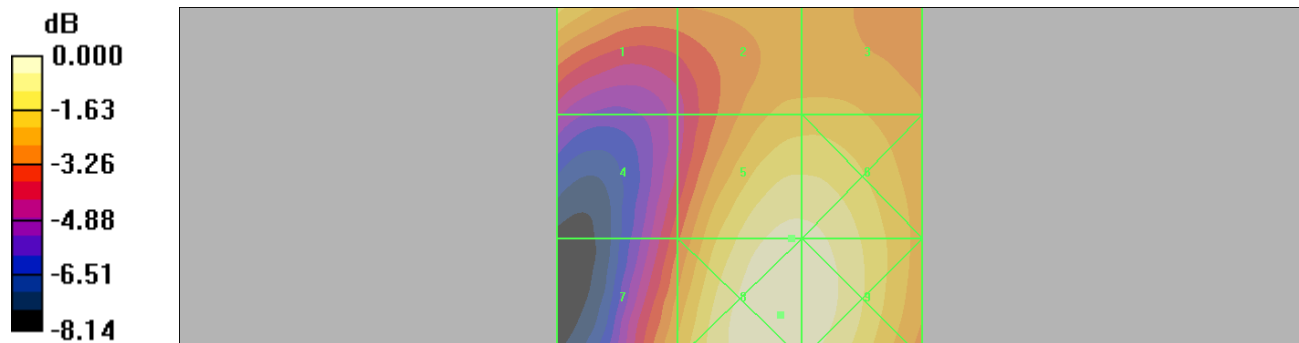
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 66.8 V/m

E Category: M3

Location: -5.5, 19, 368.7 mm



0 dB = 66.8V/m

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Date: 2012/11/12

## HAC\_E\_GSM1900\_CH810

Communication System: GSM1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Device Section

### DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 68.2 V/m

Probe Modulation Factor = 2.94

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 23.5 V/m; Power Drift = 0.011 dB

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

Peak E-field in V/m

Grid 1 <b>66.6 M3</b>	Grid 2 <b>54.4 M3</b>	Grid 3 <b>53.8 M3</b>
Grid 4 <b>47.2 M4</b>	Grid 5 <b>68.2 M3</b>	Grid 6 <b>68.1 M3</b>
Grid 7 <b>57.4 M3</b>	Grid 8 <b>73.1 M3</b>	Grid 9 <b>71.8 M3</b>

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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

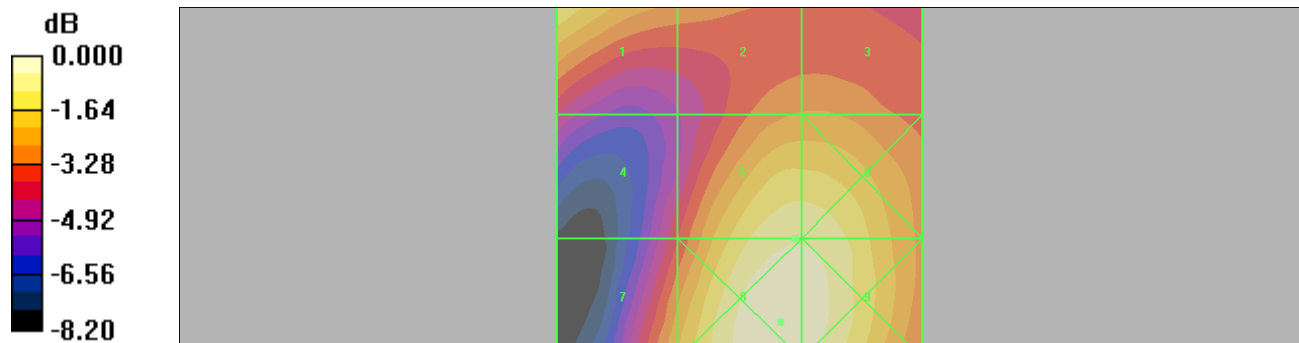
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 73.1 V/m

E Category: M3

Location: -5.5, 20, 368.7 mm



0 dB = 73.1V/m

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Date: 2012/12/3

## HAC\_E\_WCDMA BAND II\_CH9262

Communication System: WCDMA Band II; Frequency: 1852.4 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1260; Calibrated: 2012/8/23
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 36.1 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 37.6 V/m; Power Drift = -0.153 dB

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

Peak E-field in V/m

Grid 1 <b>30.6 M4</b>	Grid 2 <b>30.1 M4</b>	Grid 3 <b>30.1 M4</b>
Grid 4 <b>26.1 M4</b>	Grid 5 <b>36.1 M4</b>	Grid 6 <b>36.0 M4</b>
Grid 7 <b>31.2 M4</b>	Grid 8 <b>37.7 M4</b>	Grid 9 <b>37.0 M4</b>

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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

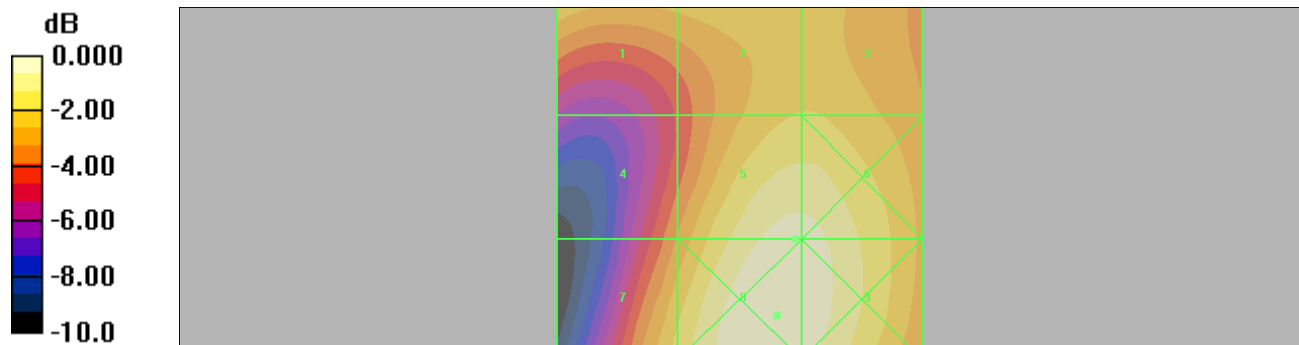
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 37.7 V/m

E Category: M4

Location: -5, 19, 368.7 mm



0 dB = 37.7V/m

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Date: 2012/12/3

## HAC\_E\_WCDMA BAND II\_CH9400

Communication System: WCDMA Band II; Frequency: 1880 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1260; Calibrated: 2012/8/23
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 33.6 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 35.4 V/m; Power Drift = -0.035 dB

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

Peak E-field in V/m

Grid 1 <b>28.5 M4</b>	Grid 2 <b>27.4 M4</b>	Grid 3 <b>27.4 M4</b>
Grid 4 <b>24.4 M4</b>	Grid 5 <b>33.6 M4</b>	Grid 6 <b>33.2 M4</b>
Grid 7 <b>28.7 M4</b>	Grid 8 <b>35.1 M4</b>	Grid 9 <b>34.4 M4</b>

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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

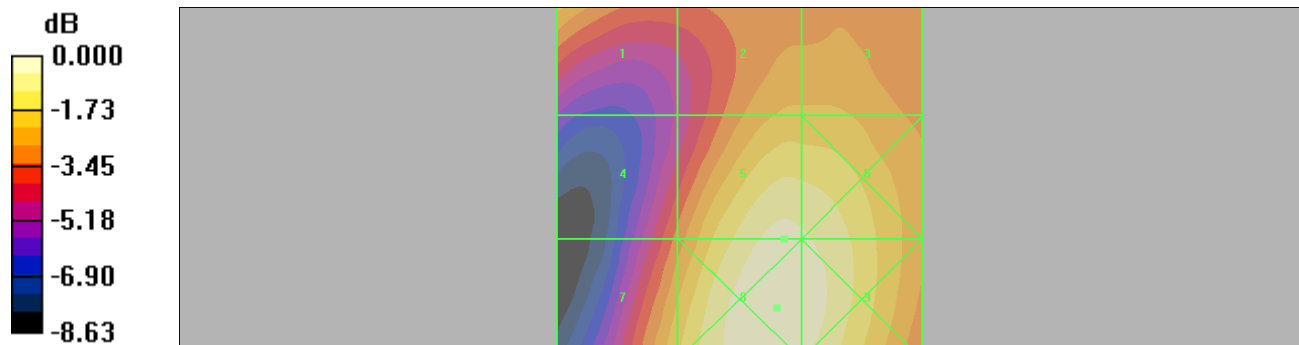
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 35.1 V/m

E Category: M4

Location: -5, 18, 368.7 mm



0 dB = 35.1V/m

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Date: 2012/12/3

## HAC\_E\_WCDMA BAND II\_CH9538

Communication System: WCDMA Band II; Frequency: 1907.6 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1260; Calibrated: 2012/8/23
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 35.1 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 36.4 V/m; Power Drift = -0.066 dB

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

Peak E-field in V/m

Grid 1 <b>32.7 M4</b>	Grid 2 <b>28.1 M4</b>	Grid 3 <b>28.1 M4</b>
Grid 4 <b>24.9 M4</b>	Grid 5 <b>35.1 M4</b>	Grid 6 <b>34.9 M4</b>
Grid 7 <b>29.7 M4</b>	Grid 8 <b>36.8 M4</b>	Grid 9 <b>36.2 M4</b>

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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

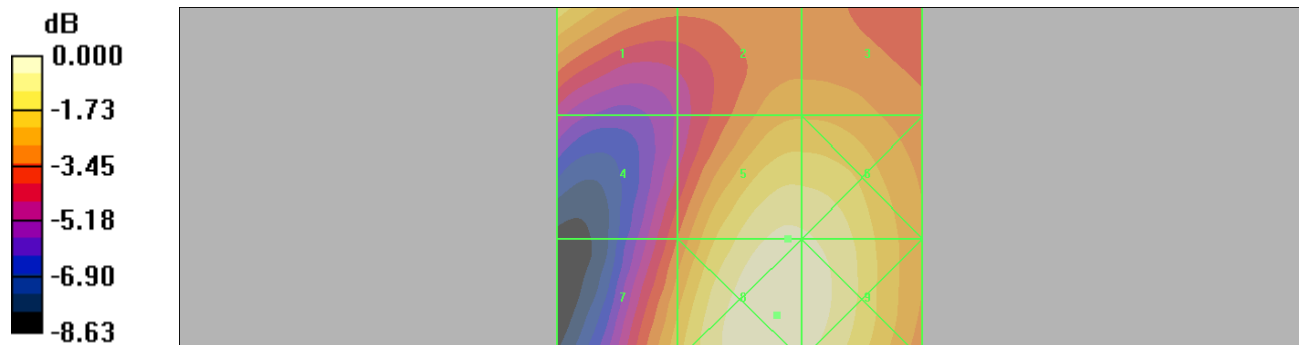
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 36.8 V/m

E Category: M4

Location: -5, 19, 368.7 mm



0 dB = 36.8V/m

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Date: 2012/11/12

## HAC\_E\_WCDMA Band IV\_CH1312

Communication System: WCDMA BAND4; Frequency: 1712.4 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 32.0 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 32.6 V/m; Power Drift = -0.144 dB

