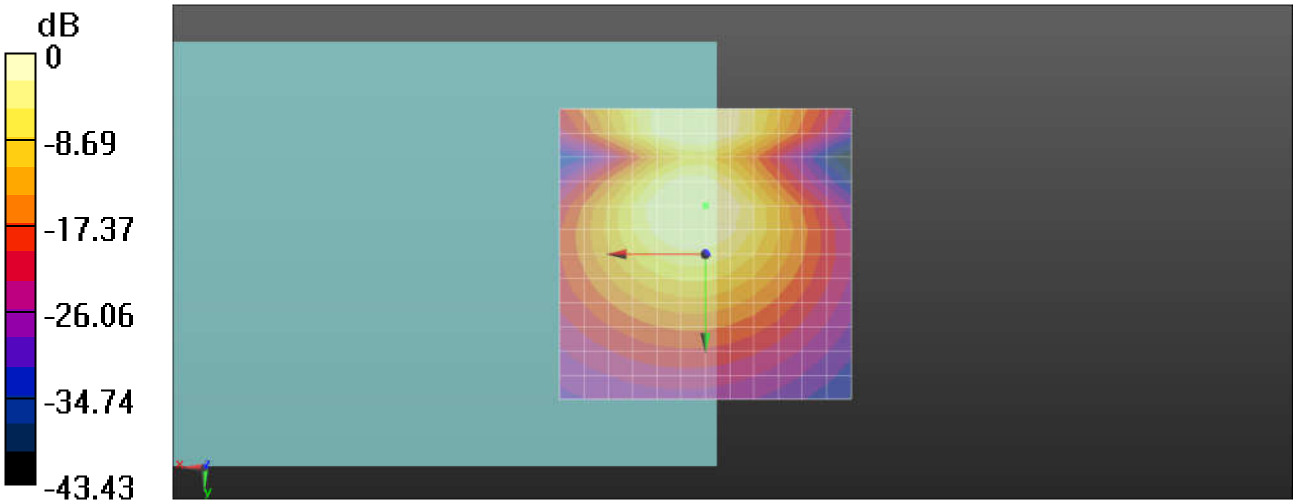
Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2016.5.14

8 HAC T-Coil WCDMA V_Voice_Ch4182(Y)_Battery 2

Communication System: UID 0, UMTS (0); Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.6 ℃

DASY5 Configuration:
- Probe: AM1DV3 - 3128; ; Calibrated: 2016.1.12
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn917; Calibrated: 2015.12.14
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch4128/y (transversal) 4.2mm 50 x 50/ABM SNR(x,y,z) (13x13x1): Measurement grid: dx=10mm, dy=10mm
ABM1/ABM2 = 49.00 dB
ABM1 comp = 2.51 dBA/m
Location: 0, -8.3, 3.7 mm



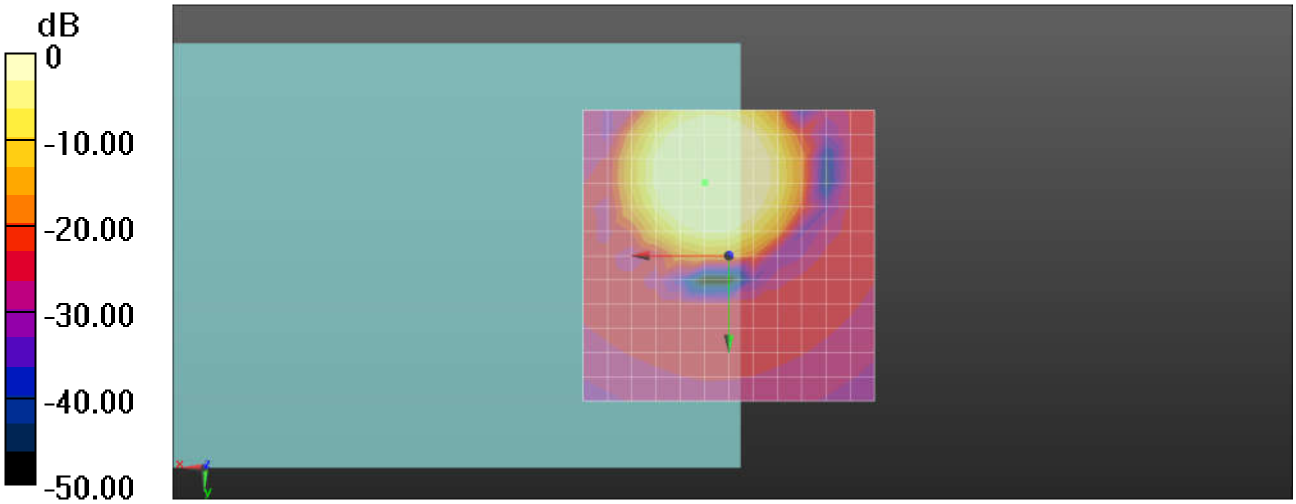
0 dB = 1.000 A/m = 0.00 dBA/m

9 HAC T-Coil WCDMA IV_Voice_Ch1413(Z)_Battery 2

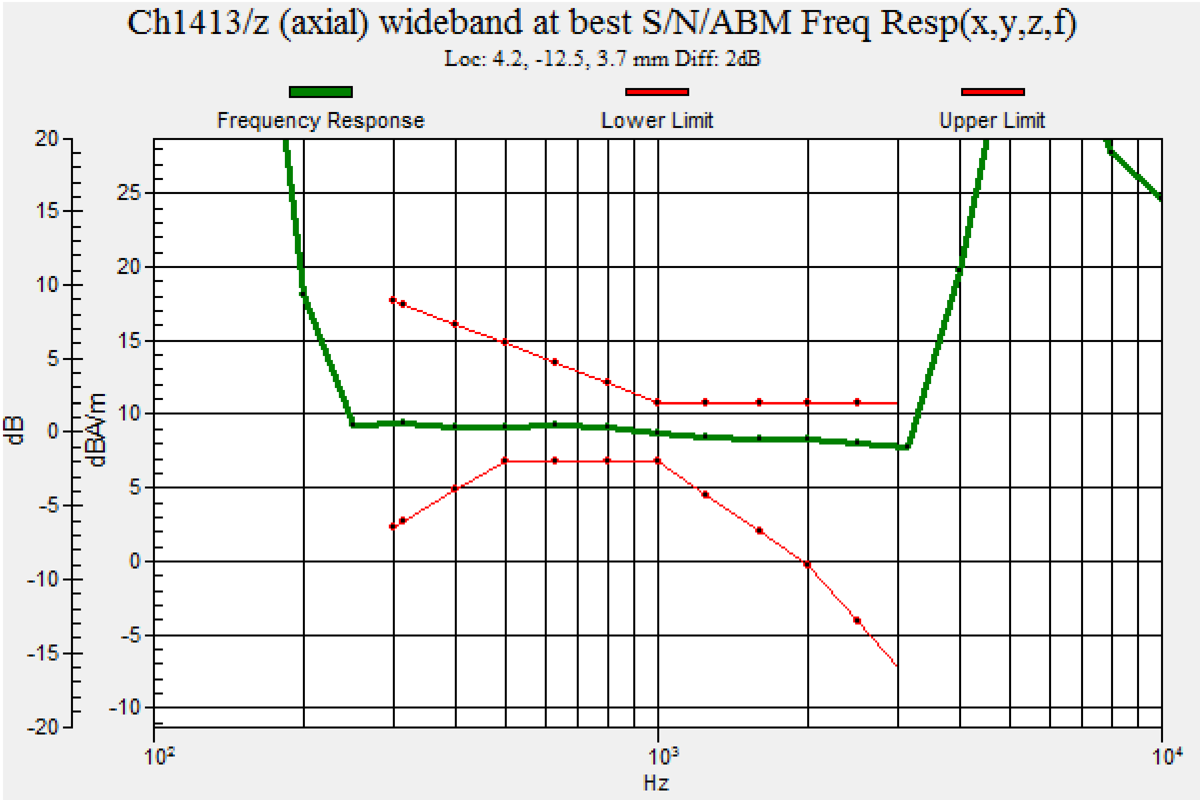
Communication System: UID 0, UMTS (0); Frequency: 1732.6 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.6 ℃

