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# Hearing Aid Compatibility (HAC) **TEST REPORT**

## <For RF-Emission measurement>

Applicant Name	Qisda Corporation	
Address of Applicant	157 Shan-Yang Road, Gueishan Taoyuan 333, Taiwan	
EUT Name	Mobile Internet Device	
Model Number	M01M002	
Date of receive	2010.03.04	
Date of Test(s)	2010.03.08	
Date of Issue	2010.03.18	

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. This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Taiwan Electronics & Communication Laboratory or testing done by SGS Taiwan Electronics & Communication Laboratory in connection with distribution or use of the product described in this report must be approved by SGS Taiwan Electronics & Communication Laboratory in writing.

	ky sh	rang		ni	ick Heu	
Tested by :			Approved by:			
Ricky Huang			Nick Hsu			
Asst Supervisor	Date:	2010/03/18	Supervisor	Date:	2010/03/18	

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17. System Validation from Original equipment supplier ...... 83

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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

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 indication 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

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Company address	134, Wu Kung Road, Wuku Industrial Zone Taipei,
	Taiwan, R.O.C.
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Fax	+886-2-2298-0488
Website	http://www.tw.sgs.com/

# 3. Details of Applicant

Applicant Name	Qisda Corporation
Applicant Address	157 Shan-Ying Road, Gueishan Taoyuan 333, Taiwan
Contact Person	Kun Han Liu
TEL	+886 3 359 5000 Ext. 3704
Fax	+886 3 359 3395
E-mail	Kun.han.liu@qisda.com

# 4. Description of EUT

EUT Name	Mobile Internet Device	
FCC ID	VRSM01M002	
Model Name	M01M002	
Brand Name	DELL	
Freq. of Operation	GSM /GPRS/EDGE/WCDMA/HSDPA/HSUPA/802.11b+g	
IMEI Code	012214000000230	
Definition	Production unit	

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Channel Number	GSM 850	GSM1900	WCDMA B4
(ARFCN)	128-	512-	1312-
	251	810	1513

### 5. Test Environment

Ī	Ambient Temperature	22.2° C	70
	Relative Humidity	<60 %	

# 6. System Specifications of DASY4

6.1 Measurement system Diagram for SPEAG Robotic

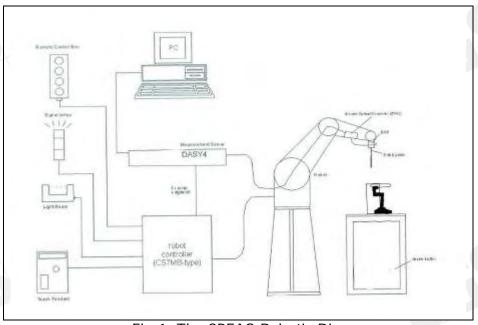


Fig 1. The SPEAG Robotic Diagram

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

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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 2000 or Windows XP.
- 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

O.Z L dild ii ii	0.0.1.0.00	
Construction	One dipole parallel, two dipoles normal to probe axis Built-in shielding against static charges PEEK enclosure material	
Calibration	In air from 100 MHz to 3.0 GHz (absolute accuracy ±6.0%, k=2)	11/19
Frequency	100 MHz to > 6 GHz (extended to 20 MHz for MRI), Linearity: ± 0.2 dB (100 MHz to 3 GHz)	ER3DV6 E-Field Probe
Directivity	± 0.2 dB in air (rotation around probe axis) ± 0.4 dB in air (rotation normal to probe axis)	
Dynamic Range	2 V/m to > 1000 V/m; Linearity: ± 0.2 dB	
Dimensions	Overall length: 330 mm (Tip: 16 mm) Tip diameter: 8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.5 mm	
Application	General near-field measurements up to 6 GHz Field component measurements Fast automatic scanning in phantoms	

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0 1 1	Th		
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., glycolether)	///	
Frequency	200 MHz to 3 GHz (absolute accuracy ±	//0//	
requericy	6.0%, k=2); Output linearized	400	
	0.076, K=2), Output iiileanzeu	(1)	
		H3DV6 H-Field Probe	
Directivity	± 0.2 dB (spherical isotropy error)		
Dynamic Range	10 mA/m to 2 A/m at 1 GHz		
E-Field	< 10% at 3 GHz (for plane wave)		
Interference			
Dimensions	Overall length: 330 mm (Tip: 40 mm)		
	Tip diameter: 6 mm (Body: 12 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

•	and well defined positioning of and validation dipoles as well as	
	ching of the robot.	
Dimensions length: 37 width: 370 height: 37	) mm	Test Arch

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### 6.4 Phone Holder

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

### 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 2mm increments in the  $5 \times 5$  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.

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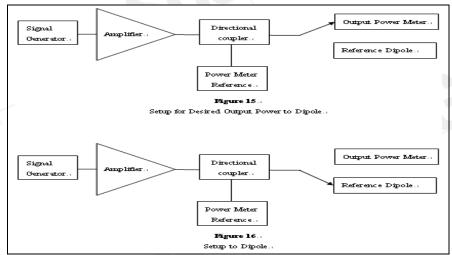
8. The system performed a drift evaluation by measuring the field at the reference location.

9. Steps 1-8 were done for both the E and H-Field measurements.

# 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 F-Field Scan

Mode	Frequency	Input	Measured	Target	Measured
	(MHz)	Power(dBm)	Value(V/m)	Value(V/m)	Date
CW	835	20	161.7	168.7	2010/03/08
Mode	Frequency	Input	Measured	Target	Measured
	(MHz)	Power(dBm)	Value(V/m)	Value(V/m)	Date
CW	1880	20	136.6	138.3	2010/03/08

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#### For H-Field Scan

Mode	Frequency	Input	Measured	Target	Measured
	1109401103	Power	Value(A/m)	Value(A/m)	Date
CW	835	20	0.448	0.457	2010/03/08
Mode	Frequency	Input	Measured	Target	Measured
Mode	rrequericy	Power	Value(A/m)	Value(A/m)	Date
CW	1880	20	0.446	0.463	2010/03/08

### 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 may be 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:

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- Center Frequency: nominal center frequency of channel
- · Span: zero
- Resolution bandwidth >= emission bandwidth
- Video bandwidth = 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 tranmission 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.

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.

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- 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,

J ( G ) ( G )			
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	Туре	Serial number	Date of last calibration
Schmid & Partner	E-Field and H-Field	ER3DV6	2306	Apr.27.2009
Engineering AG	Probe	H3DV6	6142	Apr.27.2009
Schmid & Partner Engineering AG	835&1880 MHz System Validation Dipole In Air	CD835V3 CD1880V3	1052 1044	Apr.22.2009 Apr.22.2009
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	547	Jan.22.2010
Schmid & Partner Engineering AG	Software	DASY 4 V4.7 Build 80	N/A	Calibration isn't necessary
Agilent	Dielectric Probe Kit	85070D	US01440168	Calibration isn't necessary
Agilent	Dual-directional coupler	778D	50313	Aug.26.2009
Agilent	RF Signal Generator	8648D	3847M00432	May.25.2009
Agilent	Power Sensor	U2001B	MY48100169	Apr.09.2009
R&S	Radio Communication Test	CMU200	109326	Mar.17.2009
Schmid & Partner Engineering AG	Test Arch SD HAC	P01	1047	N/A

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# 12. Summary of Results

### E-Field

E-Field Emission	Channel	Modulation Factor	Conducte d Power at BS (dBm)	Measured Drift(%)	Time Avg. Field (V/m)	RESULT	Excl Blocks per 4.3.1.2.2
	128	2.83	32.81	-0.002	159.7	М3	689
GSM850	190	2.83	32.89	0.012	148.2	M4	689
	251	2.83	32.86	0.050	138.7	M4	689
E-Field Emission	Channel	Modulation Factor	Conducte d Power at BS (dBm)	Measured Drift(%)	Time Avg. Field (V/m)	RESULT	Excl Blocks per 4.3.1.2.2
	512	2.94	29.84	0.077	72.9	М3	689
GSM1900	661	2.94	29.85	0.169	74.5	М3	689
	810	2.94	29.99	0.075	77.8	M3	689
E-Field Emission	Channel	Modulation Factor	Conducte d Power at BS (dBm)	Measured Drift(%)	Time Avg. Field (V/m)	RESULT	Excl Blocks per 4.3.1.2.2
	1312	1	22.31	0.056	38	M4	123
WCDMA B4	1412	1	22.32	-0.015	42.5	M4	123
	1513	1	22.34	-0.026	42.5	M4	123

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### H-Field

I I-I ICIU							
H-Field Emission	Channel	Modulation Factor	Conducte d Power at BS (dBm)	Measured Drift(%)	Time Avg. Field (A/m)	RESULT	Excl Blocks per 4.3.1.2.2
	128	2.98	32.81	0.079	0.301	M4	147
GSM850	190	2.98	32.89	0.003	0.274	M4	147
	251	2.98	32.86	0.063	0.253	M4	147
H-Field Emission	Channel	Modulation Factor	Conducte d Power at BS (dBm)	Measured Drift(%)	Time Avg. Field (A/m)	RESULT	Excl Blocks per 4.3.1.2.2
	512	2.78	29.84	-0.030	0.221	М3	236
GSM900	661	2.78	29.85	-0.078	0.206	М3	236
	810	2.78	29.99	-0.110	0.223	М3	236
H-Field Emission	Channel	Modulation Factor	Conducte d Power at BS (dBm)	Measured Drift(%)	Time Avg. Field (A/m)	RESULT	Excl Blocks per 4.3.1.2.2
	1312	1	22.31	-0.001	0.108	M4	236
WCDMA B4	1412	1	22.32	-0.009	0.119	M4	123
	1513	1	22.34	-0.050	0.120	M4	123