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

Peak E-field in V/m

Grid 1 <b>24.4 M4</b>	Grid 2 <b>21.4 M4</b>	Grid 3 <b>21.3 M4</b>
Grid 4 <b>27.6 M4</b>	Grid 5 <b>32.0 M4</b>	Grid 6 <b>30.8 M4</b>
Grid 7 <b>35.4 M4</b>	Grid 8 <b>36.5 M4</b>	Grid 9 <b>32.1 M4</b>

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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

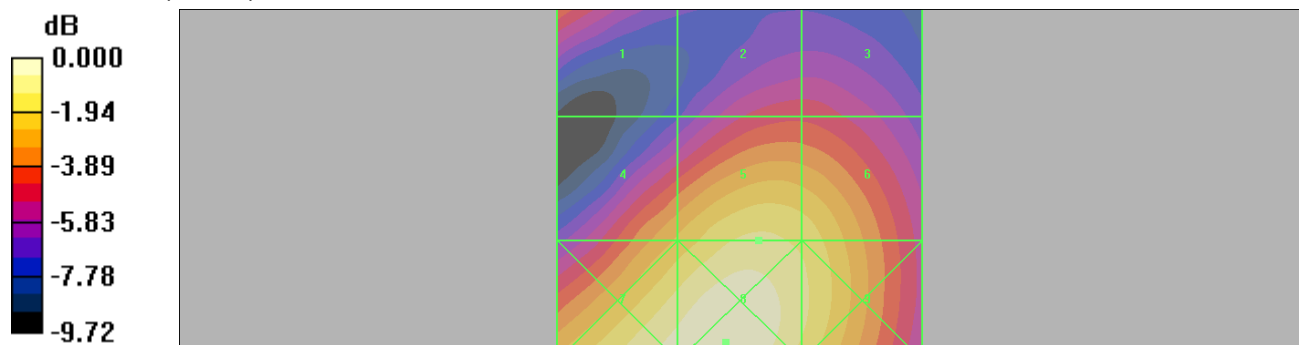
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 36.5 V/m

E Category: M4

Location: 2, 22.5, 368.7 mm



0 dB = 36.5V/m

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Date: 2012/11/12

## HAC\_E\_WCDMA Band IV\_CH1412

Communication System: WCDMA BAND4; Frequency: 1732.4 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 32.0 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 31.9 V/m; Power Drift = -0.042 dB

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

Peak E-field in V/m

Grid 1 <b>25.4 M4</b>	Grid 2 <b>21.9 M4</b>	Grid 3 <b>21.8 M4</b>
Grid 4 <b>26.2 M4</b>	Grid 5 <b>32.0 M4</b>	Grid 6 <b>31.0 M4</b>
Grid 7 <b>33.9 M4</b>	Grid 8 <b>36.0 M4</b>	Grid 9 <b>32.7 M4</b>

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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

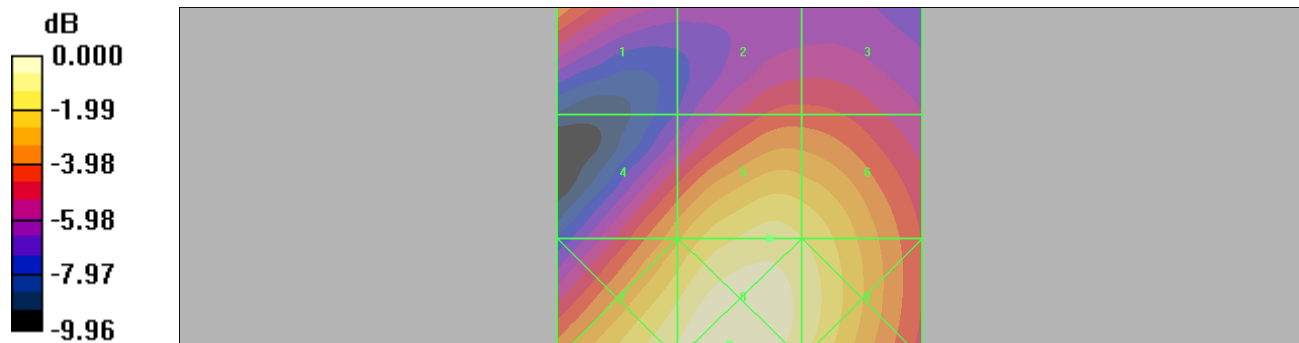
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 36.0 V/m

E Category: M4

Location: 1.5, 23, 368.7 mm



0 dB = 36.0V/m

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Date: 2012/11/12

## HAC\_E\_WCDMA Band IV\_CH1513

Communication System: WCDMA BAND4; Frequency: 1752.6 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 35.5 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 35.3 V/m; Power Drift = 0.041 dB

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

Peak E-field in V/m

Grid 1 <b>29.8 M4</b>	Grid 2 <b>24.3 M4</b>	Grid 3 <b>24.3 M4</b>
Grid 4 <b>28.7 M4</b>	Grid 5 <b>35.5 M4</b>	Grid 6 <b>35.2 M4</b>
Grid 7 <b>38.0 M4</b>	Grid 8 <b>40.3 M4</b>	Grid 9 <b>37.7 M4</b>

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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

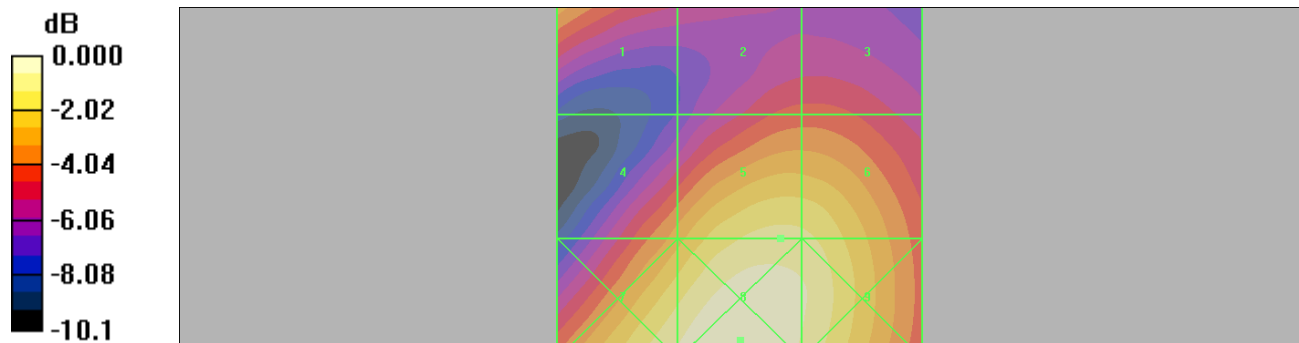
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 40.3 V/m

E Category: M4

Location: 0, 22.5, 368.7 mm



0 dB = 40.3V/m

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Date: 2012/11/12

## HAC\_E\_WCDMA Band V\_CH4132

Communication System: WCDMA Band V; Frequency: 826.4 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Device Section

### DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 53.3 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 74.2 V/m; Power Drift = 0.028 dB

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

Peak E-field in V/m

Grid 1 <b>48.9 M4</b>	Grid 2 <b>53.3 M4</b>	Grid 3 <b>49.9 M4</b>
Grid 4 <b>49.4 M4</b>	Grid 5 <b>53.0 M4</b>	Grid 6 <b>51.4 M4</b>
Grid 7 <b>53.9 M4</b>	Grid 8 <b>53.5 M4</b>	Grid 9 <b>49.9 M4</b>

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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

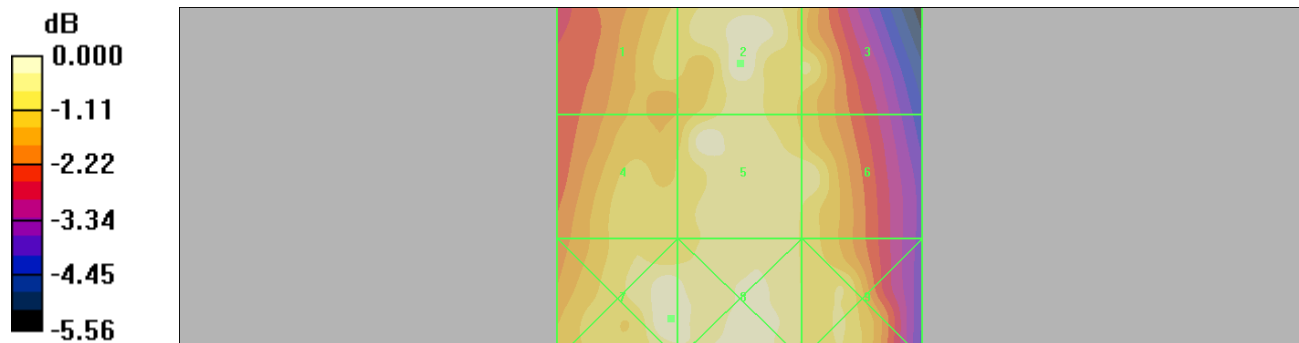
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 53.9 V/m

E Category: M4

Location: 9.5, 19.5, 368.7 mm



0 dB = 53.9V/m

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Date: 2012/11/12

## HAC\_E\_WCDMA Band V\_CH4183

Communication System: WCDMA Band V; Frequency: 836.6 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 59.1 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 75.2 V/m; Power Drift = -0.014 dB

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

Peak E-field in V/m

Grid 1 <b>50.8 M4</b>	Grid 2 <b>55.6 M4</b>	Grid 3 <b>53.7 M4</b>
Grid 4 <b>54.9 M4</b>	Grid 5 <b>59.1 M4</b>	Grid 6 <b>56.8 M4</b>
Grid 7 <b>58.1 M4</b>	Grid 8 <b>61.1 M4</b>	Grid 9 <b>57.8 M4</b>

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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

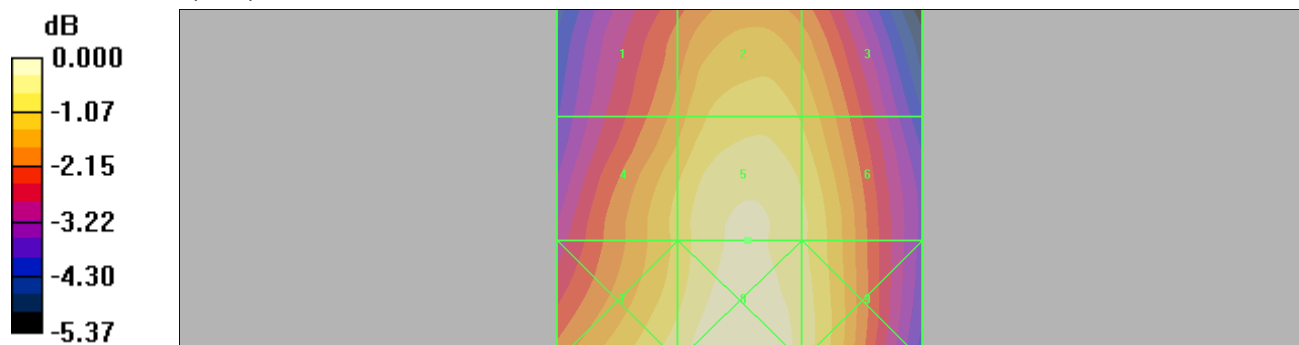
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 61.1 V/m