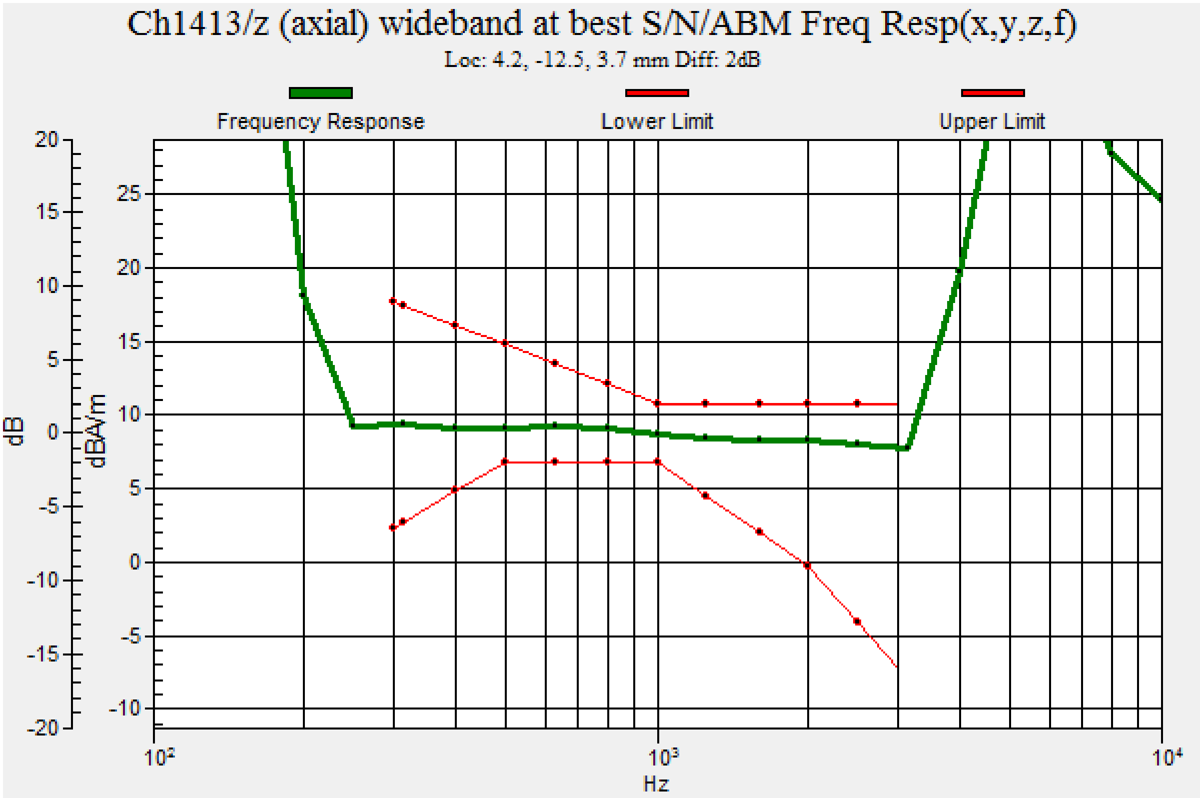
DASY5 Configuration:
- Probe: AM1DV3 - 3128; ; Calibrated: 2016.1.12
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn917; Calibrated: 2015.12.14
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch1413/z (axial) 4.2mm 50 x 50/ABM SNR(x,y,z) (13x13x1): Measurement grid: dx=10mm, dy=10mm
ABM1/ABM2 = 52.66 dB
ABM1 comp = 9.40 dBA/m
Location: 4.2, -12.5, 3.7 mm



0 dB = 1.000 A/m = 0.00 dBA/m


Ch1413/z (axial) wideband at best S/N/ABM Freq Resp(x,y,z,f)
Loc: 4.2, -12.5, 3.7 mm Diff: 2dB
Frequency Response
Lower Limit
Upper Limit
dB
dBA/m
Hz

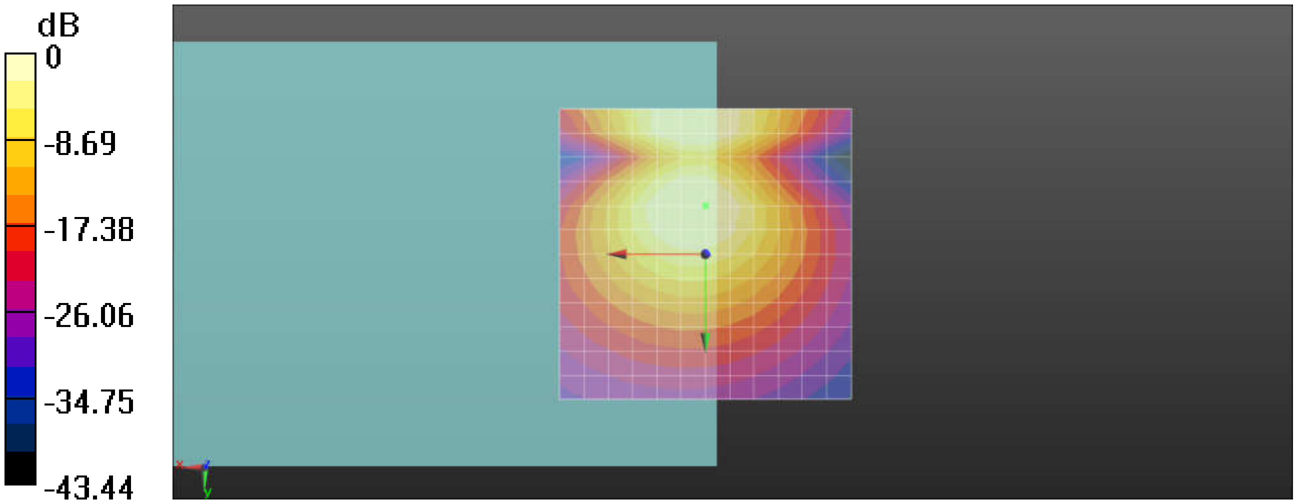

Ch1413/z (axial) wideband at best S/N/ABM Freq Resp(x,y,z,f)
Loc: 4.2, -12.5, 3.7 mm Diff: 2dB
Frequency Response
Lower Limit
Upper Limit
dB
dBA/m
Hz

9 HAC T-Coil WCDMA IV_Voice_Ch1413(Y)_Battery 2

Communication System: UID 0, UMTS (0); Frequency: 1732.6 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.6 ℃

DASY5 Configuration:
- Probe: AM1DV3 - 3128; ; Calibrated: 2016.1.12
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn917; Calibrated: 2015.12.14
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch1413/y (transversal) 4.2mm 50 x 50/ABM SNR(x,y,z) (13x13x1): Measurement grid: dx=10mm, dy=10mm
ABM1/ABM2 = 49.80 dB
ABM1 comp = 2.53 dBA/m
Location: 0, -8.3, 3.7 mm



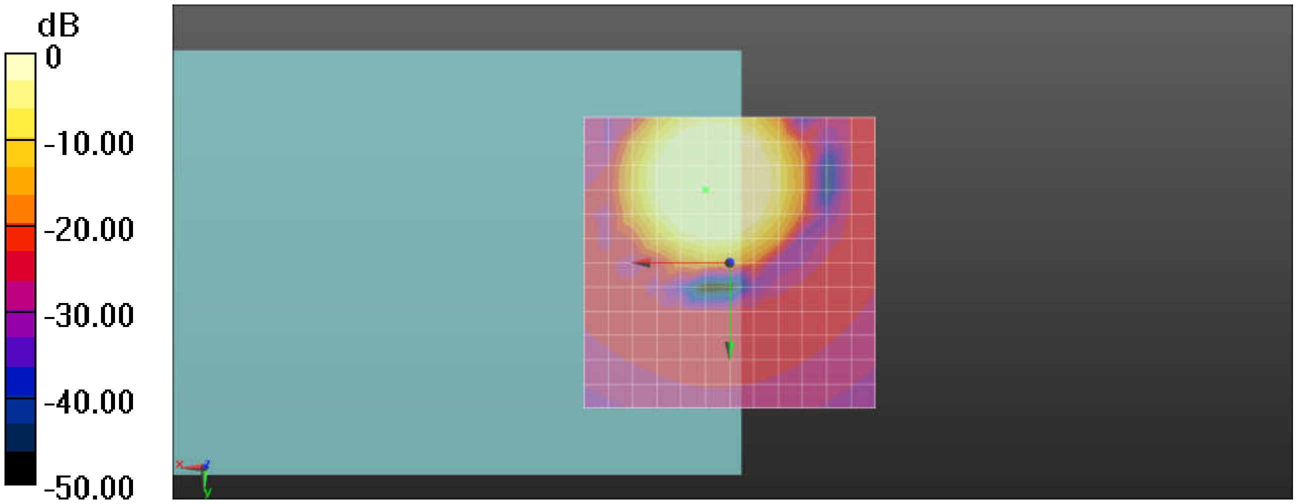
0 dB = 1.000 A/m = 0.00 dBA/m

10 HAC T-Coil WCDMA II_Voice_Ch9400(Z)_Battery 2

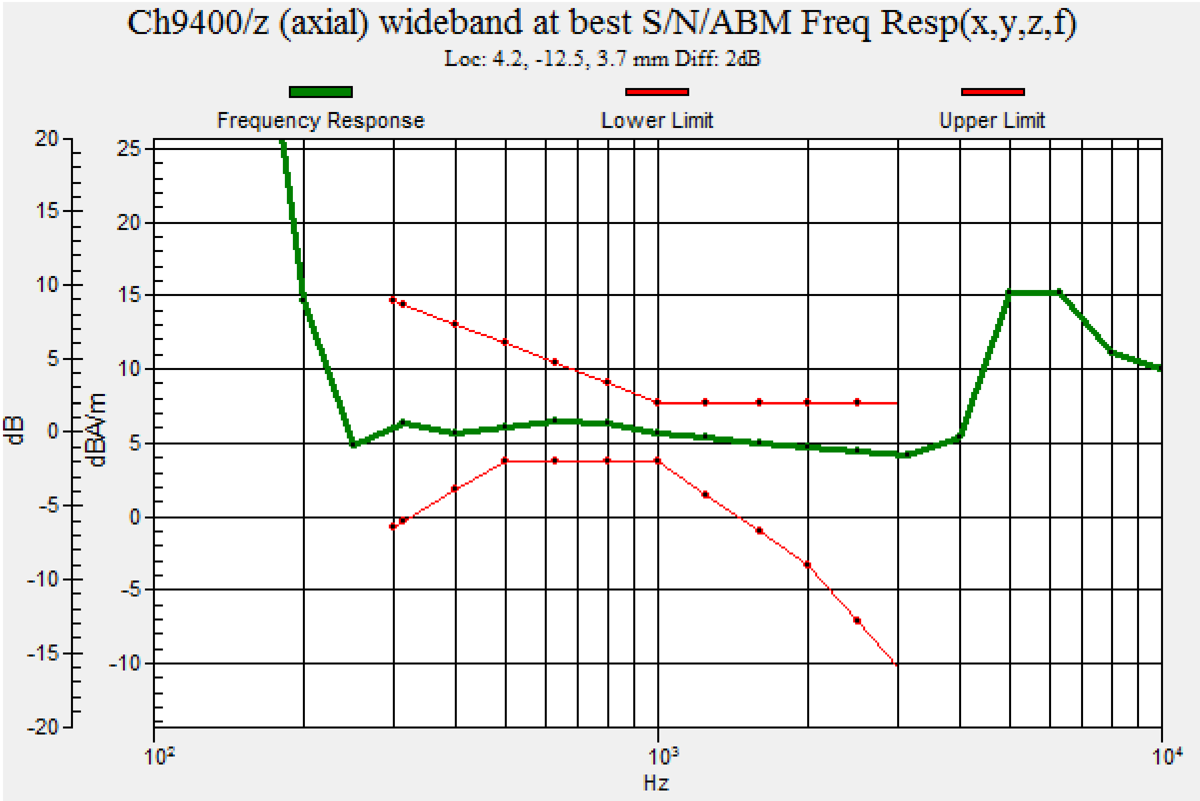
Communication System: UID 0, UMTS (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.6 ℃

