

HAC RF H-Field WCDMA 1900 Low with Flip cover

Date: 2014-1-4

Electronics: DAE4 Sn777

Medium: Air

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

Ambient Temperature: 22.6°C

Communication System: WCDMA 1900; Frequency: 1852.4 MHz; Duty Cycle: 1:1

Probe: H3DV6 - SN6103;

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device 3/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.03600 A/m; Power Drift = -0.15 dB

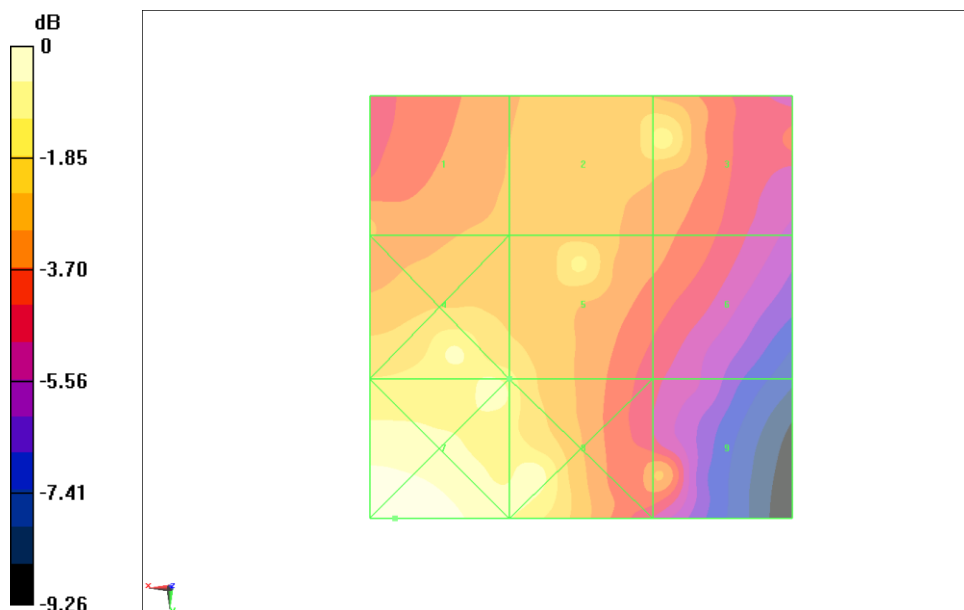
PMR not calibrated. PMF = 1.005 is applied.

H-field emissions = 0.03795 A/m

Near-field category: M4 (AWF 0 dB)

PMF scaled H-field

Grid 1 M4 0.032 A/m	Grid 2 M4 0.037 A/m	Grid 3 M4 0.038 A/m
Grid 4 M4 0.040 A/m	Grid 5 M4 0.038 A/m	Grid 6 M4 0.031 A/m
Grid 7 M4 0.045 A/m	Grid 8 M4 0.041 A/m	Grid 9 M4 0.032 A/m



0 dB = 0.04531 A/m = -26.88 dBA/m

Fig B.52 HAC RF H-Field WCDMA 1900 Low

Total M-rating of GSM 850 MHz Band with Flip cover

Date: 2014-1-4

Electronics: DAE4 Sn777

Medium: Air

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

Ambient Temperature:22.6°C

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

Probe: ER3DV6 - SN2272Probe: H3DV6 - SN6103;ConvF(1, 1, 1)

E Scan - ER3DV6 - 2007: 15 mm from Probe Center to the Device 2/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 41.08 V/m; Power Drift = -0.02 dB

PMR not calibrated. PMF = 2.875 is applied.

E-field emissions = 106.1 V/m

Near-field category: M4 (AWF -5 dB)

PMF scaled E-field

Grid 1 M4 103.5 V/m	Grid 2 M4 114.7 V/m	Grid 3 M4 113.6 V/m
Grid 4 M4 93.33 V/m	Grid 5 M4 106.1 V/m	Grid 6 M4 106.0 V/m
Grid 7 M4 80.17 V/m	Grid 8 M4 95.03 V/m	Grid 9 M4 95.16 V/m

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device 2/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.05300 A/m; Power Drift = -0.01 dB

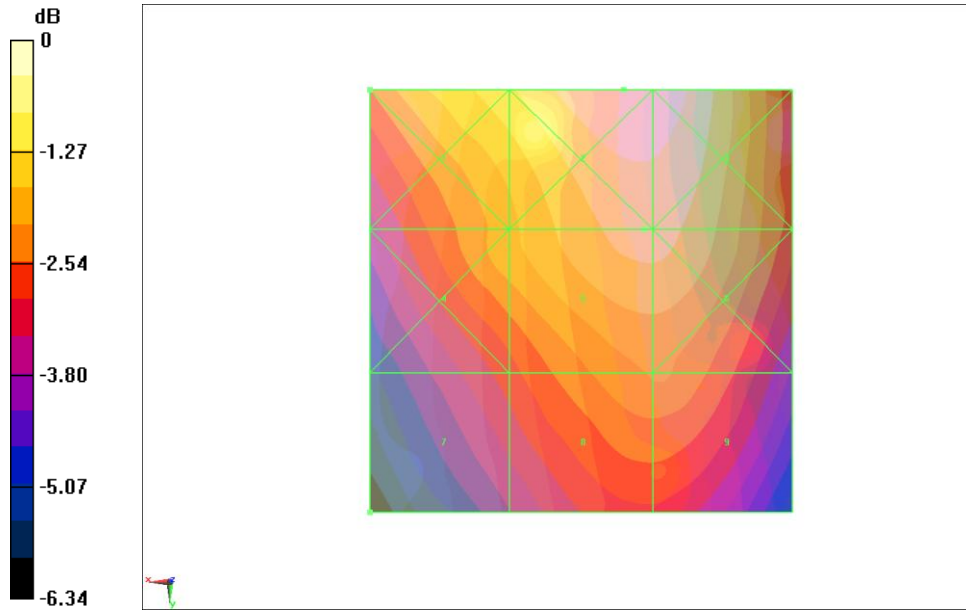
PMR not calibrated. PMF = 2.875 is applied.