E Category: M4

Location: 0.5, 25, 368.7 mm



0 dB = 61.1V/m

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Date: 2012/11/12

## HAC\_E\_WCDMA Band V\_CH4233

Communication System: WCDMA Band V; Frequency: 846.6 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 48.2 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 60.9 V/m; Power Drift = 0.049 dB

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

Peak E-field in V/m

Grid 1 <b>41.2 M4</b>	Grid 2 <b>45.0 M4</b>	Grid 3 <b>43.2 M4</b>
Grid 4 <b>44.7 M4</b>	Grid 5 <b>48.2 M4</b>	Grid 6 <b>46.0 M4</b>
Grid 7 <b>47.4 M4</b>	Grid 8 <b>50.0 M4</b>	Grid 9 <b>47.3 M4</b>

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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

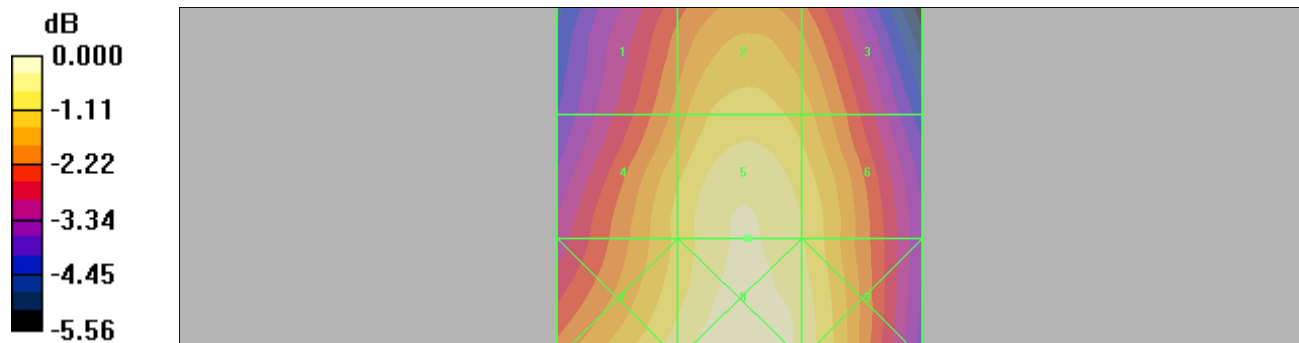
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 50.0 V/m

E Category: M4

Location: 0, 25, 368.7 mm



0 dB = 50.0V/m

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## 14. System Verification

Date: 2012/11/12

### HAC\_H\_Dipole\_835MHz

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Dipole Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 probe center 10mm above CD835 Dipole/Hearing Aid

**Compatibility Test (41x361x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.453 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 0.480 A/m; Power Drift = 0.022 dB

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

Peak H-field in A/m

Grid 1 <b>0.371 M4</b>	Grid 2 <b>0.376 M4</b>	Grid 3 <b>0.352 M4</b>
Grid 4 <b>0.439 M4</b>	Grid 5 <b>0.453 M4</b>	Grid 6 <b>0.424 M4</b>
Grid 7 <b>0.399 M4</b>	Grid 8 <b>0.414 M4</b>	Grid 9 <b>0.385 M4</b>

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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

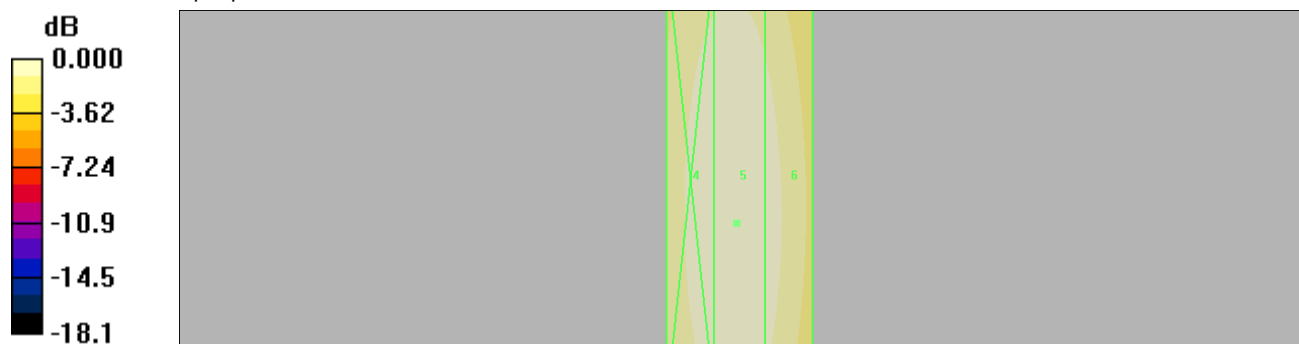
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.453 A/m

H Category: M4

Location: 0.5, 6, 364.7 mm



0 dB = 0.453A/m

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Date: 2012/11/12

## HAC\_H\_Dipole\_1880MHz

Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Dipole Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 probe center 10mm above CD1880 Dipole/Hearing Aid Compatibility Test (41x181x1):

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

Maximum value of peak Total field = 0.464 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 0.489 A/m; Power Drift = 0.006 dB

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

Peak H-field in A/m

Grid 1 <b>0.414 M2</b>	Grid 2 <b>0.426 M2</b>	Grid 3 <b>0.400 M2</b>
Grid 4 <b>0.451 M2</b>	Grid 5 <b>0.464 M2</b>	Grid 6 <b>0.434 M2</b>
Grid 7 <b>0.423 M2</b>	Grid 8 <b>0.435 M2</b>	Grid 9 <b>0.402 M2</b>

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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

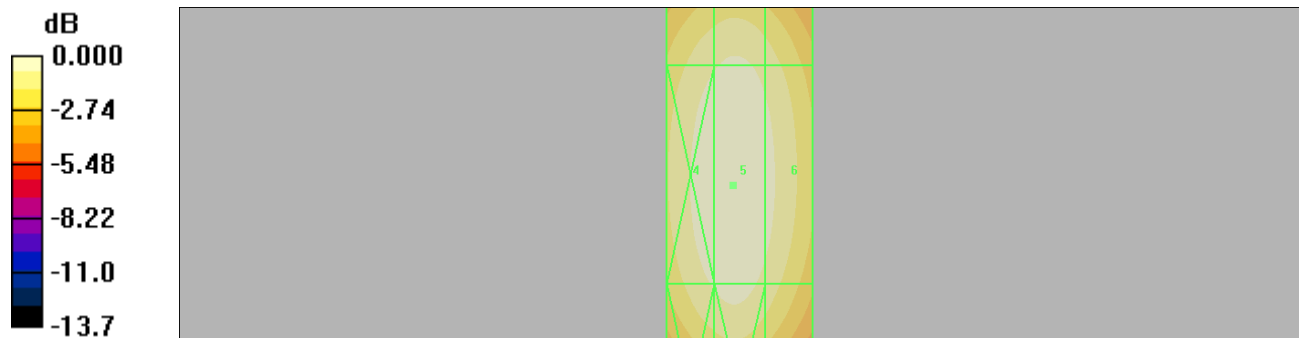
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.464 A/m

H Category: M2

Location: 1, 1.5, 364.7 mm



0 dB = 0.464A/m

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Date: 2012/12/3

## HAC\_H\_Dipole\_1880MHz

Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: H Dipole Section

### DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### H Scan - H3DV6 probe center 10mm above CD1880 Dipole/Hearing Aid Compatibility Test (41x181x1): Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.458 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 0.483 A/m; Power Drift = -0.001 dB

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

Peak H-field in A/m

Grid 1 <b>0.408 M2</b>	Grid 2 <b>0.421 M2</b>	Grid 3 <b>0.395 M2</b>
Grid 4 <b>0.446 M2</b>	Grid 5 <b>0.458 M2</b>	Grid 6 <b>0.429 M2</b>
Grid 7 <b>0.418 M2</b>	Grid 8 <b>0.431 M2</b>	Grid 9 <b>0.397 M2</b>

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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

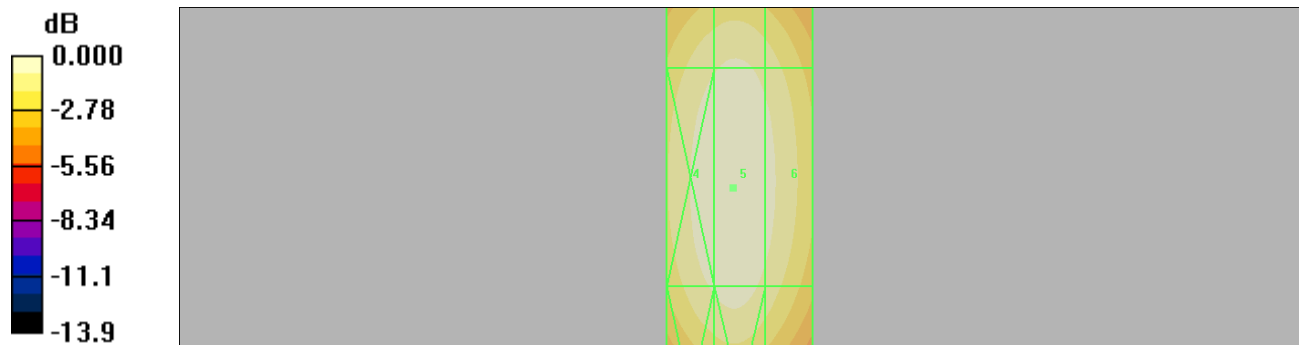
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 0.458 A/m

H Category: M2

Location: 1, 1.5, 364.7 mm



0 dB = 0.458A/m

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## HAC\_E\_Dipole\_835MHz

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Dipole Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER probe center 10mm above CD835 Dipole/Hearing Aid Compatibility Test (41x361x1):

Measurement grid: dx=5mm, dy=5mm  
 Maximum value of peak Total field = 167.7 V/m  
 Probe Modulation Factor = 1.00  
 Device Reference Point: 0.000, 0.000, 354.7 mm  
 Reference Value = 131.0 V/m; Power Drift = -0.004 dB  
**Hearing Aid Near-Field Category: M4 (AWF 0 dB)**

Peak E-field in V/m

Grid 1 <b>163.4 M4</b>	Grid 2 <b>167.7 M4</b>	Grid 3 <b>165.1 M4</b>
Grid 4 <b>95.8 M4</b>	Grid 5 <b>97.7 M4</b>	Grid 6 <b>94.2 M4</b>
Grid 7 <b>218.3 M3</b>	Grid 8 <b>225.9 M3</b>	Grid 9 <b>215.2 M3</b>

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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