DASY5 Configuration:
- Probe: AM1DV3 - 3128; ; Calibrated: 2016.1.12
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn917; Calibrated: 2015.12.14
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch9400/z (axial) 4.2mm 50 x 50/ABM SNR(x,y,z) (13x13x1): Measurement grid: dx=10mm, dy=10mm
ABM1/ABM2 = 52.90 dB
ABM1 comp = 9.45 dBA/m
Location: 4.2, -12.5, 3.7 mm



0 dB = 1.000 A/m = 0.00 dBA/m

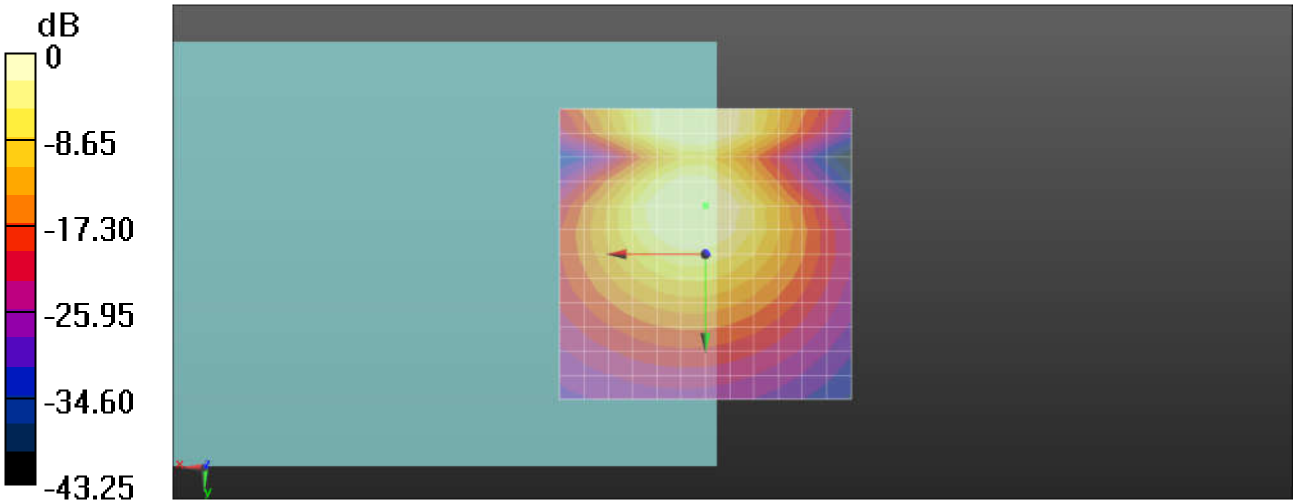

Ch9400/z (axial) wideband at best S/N/ABM Freq Resp(x,y,z,f)
Loc: 4.2, -12.5, 3.7 mm Diff: 2dB
Frequency Response
Lower Limit
Upper Limit
dB
dBA/m
Hz
10²
10³
10⁴

10 HAC T-Coil WCDMA II_Voice_Ch9400(Y)_Battery 2

Communication System: UID 0, UMTS (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.6 ℃

DASY5 Configuration:
- Probe: AM1DV3 - 3128; ; Calibrated: 2016.1.12
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn917; Calibrated: 2015.12.14
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch9400/y (transversal) 4.2mm 50 x 50/ABM SNR(x,y,z) (13x13x1): Measurement grid: dx=10mm, dy=10mm
ABM1/ABM2 = 50.17 dB
ABM1 comp = 2.50 dBA/m
Location: 0, -8.3, 3.7 mm



0 dB = 1.000 A/m = 0.00 dBA/m

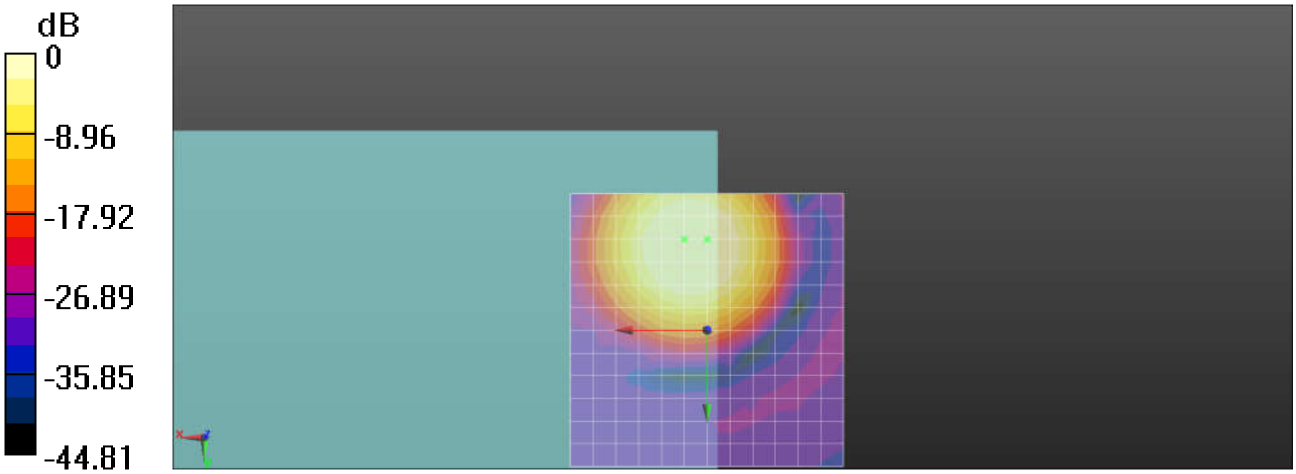
Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2016.4.30

11 HAC T-Coil GSM850_Voice_Ch189(Z)_Battery 1_Holster

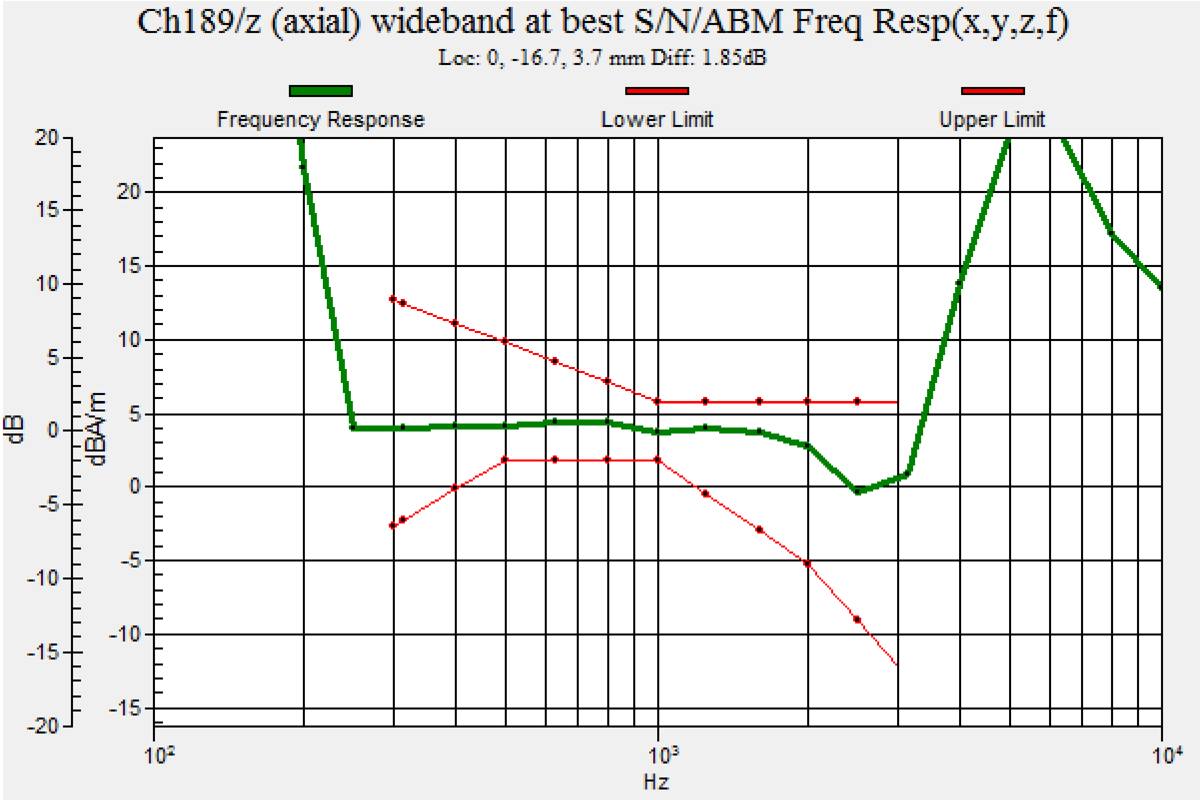
Communication System: UID 0, General GSM (0); Frequency: 836.4 MHz;Duty Cycle: 1:8.3
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.6 ℃