H-field emissions = 0.2101 A/m

Near-field category: M4 (AWF -5 dB)

PMF scaled H-field

Grid 1 M4 0.235 A/m	Grid 2 M4 0.212 A/m	Grid 3 M4 0.118 A/m
Grid 4 M4 0.224 A/m	Grid 5 M4 0.166 A/m	Grid 6 M4 0.126 A/m
Grid 7 M4 0.210 A/m	Grid 8 M4 0.171 A/m	Grid 9 M4 0.150 A/m



0 dB = 114.9 V/m = 41.21 dBV/m

RF RESULTS AND M-RATING	E-Field M Rating	M4 (AWF -5 dB)
	H-Field M Rating	M4 (AWF -5 dB)
	Total M Rating	M4

Fig B.53 Total M-rating of GSM 850

Total M-rating of GSM 1900 MHz Band with Flip cover

Date: 2014-1-4

Electronics: DAE4 Sn777

Medium: Air

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

Ambient Temperature:22.6°C

Communication System: PCS 1900; Frequency: 1850.2 MHz; Frequency: 1880 MHz;Duty Cycle: 1:8.3

Probe: ER3DV6 - SN2272Probe: H3DV6 - SN6103;ConvF(1, 1, 1)

E Scan - ER3DV6 - 2007: 15 mm from Probe Center to the Device 3/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 13.34 V/m; Power Drift = -0.07 dB

PMR not calibrated. PMF = 2.884 is applied.

E-field emissions = 35.78 V/m

Near-field category: M4 (AWF -5 dB)

PMF scaled E-field

Grid 1 M4 34.57 V/m	Grid 2 M4 28.71 V/m	Grid 3 M4 25.69 V/m
Grid 4 M4 36.64 V/m	Grid 5 M4 32.79 V/m	Grid 6 M4 33.45 V/m
Grid 7 M4 39.12 V/m	Grid 8 M4 36.47 V/m	Grid 9 M4 35.78 V/m

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device 2/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.03400 A/m; Power Drift = -0.12 dB

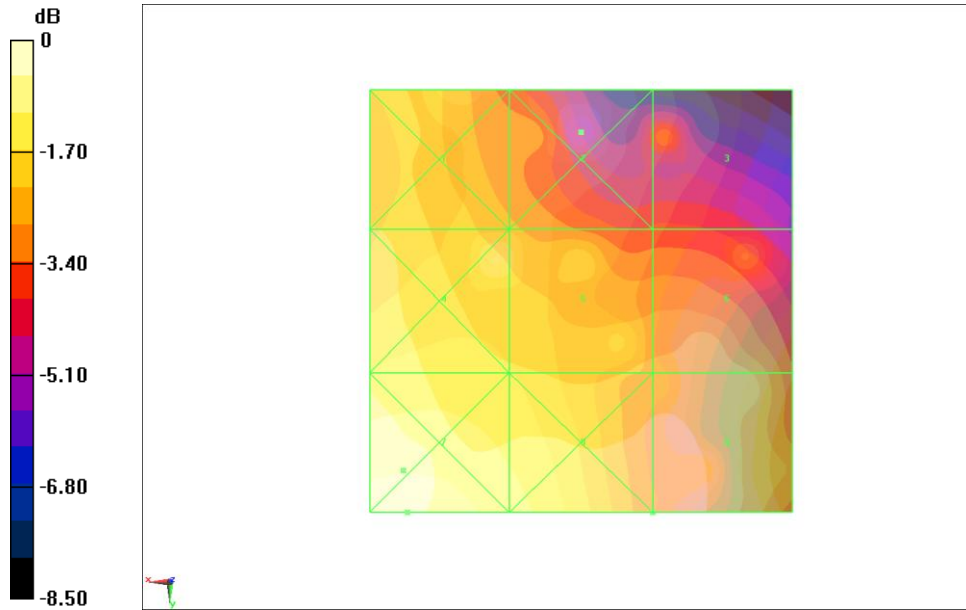
PMR not calibrated. PMF = 2.868 is applied.

H-field emissions = 0.08936 A/m

Near-field category: M4 (AWF -5 dB)

PMF scaled H-field

Grid 1 M4 0.079 A/m	Grid 2 M4 0.092 A/m	Grid 3 M4 0.068 A/m
Grid 4 M4 0.086 A/m	Grid 5 M4 0.083 A/m	Grid 6 M4 0.066 A/m
Grid 7 M4 0.089 A/m	Grid 8 M4 0.083 A/m	Grid 9 M4 0.059 A/m



0 dB = 39.08 V/m = 31.84 dBV/m

RF RESULTS AND M-RATING	E-Field M Rating	M4 (AWF -5 dB)
	H-Field M Rating	M4 (AWF -5 dB)
	Total M Rating	M4

Fig B.54 Total M-rating of GSM 1900

Total M-rating of WCDMA 850 MHz Band with Flip cover

Date: 2014-1-4

Electronics: DAE4 Sn777

Medium: Air

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

Ambient Temperature:22.6°C

Communication System: WCDMA 850; Frequency: 826.4 MHz; Frequency: 836.4 MHz;
Duty Cycle: 1:1

Probe: ER3DV6 - SN2272Probe: H3DV6 - SN6103;ConvF(1, 1, 1)

E Scan - ER3DV6 - 2007: 15 mm from Probe Center to the Device 3/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 42.21 V/m; Power Drift = -0.04 dB

PMR not calibrated. PMF = 1.003 is applied.