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### 13. Measurement Data

Date: 2010/3/8

HAC\_E\_GSM 850\_CH128

DUT: M01M002;

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

Phantom section: E Device Section

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 = 159.7 V/m

Probe Modulation Factor = 2.83

Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 68.5 V/m; Power Drift = -0.002 dB Hearing Aid Near-Field Category: M3 (AWF -5 dB)

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
129.1 M4	147.1 M4	145.9 M4
Grid 4	Grid 5	Grid 6
140.2 M4	159.7 M3	158.7 M3
Grid 7	Grid 8	Grid 9
149.9 M3	165.2 M3	161.5 M3

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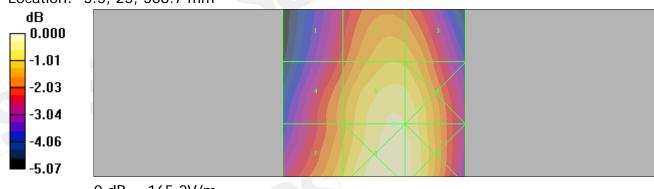
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Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 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
161	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5	<149.6	<0.45

#### **Cursor:**

Total = 165.2 V/mE Category: M3

Location: -3.5, 25, 368.7 mm



0 dB = 165.2V/m

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Date: 2010/3/8

# HAC\_E\_GSM 850\_CH190

### DUT: M01M002;

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

Phantom section: E Device Section

### DASY4 Configuration:

Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

• Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 = 148.2 V/m

Probe Modulation Factor = 2.83

Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 61.9 V/m; Power Drift = 0.012 dB Hearing Aid Near-Field Category: M4 (AWF -5 dB)

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
113.2 M4	133.6 M4	133.1 M4
Grid 4	Grid 5	Grid 6
126.7 M4	148.2 M4	147.7 M4
Grid 7	Grid 8	Grid 9
139.2 M4	156.2 M3	153.8 M3

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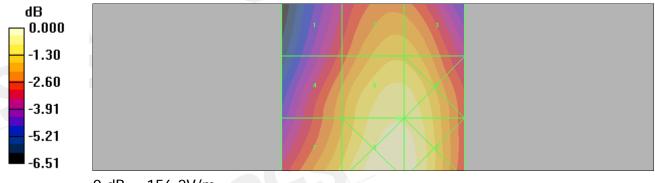
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AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
0	199.5 - 354.8	0.6 - 1.07
-5	149.6 - 266.1	0.45 - 0.8
0	112.2 - 199.5	0.34 - 0.6
-5	84.1 - 149.6	0.25 - 0.45
0	63.1 - 112.2	0.19 - 0.34
-5	47.3 - 84.1	0.14 - 0.25
0	<63.1	<0.19
-5	<47.3	<0.14
AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
0	631 - 1122	1.91 - 3.39
-5	473.2 - 841.4	1.43 - 2.54
0	354.8 - 631	1.07 - 1.91
-5	266.1 - 473.2	0.8 - 1.43
0	199.5 - 354.8	0.6 - 1.07
-5	149.6 - 266.1	0.45 - 0.8
0	<199.5	<0.6
-		
	(dB)  0  -5  0  -5  0  -5  AWF (dB)  0  -5  0  -5  -5  0  -5  0  -5	(dB) 960MHz  0 199.5 - 354.8  -5 149.6 - 266.1  0 112.2 - 199.5  -5 84.1 - 149.6  0 63.1 - 112.2  -5 47.3 - 84.1  0 <63.1  -5 <47.3  AWF (dB) 960MHz  0 631 - 1122  -5 473.2 - 841.4  0 354.8 - 631  -5 266.1 - 473.2  0 199.5 - 354.8  -5 149.6 - 266.1

#### **Cursor:**

Total = 156.2 V/mE Category: M3

Location: -4, 25, 368.7 mm



0 dB = 156.2V/m

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Date: 2010/3/8

## HAC\_E\_GSM 850\_CH251

### DUT: M01M002;

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

Phantom section: E Device Section

### DASY4 Configuration:

Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 = 138.7 V/m

Probe Modulation Factor = 2.83

Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 58.0 V/m; Power Drift = 0.050 dB

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

#### Peak E-field in V/m

Grid 1	Grid 2	Grid 3
109.5 M4	125.6 M4	124.2 M4
Grid 4	Grid 5	Grid 6
121.2 M4	138.7 M4	137.9 M4
Grid 7	Grid 8	Grid 9
131.6 M4	145.6 M4	142.5 M4

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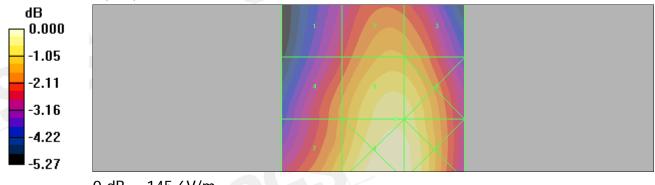
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Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
\	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 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 = 145.6 V/mE Category: M4

Location: -3.5, 25, 368.7 mm



0 dB = 145.6V/m

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Date: 2010/3/8

# HAC\_H\_GSM 850\_CH128

### DUT: M01M002;

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

Phantom section: H Device Section

### DASY4 Configuration:

Probe: H3DV6 - SN6142; ; Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 discance 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 = 0.301 A/m

Probe Modulation Factor = 2.98

Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 0.086 A/m; Power Drift = 0.079 dB Hearing Aid Near-Field Category: M4 (AWF -5 dB)

#### Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.386 M4	0.301 M4	0.214 M4
Grid 4	Grid 5	Grid 6
0.352 M4	0.288 M4	0.205 M4
Grid 7	Grid 8	Grid 9
		0.185 M4

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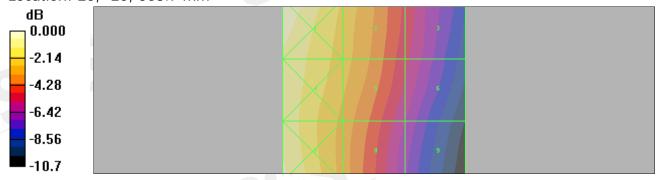
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AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
0	199.5 - 354.8	0.6 - 1.07
-5	149.6 - 266.1	0.45 - 0.8
0	112.2 - 199.5	0.34 - 0.6
-5	84.1 - 149.6	0.25 - 0.45
0	63.1 - 112.2	0.19 - 0.34
-5	47.3 - 84.1	0.14 - 0.25
0	<63.1	<0.19
-5	<47.3	<0.14
AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
0	631 - 1122	1.91 - 3.39
-5	473.2 - 841.4	1.43 - 2.54
0	354.8 - 631	1.07 - 1.91
-5	266.1 - 473.2	0.8 - 1.43
0	199.5 - 354.8	0.6 - 1.07
-5	149.6 - 266.1	0.45 - 0.8
0	<199.5	<0.6
-		
	(dB)  0  -5  0  -5  0  -5  AWF (dB)  0  -5  0  -5  -5  0  -5  0  -5	(dB) 960MHz  0 199.5 - 354.8  -5 149.6 - 266.1  0 112.2 - 199.5  -5 84.1 - 149.6  0 63.1 - 112.2  -5 47.3 - 84.1  0 <63.1  -5 <47.3  AWF (dB) 960MHz  0 631 - 1122  -5 473.2 - 841.4  0 354.8 - 631  -5 266.1 - 473.2  0 199.5 - 354.8  -5 149.6 - 266.1

#### **Cursor:**

Total = 0.386 A/mH Category: M4

Location: 25, -25, 368.7 mm



0 dB = 0.386A/m

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# HAC\_H\_GSM 850\_CH190

### DUT: M01M002;

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

Phantom section: H Device Section

### DASY4 Configuration:

Probe: H3DV6 - SN6142; ; Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

• Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 discance 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 = 0.274 A/m

Probe Modulation Factor = 2.98

Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 0.080 A/m; Power Drift = 0.003 dB Hearing Aid Near-Field Category: M4 (AWF -5 dB)

#### Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.341 M4	0.274 M4	0.206 M4
Grid 4	Grid 5	Grid 6
0 040 114	0 0 ( 0 8 4 4	0 407 844
0.312 M4	0.262 M4	0.196 W4
		Grid 9

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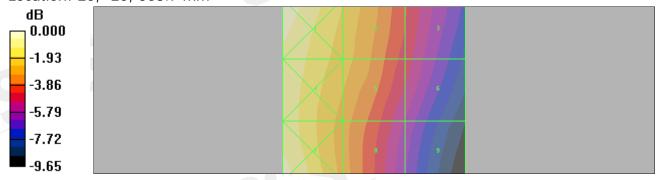
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AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
0	199.5 - 354.8	0.6 - 1.07
-5	149.6 - 266.1	0.45 - 0.8
0	112.2 - 199.5	0.34 - 0.6
-5	84.1 - 149.6	0.25 - 0.45
0	63.1 - 112.2	0.19 - 0.34
-5	47.3 - 84.1	0.14 - 0.25
0	<63.1	<0.19
-5	<47.3	<0.14
AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
0	631 - 1122	1.91 - 3.39
-5	473.2 - 841.4	1.43 - 2.54
0	354.8 - 631	1.07 - 1.91
-5	266.1 - 473.2	0.8 - 1.43
0	199.5 - 354.8	0.6 - 1.07
-5	149.6 - 266.1	0.45 - 0.8
0	<199.5	<0.6
-		
	(dB)  0  -5  0  -5  0  -5  AWF (dB)  0  -5  0  -5  -5  0  -5  0  -5	(dB) 960MHz  0 199.5 - 354.8  -5 149.6 - 266.1  0 112.2 - 199.5  -5 84.1 - 149.6  0 63.1 - 112.2  -5 47.3 - 84.1  0 <63.1  -5 <47.3  AWF (dB) 960MHz  0 631 - 1122  -5 473.2 - 841.4  0 354.8 - 631  -5 266.1 - 473.2  0 199.5 - 354.8  -5 149.6 - 266.1