DASY5 Configuration:
- Probe: AM1DV3 - 3093; ; Calibrated: 2015.5.21
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn1210; Calibrated: 2015.5.21
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch189/z (axial) 4.2mm 50 x 50/ABM SNR(x,y,z) (13x13x1): Measurement grid: dx=10mm, dy=10mm
ABM1/ABM2 = 33.18 dB
ABM1 comp = 3.59 dBA/m
Location: 0, -16.7, 3.7 mm



0 dB = 1.000 A/m = 0.00 dBA/m

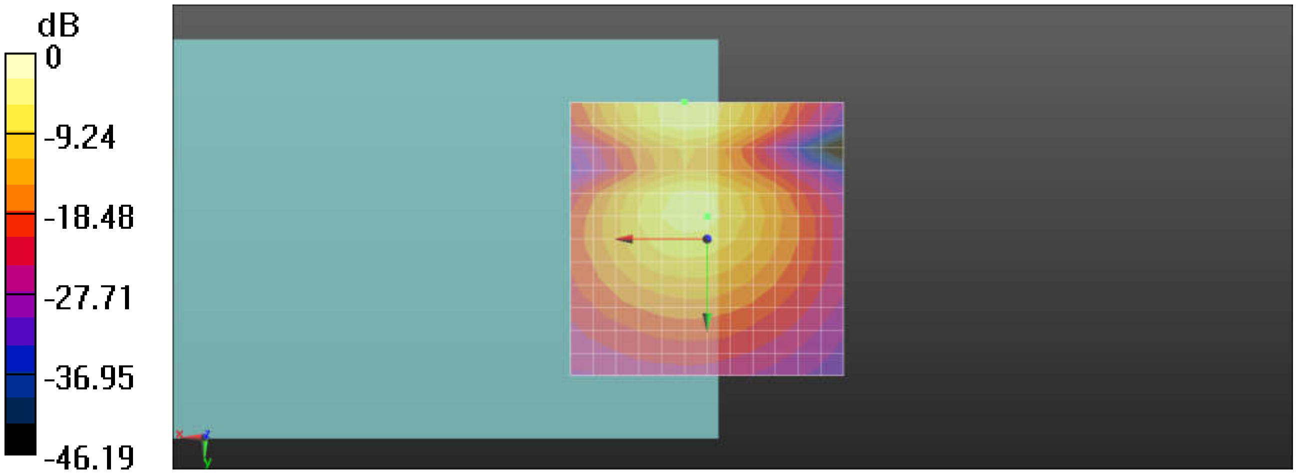

Ch189/z (axial) wideband at best S/N/ABM Freq Resp(x,y,z,f)
Loc: 0, -16.7, 3.7 mm Diff: 1.85dB
Frequency Response
Lower Limit
Upper Limit
dB
dBA/m
Hz
10^2
10^3
10^4

11 HAC T-Coil GSM850_Voice_Ch189(Y)_Battery 1_Holster

Communication System: UID 0, General GSM (0); Frequency: 836.4 MHz;Duty Cycle: 1:8.3
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.6 ℃

DASY5 Configuration:
- Probe: AM1DV3 - 3093; ; Calibrated: 2015.5.21
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn1210; Calibrated: 2015.5.21
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch189/y (transversal) 4.2mm 50 x 50/ABM SNR(x,y,z) (13x13x1): Measurement grid: dx=10mm, dy=10mm
ABM1/ABM2 = 38.61 dB
ABM1 comp = -5.00 dBA/m
Location: 0, -4.2, 3.7 mm



0 dB = 1.000 A/m = 0.00 dBA/m

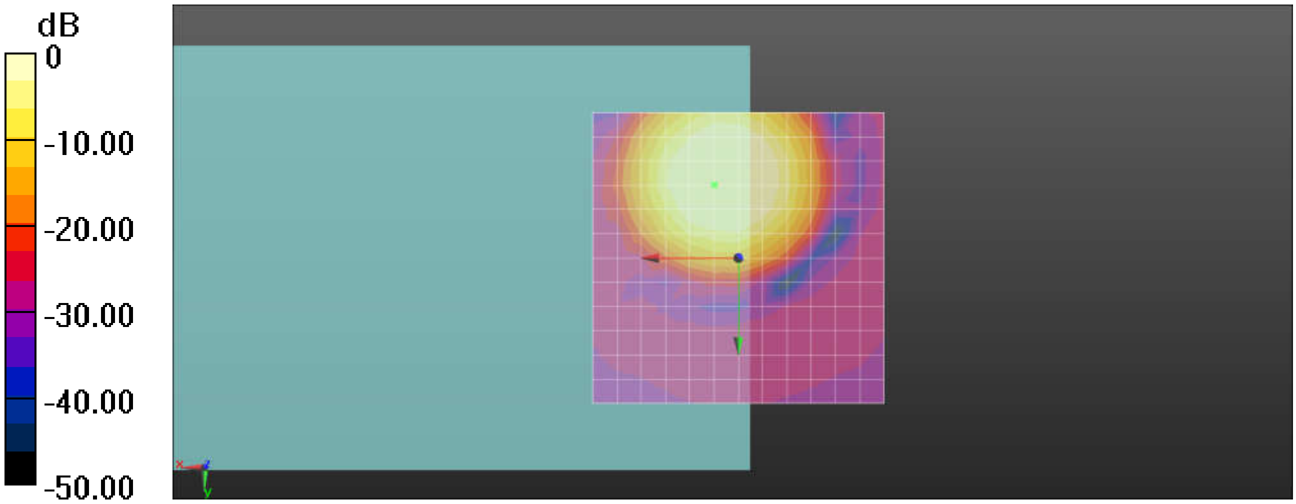
Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2016.5.14

12 HAC T-Coil GSM1900_Voice_Ch661(Z)_Battery 1_Holster

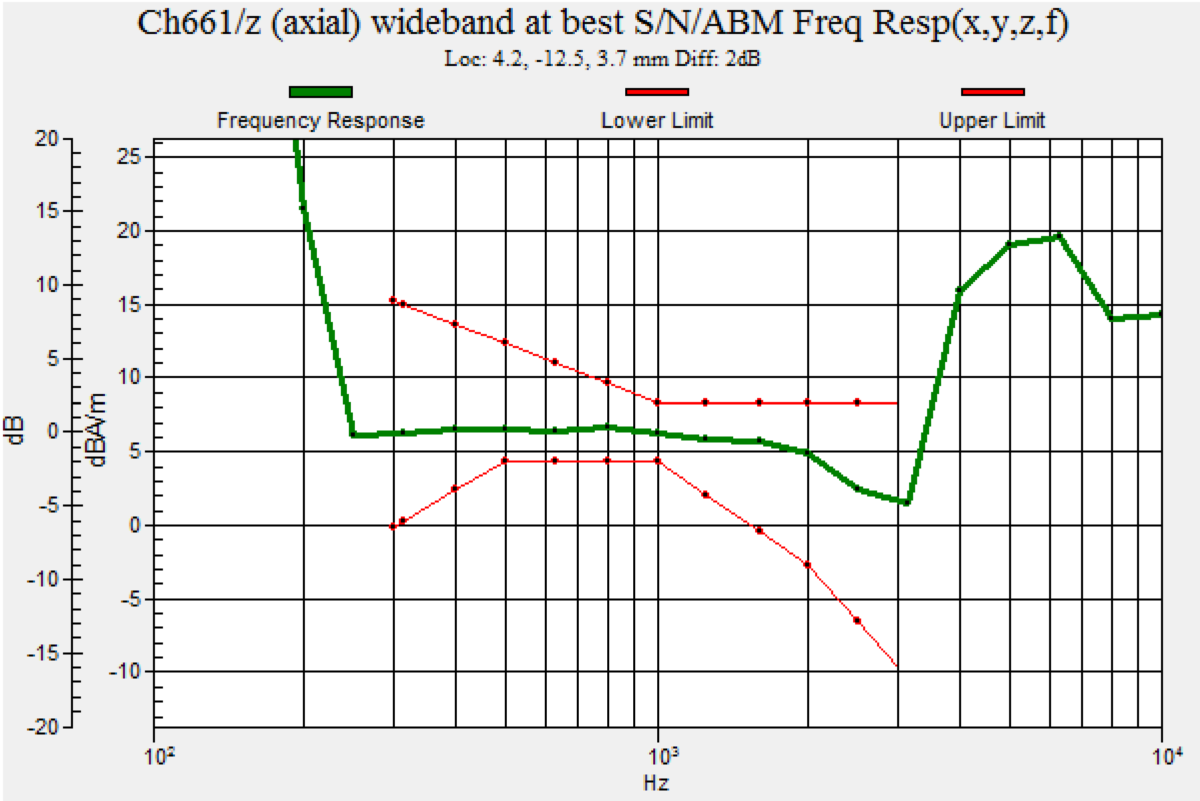
Communication System: UID 0, General GSM (0); Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.6 ℃