E-field emissions = 37.82 V/m

Near-field category: M4 (AWF 0 dB)

PMF scaled E-field

Grid 1 M4 37.03 V/m	Grid 2 M4 40.65 V/m	Grid 3 M4 40.04 V/m
Grid 4 M4 33.02 V/m	Grid 5 M4 37.82 V/m	Grid 6 M4 37.62 V/m
Grid 7 M4 28.48 V/m	Grid 8 M4 33.33 V/m	Grid 9 M4 33.32 V/m

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device 2/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.04900 A/m; Power Drift = -0.02 dB

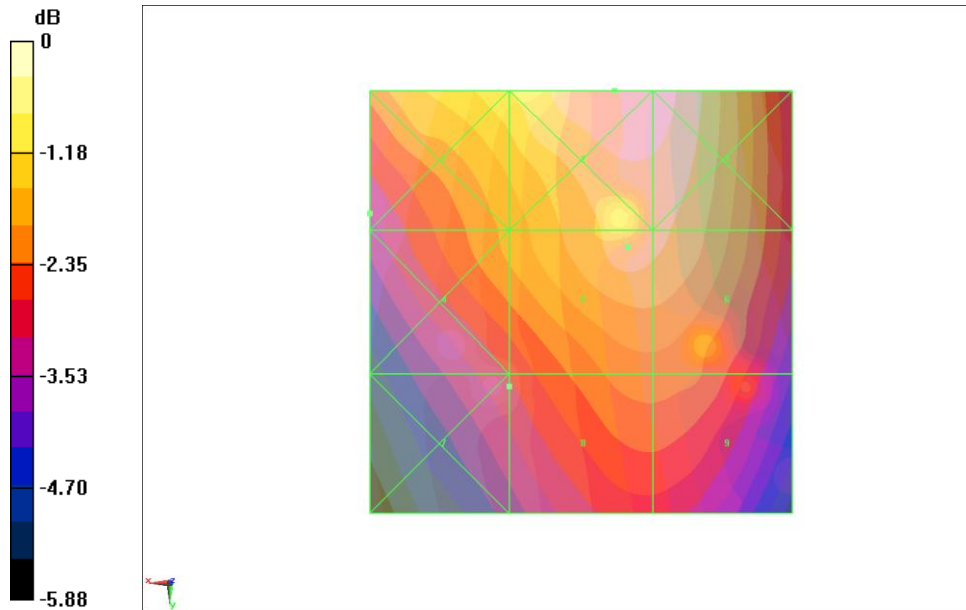
PMR not calibrated. PMF = 1.006 is applied.

H-field emissions = 0.06257 A/m

Near-field category: M4 (AWF 0 dB)

PMF scaled H-field

Grid 1 M4 0.077 A/m	Grid 2 M4 0.059 A/m	Grid 3 M4 0.040 A/m
Grid 4 M4 0.075 A/m	Grid 5 M4 0.060 A/m	Grid 6 M4 0.052 A/m
Grid 7 M4 0.068 A/m	Grid 8 M4 0.063 A/m	Grid 9 M4 0.050 A/m



0 dB = 40.65 V/m = 32.18 dBV/m

RF RESULTS AND M-RATING	E-Field M Rating	M4 (AWF 0 dB)
	H-Field M Rating	M4 (AWF 0 dB)
	Total M Rating	M4

Fig B.55 Total M-rating of WCDMA 850

Total M-rating of WCDMA 1900 MHz Band with Flip cover

Date: 2014-1-4

Electronics: DAE4 Sn777

Medium: Air

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

Ambient Temperature: 22.6°C

Communication System: WCDMA 1900; Frequency: 1852.4 MHz; Duty Cycle: 1:1

Probe: ER3DV6 - SN2272 Probe: H3DV6 - SN6103; ConvF(1, 1, 1)

E Scan - ER3DV6 - 2007: 15 mm from Probe Center to the Device 3/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 15.66 V/m; Power Drift = 0.06 dB

PMR not calibrated. PMF = 1.005 is applied.

E-field emissions = 14.65 V/m

Near-field category: M4 (AWF 0 dB)

PMF scaled E-field

Grid 1 M4 13.52 V/m	Grid 2 M4 11.33 V/m	Grid 3 M4 11.52 V/m
Grid 4 M4 14.10 V/m	Grid 5 M4 14.53 V/m	Grid 6 M4 14.65 V/m
Grid 7 M4 15.11 V/m	Grid 8 M4 15.50 V/m	Grid 9 M4 15.56 V/m

H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device 3/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.03600 A/m; Power Drift = -0.15 dB