#### **Cursor:**

Total = 0.341 A/mH Category: M4

Location: 25, -25, 368.7 mm



0 dB = 0.341A/m

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# HAC\_H\_GSM 850\_CH251

### DUT: M01M002;

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

Phantom section: H Device Section

### DASY4 Configuration:

Probe: H3DV6 - SN6142; ; Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 discance 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 = 0.253 A/m

Probe Modulation Factor = 2.98

Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 0.074 A/m; Power Drift = 0.063 dB Hearing Aid Near-Field Category: M4 (AWF -5 dB)

#### Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.322 M4	0.253 M4	0.184 M4
Grid 4	Grid 5	Grid 6
0.297 M4	0.243 M4	0.178 M4
Grid 7	Grid 8	Grid 9
0.314 M4	0.230 M4	0.159 M4

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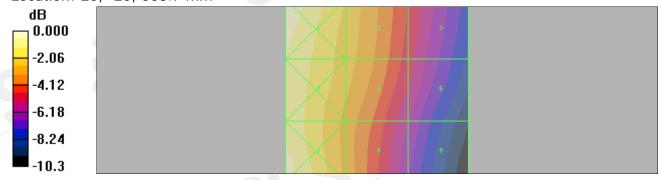
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AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
0	199.5 - 354.8	0.6 - 1.07
-5	149.6 - 266.1	0.45 - 0.8
0	112.2 - 199.5	0.34 - 0.6
-5	84.1 - 149.6	0.25 - 0.45
0	63.1 - 112.2	0.19 - 0.34
-5	47.3 - 84.1	0.14 - 0.25
0	<63.1	<0.19
-5	<47.3	<0.14
AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
0	631 - 1122	1.91 - 3.39
-5	473.2 - 841.4	1.43 - 2.54
0	354.8 - 631	1.07 - 1.91
-5	266.1 - 473.2	0.8 - 1.43
0	199.5 - 354.8	0.6 - 1.07
-5	149.6 - 266.1	0.45 - 0.8
0	<199.5	<0.6
-		
	(dB)  0  -5  0  -5  0  -5  AWF (dB)  0  -5  0  -5  -5  0  -5  0  -5	(dB) 960MHz  0 199.5 - 354.8  -5 149.6 - 266.1  0 112.2 - 199.5  -5 84.1 - 149.6  0 63.1 - 112.2  -5 47.3 - 84.1  0 <63.1  -5 <47.3  AWF (dB) 960MHz  0 631 - 1122  -5 473.2 - 841.4  0 354.8 - 631  -5 266.1 - 473.2  0 199.5 - 354.8  -5 149.6 - 266.1

#### **Cursor:**

Total = 0.322 A/mH Category: M4

Location: 25, -25, 368.7 mm



0 dB = 0.322A/m

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# HAC\_E\_GSM 1900\_CH512

### DUT: M01M002;

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

Phantom section: E Device Section

### DASY4 Configuration:

Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

• Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 = 72.9 V/m

Probe Modulation Factor = 2.94

Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 13.5 V/m; Power Drift = 0.077 dB

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

#### Peak E-field in V/m

Grid 1	Grid 2	Grid 3
72.8 M3	72.9 M3	56.2 M3
Grid 4	Grid 5	Grid 6
38.2 M4	58.7 M3	61.8 M3
Grid 7	Grid 8	Grid 9
43.9 M4	81.7 M3	82.3 M3

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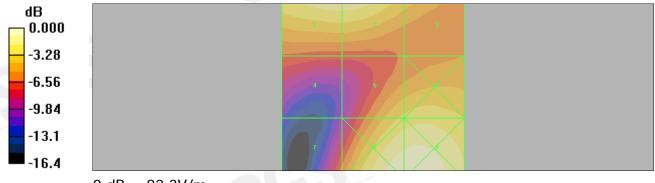
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AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
0	199.5 - 354.8	0.6 - 1.07
-5	149.6 - 266.1	0.45 - 0.8
0	112.2 - 199.5	0.34 - 0.6
-5	84.1 - 149.6	0.25 - 0.45
0	63.1 - 112.2	0.19 - 0.34
-5	47.3 - 84.1	0.14 - 0.25
0	<63.1	<0.19
-5	<47.3	<0.14
AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
0	631 - 1122	1.91 - 3.39
-5	473.2 - 841.4	1.43 - 2.54
0	354.8 - 631	1.07 - 1.91
-5	266.1 - 473.2	0.8 - 1.43
0	199.5 - 354.8	0.6 - 1.07
Е	149.6 - 266.1	0.45 - 0.8
-5	117.0 200.1	0.10 0.0
-5	<199.5	<0.6
	(dB)  0  -5  0  -5  0  -5  AWF (dB)  0  -5  0  0  -5  0  0  -5  0	(dB) 960MHz  0 199.5 - 354.8  -5 149.6 - 266.1  0 112.2 - 199.5  -5 84.1 - 149.6  0 63.1 - 112.2  -5 47.3 - 84.1  0   47.3 - 84.1  -63.1  -5    AWF (dB) Limits for E-Field Emissions (V/m) < 960MHz

#### **Cursor:**

Total = 82.3 V/mE Category: M3

Location: -10.5, 25, 368.7 mm



0 dB = 82.3V/m

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### HAC\_E\_GSM 1900\_CH661

### DUT: M01M002;

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

Phantom section: E Device Section

### DASY4 Configuration:

Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

• Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 = 74.5 V/m

Probe Modulation Factor = 2.94

Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 10.9 V/m; Power Drift = 0.169 dB

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

#### Peak E-field in V/m

Grid 1	Grid 2	Grid 3
74.1 M3	74.5 M3	60.2 M3
Grid 4	Grid 5	Grid 6
38.9 M4	52.9 M3	57.2 M3
Grid 7	Grid 8	Grid 9
38.5 M4	77.8 M3	78.8 M3

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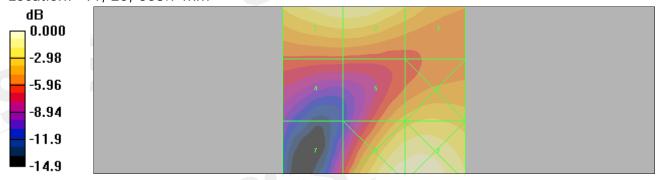
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Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
\	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 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 = 78.8 V/mE Category: M3

Location: -11, 25, 368.7 mm



0 dB = 78.8V/m

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## HAC\_E\_GSM 1900\_CH810

### DUT: M01M002;

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

Phantom section: E Device Section

### DASY4 Configuration:

Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

• Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 = 77.8 V/m

Probe Modulation Factor = 2.94

Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 10.1 V/m; Power Drift = 0.075 dB

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

#### Peak E-field in V/m

Grid 1	Grid 2	Grid 3
76.8 M3	77.8 M3	64.9 M3
Grid 4	Grid 5	Grid 6
41.4 M4	50.3 M3	54.7 M3
Grid 7	Grid 8	Grid 9
38 6 M4	78 6 M3	79.7 M3

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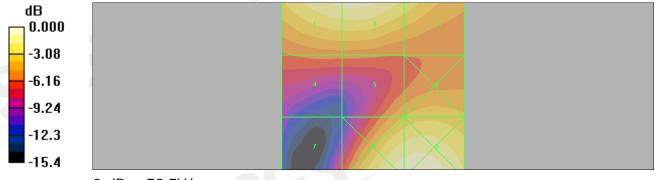
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Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
\	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 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 = 79.7 V/mE Category: M3

Location: -11, 25, 368.7 mm



0 dB = 79.7V/m

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# HAC\_H\_GSM 1900\_CH512

### DUT: M01M002;

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

Phantom section: H Device Section

### DASY4 Configuration:

Probe: H3DV6 - SN6142; ; Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

• Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 discance 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 = 0.221 A/m

Probe Modulation Factor = 2.78

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.087 A/m; Power Drift = -0.030 dB Hearing Aid Near-Field Category: M3 (AWF -5 dB)

#### Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.195 M3	0.221 M3	0.220 M3
Grid 4	Grid 5	Grid 6
0.183 M3	0.221 M3	0.220 M3
Grid 7	Grid 8	Grid 9
0.180 M3	0.196 M3	0.195 M3

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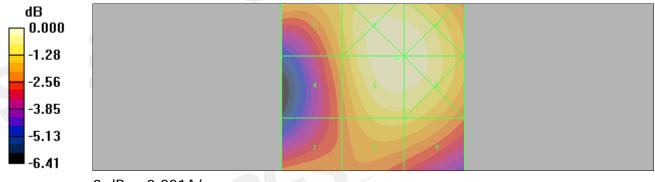
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Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
\	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 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 = 0.221 A/mH Category: M3

Location: -6.5, -8, 368.7 mm



0 dB = 0.221A/m

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## HAC\_H\_GSM 1900\_CH661

#### DUT: M01M002;

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

Phantom section: H Device Section

#### DASY4 Configuration:

Probe: H3DV6 - SN6142; ; Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

• Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 discance 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 = 0.206 A/m

Probe Modulation Factor = 2.78

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.080 A/m; Power Drift = -0.078 dB Hearing Aid Near-Field Category: M3 (AWF -5 dB)

#### Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.196 M3	0.206 M3	0.206 M3
		Grid 6
0.154 M3	0.206 M3	0.206 M3
Grid 7	Grid 8	Grid 9
0.177 M3	0.191 M3	0.191 M3

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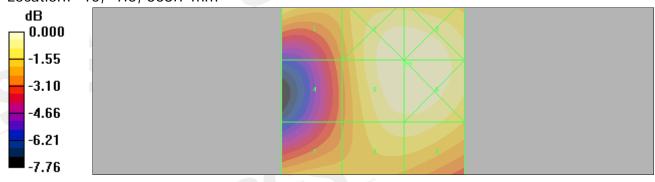
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Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
\	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 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 = 0.206 A/mH Category: M3

Location: -10, -7.5, 368.7 mm



0 dB = 0.206A/m

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## HAC\_H\_GSM 1900\_CH810

#### DUT: M01M002;

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

Phantom section: H Device Section

#### DASY4 Configuration:

Probe: H3DV6 - SN6142; ; Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

• Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 discance 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 = 0.223 A/m

Probe Modulation Factor = 2.78

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.087 A/m; Power Drift = -0.110 dB Hearing Aid Near-Field Category: M3 (AWF -5 dB)

#### Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.202 M3	0.221 M3	0.221 M3
Grid 4	Grid 5	Grid 6
0.163 M3	0.223 M3	0.223 M3
Grid 7	Grid 8	Grid 9
0.172 M3	0.206 M3	0.206 M3

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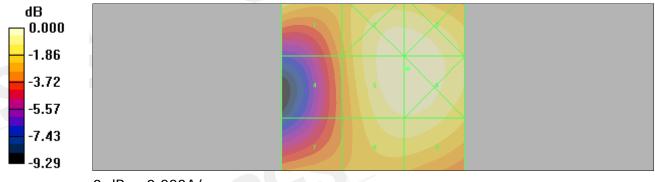
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AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
0	199.5 - 354.8	0.6 - 1.07
-5	149.6 - 266.1	0.45 - 0.8
0	112.2 - 199.5	0.34 - 0.6
-5	84.1 - 149.6	0.25 - 0.45
0	63.1 - 112.2	0.19 - 0.34
-5	47.3 - 84.1	0.14 - 0.25
0	<63.1	<0.19
-5	<47.3	<0.14
AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
0	631 - 1122	1.91 - 3.39
-5	473.2 - 841.4	1.43 - 2.54
0	354.8 - 631	1.07 - 1.91
-5	266.1 - 473.2	0.8 - 1.43
0	199.5 - 354.8	0.6 - 1.07
Е	149.6 - 266.1	0.45 - 0.8
-5	117.0 200.1	0.10 0.0
-5	<199.5	<0.6
	(dB)  0  -5  0  -5  0  -5  AWF (dB)  0  -5  0  0  -5  0  0  -5  0	(dB) 960MHz  0 199.5 - 354.8  -5 149.6 - 266.1  0 112.2 - 199.5  -5 84.1 - 149.6  0 63.1 - 112.2  -5 47.3 - 84.1  0   47.3 - 84.1  -63.1  -5    AWF (dB) Limits for E-Field Emissions (V/m) < 960MHz

#### **Cursor:**

Total = 0.223 A/mH Category: M3

Location: -9.5, -5, 368.7 mm



0 dB = 0.223A/m

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## HAC\_E\_WCDMA B4\_CH1312

#### DUT: M01M002;

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

Phantom section: E Device Section

#### DASY4 Configuration:

Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

• Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 = 38.0 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 21.6 V/m; Power Drift = 0.056 dB Hearing Aid Near-Field Category: M4 (AWF 0 dB)

#### Peak E-field in V/m

Grid 1	Grid 2	Grid 3
41.2 M4	40.9 M4	25.9 M4
Grid 4	Grid 5	Grid 6
23.4 M4	27.3 M4	28.4 M4
Grid 7	Grid 8	Grid 9

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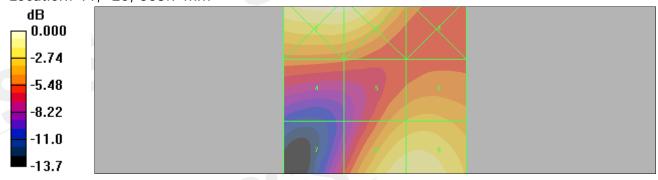
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Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
\	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 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 = 41.2 V/mE Category: M4

Location: 11, -25, 368.7 mm



0 dB = 41.2V/m

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## HAC\_E\_WCDMA B4\_CH1412

#### DUT: M01M002;

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

Phantom section: E Device Section

#### DASY4 Configuration:

Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

• Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 = 42.5 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 26.8 V/m; Power Drift = -0.015 dB Hearing Aid Near-Field Category: M4 (AWF 0 dB)

#### Peak E-field in V/m

Grid 1	Grid 2	Grid 3
46.3 M4	46.2 M4	32.0 M4
Grid 4	Grid 5	Grid 6
26.6 M4	31.9 M4	33.4 M4
Grid 7	Grid 8	Grid 9

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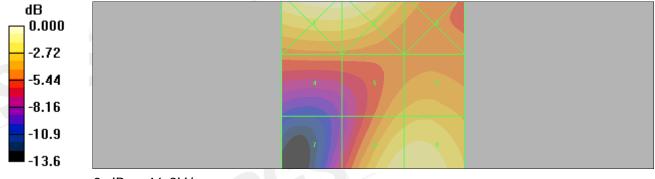
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Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
\	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 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 = 46.3 V/mE Category: M4

Location: 10.5, -25, 368.7 mm



0 dB = 46.3V/m

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## HAC\_E\_WCDMA B4\_CH1513

#### DUT: M01M002;

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

Phantom section: E Device Section

#### DASY4 Configuration:

Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

• Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 = 42.5 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 28.8 V/m; Power Drift = -0.026 dB Hearing Aid Near-Field Category: M4 (AWF 0 dB)

#### Peak E-field in V/m

Grid 1	Grid 2	Grid 3
46.0 M4	45.9 M4	32.3 M4
Grid 4	Grid 5	Grid 6
27.3 M4	33.1 M4	34.3 M4
Grid 7	Grid 8	Grid 9
23.4 M4	42.1 M4	42.5 M4

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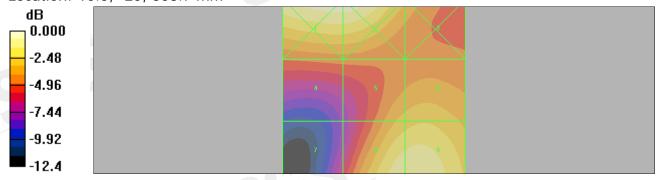
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AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
0	199.5 - 354.8	0.6 - 1.07
-5	149.6 - 266.1	0.45 - 0.8
0	112.2 - 199.5	0.34 - 0.6
-5	84.1 - 149.6	0.25 - 0.45
0	63.1 - 112.2	0.19 - 0.34
-5	47.3 - 84.1	0.14 - 0.25
0	<63.1	<0.19
-5	<47.3	<0.14
AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
0	631 - 1122	1.91 - 3.39
-5	473.2 - 841.4	1.43 - 2.54
0	354.8 - 631	1.07 - 1.91
-5	266.1 - 473.2	0.8 - 1.43
0	199.5 - 354.8	0.6 - 1.07
-5	149.6 - 266.1	0.45 - 0.8
0	<199.5	<0.6
-		
	(dB)  0  -5  0  -5  0  -5  AWF (dB)  0  -5  0  -5  -5  0  -5  0  -5	(dB) 960MHz  0 199.5 - 354.8  -5 149.6 - 266.1  0 112.2 - 199.5  -5 84.1 - 149.6  0 63.1 - 112.2  -5 47.3 - 84.1  0 <63.1  -5 <47.3  AWF (dB) 960MHz  0 631 - 1122  -5 473.2 - 841.4  0 354.8 - 631  -5 266.1 - 473.2  0 199.5 - 354.8  -5 149.6 - 266.1

#### **Cursor:**

Total = 46.0 V/mE Category: M4

Location: 10.5, -25, 368.7 mm



0 dB = 46.0V/m

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Date: 2010/3/8

## HAC\_H\_WCDMA B4\_CH1312

#### DUT: M01M002;

Communication System: WCDMA BAND4; Frequency: 1712.4 MHz; Duty Cycle: 1:1

Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\varepsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>

Phantom section: H Device Section

#### DASY4 Configuration:

Probe: H3DV6 - SN6142; ; Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

• Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 discance 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 = 0.108 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.119 A/m; Power Drift = -0.001 dB Hearing Aid Near-Field Category: M4 (AWF 0 dB)

#### Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.105 M4	0.108 M4	0.106 M4
Grid 4	Grid 5	Grid 6
0.096 M4	0.108 M4	0.106 M4
Grid 7	Grid 8	Grid 9
0.088 M4	0.097 M4	0.095 M4

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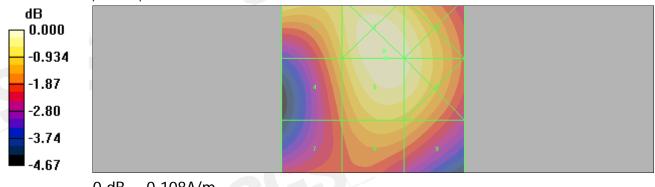
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Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
\	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 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 = 0.108 A/mH Category: M4