DASY5 Configuration:
- Probe: AM1DV3 - 3128; ; Calibrated: 2016.1.12
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn917; Calibrated: 2015.12.14
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch661/z (axial) 4.2mm 50 x 50/ABM SNR(x,y,z) (13x13x1): Measurement grid: dx=10mm, dy=10mm
ABM1/ABM2 = 40.24 dB
ABM1 comp = 6.14 dBA/m
Location: 4.2, -12.5, 3.7 mm



0 dB = 1.000 A/m = 0.00 dBA/m

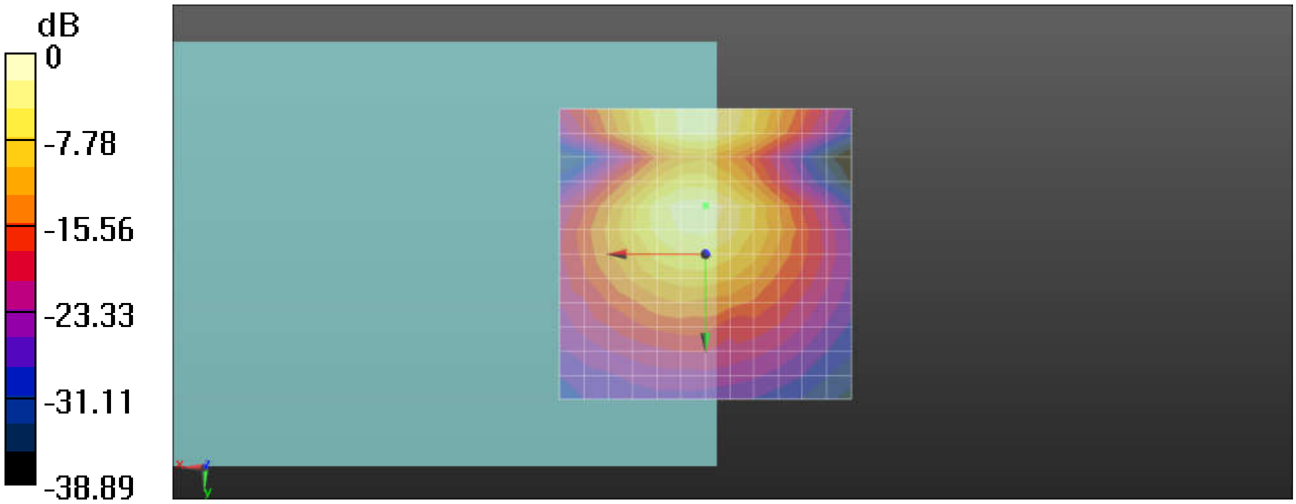

Ch661/z (axial) wideband at best S/N/ABM Freq Resp(x,y,z,f)
Loc: 4.2, -12.5, 3.7 mm Diff: 2dB
Frequency Response
Lower Limit
Upper Limit
dB
dBA/m
Hz
10²
10³
10⁴

12 HAC T-Coil GSM1900_Voice_Ch661(Y)_Battery 1_Holster

Communication System: UID 0, General GSM (0); Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: Air Medium parameters used: σ = 0 S/m, $\varepsilon_r = 1$; ρ = 0 kg/m^3
Ambient Temperature：23.6 ℃

DASY5 Configuration:
- Probe: AM1DV3 - 3128; ; Calibrated: 2016.1.12
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn917; Calibrated: 2015.12.14
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch661/y (transversal) 4.2mm 50 x 50/ABM SNR(x,y,z) (13x13x1): Measurement grid: dx=10mm, dy=10mm
ABM1/ABM2 = 44.01 dB
ABM1 comp = -0.80 dBA/m
Location: 0, -8.3, 3.7 mm



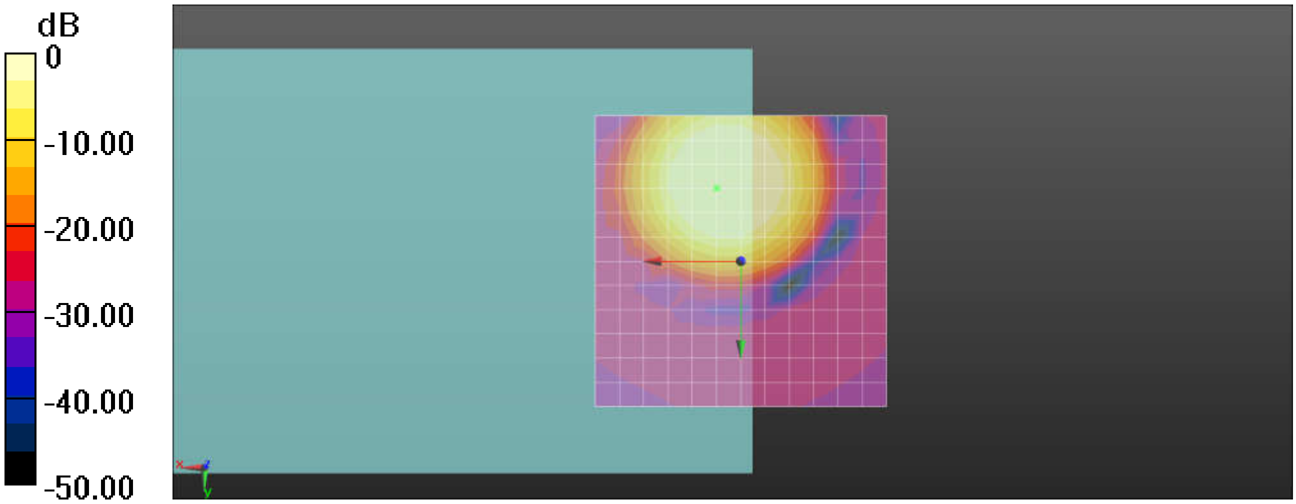
0 dB = 1.000 A/m = 0.00 dBA/m

13 HAC T-Coil WCDMA V_Voice_Ch4182(Z)_Battery 1_Holster

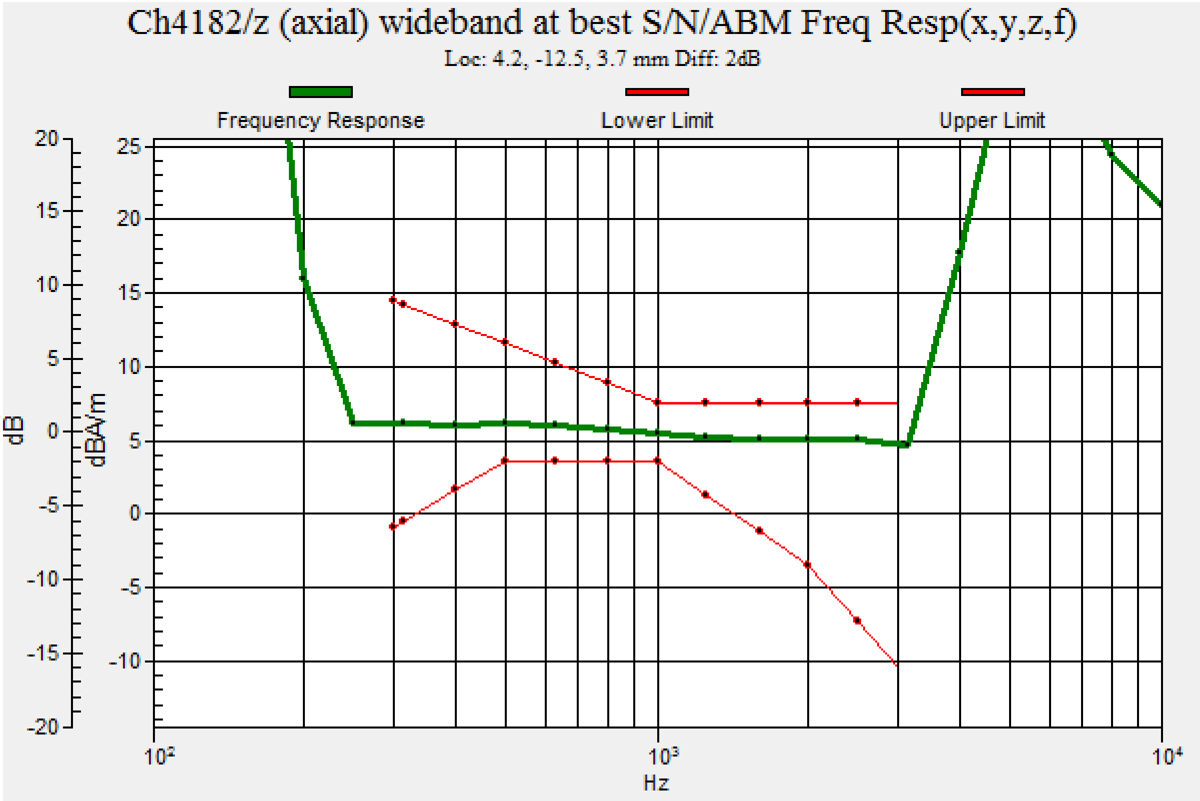
Communication System: UID 0, UMTS (0); Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.6 ℃

DASY5 Configuration:
- Probe: AM1DV3 - 3128; ; Calibrated: 2016.1.12
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn917; Calibrated: 2015.12.14
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch4182/z (axial) 4.2mm 50 x 50/ABM SNR(x,y,z) (13x13x1): Measurement grid: dx=10mm, dy=10mm
ABM1/ABM2 = 49.35 dB
ABM1 comp = 6.32 dBA/m
Location: 4.2, -12.5, 3.7 mm



0 dB = 1.000 A/m = 0.00 dBA/m



Ch4182/z (axial) wideband at best S/N/ABM Freq Resp(x,y,z,f)
Loc: 4.2, -12.5, 3.7 mm Diff: 2dB
Frequency Response
Lower Limit
Upper Limit
dB
dBA/m
Hz