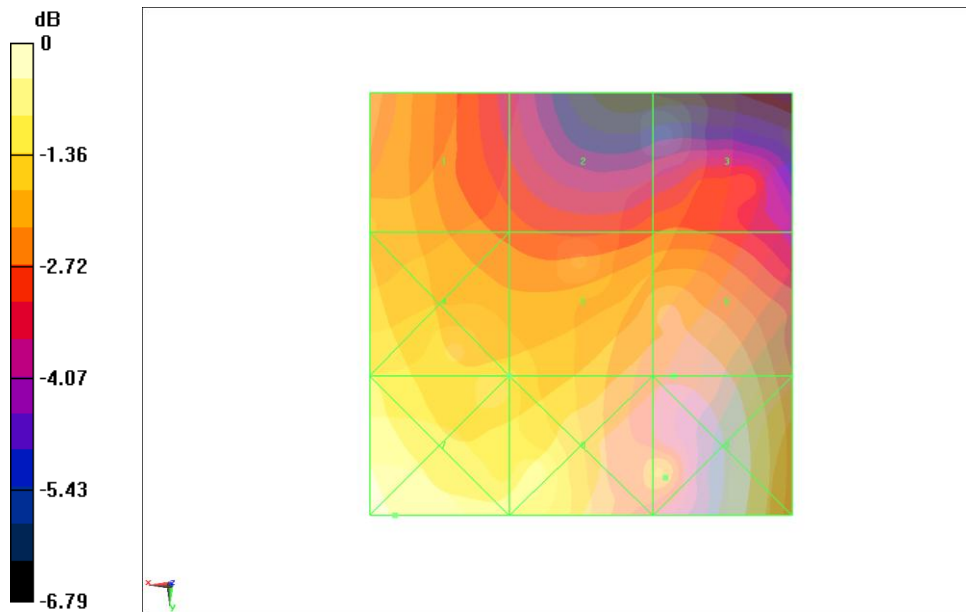
PMR not calibrated. PMF = 1.005 is applied.

H-field emissions = 0.03795 A/m

Near-field category: M4 (AWF 0 dB)

PMF scaled H-field

Grid 1 M4 0.032 A/m	Grid 2 M4 0.037 A/m	Grid 3 M4 0.038 A/m
Grid 4 M4 0.040 A/m	Grid 5 M4 0.038 A/m	Grid 6 M4 0.031 A/m
Grid 7 M4 0.045 A/m	Grid 8 M4 0.041 A/m	Grid 9 M4 0.032 A/m



0 dB = 15.56 V/m = 23.84 dBV/m

RF RESULTS AND M-RATING	E-Field M Rating	M4 (AWF 0 dB)
	H-Field M Rating	M4 (AWF 0 dB)
	Total M Rating	M4

Fig B.56 Total M-rating of WCDMA 1900

ANNEX C SYSTEM VALIDATION RESULT

E SCAN of Dipole 835 MHz

Date: 2014-1-4

Electronics: DAE4 Sn777

Medium: Air

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

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

Probe: ER3DV6 - SN2272;ConvF(1, 1, 1)

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 = 169.5 V/m

Probe Modulation Factor = 1

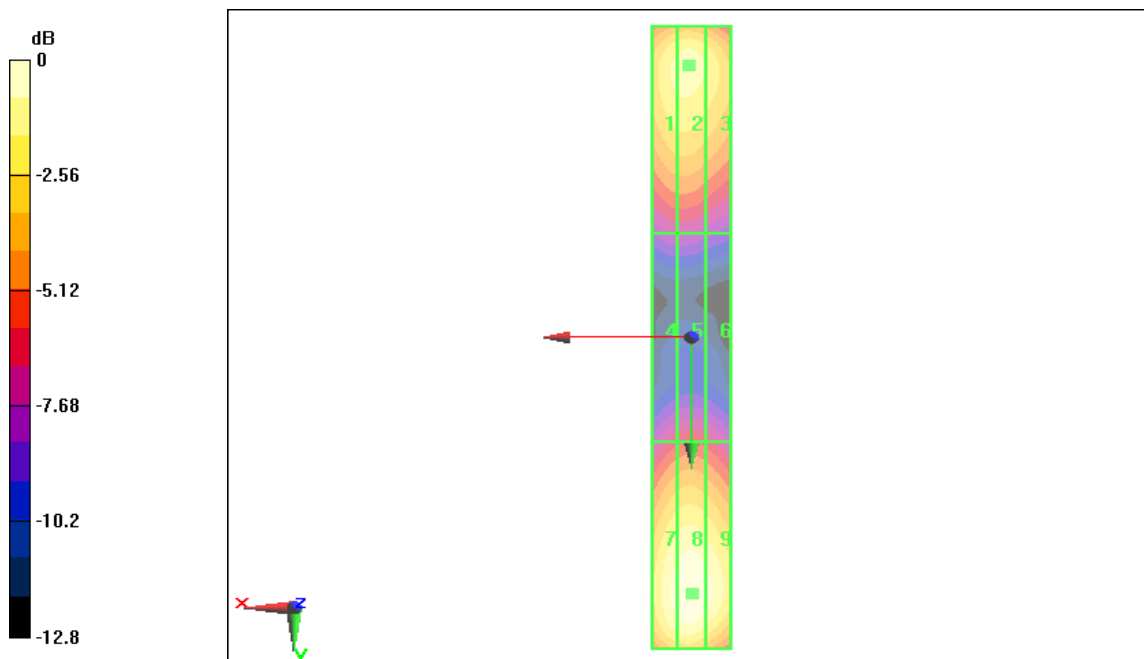
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 109.3 V/m; Power Drift = 0.12 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
159.6 M4	163.1 M4	154.8 M4
Grid 4	Grid 5	Grid 6
93.4 M4	93.6 M4	89.7 M4
Grid 7	Grid 8	Grid 9
158.7 M4	169.5M4	165.6 M4



0 dB = 167.8V/m

H SCAN of Dipole 835 MHz

Date: 2014-1-4

Electronics: DAE4 Sn777

Medium: Air

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

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

Probe: H3DV6 - SN6103;