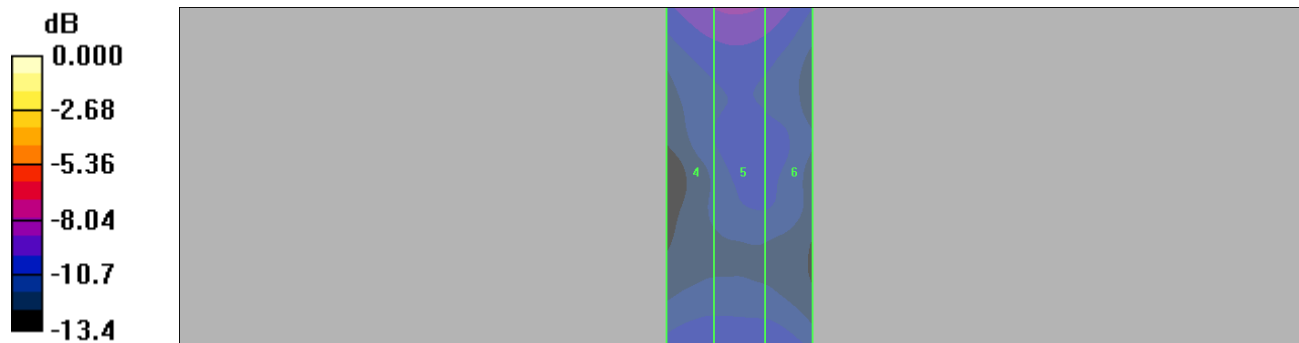
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 225.9 V/m

E Category: M3

Location: 0.5, 79, 364.7 mm



0 dB = 225.9V/m

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Date: 2012/11/12

## HAC\_E\_Dipole\_1880MHz

Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Dipole Section

### DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1260; Calibrated: 2012/8/23
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER probe center 10mm above CD1880 Dipole/Hearing Aid

**Compatibility Test (41x181x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 140.2 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 162.3 V/m; Power Drift = 0.029 dB

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

Peak E-field in V/m

Grid 1 <b>136.7 M2</b>	Grid 2 <b>140.2 M2</b>	Grid 3 <b>135.8 M2</b>
Grid 4 <b>91.2 M3</b>	Grid 5 <b>92.5 M3</b>	Grid 6 <b>89.1 M3</b>
Grid 7 <b>137.5 M2</b>	Grid 8 <b>144.6 M2</b>	Grid 9 <b>141.9 M2</b>

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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

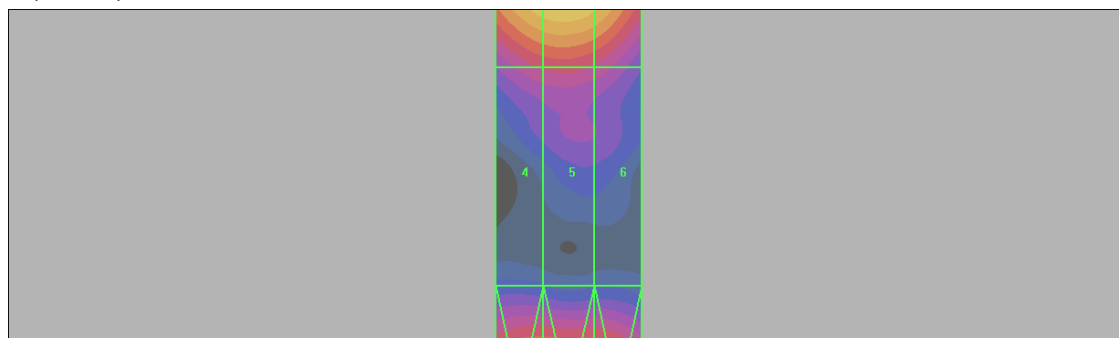
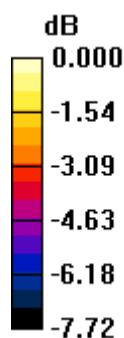
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 144.6 V/m

E Category: M2

Location: -0.5, 38.5, 364.7 mm



0 dB = 144.6V/m

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Date: 2012/12/3

## HAC\_E\_Dipole\_1880MHz

Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: E Dipole Section

### DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2012/4/25
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1260; Calibrated: 2012/8/23
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### E Scan - ER probe center 10mm above CD1880 Dipole/Hearing Aid

**Compatibility Test (41x181x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 140.6 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 163.2 V/m; Power Drift = -0.005 dB

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

Peak E-field in V/m

Grid 1 <b>137.2 M2</b>	Grid 2 <b>140.6 M2</b>	Grid 3 <b>136.2 M2</b>
Grid 4 <b>91.4 M3</b>	Grid 5 <b>92.8 M3</b>	Grid 6 <b>89.4 M3</b>
Grid 7 <b>137.7 M2</b>	Grid 8 <b>145.0 M2</b>	Grid 9 <b>142.4 M2</b>

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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

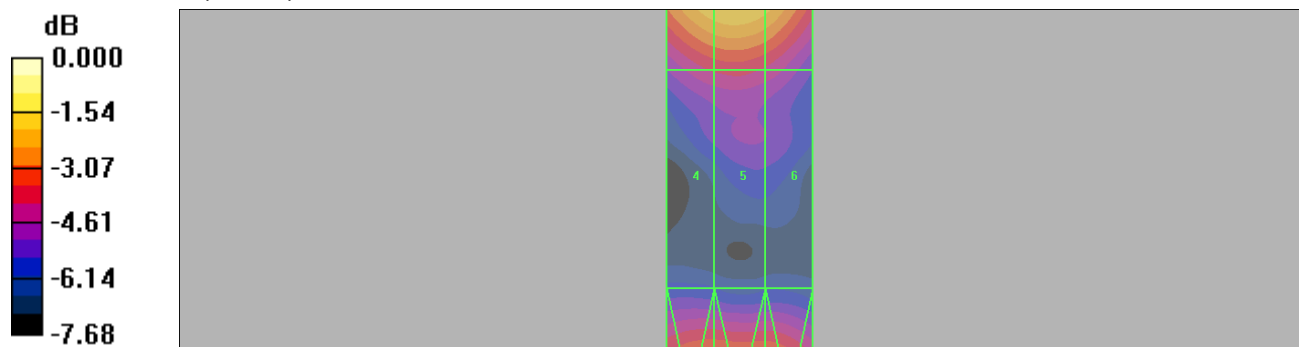
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5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

**Cursor:**

Total = 145.0 V/m

E Category: M2

Location: -0.5, 38.5, 364.7 mm



0 dB = 145.0V/m

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# 15. DAE & Probe Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client **SGS-TW (Auden)**

Certificate No: **DAE4-547\_Jun12**

## CALIBRATION CERTIFICATE

Object: **DAE4 - SD 000 D04 BJ - SN: 547**

Calibration procedure(s): **QA CAL-06.v24  
Calibration procedure for the data acquisition electronics (DAE)**

Calibration date: **June 01, 2012**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-11 (No:11450)	Sep-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V2.1	SE UWS 053 AA 1001	05-Jan-12 (in house check)	In house check: Jan-13

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

Issued: June 1, 2012

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

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**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

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

## Methods Applied and Interpretation of Parameters

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

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**DC Voltage Measurement**

A/D - Converter Resolution nominal

 High Range: 1LSB = 6.1 $\mu$ V, full range = -100...+300 mV

Low Range: 1LSB = 61nV, full range = -1.....+3mV

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

Calibration Factors	X	Y	Z
High Range	403.991 $\pm$ 0.1% (k=2)	404.021 $\pm$ 0.1% (k=2)	404.165 $\pm$ 0.1% (k=2)
Low Range	3.95833 $\pm$ 0.7% (k=2)	3.96044 $\pm$ 0.7% (k=2)	3.97334 $\pm$ 0.7% (k=2)

**Connector Angle**

Connector Angle to be used in DASY system:	188.5 $^{\circ}$ $\pm$ 1 $^{\circ}$
--	-------------------------------------

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**Appendix**
**1. DC Voltage Linearity**

High Range	Reading ( $\mu\text{V}$ )	Difference ( $\mu\text{V}$ )	Error (%)
Channel X + Input	199998.35	2.97	0.00
Channel X + Input	20003.01	3.40	0.02
Channel X - Input	-19999.79	1.72	-0.01
Channel Y + Input	199995.78	0.56	0.00
Channel Y + Input	19997.80	-1.85	-0.01
Channel Y - Input	-20002.86	-1.29	0.01
Channel Z + Input	199994.37	-1.29	-0.00
Channel Z + Input	19999.89	0.33	0.00
Channel Z - Input	-20004.55	-3.05	0.02

Low Range	Reading ( $\mu\text{V}$ )	Difference ( $\mu\text{V}$ )	Error (%)
Channel X + Input	2000.42	0.22	0.01
Channel X + Input	200.58	0.05	0.03
Channel X - Input	-200.36	-0.95	0.47
Channel Y + Input	2000.13	0.09	0.00
Channel Y + Input	200.21	-0.28	-0.14
Channel Y - Input	-200.21	-0.72	0.36
Channel Z + Input	2000.48	0.50	0.02
Channel Z + Input	200.00	-0.35	-0.18
Channel Z - Input	-200.24	-0.72	0.36

**2. Common mode sensitivity**

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

	Common mode Input Voltage (mV)	High Range Average Reading ( $\mu\text{V}$ )	Low Range Average Reading ( $\mu\text{V}$ )
Channel X	200	2.44	0.42
	-200	-1.09	-2.58
Channel Y	200	-12.58	-13.15
	-200	12.53	12.88
Channel Z	200	20.17	19.90
	-200	-20.96	-21.63

**3. Channel separation**

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

	Input Voltage (mV)	Channel X ( $\mu\text{V}$ )	Channel Y ( $\mu\text{V}$ )	Channel Z ( $\mu\text{V}$ )
Channel X	200	-	2.91	-1.28
Channel Y	200	9.12	-	4.48
Channel Z	200	5.56	7.61	-

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**4. AD-Converter Values with inputs shorted**

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

	High Range (LSB)	Low Range (LSB)
Channel X	16136	15101
Channel Y	16450	16073
Channel Z	15981	16890

**5. Input Offset Measurement**

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

 Input 10M $\Omega$ 

	Average ( $\mu$ V)	min. Offset ( $\mu$ V)	max. Offset ( $\mu$ V)	Std. Deviation ( $\mu$ V)
Channel X	1.92	0.96	3.04	0.39
Channel Y	-0.95	-1.86	0.27	0.40
Channel Z	-2.66	-3.84	-1.65	0.45

**6. Input Offset Current**

Nominal Input circuitry offset current on all channels: &lt;25fA

**7. Input Resistance** (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

**8. Low Battery Alarm Voltage** (Typical values for information)

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

**9. Power Consumption** (Typical values for information)

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

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



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Accredited by the Swiss Accreditation Service (SAS)  
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **SGS-TW (Auden)**

Certificate No: **H3-6142\_Apr12**

## CALIBRATION CERTIFICATE

Object: **H3DV6 - SN:6142**

Calibration procedure(s): **QA CAL-03.v6, QA CAL-25.v4  
Calibration procedure for H-field probes optimized for close near field  
evaluations in air**

Calibration date: **April 25, 2012**

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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe H3DV6	SN: 6182	11-Oct-11 (No. H3-6182_Oct11)	Oct-12
DAE4	SN: 789	30-Jan-12 (No. DAE4-789_Jan12)	Jan-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

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

Issued: April 26, 2012

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**Calibration Laboratory of  
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Accreditation No.: **SCS 108**

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**Glossary:**

NORM <sub>x,y,z</sub>	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 $\psi$	$\psi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ 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.
- b) CTIA Test Plan for Hearing Aid Compatibility, April 2010.