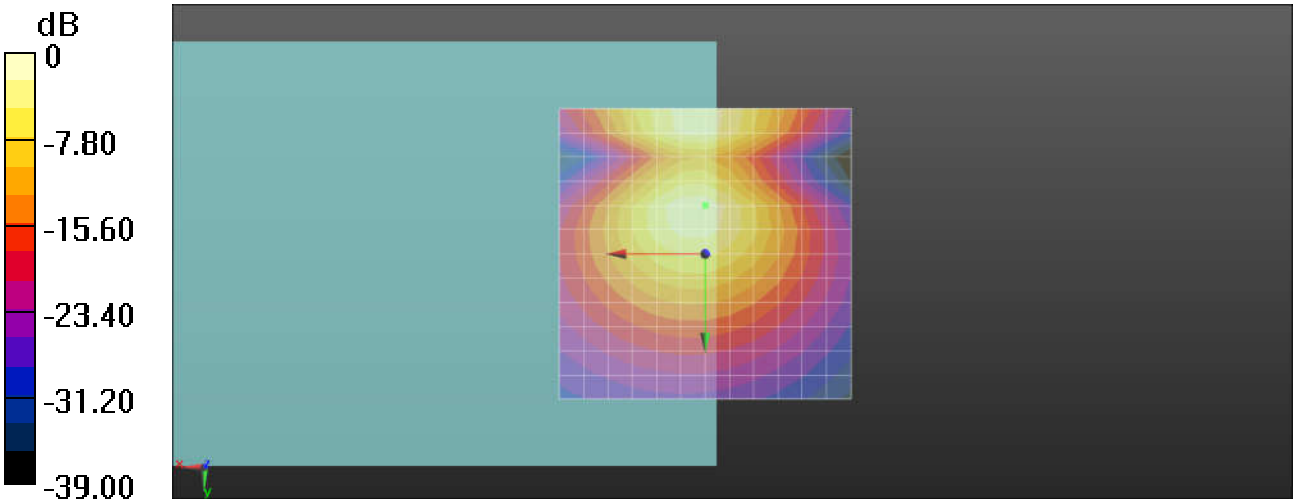
Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2016.5.14

13 HAC T-Coil WCDMA V_Voice_Ch4182(Y)_Battery 1_Holster

Communication System: UID 0, UMTS (0); Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.6 ℃

DASY5 Configuration:
- Probe: AM1DV3 - 3128; ; Calibrated: 2016.1.12
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn917; Calibrated: 2015.12.14
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch4182/y (transversal) 4.2mm 50 x 50/ABM SNR(x,y,z) (13x13x1): Measurement grid: dx=10mm, dy=10mm
ABM1/ABM2 = 45.25 dB
ABM1 comp = -0.53 dBA/m
Location: 0, -8.3, 3.7 mm



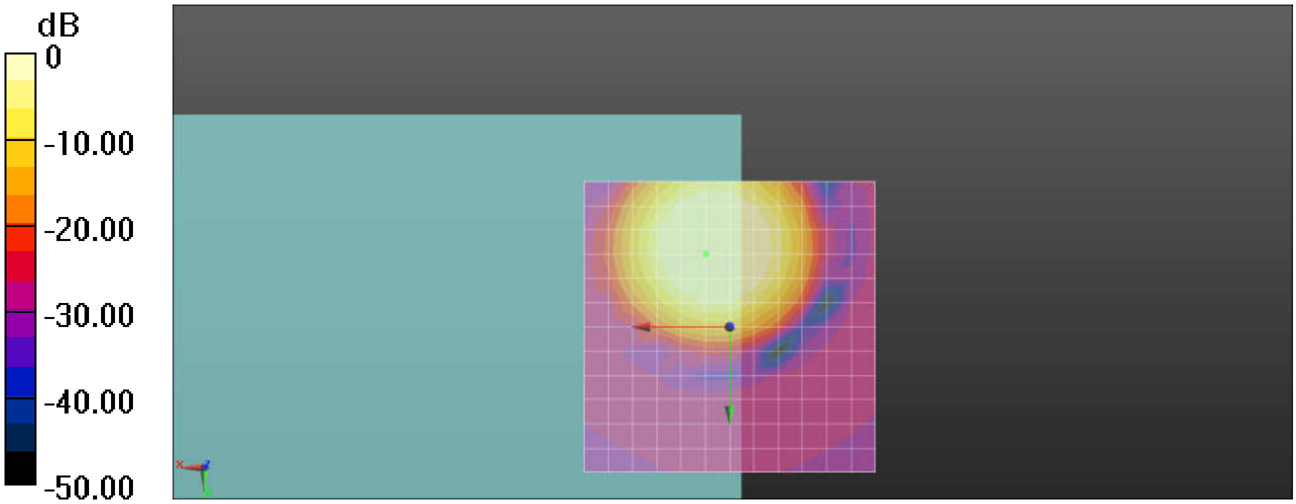
0 dB = 1.000 A/m = 0.00 dBA/m

14 HAC T-Coil WCDMA IV_Voice_Ch1413(Z)_Battery 1_Holster

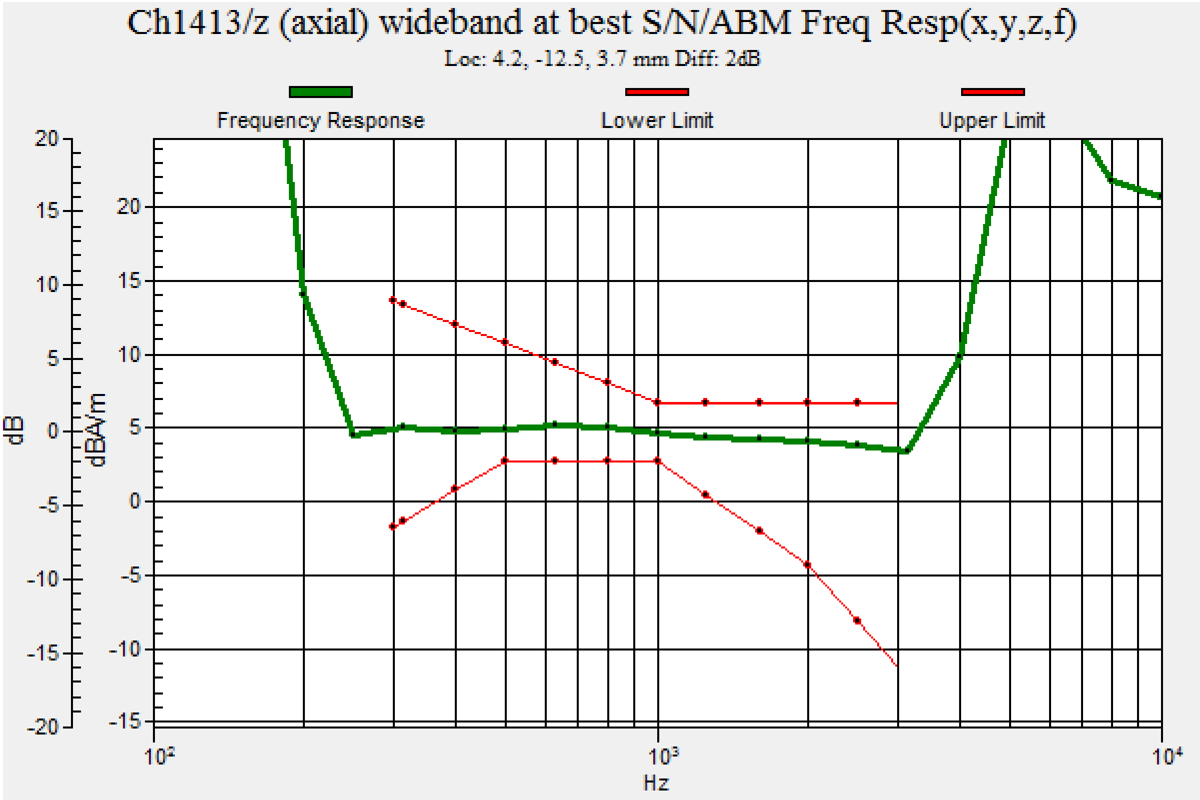
Communication System: UID 0, UMTS (0); Frequency: 1732.6 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.6 ℃

DASY5 Configuration:
- Probe: AM1DV3 - 3128; ; Calibrated: 2016.1.12
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn917; Calibrated: 2015.12.14
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch1413/z (axial) 4.2mm 50 x 50/ABM SNR(x,y,z) (13x13x1): Measurement grid: dx=10mm, dy=10mm
ABM1/ABM2 = 48.36 dB
ABM1 comp = 6.16 dBA/m
Location: 4.2, -12.5, 3.7 mm