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 = 0.469 A/m

Probe Modulation Factor = 1

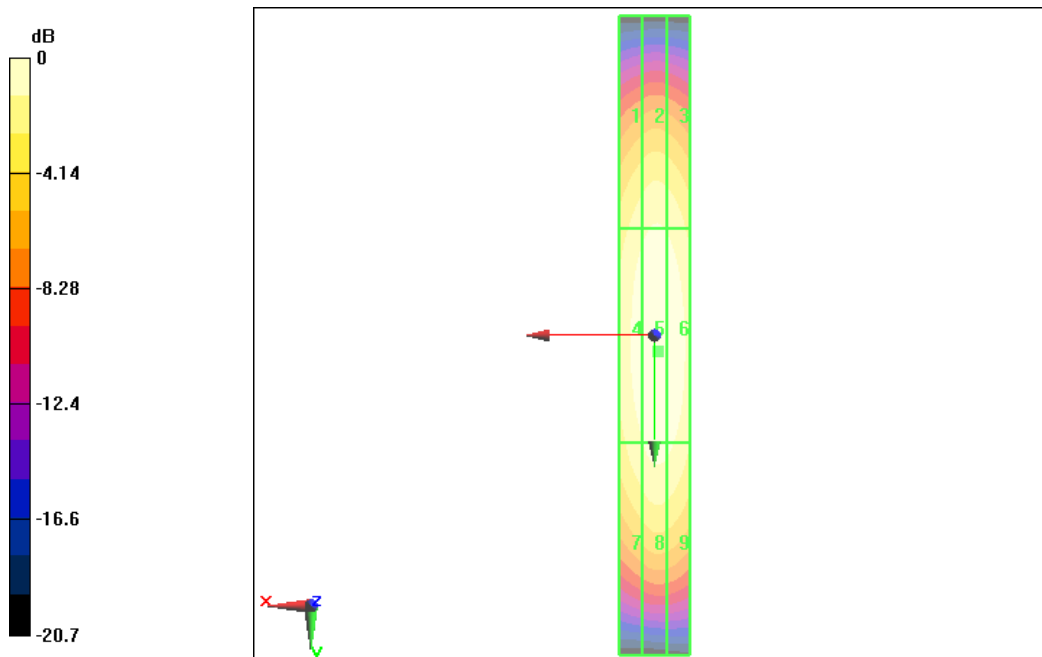
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.499 A/m; Power Drift = 0.06 dB

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

Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.390 M4	0.405 M4	0.387 M4
Grid 4	Grid 5	Grid 6
0.436 M4	0.469 M4	0.446 M4
Grid 7	Grid 8	Grid 9
0.394 M4	0.424 M4	0.410M4



0 dB = 0.469A/m

E SCAN of Dipole 1880 MHz

Date: 2014-1-4

Electronics: DAE4 Sn777

Medium: Air

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

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

Probe: ER3DV6 - SN2272;ConvF(1, 1, 1)

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 = 141.3 V/m

Probe Modulation Factor = 1

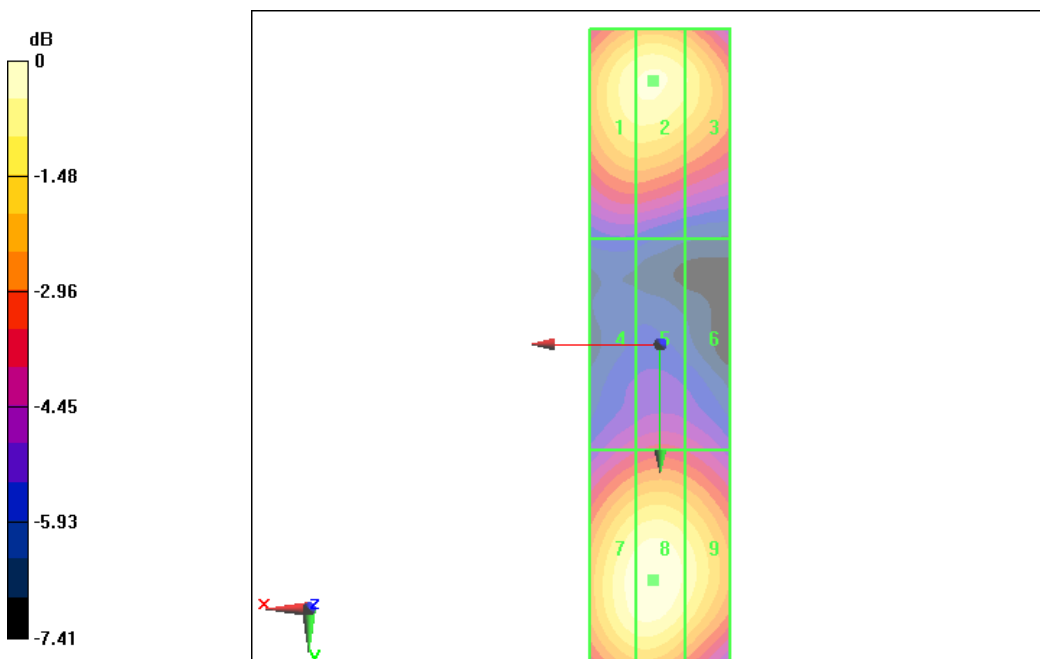
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 159.0 V/m; Power Drift = 0.17 dB