**Methods Applied and Interpretation of Parameters:**

- **NORM<sub>x,y,z</sub>**: 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)  $a_0 a_1 a_2 = X, Y, Z a_0 a_1 a_2$  \* frequency\_response** (see Frequency Response Chart).
- **DCP<sub>x,y,z</sub>**: 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.
- **PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- **A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; VR<sub>x,y,z</sub>; 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  $a_0 a_1 a_2$  (no uncertainty required).

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H3DV6 – SN:6142

April 25, 2012

# Probe H3DV6

## SN:6142

Manufactured: July 3, 2002  
Calibrated: April 25, 2012

Calibrated for DASY/EASY Systems  
(Note: non-compatible with DASY2 system!)

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H3DV6- SN:6142

April 25, 2012

## DASY/EASY - Parameters of Probe: H3DV6 - SN:6142

### Basic Calibration Parameters

		Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (A/m / $\sqrt{\text{mV}}$ )	a0	2.69E-003	2.67E-003	3.11E-003	$\pm 5.1 \%$
Norm (A/m / $\sqrt{\text{mV}}$ )	a1	-1.21E-005	-5.34E-005	-3.24E-004	$\pm 5.1 \%$
Norm (A/m / $\sqrt{\text{mV}}$ )	a2	-2.91E-005	-5.06E-006	4.43E-005	$\pm 5.1 \%$
DCP (mV) <sup>B</sup>		91.4	91.5	92.5	

### Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc <sup>E</sup> (k=2)
0	CW	0.00	X	0.00	0.00	1.00	130.4	$\pm 3.0 \%$
			Y	0.00	0.00	1.00	133.8	
			Z	0.00	0.00	1.00	138.0	

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%.

<sup>B</sup> Numerical linearization parameter; uncertainty not required.

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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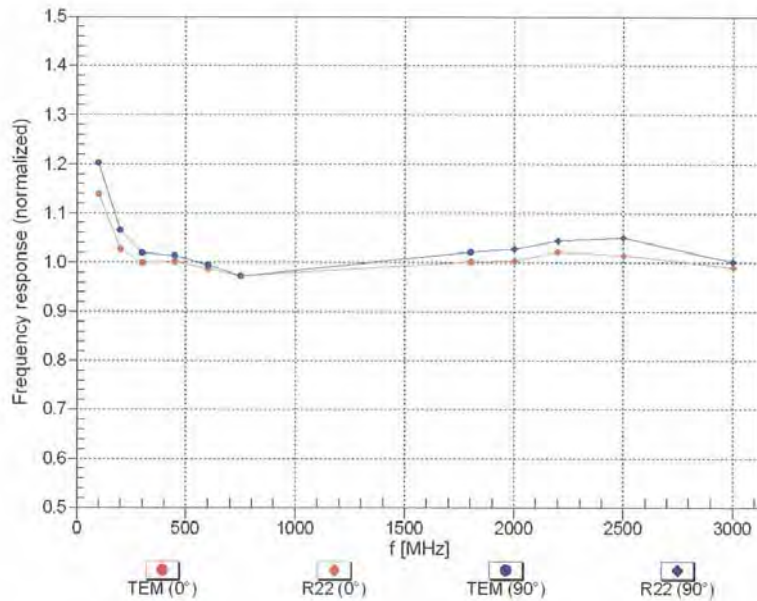
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H3DV6-SN:6142

April 25, 2012

## Frequency Response of H-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



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

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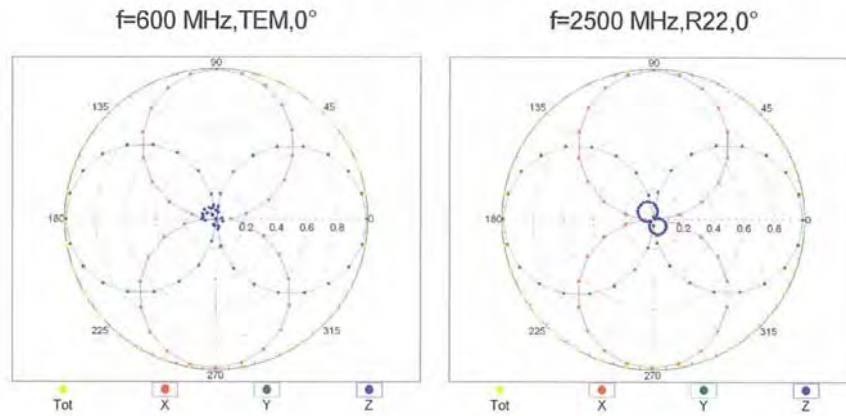
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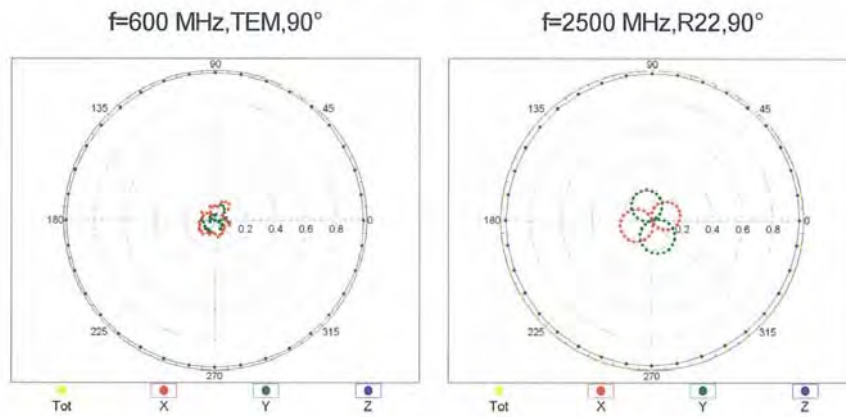
H3DV6- SN:6142

April 25, 2012

## Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$



## Receiving Pattern ( $\phi$ ), $\theta = 90^\circ$



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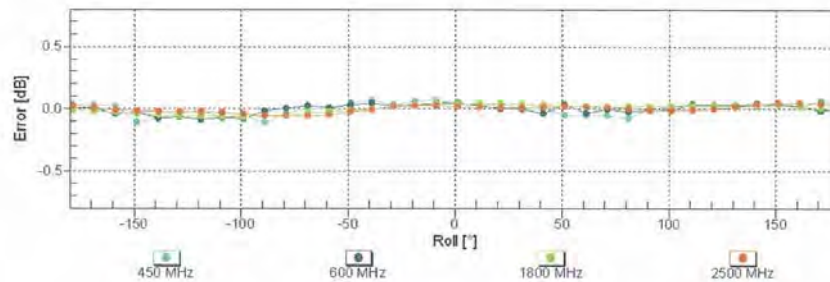
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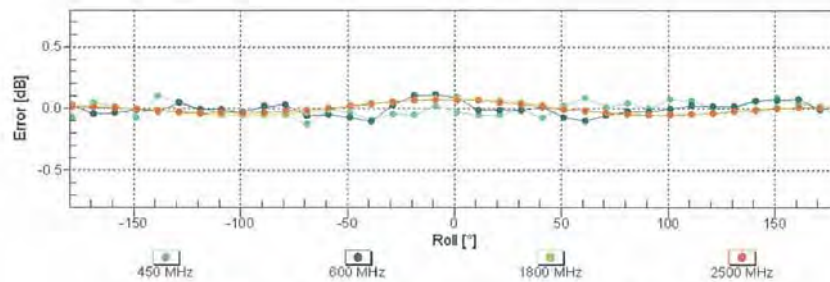
April 25, 2012

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



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

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



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

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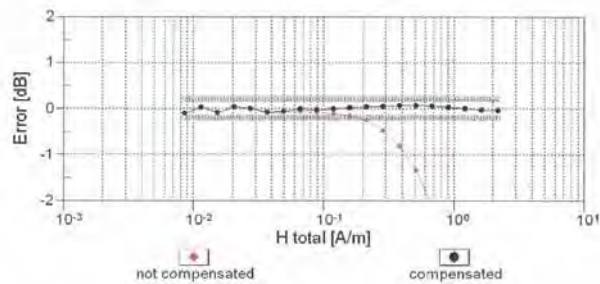
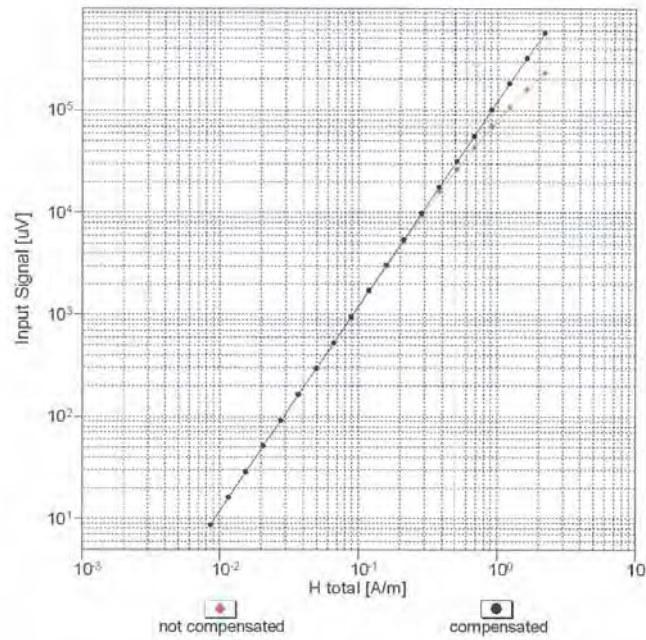
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H3DV6- SN:6142

April 25, 2012

## Dynamic Range f(H-field) (TEM cell, f = 900 MHz)



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

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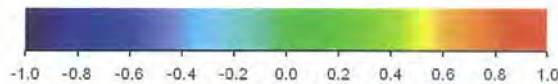
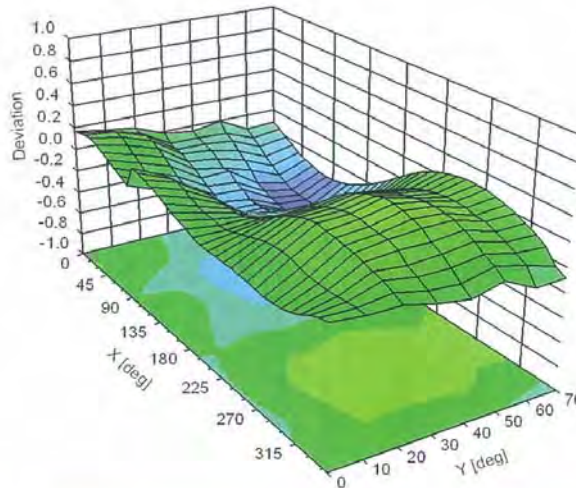


H3DV6-SN:6142

April 25, 2012

## Deviation from Isotropy in Air

Error ( $\phi, \theta$ ),  $f = 900$  MHz



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

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H3DV6- SN:6142

April 25, 2012

## DASY/EASY - Parameters of Probe: H3DV6 - SN:6142

### Other Probe Parameters

Sensor Arrangement	Rectangular
Connector Angle (°)	-68.9
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 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

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



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

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

Accreditation No.: **SCS 108**

Client **SGS-TW (Auden)**

Certificate No: **ER3-2306\_Apr12**

## CALIBRATION CERTIFICATE

Object: **ER3DV6 - SN:2306**

Calibration procedure(s): **QA CAL-02.v6, QA CAL-25.v4**  
 Calibration procedure for E-field probes optimized for close near field evaluations in air

Calibration date: **April 25, 2012**

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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ER3DV6	SN: 2328	11-Oct-11 (No. ER3-2328_Oct11)	Oct-12
DAE4	SN: 789	30-Jan-12 (No. DAE4-789_Jan12)	Jan-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 27, 2012

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

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**Calibration Laboratory of  
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**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
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Accreditation No.: **SCS 108**

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**Glossary:**

NORM <sub>x,y,z</sub>	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 $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ 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
- b) CTIA Test Plan for Hearing Aid Compatibility, April 2010.