0 dB = 1.000 A/m = 0.00 dBA/m

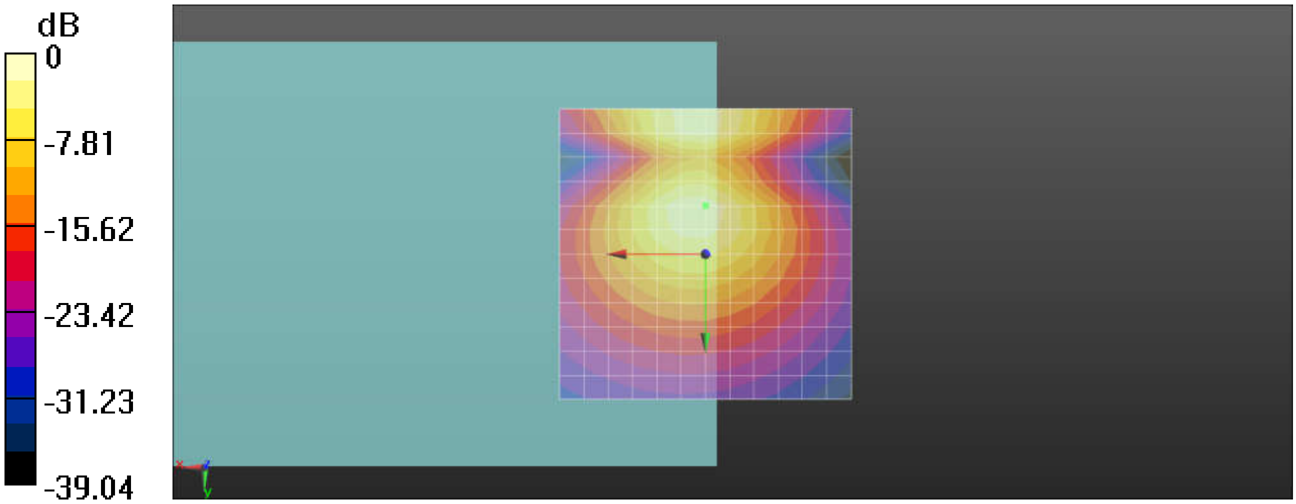

Ch1413/z (axial) wideband at best S/N/ABM Freq Resp(x,y,z,f)
Loc: 4.2, -12.5, 3.7 mm Diff: 2dB
Frequency Response
Lower Limit
Upper Limit
dB
dBA/m
Hz
10^2
10^3
10^4

14 HAC T-Coil WCDMA IV_Voice_Ch1413(Y)_Battery 1_Holster

Communication System: UID 0, UMTS (0); Frequency: 1732.6 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.6 ℃

DASY5 Configuration:
- Probe: AM1DV3 - 3128; ; Calibrated: 2016.1.12
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn917; Calibrated: 2015.12.14
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch1413/y (transversal) 4.2mm 50 x 50/ABM SNR(x,y,z) (13x13x1): Measurement grid: dx=10mm, dy=10mm
ABM1/ABM2 = 44.86 dB
ABM1 comp = -0.60 dBA/m
Location: 0, -8.3, 3.7 mm



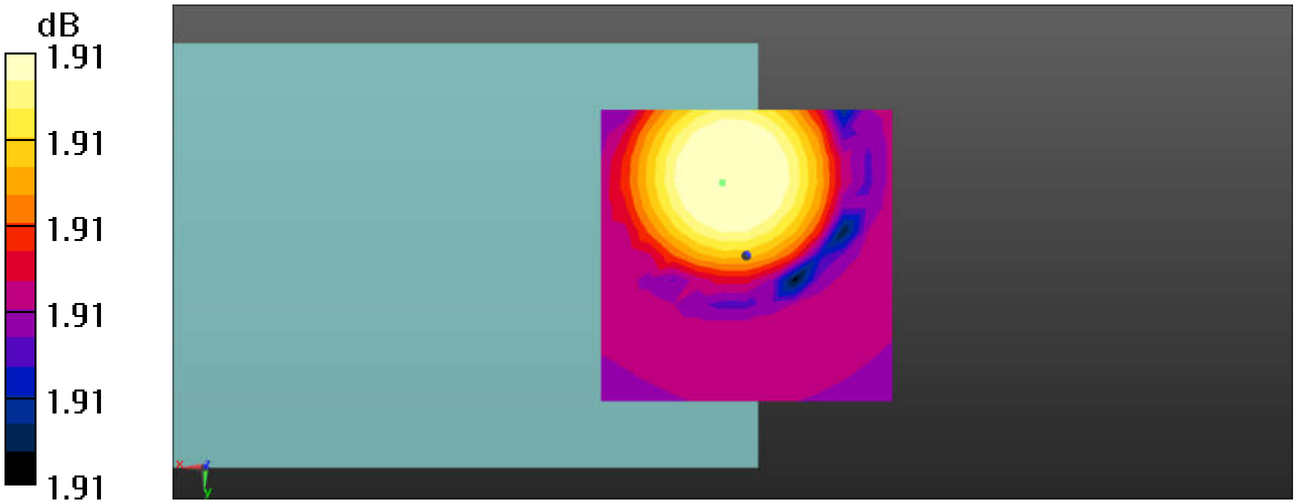
0 dB = 1.000 A/m = 0.00 dBA/m

15 HAC T-Coil WCDMA II_Voice_Ch9400(Z)_Battery 1_Holster

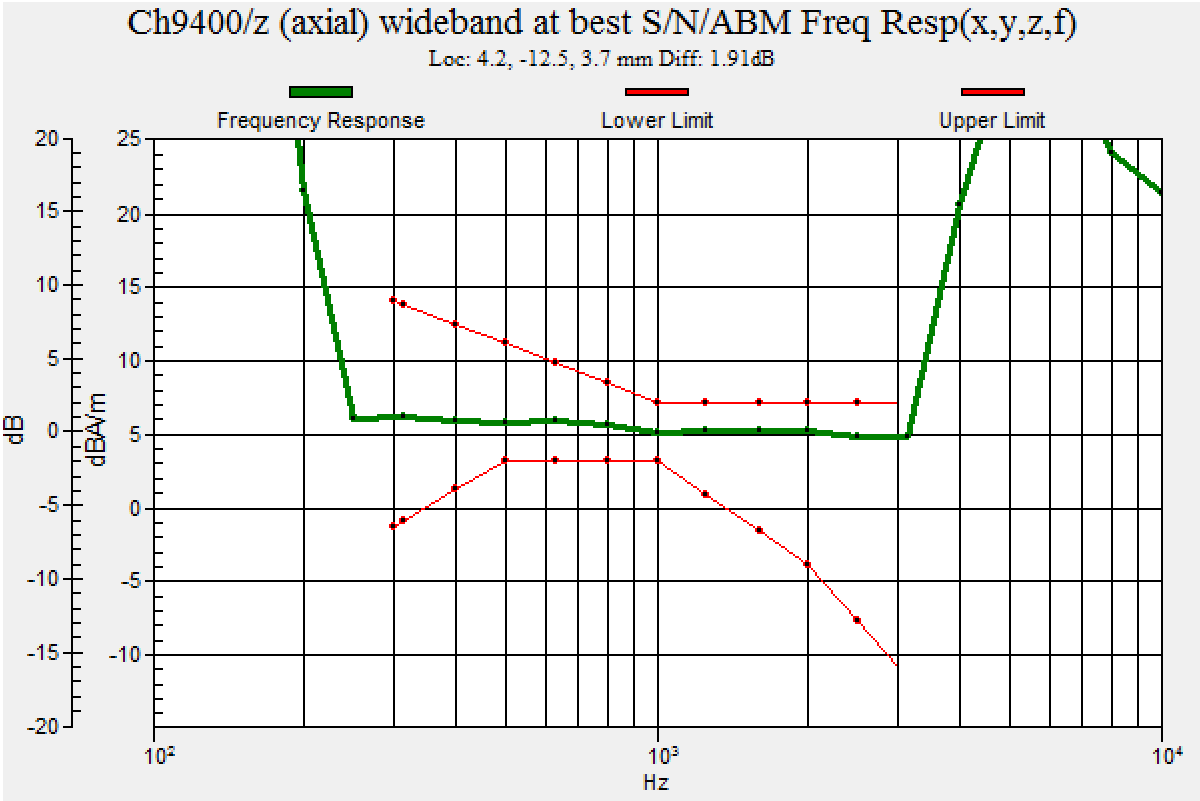
Communication System: UID 0, UMTS (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.6 ℃

DASY5 Configuration:
- Probe: AM1DV3 - 3128; ; Calibrated: 2016.1.12
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn917; Calibrated: 2015.12.14
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch9400/z (axial) 4.2mm 50 x 50/ABM SNR(x,y,z) (13x13x1): Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 47.73 dB
ABM1 comp = 6.14 dBA/m
Location: 4.2, -12.5, 3.7 mm



0 dB = 1.00 dB

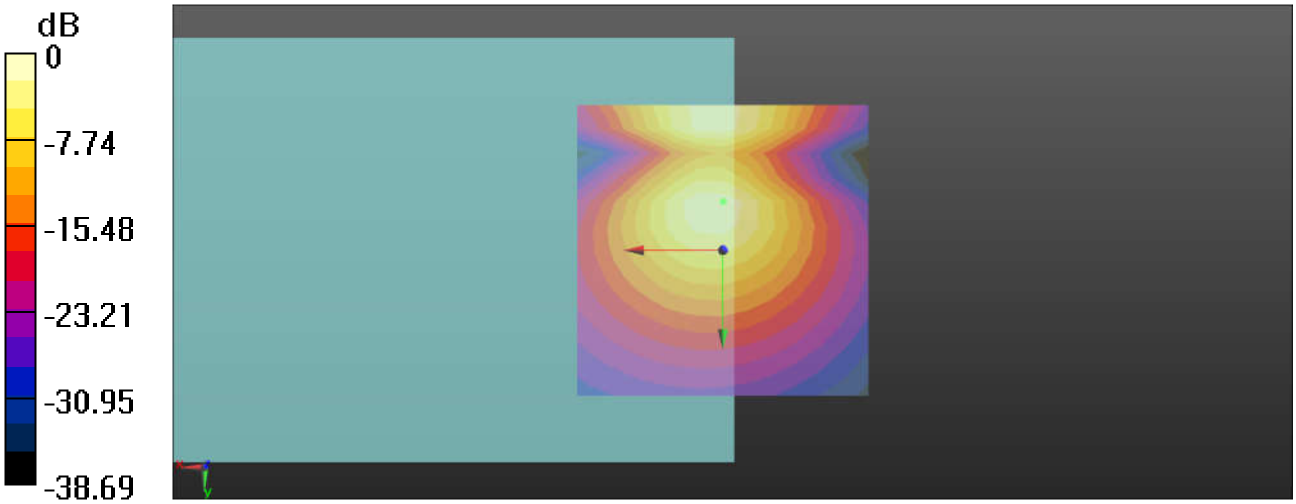

Ch9400/z (axial) wideband at best S/N/ABM Freq Resp(x,y,z,f)
Loc: 4.2, -12.5, 3.7 mm Diff: 1.91dB
Frequency Response
Lower Limit
Upper Limit
dB
dBA/m
Hz