Location: -3, -10.5, 368.7 mm



0 dB = 0.108A/m

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Date: 2010/3/8

## HAC\_H\_WCDMA B4\_CH1412

#### DUT: M01M002;

Communication System: WCDMA BAND4; Frequency: 1732.4 MHz; Duty Cycle: 1:1

Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\varepsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>

Phantom section: H Device Section

#### DASY4 Configuration:

Probe: H3DV6 - SN6142; ; Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

• Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 discance 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 = 0.119 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.129 A/m; Power Drift = -0.009 dB Hearing Aid Near-Field Category: M4 (AWF 0 dB)

#### Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.126 M4	0.120 M4	0.118 M4
Grid 4	Grid 5	Grid 6
0.106 M4	0.119 M4	0.117 M4
Grid 7	Grid 8	Grid 9

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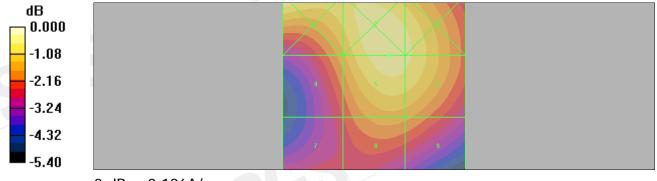
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Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
\	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 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 = 0.126 A/mH Category: M4

Location: 25, -25, 368.7 mm



0 dB = 0.126A/m

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Date: 2010/3/8

## HAC\_H\_WCDMA B4\_CH1513

#### DUT: M01M002;

Communication System: WCDMA BAND4; Frequency: 1752.6 MHz; Duty Cycle: 1:1

Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\varepsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>

Phantom section: H Device Section

#### DASY4 Configuration:

Probe: H3DV6 - SN6142; ; Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

• Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 discance 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 = 0.120 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.132 A/m; Power Drift = -0.050 dB Hearing Aid Near-Field Category: M4 (AWF 0 dB)

#### Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.123 M4	0.120 M4	0.118 M4
Grid 4	Grid 5	Grid 6
0.107 M4	0.120 M4	0.118 M4
Grid 7	Grid 8	Grid 9
0.095 M4	0.106 M4	0.104 M4

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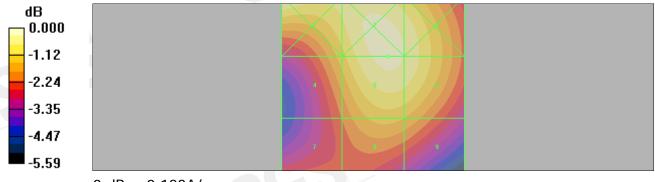
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Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
\	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 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 = 0.123 A/mH Category: M4

Location: 25, -25, 368.7 mm



0 dB = 0.123A/m

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## 14. System Verification

Date: 2010/3/8

## HAC\_E\_Dipole\_835MHz

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

Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\varepsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: E Dipole Section

Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 = 161.7 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 109.4 V/m; Power Drift = -0.027 dB Hearing Aid Near-Field Category: M4 (AWF 0 dB)

#### Peak E-field in V/m

Grid 1	Grid 2	Grid 3
158.3 M4	161.7 M4	157.1 M4
Grid 4	Grid 5	Grid 6
85.7 M4	87.3 M4	84.0 M4
Grid 7	Grid 8	Grid 9
168.5 M4	176.9 M4	173.4 M4

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AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
0	199.5 - 354.8	0.6 - 1.07
-5	149.6 - 266.1	0.45 - 0.8
0	112.2 - 199.5	0.34 - 0.6
-5	84.1 - 149.6	0.25 - 0.45
0	63.1 - 112.2	0.19 - 0.34
-5	47.3 - 84.1	0.14 - 0.25
0	<63.1	<0.19
-5	<47.3	<0.14
AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
0	631 - 1122	1.91 - 3.39
-5	473.2 - 841.4	1.43 - 2.54
0	354.8 - 631	1.07 - 1.91
-5	266.1 - 473.2	0.8 - 1.43
0	199.5 - 354.8	0.6 - 1.07
-5	149.6 - 266.1	0.45 - 0.8
0	<199.5	<0.6
-		
	(dB)  0  -5  0  -5  0  -5  AWF (dB)  0  -5  0  -5  -5  0  -5  0  -5	(dB) 960MHz  0 199.5 - 354.8  -5 149.6 - 266.1  0 112.2 - 199.5  -5 84.1 - 149.6  0 63.1 - 112.2  -5 47.3 - 84.1  0 <63.1  -5 <47.3  AWF (dB) 960MHz  0 631 - 1122  -5 473.2 - 841.4  0 354.8 - 631  -5 266.1 - 473.2  0 199.5 - 354.8  -5 149.6 - 266.1

#### **Cursor:**

Total = 176.9 V/mE Category: M4

Location: -1, 79.5, 364.7 mm



0 dB = 176.9V/m

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Date: 2010/3/8

## HAC\_H\_Dipole\_835MHz

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

Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\varepsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>

Phantom section: H Dipole Section

### DASY4 Configuration:

Probe: H3DV6 - SN6142; ; Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 = 0.448 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 0.478 A/m; Power Drift = -0.073 dB

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

#### Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.366 M4	0.397 M4	0.384 M4
Grid 4	Grid 5	Grid 6
0.409 M4	0.448 M4	0.436 M4
Grid 7	Grid 8	Grid 9
0.366 M4	0.403 M4	0.393 M4

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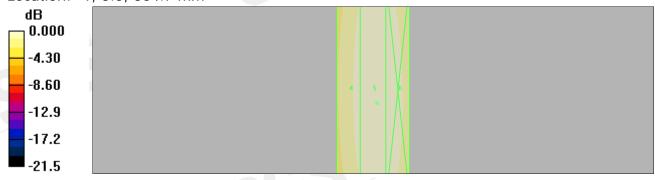
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Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
\	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 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
		11110	

#### **Cursor:**

Total = 0.448 A/mH Category: M4

Location: -1, 3.5, 364.7 mm



0 dB = 0.448A/m

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Date: 2010/3/8

## HAC\_E\_Dipole\_1880MHz

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

Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\varepsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: E Dipole Section

### **DASY4** Configuration:

Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 = 136.3 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 175.6 V/m; Power Drift = -0.025 dB Hearing Aid Near-Field Category: M2 (AWF 0 dB)

#### Peak E-field in V/m

Grid 1	Grid 2	Grid 3
132.8 M2	136.3 M2	133.5 M2
Grid 4	Grid 5	Grid 6
105.3 M3	107.3 M3	104.4 M3
		i i
Grid 7	Grid 8	Grid 9

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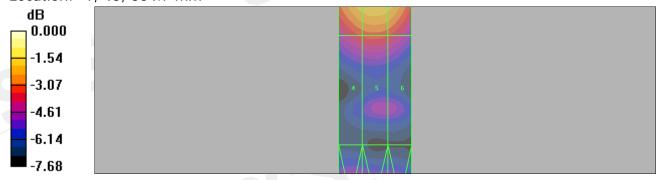
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AWF (dB)		Limits for H-Field Emissions (A/m) > 960MHz
0	199.5 - 354.8	0.6 - 1.07
-5	149.6 - 266.1	0.45 - 0.8
0	112.2 - 199.5	0.34 - 0.6
-5	84.1 - 149.6	0.25 - 0.45
0	63.1 - 112.2	0.19 - 0.34
-5	47.3 - 84.1	0.14 - 0.25
0	<63.1	<0.19
-5	<47.3	<0.14
AWF (dB)		Limits for H-Field Emissions (A/m) < 960 MHz
0	631 - 1122	1.91 - 3.39
-5	473.2 - 841.4	1.43 - 2.54
0	354.8 - 631	1.07 - 1.91
-5	266.1 - 473.2	0.8 - 1.43
0	199.5 - 354.8	0.6 - 1.07
-5	149.6 - 266.1	0.45 - 0.8
0	<199.5	<0.6
-5	<149.6	<0.45
	(dB)  0  -5  0  -5  0  -5  0  -5  0  -5  0  -5  0  -5  0  -5  0  -5  0  -5  0	(dB) 960MHz  0 199.5 - 354.8  -5 149.6 - 266.1  0 112.2 - 199.5  -5 84.1 - 149.6  0 63.1 - 112.2  -5 47.3 - 84.1  0   47.3 - 84.1  -5     AWF (dB) Limits for E-Field Emissions (V/m) < 960MHz

#### **Cursor:**

Total = 156.7 V/mE Category: M2

Location: -1, 43, 364.7 mm



0 dB = 156.7V/m

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Date: 2010/3/8

## HAC\_H\_Dipole\_1880MHz

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

Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\varepsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>

Phantom section: H Dipole Section

#### **DASY4** Configuration:

Probe: H3DV6 - SN6142; ; Calibrated: 2009/4/27

Sensor-Surface: (Fix Surface)

Electronics: DAE4 Sn547; Calibrated: 2010/1/22

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 = 0.446 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 0.469 A/m; Power Drift = -0.029 dB Hearing Aid Near-Field Category: M2 (AWF 0 dB)

#### Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.366 M2	0.404 M2	0.397 M2
Grid 4	Grid 5	Grid 6
0.407 M2	0.446 M2	0.437 M2
Grid 7	Grid 8	Grid 9
0.379 M2	0.416 M2	0.405 M2

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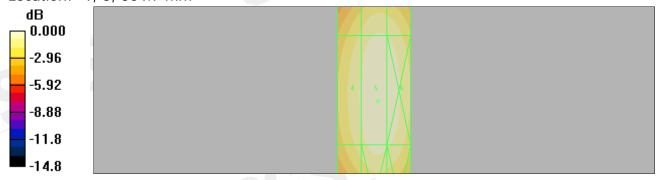
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Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz	
M1	0	199.5 - 354.8	0.6 - 1.07	
\	-5	149.6 - 266.1	0.45 - 0.8	
M2	0	112.2 - 199.5	0.34 - 0.6	
	-5	84.1 - 149.6	0.25 - 0.45	
M3	0	63.1 - 112.2	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	_	.100 Г	<0.6	
IVI4	0	<199.5	<0.0	