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

Peak E-field in V/m

Grid 1 136.8 M2	Grid 2 140.7 M2	Grid 3 137.0 M2
Grid 4 94.1 M3	Grid 5 96.6 M3	Grid 6 91.2 M3
Grid 7 132.8 M2	Grid 8 141.3 M2	Grid 9 138.4 M2



0 dB = 141.5V/m

H SCAN of Dipole 1880 MHz

Date: 2014-1-4

Electronics: DAE4 Sn777

Medium: Air

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

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

Probe: H3DV6 - SN6103;

H 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 = 0.456 A/m

Probe Modulation Factor = 1

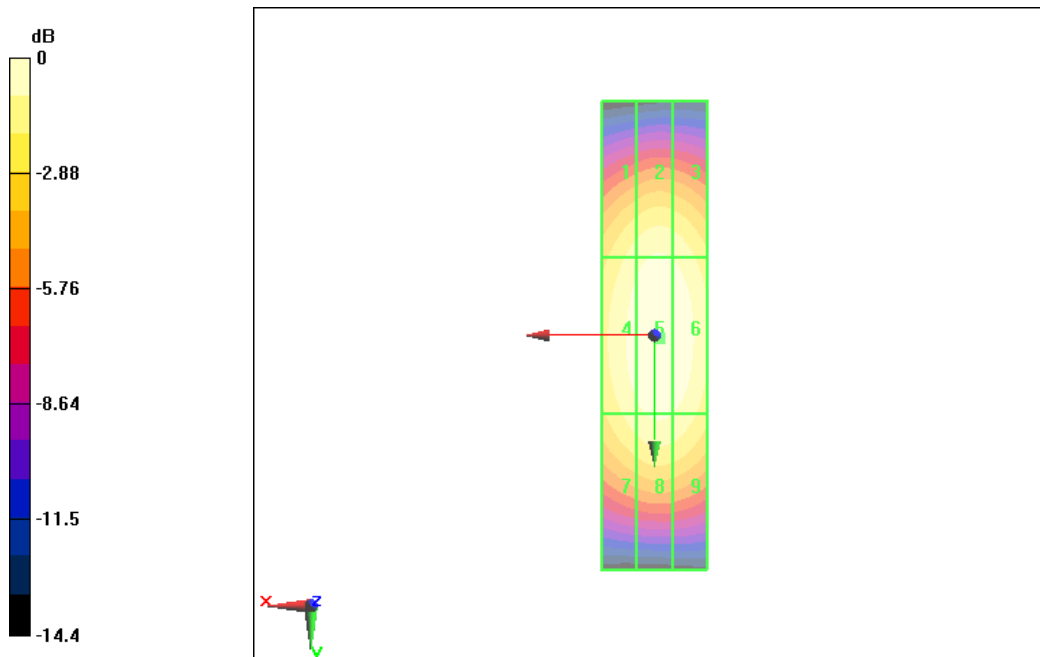
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.483 A/m; Power Drift = -0.11 dB

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

Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.396 M2	0.415 M2	0.396 M2
Grid 4	Grid 5	Grid 6
0.434 M2	0.456 M2	0.437 M2
Grid 7	Grid 8	Grid 9
0.394 M2	0.427 M2	0.405 M2



0 dB = 0.456A/m

ANNEX D PROBE CALIBRATION CERTIFICATE

E_Probe ER3DV6

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



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

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

Accreditation No.: **SCS 108**

Client **TMC-BJ (Auden)**

Certificate No: **ER3-2272_Jan13**

CALIBRATION CERTIFICATE

Object **ER3DV6 - SN:2272**

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

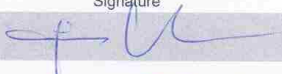

Calibration date: **January 21, 2013**

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 $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ER3DV6	SN: 2328	12-Oct-12 (No. ER3-2328_Oct12)	Oct-13
DAE4	SN: 789	18-Sep-12 (No. DAE4-789_Sep12)	Sep-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: January 21, 2013

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

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



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

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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1309-2005, "IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", December 2005
- b) CTIA Test Plan for Hearing Aid Compatibility, April 2010.

Methods Applied and Interpretation of Parameters:

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

ER3DV6 – SN:2272

January 21, 2013

Probe ER3DV6

SN:2272

Manufactured: November 29, 2001
Calibrated: January 21, 2013

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

ER3DV6- SN:2272

January 21, 2013

DASY/EASY - Parameters of Probe: ER3DV6 - SN:2272

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$)	1.65	1.71	1.78	$\pm 10.1 \%$
DCP (mV) ^B	102.3	99.1	99.0	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB/ $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	149.2	$\pm 3.5 \%$
		Y	0.0	0.0	1.0		165.3	
		Z	0.0	0.0	1.0		150.8	

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%.

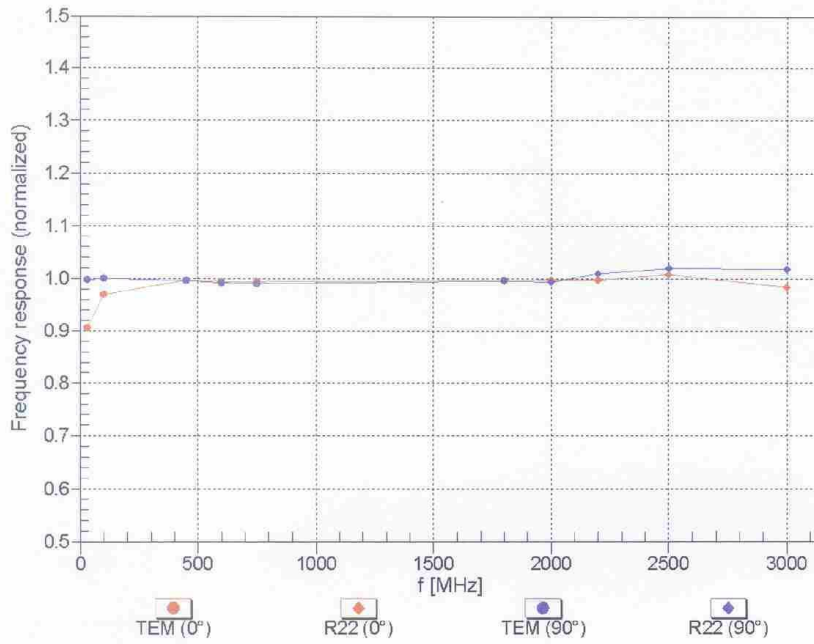
^B Numerical linearization parameter: uncertainty not required.