**Methods Applied and Interpretation of Parameters:**

- **NORM<sub>x,y,z</sub>**: 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)<sub>x,y,z</sub>** = NORM<sub>x,y,z</sub> \* frequency\_response (see Frequency Response Chart).
- **DCP<sub>x,y,z</sub>**: 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.
- **PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- **A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: 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<sub>x</sub> (no uncertainty required).

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ER3DV6 – SN:2306

April 25, 2012

# Probe ER3DV6

## SN:2306

Manufactured: December 17, 2002

Calibrated: April 25, 2012

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

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ER3DV6-SN:2306

April 25, 2012

## DASY/EASY - Parameters of Probe: ER3DV6 - SN:2306

### Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ )	1.08	1.12	1.23	$\pm 10.1\%$
DCP (mV) <sup>B</sup>	104.9	102.5	103.9	

### Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc <sup>E</sup> (k=2)
0	CW	0.00	X	0.00	0.00	1.00	157.5	$\pm 3.3\%$
			Y	0.00	0.00	1.00	127.1	
			Z	0.00	0.00	1.00	117.2	

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%.

<sup>B</sup> Numerical linearization parameter; uncertainty not required.

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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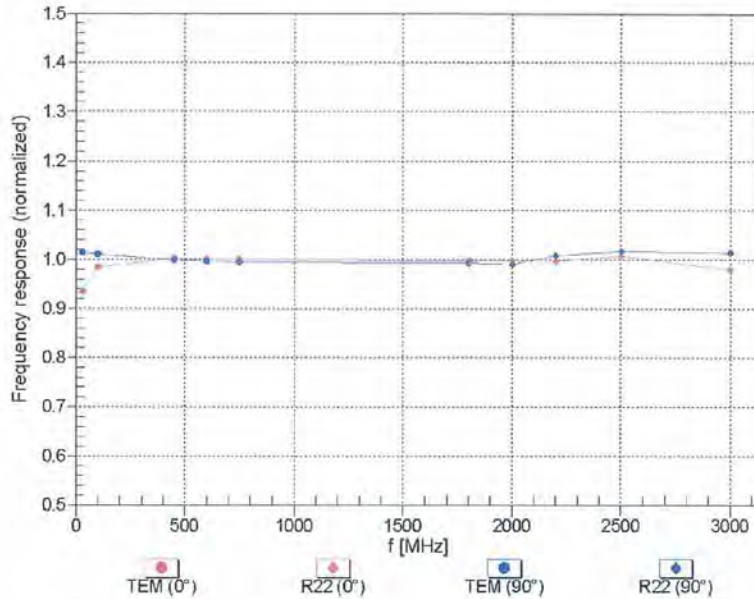
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ER3DV6- SN:2306

April 25, 2012

### Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



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

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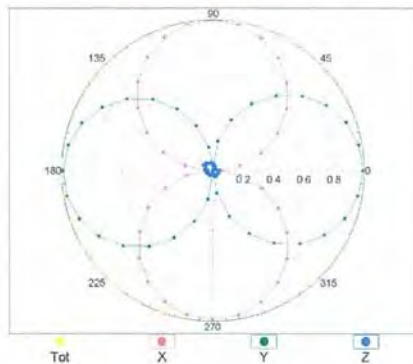
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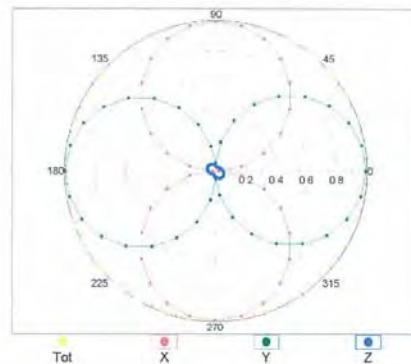
April 25, 2012

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

f=600 MHz,TEM,0°

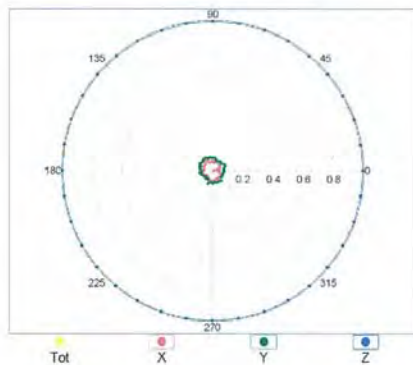


f=2500 MHz,R22,0°

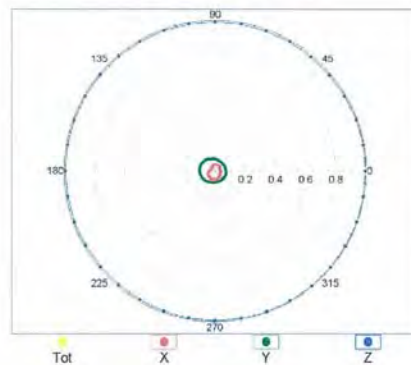


## Receiving Pattern ( $\phi$ ), $\vartheta = 90^\circ$

f=600 MHz,TEM,90°



f=2500 MHz,R22,90°



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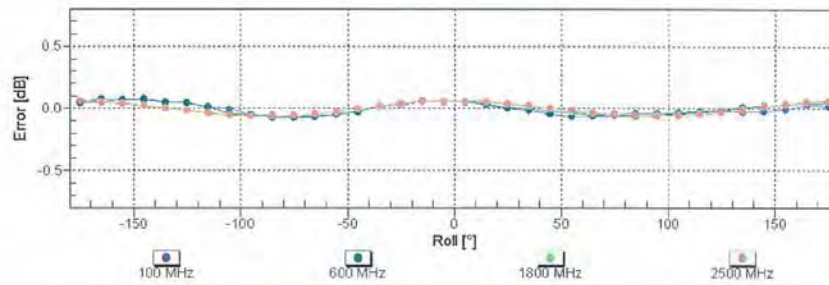
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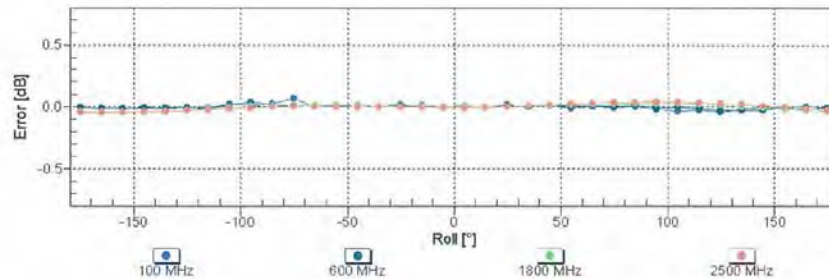
April 25, 2012

### Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$



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

### Receiving Pattern ( $\phi$ ), $\theta = 90^\circ$



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

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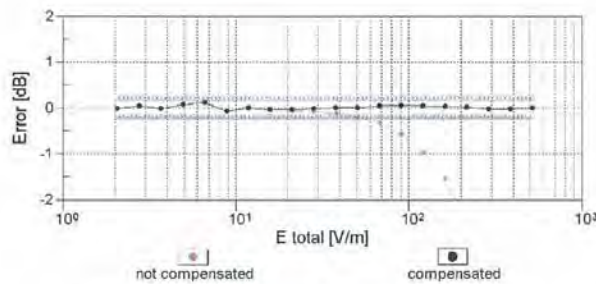
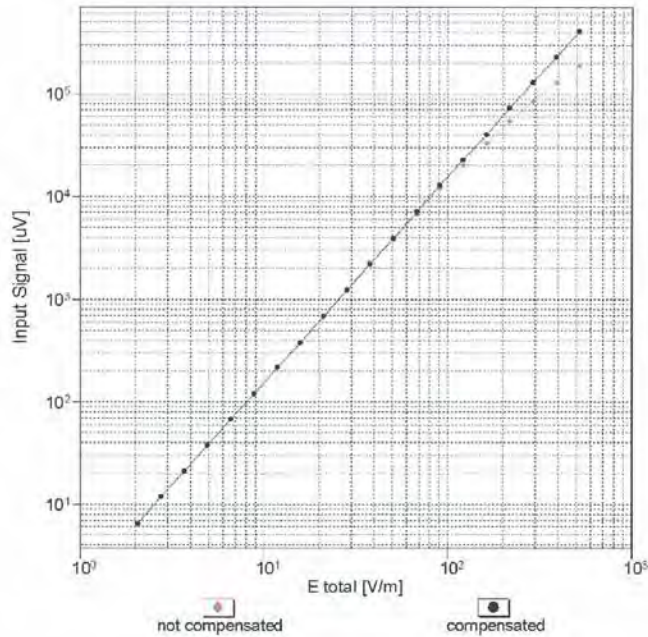
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ER3DV6-SN:2306

April 25, 2012

## Dynamic Range f(E-field) (TEM cell , f = 900 MHz)



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

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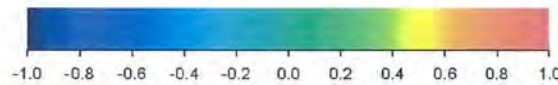
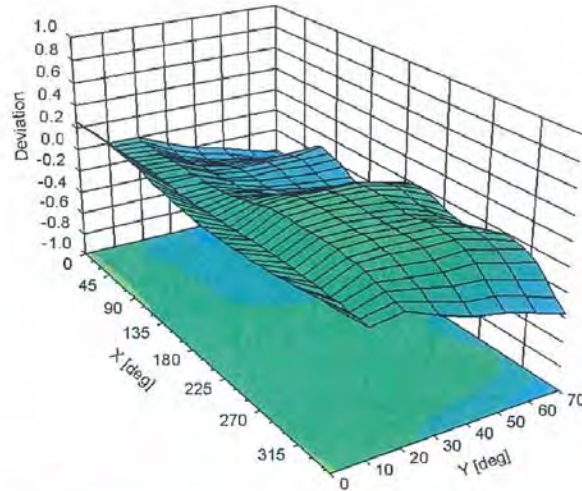
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ER3DV6-SN:2306

April 25, 2012

## Deviation from Isotropy in Air Error ( $\phi$ , $\theta$ ), $f = 900$ MHz



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

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ER3DV6- SN:2306

April 25, 2012

## DASY/EASY - Parameters of Probe: ER3DV6 - SN:2306

### Other Probe Parameters

Sensor Arrangement	Rectangular
Connector Angle (°)	134.7
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 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