#### **Cursor:**

Total = 0.446 A/mH Category: M2

Location: -1, 3, 364.7 mm



0 dB = 0.446A/m

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## 15. DAE & Probe Calibration certificate

Calibration Laboratory of SNISS Schweizerischer Kalibrierdienst Schmid & Partner Service suisse d'étalonnage ac-MRA STIBRATIO C Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland Servizio svizzero di taratura **Swiss Calibration Service** Accredited by the Swiss Accreditation Service (SAS) Accreditation No.: SCS 108 The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates SGS - TW (Auden) Certificate No: DAE4-547\_Jan10 **CALIBRATION CERTIFICATE** DAE4 - SD 000 D04 BJ - SN: 547 Object QA CAL-06.v12 Calibration procedure(s) Calibration procedure for the data acquisition electronics (DAE) Calibration date: January 22, 2010 This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70% Calibration Equipment used (M&TE critical for calibration) Primary Standards ID# Cal Date (Certificate No.) Scheduled Calibration Keithley Multimeter Type 2001 SN: 0810278 1-Oct-09 (No: 9055) Oct-10 Secondary Standards ID# Check Date (in house) Scheduled Check Calibrator Box V1.1 SE UMS 006 AB 1004 05-Jun-09 (in house check) In house check: Jun-10 Function Calibrated by: Andrea Guntli Technician Approved by: Fin Bomholt R&D Director Issued: January 26, 2010 This calibration certificate shall not be reproduced except in full without written approval of the laboratory Certificate No: DAE4-547\_Jan10 Page 1 of 5

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### Calibration Laboratory of

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





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Accredited by the Swiss Accreditation Service (SAS)

SGS (Auden)

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Accreditation No.: SCS 108

Certificate No: ER3-2306\_Apr09

#### **CALIBRATION CERTIFICATE**

ER3DV6 - SN:2306 Object

Calibration procedure(s) QA CAL-02.v5

Calibration procedure for E-field probes optimized for close near field

evaluations in air

April 27, 2009 Calibration date

In Tolerance Condition of the calibrated item

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%.

Primary Standards	ID#	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ER3DV6	SN: 2328	1-Oct-08 (No. ER3-2328_Oct08)	Oct-09
DAE4	SN: 789	19-Dec-08 (No. DAE4-789_Dec08)	Dec-09
Secondary Standards	ID#	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09
	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	Stor Kal
		X	11/2
Approved by:	Niels Kuster	Quality Manager	1/20

Certificate No: ER3-2306 Apr09

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Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

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#### Glossary:

NORMx,y,z sensitivity in free space DCP diode compression point Polarization φ φ rotation around probe axis

Polarization 9 9 rotation around an axis that is in the plane normal to probe axis (at

measurement center), i.e.,  $\vartheta$  = 0 is normal to probe axis

Connector Angle information used in DASY system to align probe sensor X to the robot

coordinate system

#### Calibration is Performed According to the Following Standards:

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

#### Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization  $\vartheta = 0$  for XY sensors and  $\vartheta = 90$  for Z sensor (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide).
- NORM(f)x,y,z = NORMx,y,z \* frequency\_response (see Frequency Response Chart).
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency.
- 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 NORMx (no uncertainty required).

Certificate No: ER3-2306\_Apr09

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ER3DV6 SN:2306

April 27, 2009



# Probe ER3DV6

SN:2306

Manufactured:

December 17, 2002

Last calibrated: Recalibrated:

April 17, 2008 April 27, 2009

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: ER3-2306\_Apr09

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ER3DV6 SN:2306

April 27, 2009

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

Sensitivity in Free Space [μV/(V/m)<sup>2</sup>]

Diode Compression<sup>A</sup>

NormX 1.11 ± 10.1 % (k=2) NormY 1.13 ± 10.1 % (k=2)

96 mV DCP X DCP Y

NormZ 1.27 ± 10.1 % (k=2)

96 mV DCP Z 99 mV

#### Frequency Correction

X 0.0 0.0 7 0.0

Sensor Offset (Probe Tip to Sensor Center)

> X 2.5 mm 2.5 mm Z 2.5 mm

Connector Angle -226°

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%.

numerical linearization parameter; uncertainty not required

Certificate No: ER3-2306\_Apr09

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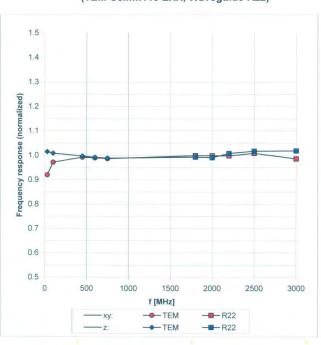
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ER3DV6 SN:2306

April 27, 2009

#### Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide R22)



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Certificate No: ER3-2306 Apr09

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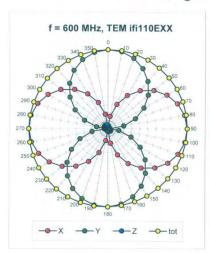
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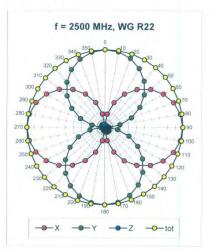


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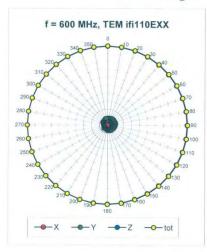
ER3DV6 SN:2306 April 27, 2009

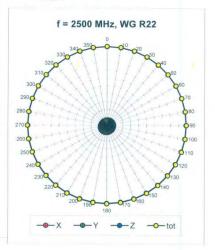
### Receiving Pattern ( $\phi$ ), $\vartheta = 0^{\circ}$





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





Certificate No: ER3-2306 Apr09

Page 6 of 9

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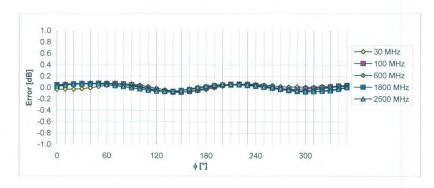


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ER3DV6 SN:2306

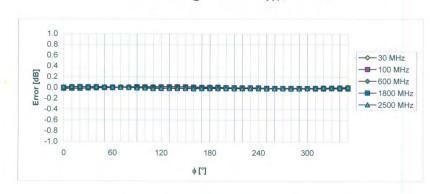
April 27, 2009

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



Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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



Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Certificate No: ER3-2306\_Apr09

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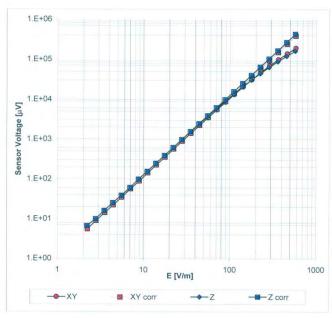
Page: 70 of 93

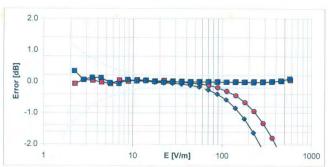
ER3DV6 SN:2306

April 27, 2009

#### Dynamic Range f(E-field)

(Waveguide R22, f = 1800 MHz)





Uncertainty of Linearity Assessment: ± 0.6% (k=2)

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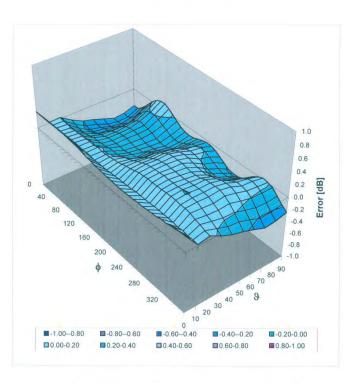


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ER3DV6 SN:2306

April 27, 2009

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



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

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





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The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

SGS (Auden)

Accreditation No.: SCS 108

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Certificate No: H3-6142\_Apr09

#### **CALIBRATION CERTIFICATE** H3DV6 - SN:6142 Object Calibration procedure(s) QA CAL-03.v5 Calibration procedure for H-field probes optimized for close near field evaluations in air Calibration date April 27, 2009 In Tolerance This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI) The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate All calibrations have been conducted in the closed laboratory facility; environment temperature (22 ± 3)°C and humidity < 70%. Calibration Equipment used (M&TE critical for calibration) Primary Standards Cal Date (Certificate No.) Scheduled Calibration Apr-10 Power meter E4419B GB41293874 1-Apr-09 (No. 217-01030) MY41495277 Power sensor E4412A 1-Apr-09 (No. 217-01030) Apr-10 Power sensor E4412A MY41498087 1-Apr-09 (No. 217-01030) Apr-10 Reference 3 dB Attenuator SN: S5054 (3c) 31-Mar-09 (No. 217-01026) Mar-10 Reference 20 dB Attenuator SN: S5086 (20b) 31-Mar-09 (No. 217-01028) Mar-10 Reference 30 dB Attenuator SN: S5129 (30b) 31-Mar-09 (No. 217-01027) Mar-10 Reference Probe H3DV6 SN: 6182 1-Oct-08 (No. H3-6182\_Oct08) Oct-09 DAE4 SN: 789 19-Dec-08 (No. DAE4-789\_Dec08) Dec-09 Secondary Standards Check Date (in house) Scheduled Check US3642U01700 RF generator HP 8648C 4-Aug-99 (in house check Oct-07) 18-Oct-01 (in house check Oct-08) In house check: Oct-09 Network Analyzer HP 8753E US37390585 In house check: Oct-09 Function Calibrated by Katja Pokovic Technical Manager Niels Kuster Quality Manager Approved by:

Certificate No: H3-6142 Apr09

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Issued: April 27, 2009



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### Calibration Laboratory of

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





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

Accreditation No.: SCS 108

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

#### Glossary:

NORMx,y,z sensitivity in free space DCP diode compression point Polarization o φ rotation around probe axis

Polarization 9 9 rotation around an axis that is in the plane normal to probe axis (at

measurement center), i.e., 9 = 0 is normal to probe axis

Connector Angle information used in DASY system to align probe sensor X to the robot

coordinate system

### Calibration is Performed According to the Following Standards:

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

## Methods Applied and Interpretation of Parameters:

- X, Y, Z\_a0a1a2: Assessed for E-field polarization  $\theta = 90$  for XY sensors and  $\theta = 0$  for Z sensor (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide).
- X,Y,Z(f) a0a1a2= X,Y,Z a0a1a2\* frequency response (see Frequency Response Chart).
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency.
- Spherical isotropy (3D deviation from isotropy): in a locally homogeneous field realized using an open waveguide setup.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the X\_a0a1a2 (no uncertainty required).