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

ER3DV6- SN:2272

January 21, 2013

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



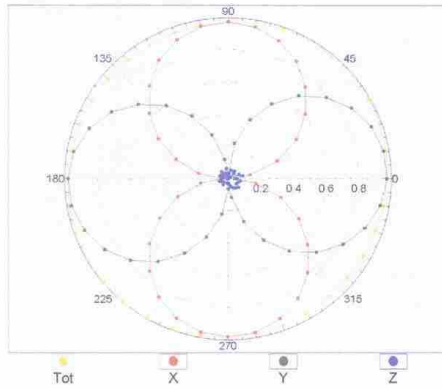
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

ER3DV6-SN:2272

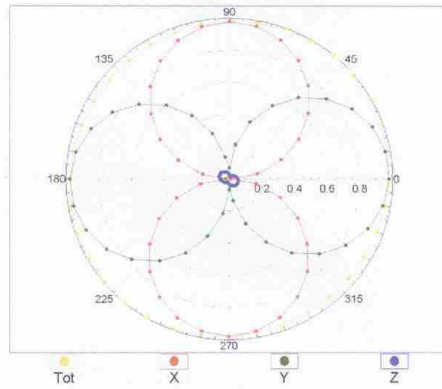
January 21, 2013

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

f=600 MHz, TEM, 0°

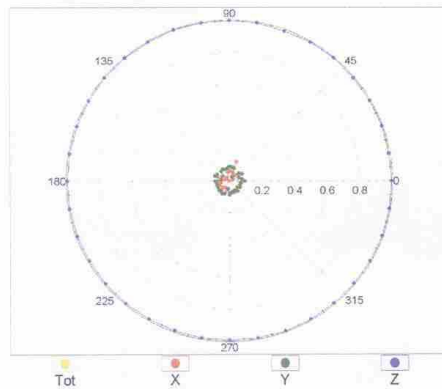


f=2500 MHz, R22, 0°

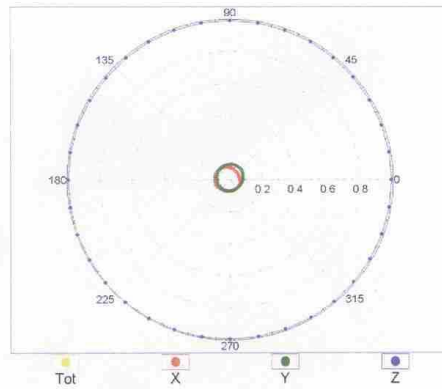


Receiving Pattern (ϕ), $\vartheta = 90^\circ$

f=600 MHz, TEM, 90°



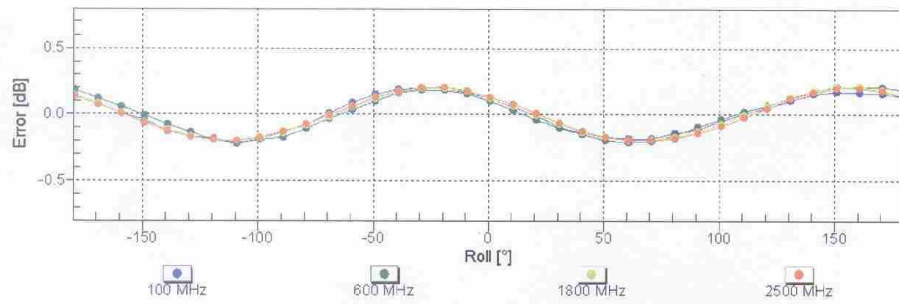
f=2500 MHz, R22, 90°



ER3DV6- SN:2272

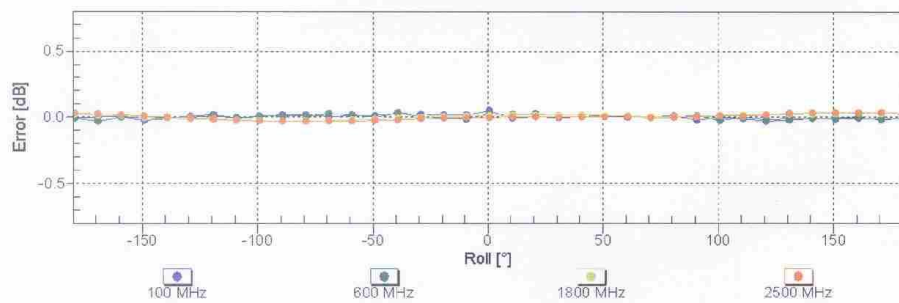
January 21, 2013

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



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

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

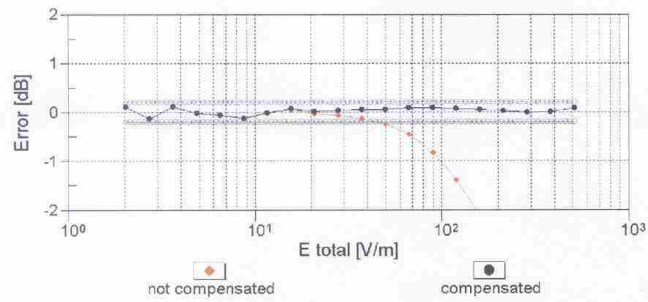
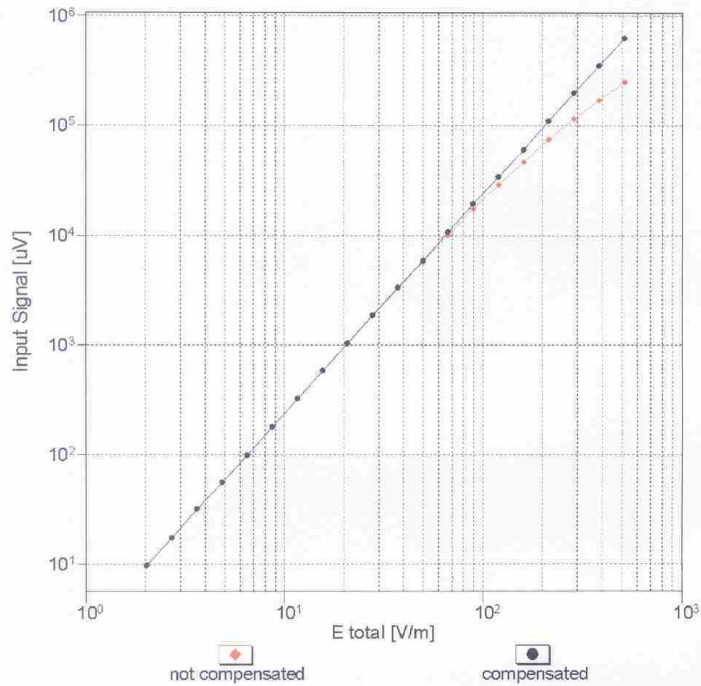


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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January 21, 2013

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

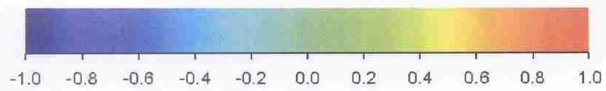
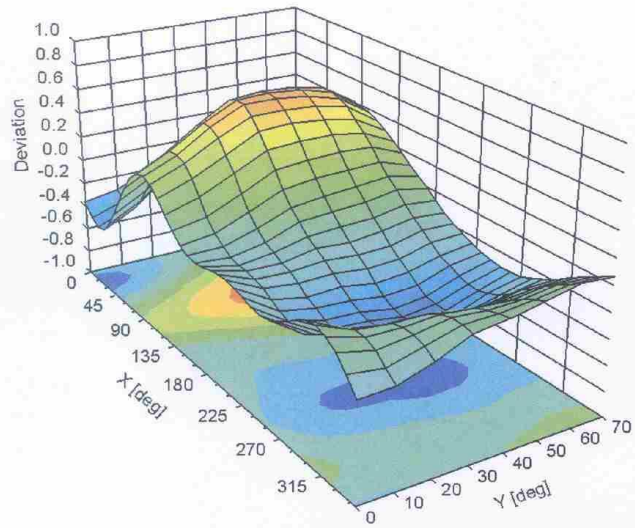


Uncertainty of Linearity Assessment: $\pm 0.6\%$ (k=2)

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January 21, 2013

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



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

ER3DV6- SN:2272

January 21, 2013

DASY/EASY - Parameters of Probe: ER3DV6 - SN:2272

Other Probe Parameters

Sensor Arrangement	Rectangular
Connector Angle (°)	-69.2
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	8 mm
Probe Tip to Sensor X Calibration Point	2.5 mm
Probe Tip to Sensor Y Calibration Point	2.5 mm