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## 16. Uncertainty Analysis

HAC-Extension Setup Performance Test Using SPEAG Calibration Dipoles							
Error Description	Uncertainty value	Prob. Dist.	Div.	$(c_1)$ E	$(c_2)$ H	Std. Unc. E	Std. Unc. H
<b>Measurement System</b>							
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%
Boundary Effects	±2.4%	R	$\sqrt{3}$	1	1	±1.4%	±1.4%
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%
Scaling to Peak Envelope Power	±0%	R	$\sqrt{3}$	1	1	±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%	R	$\sqrt{3}$	1	1	±0%	±0%
Integration Time	±0%	R	$\sqrt{3}$	1	1	±0%	±0%
RF Ambient Conditions	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%
RF Reflections	±6.0%	R	$\sqrt{3}$	1	1	±3.5%	±3.5%
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%
Extrap. and Interpolation	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%
<b>Dipole Related</b>							
Distance Dipole - Scanning Plane	±5.2%	R	$\sqrt{3}$	1	0.3	±3.0%	±0.9%
Input power	±4.7%	N	1	1	1	±4.7%	±4.7%
Combined Std. Uncertainty						±13.7%	±9.3%
<b>Expanded Std. Uncertainty on Power</b>						<b>±27.4%</b>	<b>±18.6%</b>
<b>Expanded Std. Uncertainty on Field</b>						<b>±13.7%</b>	<b>±9.3%</b>

Table 28.1: Uncertainty budget for HAC setup performance test. The budget is valid for the frequency range 800 MHz - 3 GHz and represents a worst-case analysis with respect to power uncertainty of the field. Some of the parameters are dependent on the user situations and need adjustment according to the actual laboratory conditions.

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# 17. System Validation from Original Equipment Supplier

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



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

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

Accreditation No.: **SCS 108**

Client **SGS-TW (Auden)**

Certificate No: **CD835V3-1052\_Apr12**

CALIBRATION CERTIFICATE																																																			
Object	CD835V3 - SN: 1052																																																		
Calibration procedure(s)	QA CAL-20.v6 Calibration procedure for dipoles in air																																																		
Calibration date:	April 19, 2012																																																		
<p>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.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity &lt; 70%.</p> <p>Calibration Equipment used (M&amp;TE critical for calibration)</p> <table border="1"> <thead> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date (Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Power meter EPM-442A</td> <td>GB37480704</td> <td>05-Oct-11 (No. 217-01451)</td> <td>Oct-12</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>US37292783</td> <td>05-Oct-11 (No. 217-01451)</td> <td>Oct-12</td> </tr> <tr> <td>Probe ER3DV6</td> <td>SN: 2336</td> <td>29-Dec-11 (No. ER3-2336_Dec11)</td> <td>Dec-12</td> </tr> <tr> <td>Probe H3DV6</td> <td>SN: 6065</td> <td>29-Dec-11 (No. H3-6065_Dec11)</td> <td>Dec-12</td> </tr> <tr> <td>D4E4</td> <td>SN: 781</td> <td>20-Apr-11 (No. D4E4-781_Apr11)</td> <td>Apr-12</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Secondary Standards</th> <th>ID #</th> <th>Check Date (in house)</th> <th>Scheduled Check</th> </tr> </thead> <tbody> <tr> <td>Power meter Agilent 4419B</td> <td>SN: GB42420191</td> <td>09-Oct-09 (in house check Oct-11)</td> <td>In house check: Oct-12</td> </tr> <tr> <td>Power sensor HP 8482H</td> <td>SN: 3318A09450</td> <td>09-Oct-09 (in house check Oct-11)</td> <td>In house check: Oct-12</td> </tr> <tr> <td>Power sensor HP 8482A</td> <td>SN: US37295597</td> <td>09-Oct-09 (in house check Oct-11)</td> <td>In house check: Oct-12</td> </tr> <tr> <td>Network Analyzer HP 8753E</td> <td>US37390585</td> <td>18-Oct-01 (in house check Oct-11)</td> <td>In house check: Oct-12</td> </tr> <tr> <td>RF generator E4433B</td> <td>MY 41000675</td> <td>03-Nov-04 (in house check Oct-11)</td> <td>In house check: Oct-13</td> </tr> </tbody> </table>				Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration	Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12	Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12	Probe ER3DV6	SN: 2336	29-Dec-11 (No. ER3-2336_Dec11)	Dec-12	Probe H3DV6	SN: 6065	29-Dec-11 (No. H3-6065_Dec11)	Dec-12	D4E4	SN: 781	20-Apr-11 (No. D4E4-781_Apr11)	Apr-12	Secondary Standards	ID #	Check Date (in house)	Scheduled Check	Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Oct-11)	In house check: Oct-12	Power sensor HP 8482H	SN: 3318A09450	09-Oct-09 (in house check Oct-11)	In house check: Oct-12	Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-11)	In house check: Oct-12	Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12	RF generator E4433B	MY 41000675	03-Nov-04 (in house check Oct-11)	In house check: Oct-13
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Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature 																																																
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature 																																																
			Issued: April 19, 2012																																																
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Certificate No: CD835V3-1052\_Apr12

Page 1 of 6

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**References**

- [1] ANSI-C63.19-2007  
American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.

**Methods Applied and Interpretation of Parameters:**

- **Coordinate System:** y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes. In coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a distance of 10 mm above the top edge of the dipole arms.
- **Measurement Conditions:** Further details are available from the hardcopies at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- **Antenna Positioning:** The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections. It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- **Feed Point Impedance and Return Loss:** These parameters are measured using a HP 8753E Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- **E-field distribution:** E field is measured in the x-y-plane with an isotropic ER3D-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 10 mm (in z) above the top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, 10mm above the dipole surface.
- **H-field distribution:** H-field is measured with an isotropic H-field probe with 100mW forward power to the antenna feed point, in the x-y-plane. The scan area and sensor distance is equivalent to the E-field scan. The maximum of the field is available at the center (subgrid 5) above the feed point. The H-field value stated as calibration value represents the maximum of the interpolated H-field, 10mm above the dipole surface at the feed point.

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%.

### Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	10mm	
Scan resolution	dx, dy = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	
Input power drift	< 0.05 dB	

### Maximum Field values at 835 MHz

H-field 10 mm above dipole surface	condition	interpolated maximum
Maximum measured	100 mW input power	0.456 A / m $\pm$ 8.2 % (k=2)

E-field 10 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	170.5 V / m
Maximum measured above low end	100 mW input power	166.8 V / m
Averaged maximum above arm	100 mW input power	168.7 V / m $\pm$ 12.8 % (k=2)

## Appendix

### Antenna Parameters

Frequency	Return Loss	Impedance
800 MHz	15.9 dB	43.9 $\Omega$ - 13.9 j $\Omega$
835 MHz	32.7 dB	49.2 $\Omega$ + 2.2 j $\Omega$
900 MHz	16.4 dB	57.9 $\Omega$ - 14.4 j $\Omega$
950 MHz	18.5 dB	45.2 $\Omega$ + 10.4 j $\Omega$
960 MHz	14.0 dB	52.9 $\Omega$ + 20.7 j $\Omega$

### 3.2 Antenna Design and Handling

The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.

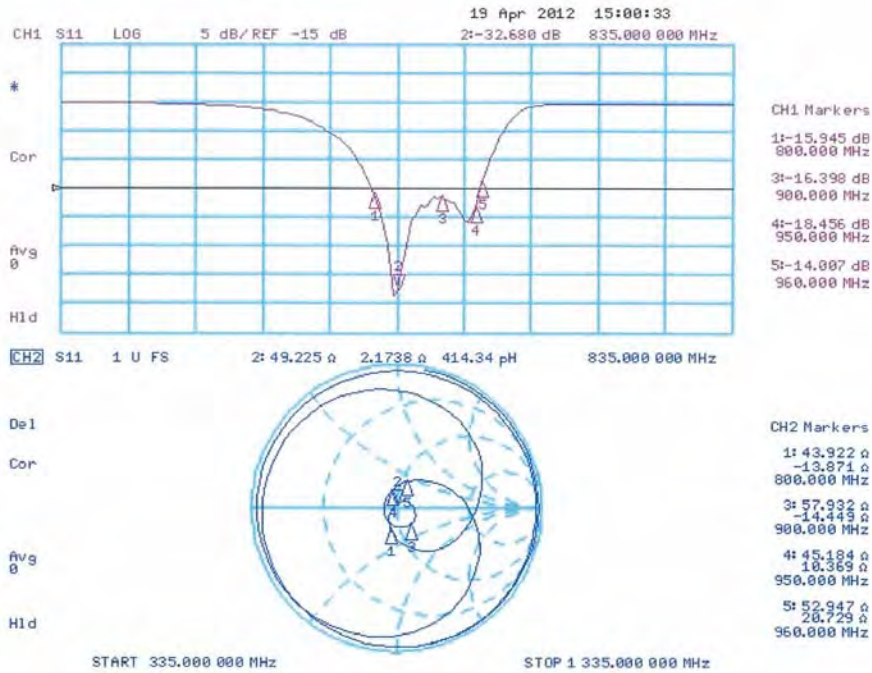
The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.

Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.



### Impedance Measurement Plot



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**DASY5 H-field Result**

Date: 19.04.2012

Test Laboratory: SPEAG Lab2

**DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN: 1052**

Communication System: CW; Frequency: 835 MHz  
 Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: RF Section  
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

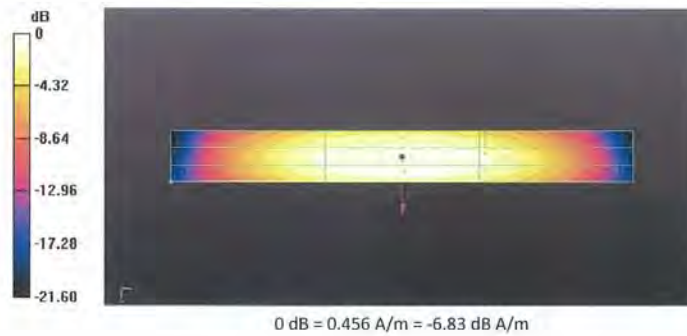
- Probe: H3DV6 - SN6065; ; Calibrated: 29.12.2011
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 20.04.2011
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

**Dipole H-Field measurement @ 835MHz/H-Scan - 835MHz d=10mm/Hearing Aid Compatibility Test (41x361x1):**

Measurement grid: dx=5mm, dy=5mm  
 Device Reference Point: 0, 0, -6.3 mm  
 Reference Value = 0.4800 A/m; Power Drift = 0.02 dB  
 PMR not calibrated. PMF = 1.000 is applied.  
 H-field emissions = 0.4557 A/m  
**Near-field category: M4 (AWF 0 dB)**

PMF scaled H-field

Grid 1 M4	Grid 2 M4	Grid 3 M4
0.398 A/m	0.407 A/m	0.372 A/m
Grid 4 M4	Grid 5 M4	Grid 6 M4
0.447 A/m	0.456 A/m	0.415 A/m
Grid 7 M4	Grid 8 M4	Grid 9 M4
0.401 A/m	0.408 A/m	0.362 A/m