Certificate No: H3-6142\_Apr09

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H3DV6 SN:6142

April 27, 2009



# Probe H3DV6

SN:6142

Manufactured: Last calibrated: Recalibrated:

July 3, 2002 April 21, 2008 April 27, 2009

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: H3-6142\_Apr09

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H3DV6 SN:6142

April 21, 2008



## Probe H3DV6

SN:6142

Manufactured: Last calibrated: Recalibrated:

July 3, 2002 April 20, 2007 April 21, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: H3-6142\_Apr06

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H3DV6 SN:6142

April 27, 2009

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

Sensitivity in Free Space [A/m / √(µV)]

	a0 a	a1	a2	
X	2.743E-03	-1.034E-4	-1.138E-5	± 5.1 % (k=2)
Y	2.722E-03	-1.151E-4	1.011E-5	± 5.1 % (k=2)
Z	3.121E-03	-3.459E-4	4.339E-5	± 5.1 % (k=2)

## Diode Compression<sup>1</sup>

DCP X	<b>82</b> mV
DCP Y	<b>89</b> mV
DCP 7	82 m\/

Sensor Offset (Probe Tip to Sensor Center)

X	3.0 mm
Υ	3.0 mm
Z	3.0 mm

Connector Angle -248 °

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%.

numerical linearization parameter: uncertainty not required

Certificate No: H3-6142\_Apr09

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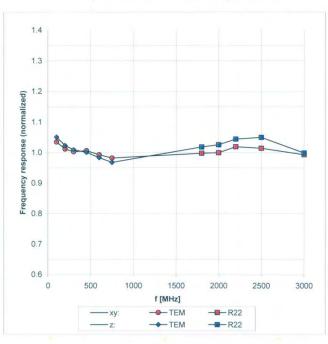
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H3DV6 SN:6142

April 27, 2009

## Frequency Response of H-Field

(TEM-Cell:ifi110 EXX, Waveguide R22)



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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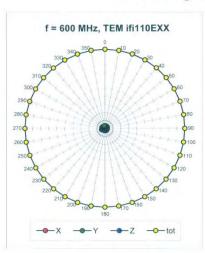


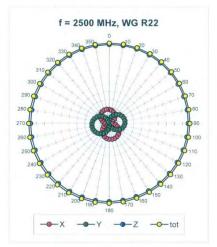
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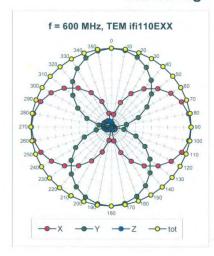
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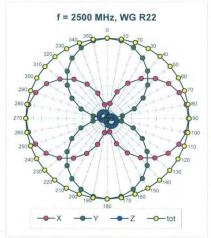
## Receiving Pattern ( $\phi$ ), $\theta$ = 90°





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





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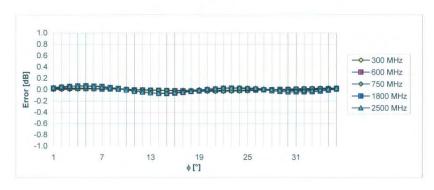


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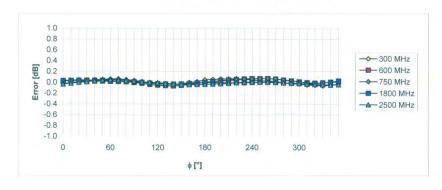
April 27, 2009

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



Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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



Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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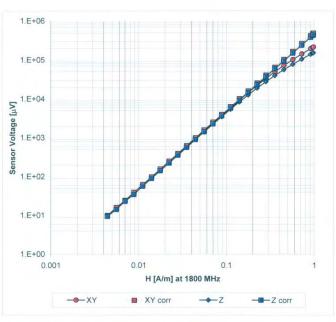
Page: 80 of 93

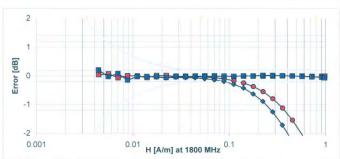
H3DV6 SN:6142

April 27, 2009

## Dynamic Range f(H-field)

(Waveguide R22, f = 1800 MHz)





Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Certificate No: H3-6142 Apr09

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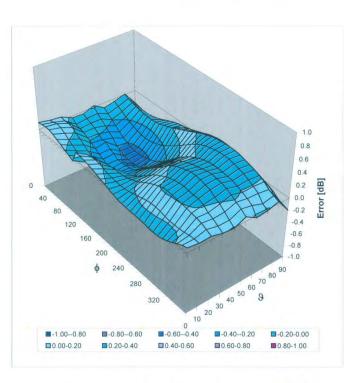


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H3DV6 SN:6142

April 27, 2009

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



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Certificate No: H3-6142\_Apr09

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## 16. Uncertainty Analysis

## HAC-Extension Setup Performance Test Using SPEAG Calibration Dipoles

Error Description	Uncertainty value	Prob. Dist.	Div.	$(c_i)$	$(c_i)$	Std. Unc.	Std. Unc
Measurement System							
Probe Calibration	15.1%	N	1	1	1	1.5.1 %	±5.1%
Axial Isotropy	14.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%
Sensor Displacement	±16.5%	R	$\sqrt{3}$	1	0.145	19.5%	±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	13.0%	R	$\sqrt{3}$	1	I	£1.7%	11.7%
RF Reflections	16.0%	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	11.0%	R	$\sqrt{3}$	1	J	10.6%	10.6%
Dipole Related							
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		1				±13.7 %	±9.3 %
Expanded Std. Uncertainty or		L. i				27.4 %	18.6 %
Expanded Std. Uncertainty or	n Field					±13.7 %	$\pm 9.3 \%$

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





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C

SGS (Auden)

Certificate No: CD835V3-1052\_Apr09

Dbject	CD835V3 - SN	: 1052			
Calibration procedure(s)	QA CAL-20.v4 Calibration pro	cedure for dipoles in air			
Calibration date:	April 22, 2009				
Condition of the calibrated item	In Tolerance				
Calibration Equipment used (M&T	E critical for calibration				
Primary Standards	ID#	Cal Date (Certificate No.)	Scheduled Calibration		
Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09		
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09		
Probe ER3DV6	SN: 2336	22-Dec-08 (No. ER3-2336_Dec08)	Dec-09		
Probe H3DV6	SN: 6065	22-Dec-08 (No. H3-6065Dec08)	Dec-09		
DAE4	SN: 781	20-Feb-09 (No. DAE4-781_Feb09)	Feb-10		
Secondary Standards	ID#	Check Date (in house)	Scheduled Check		
Power meter R&S NRP	SN: 101748	23-Sep-08 (in house check Dec-08)	In house check: Dec-10		
	SN: 100711	25-Aug-08 (in house check Dec-08)	In house check: Dec-10		
Power sensor R&S NRP-Z91	SN: 100712	25-Aug-08 (in house check Dec-08)	In house check: Dec-10		
	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09		
Power sensor R&S NRP-Z91			In house check: Oct-09		
Power sensor R&S NRP-Z91 Network Analyzer HP 8753E	MY 41310391	03-Nov-04 (in house check Oct-07)			
Power sensor R&S NRP-Z91 Network Analyzer HP 8753E		03-Nov-04 (in house check Oct-07)  Function	Signature		
Power sensor R&S NRP-Z91 Power sensor R&S NRP-Z91 Network Analyzer HP 8753E RF generator E4433B  Callibrated by:	MY 41310391		Signature		
Power sensor R&S NRP-Z91 Network Analyzer HP 8753E RF generator E4433B	MY 41310391	Function	Signature		

Certificate No: CD835V3-1052 Apr09

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### 3.3.2 DASY4 H-field Result

Date/Time: 21.04.2009 12:38:12

Test Laboratory: SPEAG Lab 2

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1052

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1 Medium parameters used:  $\sigma=0$  mho/m,  $\epsilon_r=1$ ;  $\rho=1$  kg/m³

Phantom section: RF Section Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: H3DV6 SN6065: : Calibrated: 22.12.2008
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 20.02.2009
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

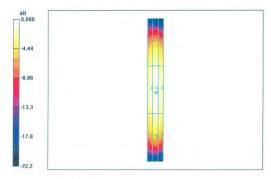
H Scan - measurement distance from the probe sensor center to CD835 Dipole =