Probe Tip to Sensor Z Calibration Point	2.5 mm

H_Probe H3DV6

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **TMC-BJ (Auden)**

Certificate No: **H3-6103_Jan13**

CALIBRATION CERTIFICATE

Object **H3DV6 - SN:6103**

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

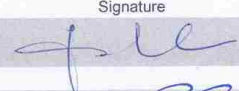

Calibration date: **January 21, 2013**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe H3DV6	SN: 6182	12-Oct-12 (No. H3-6182_Oct12)	Oct-13
DAE4	SN: 789	18-Sep-12 (No. DAE4-789_Sep12)	Sep-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: January 21, 2013

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

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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1309-2005, "IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", December 2005.
- b) CTIA Test Plan for Hearing Aid Compatibility, April 2010.

Methods Applied and Interpretation of Parameters:

- *NORM_{x,y,z}*: Assessed for E-field polarization $\vartheta = 0$ for XY sensors and $\vartheta = 90$ for Z sensor ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide).
- *X,Y,Z(f)_a0a1a2 = X,Y,Z_a0a1a2 * frequency_response* (see Frequency Response Chart).
- *DCP_{x,y,z}*: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR*: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,y,z}*: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *Spherical isotropy (3D deviation from isotropy)*: in a locally homogeneous field realized using an open waveguide setup.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *X_a0a1a2* (no uncertainty required).

H3DV6 – SN:6103

January 21, 2013

Probe H3DV6

SN:6103

Manufactured: January 5, 2002
Calibrated: January 21, 2013

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