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**DASY5 E-field Result**

Date: 19.04.2012

Test Laboratory: SPEAG Lab2

**DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN: 1052**

Communication System: CW; Frequency: 835 MHz  
 Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: RF Section  
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

**DASY52 Configuration:**

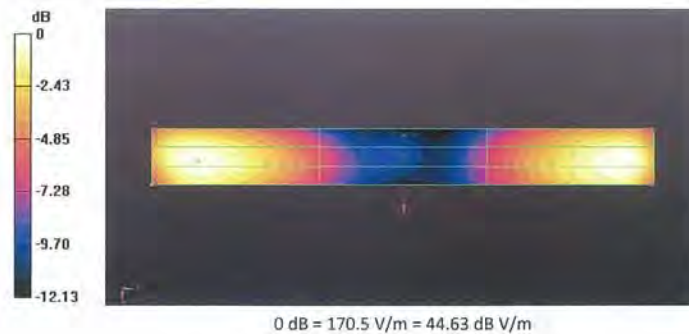
- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 29.12.2011;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 20.04.2011
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

**Dipole E-Field measurement @ 835MHz/E-Scan - 835MHz d=10mm/Hearing Aid Compatibility Test (41x361x1):**

Measurement grid: dx=5mm, dy=5mm  
 Device Reference Point: 0, 0, -6.3 mm  
 Reference Value = 109.1 V/m; Power Drift = -0.01 dB  
 PMR not calibrated. PMF = 1.000 is applied.  
 E-field emissions = 170.5 V/m  
**Near-field category: M4 (AWF 0 dB)**

PMF scaled E-field

Grid 1 M4	Grid 2 M4	Grid 3 M4
165.2 V/m	166.8 V/m	154.9 V/m
Grid 4 M4	Grid 5 M4	Grid 6 M4
86.40 V/m	86.89 V/m	80.28 V/m
Grid 7 M4	Grid 8 M4	Grid 9 M4
168.5 V/m	170.5 V/m	154.9 V/m



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



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**S** Servizio svizzero di taratura  
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **SGS-TW (Auden)**

Certificate No: **CD1880V3-1044\_Apr12**

## CALIBRATION CERTIFICATE

Object **CD1880V3 - SN: 1044**

Calibration procedure(s)  
**QA CAL-20.v6  
Calibration procedure for dipoles in air**

Calibration date: **April 19, 2012**

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 EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Probe ER3DV6	SN: 2336	29-Dec-11 (No. ER3-2336_Dec11)	Dec-12
Probe H3DV6	SN: 6065	29-Dec-11 (No. H3-6065_Dec11)	Dec-12
DAE4	SN: 781	20-Apr-11 (No. DAE4-781_Apr11)	Apr-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Oct-11)	In house check: Oct-12
Power sensor HP 8482H	SN: 3318A09450	09-Oct-09 (in house check Oct-11)	In house check: Oct-12
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-11)	In house check: Oct-12
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12
RF generator E4433B	MY 41000675	03-Nov-04 (in house check Oct-11)	In house check: Oct-13

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

Issued: April 19, 2012

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Accreditation No.: **SCS 108**

**References**

- [1] ANSI-C63.19-2007  
American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.

**Methods Applied and Interpretation of Parameters:**

- **Coordinate System:** y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes. In coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a distance of 10 mm above the top edge of the dipole arms.
- **Measurement Conditions:** Further details are available from the hardcopies at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- **Antenna Positioning:** The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections. It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- **Feed Point Impedance and Return Loss:** These parameters are measured using a HP 8753E Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminated by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- **E-field distribution:** E field is measured in the x-y-plane with an isotropic ER3D-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 10 mm (in z) above the top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, 10mm above the dipole surface.
- **H-field distribution:** H-field is measured with an isotropic H-field probe with 100mW forward power to the antenna feed point, in the x-y-plane. The scan area and sensor distance is equivalent to the E-field scan. The maximum of the field is available at the center (subgrid 5) above the feed point. The H-field value stated as calibration value represents the maximum of the interpolated H-field, 10mm above the dipole surface at the feed point.

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%.

### Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	10mm	
Scan resolution	dx, dy = 5 mm	
Frequency	1880 MHz $\pm$ 1 MHz	
Input power drift	< 0.05 dB	

### Maximum Field values at 1880 MHz

H-field 10 mm above dipole surface	condition	interpolated maximum
Maximum measured	100 mW input power	0.459 A / m $\pm$ 8.2 % (k=2)

E-field 10 mm above dipole surface	condition	interpolated maximum
Maximum measured above high end	100 mW input power	141.7 V / m
Maximum measured above low end	100 mW input power	134.8 V / m
Averaged maximum above arm	100 mW input power	138.3 V / m $\pm$ 12.8 % (k=2)

## Appendix

### Antenna Parameters

Frequency	Return Loss	Impedance
1730 MHz	24.1 dB	49.3 $\Omega$ + 6.2 j $\Omega$
1880 MHz	19.3 dB	51.9 $\Omega$ + 11.0 j $\Omega$
1900 MHz	19.9 dB	55.3 $\Omega$ + 9.4 j $\Omega$
1950 MHz	27.4 dB	54.5 $\Omega$ + 0.1 j $\Omega$
2000 MHz	21.7 dB	42.5 $\Omega$ + 1.1 j $\Omega$

### 3.2 Antenna Design and Handling

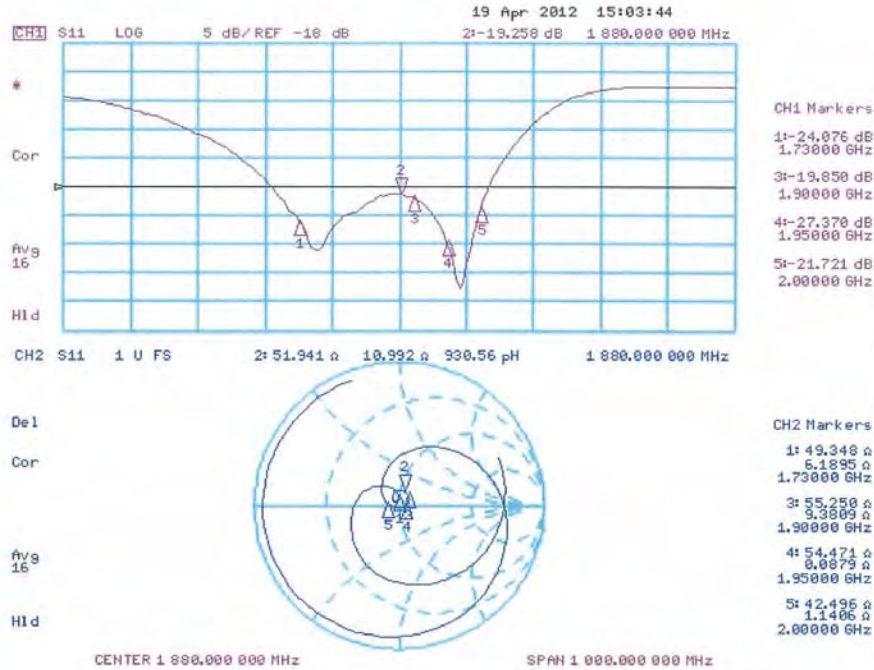
The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.

The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.

Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

### Impedance Measurement Plot



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**DASY5 H-field Result**

Date: 19.04.2012

Test Laboratory: SPEAG Lab2

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN: 1044**

Communication System: CW; Frequency: 1880 MHz  
 Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Phantom section: RF Section  
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

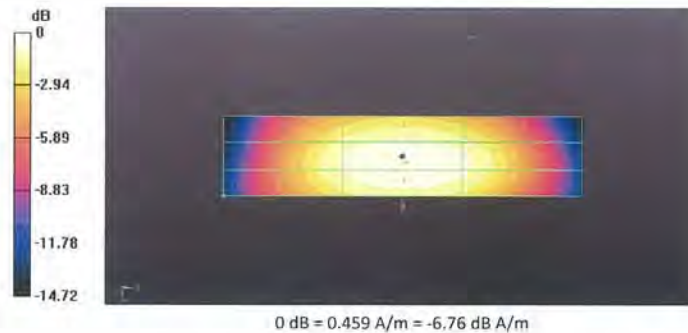
- Probe: H3DV6 - SN6065; ; Calibrated: 29.12.2011
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 20.04.2011
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

**Dipole H-Field measurement @ 1880MHz/H-Scan - 1880MHz d=10mm/Hearing Aid Compatibility Test (41x181x1):**

Measurement grid: dx=5mm, dy=5mm  
 Device Reference Point: 0, 0, -6.3 mm  
 Reference Value = 0.4820 A/m; Power Drift = -0.00 dB  
 PMR not calibrated. PMF = 1.000 is applied.  
 H-field emissions = 0.4590 A/m  
**Near-field category: M2 (AWF 0 dB)**

PMF scaled H-field

Grid 1 M2 0.409 A/m	Grid 2 M2 0.415 A/m	Grid 3 M2 0.380 A/m
Grid 4 M2 0.453 A/m	Grid 5 M2 0.459 A/m	Grid 6 M2 0.421 A/m
Grid 7 M2 0.420 A/m	Grid 8 M2 0.427 A/m	Grid 9 M2 0.387 A/m



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**DASY5 E-field Result**

Date: 19.04.2012

Test Laboratory: SPEAG Lab2

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN: 1044**

Communication System: CW; Frequency: 1880 MHz  
 Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: RF Section  
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

**DASY52 Configuration:**

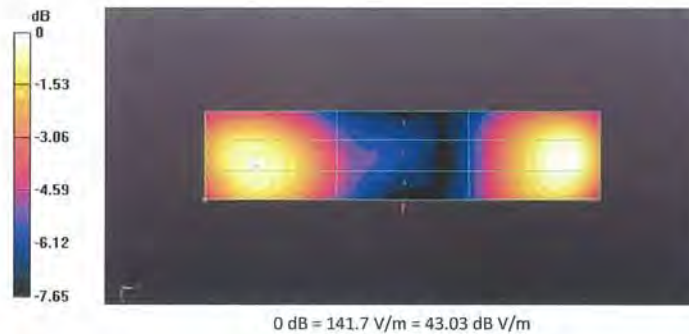
- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 29.12.2011;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 20.04.2011
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

**Dipole E-Field measurement @ 1880MHz/E-Scan - 1880MHz d=10mm/Hearing Aid Compatibility Test (41x181x1):**

Measurement grid: dx=5mm, dy=5mm  
 Device Reference Point: 0, 0, -6.3 mm  
 Reference Value = 157.1 V/m; Power Drift = 0.02 dB  
 PMR not calibrated. PMF = 1.000 is applied.  
 E-field emissions = 141.7 V/m  
 Near-field category: M2 (AWF 0 dB)

PMF scaled E-field

Grid 1 M2	Grid 2 M2	Grid 3 M2
134.5 V/m	134.8 V/m	124.2 V/m
Grid 4 M3	Grid 5 M3	Grid 6 M3
87.31 V/m	87.32 V/m	80.49 V/m
Grid 7 M2	Grid 8 M2	Grid 9 M2
138.4 V/m	141.7 V/m	133.6 V/m



## End of 1<sup>st</sup> part of report

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