10mm/Hearing Aid Compatibility Test (41x361x1): Measurement grid: dx=5mm, dy=5mm Maximum value of peak Total field = 0.457 A/m Probe Modulation Factor = 1.00 Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.486 A/m; Power Drift = -0.014 dB Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.380 M4	0.403 M4	0.383 M4
Grid 4	Grid 5	Grid 6
0.427 M4	<b>0.457 M4</b>	0.437 M4
Grid 7	Grid 8	Grid 9
<b>0.378 M4</b>	0.409 M4	<b>0.391 M4</b>



0 dB = 0.457 A/m

Certificate No: CD835V3-1052 Apr09

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### 3.3.3 DASY4 E-field Result

Date/Time: 22.04.2009 13:19:44

Test Laboratory: SPEAG Lab 2

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1052 Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1 Medium parameters used:  $\sigma=0$  mho/m,  $\epsilon_r=1$ ;  $\rho=1000$  kg/m³ Phantom section: RF Section

Measurement Standard: DASY4 (High Precision Assessment)

#### DASY4 Configuration:

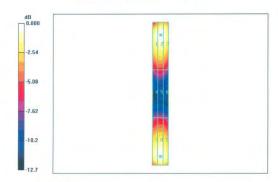
- Probe: ER3DV6 SN2336; ConvF(1, 1, 1); Calibrated: 22.12.2008
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 20.02.2009
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Measurement grid: dx=5mm, dy=5mm Maximum value of peak Total field = 168.7 V/m Probe Modulation Factor = 1.00 Device Reference Point: 0.000, 0.000, -6.30 mm Reference Value = 109.0 V/m; Power Drift = -0.002 dB Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
162.3 M4	168.3 M4	164.0 M4
Grid 4	Grid 5	Grid 6
86.8 M4	89.2 M4	86.0 M4
Grid 7	Grid 8	Grid 9
161.9 M4	168.7 M4	163.6 M4



0 dB = 168.7 V/m

Certificate No: CD835V3-1052\_Apr09

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





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SGS (Auden)

Certificate No: CD1880V3-1044\_Apr09

Accreditation No.: SCS 108

Object	CD1880V3 - SN: 1044			
Calibration procedure(s)	QA CAL-20.v4	cedure for dipoles in air		
	Cambradon pro	occure for dipoles in all		
Calibration date:	April 22, 2009	<b>创度是共享的的</b>		
Condition of the calibrated item	In Tolerance			
Calibration Equipment used (M& Primary Standards	ID#	Cal Date (Certificate No.)	Scheduled Calibration	
Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09	
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09	
Probe ER3DV6	SN: 2336	22-Dec-08 (No. ER3-2336_Dec08)	Dec-09 Dec-09	
Probe H3DV6	SN: 6065 SN 781	22-Dec-08 (No. H3-6065Dec08) 20-Feb-09 (No. DAE4-781 Feb09)	Feb-10	
	1.4			
DAE4	ID#	Check Date (in house)	Scheduled Check	
DAE4 Secondary Standards	1			
DAE4 Secondary Standards Power meter R&S NRP	ID#	Check Date (in house)	In house check: Dec-10 In house check: Dec-10	
DAE4 Secondary Standards Power meter R&S NRP Power sensor R&S NRP-Z91	ID # SN: 101748 SN: 100711 SN: 100712	Check Date (in house) 23-Sep-08 (in house check Dec-08) 25-Aug-08 (in house check Dec-08) 25-Aug-08 (in house check Dec-08)	In house check: Dec-10 In house check: Dec-10 In house check: Dec-10	
DAE4  Secondary Standards  Power meter R&S NRP  Power sensor R&S NRP-Z91  Power sensor R&S NRP-Z91  Network Analyzer HP 8753E	ID# SN: 101748 SN: 100711 SN: 100712 US37390585	Check Date (in house) 23-Sep-08 (in house check Dec-08) 25-Aug-08 (in house check Dec-08) 25-Aug-08 (in house check Dec-08) 18-Oct-01 (in house check Oct-08)	In house check: Dec-10 In house check: Dec-10 In house check: Dec-10 In house check: Oct-09	
DAE4  Secondary Standards  Power meter R&S NRP  Power sensor R&S NRP-Z91  Power sensor R&S NRP-Z91  Network Analyzer HP 8753E	ID # SN: 101748 SN: 100711 SN: 100712	Check Date (in house) 23-Sep-08 (in house check Dec-08) 25-Aug-08 (in house check Dec-08) 25-Aug-08 (in house check Dec-08)	In house check: Dec-10 In house check: Dec-10 In house check: Dec-10 In house check: Oct-09	
Secondary Standards Power meter R&S NRP Power sensor R&S NRP-Z91 Power sensor R&S NRP-Z91 Network Analyzer HP 8753E RF generator E4433B	ID # SN: 101748 SN: 100711 SN: 100712 US37390585 MY 41310391	Check Date (in house) 23-Sep-08 (in house check Dec-08) 25-Aug-08 (in house check Dec-08) 25-Aug-08 (in house check Dec-08) 18-Oct-01 (in house check Oct-08) 22-Nov-04 (in house check Oct-07)	Scheduled Check In house check: Dec-10 In house check: Dec-10 In house check: Oct-09 In house check: Oct-09 Signature	
Secondary Standards Power meter R&S NRP Power sensor R&S NRP-Z91 Power sensor R&S NRP-Z91 Network Analyzer HP 8753E RF generator E4433B	ID # SN: 101748 SN: 100711 SN: 100712 US37390585 MY 41310391	Check Date (in house) 23-Sep-08 (in house check Dec-08) 25-Aug-08 (in house check Dec-08) 25-Aug-08 (in house check Dec-08) 18-Oct-01 (in house check Oct-08) 22-Nov-04 (in house check Oct-07)	In house check: Dec-10 In house check: Dec-10 In house check: Dec-10 In house check: Oct-09 In house check: Oct-09	
DAE4  Secondary Standards  Power meter R&S NRP  Power sensor R&S NRP-Z91  Power sensor R&S NRP-Z91  Network Analyzer HP 8753E  RF generator E4433B  Calibrated by:	ID # SN: 101748 SN: 100711 SN: 100712 US37390585 MY 41310391	Check Date (in house) 23-Sep-08 (in house check Dec-08) 25-Aug-08 (in house check Dec-08) 25-Aug-08 (in house check Dec-08) 18-Oct-01 (in house check Oct-08) 22-Nov-04 (in house check Oct-07)  Function Laboratory Technician	In house check: Dec-10 In house check: Dec-10 In house check: Dec-10 In house check: Oct-09 In house check: Oct-09 Signature	

Certificate No: CD1880V3-1044 Apr09

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### 3.3.2 DASY4 H-Field Result

Date/Time: 21.04.2009 15:31:24

Test Laboratory: SPEAG Lab 2

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: 1044 Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1 Medium parameters used:  $\sigma=0$  mho/m,  $\epsilon_r=1$ ;  $\rho=1$  kg/m³ Phantom section: RF Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: H3DV6 - SN6065; ; Calibrated: 22.12.2008

Sensor-Surface: (Fix Surface)

Electronics: DAE4 Sn781; Calibrated: 20.02.2009

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

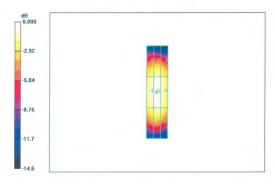
H Scan - measurement distance from the probe sensor center to CD1880 Dipole =

10mm/Hearing Aid Compatibility Test (41x181x1): Measurement grid: dx=5mm, dy=5mmMaximum value of peak Total field = 0.463 A/m Probe Modulation Factor = 1.00Device Reference Point: 0.000, 0.000, -6.30 mm Reference Value = 0.490 A/m; Power Drift = -0.003 dB

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

Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.404 M2	0.421 M2	0.399 M2
Grid 4	Grid 5	Grid 6
0.444 M2	0.463 M2	0.438 M2
Grid 7	Grid 8	Grid 9
<b>0.406 M2</b>	0.427 M2	<b>0.402 M2</b>



0 dB = 0.463 A/m

Certificate No: CD1880V3-1044 Apr09

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#### 3.3.3 DASY4 E-Field Result

Date/Time: 22.04.2009 14:56:09

Test Laboratory: SPEAG Lab 2

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: 1044 Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1 Medium parameters used:  $\sigma=0$  mho/m,  $\epsilon_r=1$ ;  $\rho=1000$  kg/m $^3$ Phantom section: RF Section

Measurement Standard: DASY4 (High Precision Assessment)

#### DASY4 Configuration:

- Probe: ER3DV6 SN2336; ConvF(1, 1, 1); Calibrated: 22.12.2008
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 20.02.2009
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

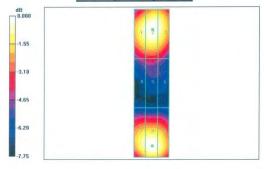
E Scan - measurement distance from the probe sensor center to CD1880 Dipole =

10mm/Hearing Aid Compatibility Test (41x181x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 138.3 V/m
Probe Modulation Factor = 1.00
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 155.4 V/m; Power Drift = 0.019 dB Hearing Aid Near-Field Category: M2 (AWF 0 dB)

#### Peak E-field in V/m

Grid 1	Grid 2	Grid 3
132.8 M2	137.9 M2	134.6 M2
Grid 4	Grid 5	Grid 6
89.3 M3	91.9 M3	88.1 M3
Grid 7	Grid 8	Grid 9
131.5 M2	138.3 M2	133.9 M2



0 dB = 138.3 V/m

Certificate No: CD1880V3-1044\_Apr09

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

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