15 HAC T-Coil WCDMA II_Voice_Ch9400(Y)_Battery 1_Holster

Communication System: UID 0, UMTS (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.6 ℃

DASY5 Configuration:
- Probe: AM1DV3 - 3128; ; Calibrated: 2016.1.12
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn917; Calibrated: 2015.12.14
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch9400/y (transversal) 4.2mm 50 x 50/ABM SNR(x,y,z) (13x13x1): Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 45.28 dB
ABM1 comp = -0.60 dBA/m
Location: 0, -8.3, 3.7 mm



0 dB = 1.000 A/m = 0.00 dBA/m

Appendix B. Calibration Data

The DASY calibration certificates are shown as follows.

Zeughausstrasse 43, 8004 Zurich, Switzerland
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IMPORTANT NOTICE

USAGE OF THE DAE 4

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE4 unit is closed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

Important Note:
Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:
Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Important Note:
To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.

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S Swiss Calibration Service

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

Accreditation No.: SCS 0108

Client **Sporton CN (Auden)**

Certificate No: DAE4-1210_May15

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BM - SN: 1210
Calibration procedure(s)	QA CAL-06.v29 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	May 21, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-14 (No:15573)	Oct-15
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	06-Jan-15 (in house check)	In house check: Jan-16
Calibrator Box V2.1	SE UMS 006 AA 1002	06-Jan-15 (in house check)	In house check: Jan-16

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	
Approved by:	Fin Bomholt	Deputy Technical Manager	i.V.

Issued: May 21, 2015

Glossary

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

Methods Applied and Interpretation of Parameters

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

DC Voltage Measurement

A/D - Converter Resolution nominal

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

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

Calibration Factors	**X**	**Y**	**Z**
High Range	404.137 ± 0.02% (k=2)	404.963 ± 0.02% (k=2)	405.072 ± 0.02% (k=2)
Low Range	3.99939 ± 1.50% (k=2)	3.98266 ± 1.50% (k=2)	3.99957 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	122.5 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	199991.86	-2.70	-0.00
Channel X	+ Input	20001.56	0.90	0.00
Channel X	- Input	-19999.14	1.73	-0.01
Channel Y	+ Input	199988.37	-6.13	-0.00
Channel Y	+ Input	19999.78	-0.97	-0.00
Channel Y	- Input	-20000.29	0.53	-0.00
Channel Z	+ Input	199992.91	-1.80	-0.00
Channel Z	+ Input	19999.00	-1.82	-0.01
Channel Z	- Input	-20001.26	-0.34	0.00

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2000.89	0.21	0.01
Channel X	+ Input	201.17	-0.00	-0.00
Channel X	- Input	-198.94	-0.16	0.08
Channel Y	+ Input	2001.04	0.23	0.01
Channel Y	+ Input	200.94	-0.35	-0.18
Channel Y	- Input	-198.65	0.00	-0.00
Channel Z	+ Input	2001.34	0.55	0.03
Channel Z	+ Input	200.34	-0.85	-0.42
Channel Z	- Input	-199.79	-1.03	0.52

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-6.43	-7.81
	- 200	8.59	6.88
Channel Y	200	-9.24	-9.53
	- 200	8.64	8.82
Channel Z	200	12.32	11.91
	- 200	-14.23	-14.26

3. Channel separation

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

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	1.89	-4.39
Channel Y	200	8.48	-	2.69
Channel Z	200	9.38	6.78	-

4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	15958	16206
Channel Y	15960	16204
Channel Z	15870	16608

5. Input Offset Measurement

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

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	-0.29	-1.11	0.62	0.33
Channel Y	0.75	-0.38	2.27	0.47
Channel Z	-1.15	-1.99	0.07	0.40

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

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

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917

IMPORTANT NOTICE

USAGE OF THE DAE 4

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE4 unit is closed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

Important Note:
Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:
Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Important Note:
To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.

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Accreditation No.: SCS 0108

Client **Auden**

Certificate No: DAE4-917_Dec15

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BK - SN: 917
Calibration procedure(s)	QA CAL-06.v29 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	December 14, 2015

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	09-Sep-15 (No:17153)	Sep-16
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	06-Jan-15 (in house check)	In house check: Jan-16
Calibrator Box V2.1	SE UMS 006 AA 1002	06-Jan-15 (in house check)	In house check: Jan-16

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	
Approved by:	Fin Bomholt	Deputy Technical Manager	i.V.

Issued: December 14, 2015

Glossary

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

Methods Applied and Interpretation of Parameters

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

DC Voltage Measurement

A/D - Converter Resolution nominal

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

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

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

Calibration Factors	X	Y	Z
High Range	404.199 ± 0.02% (k=2)	404.202 ± 0.02% (k=2)	404.213 ± 0.02% (k=2)
Low Range	3.98563 ± 1.50% (k=2)	4.01115 ± 1.50% (k=2)	4.00937 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	33.0 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	200032.27	0.77	0.00
Channel X	+ Input	20003.99	-0.19	-0.00
Channel X	- Input	-20003.58	1.52	-0.01
Channel Y	+ Input	200032.37	0.79	0.00
Channel Y	+ Input	20001.82	-2.20	-0.01
Channel Y	- Input	-20005.62	-0.31	0.00
Channel Z	+ Input	200031.83	-0.09	-0.00
Channel Z	+ Input	20001.13	-2.89	-0.01
Channel Z	- Input	-20006.52	-1.23	0.01

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2000.68	0.01	0.00
Channel X	+ Input	201.40	0.64	0.32
Channel X	- Input	-199.01	0.28	-0.14
Channel Y	+ Input	2000.00	-0.54	-0.03
Channel Y	+ Input	199.75	-0.99	-0.49
Channel Y	- Input	-199.85	-0.44	0.22
Channel Z	+ Input	2000.51	-0.06	-0.00
Channel Z	+ Input	199.18	-1.45	-0.72
Channel Z	- Input	-201.00	-1.64	0.82

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-4.66	-6.34
	- 200	7.48	6.06
Channel Y	200	5.45	4.67
	- 200	-6.49	-6.74
Channel Z	200	-14.48	-14.56
	- 200	11.80	11.90

3. Channel separation

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

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	-2.50	-3.68
Channel Y	200	5.56	-	-1.22
Channel Z	200	10.23	3.28	-

4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	16043	15339
Channel Y	16126	13804
Channel Z	15936	17532

5. Input Offset Measurement

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

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.58	-0.13	1.68	0.34
Channel Y	-0.85	-1.78	0.49	0.45
Channel Z	-0.92	-1.85	0.04	0.38

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

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

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Accreditation No.: SCS 0108

Client **Sporton-CN (Auden)**

Certificate No: AM1DV3-3093_May15/2

CALIBRATION CERTIFICATE (Replacement of No: AM1DV3-3093_May15)

Object	AM1DV3 - SN: 3093
Calibration procedure(s)	QA CAL-24.v4 Calibration procedure for AM1D magnetic field probes and TMFS in the audio range
Calibration date:	May 21, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-14 (No:15573)	Oct-15
Reference Probe AM1DV2	SN: 1008	08-Jan-15 (No. AM1D-1008_Jan15)	Jan-16
DAE4	SN: 781	12-Sep-14 (No. DAE4-781_Sep14)	Sep-15

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
AMCC	1050	01-Oct-13 (in house check Oct-13)	Oct-16
AMMI Audio Measuring Instrument	1062	26-Sep-12 (in house check Sep-12)	Sep-15

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	i.V.
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 25, 2015

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

[References

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

[2] ANSI-C63.19-2011
American National Standard, Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.

[3] DASY5 manual, Chapter: Hearing Aid Compatibility (HAC) T-Coil Extension

Description of the AM1D probe

The AM1D Audio Magnetic Field Probe is a fully shielded magnetic field probe for the frequency range from 100 Hz to 20 kHz. The pickup coil is compliant with the dimensional requirements of [1+2]. The probe includes a symmetric low noise amplifier for the signal available at the shielded 3 pin connector at the side. Power is supplied via the same connector (phantom power supply) and monitored via the LED near the connector. The 7 pin connector at the end of the probe does not carry any signals, but determines the angle of the sensor when mounted on the DAE. The probe supports mechanical detection of the surface.
The single sensor in the probe is arranged in a tilt angle allowing measurement of 3 orthogonal field components when rotating the probe by 120° around its axis. It is aligned with the perpendicular component of the field, if the probe axis is tilted nominally 35.3° above the measurement plane, using the connector rotation and sensor angle stated below.
The probe is fully RF shielded when operated with the matching signal cable (shielded) and allows measurement of audio magnetic fields in the close vicinity of RF emitting wireless devices according to [1+2] without additional shielding.

Handling of the item

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

Methods Applied and Interpretation of Parameters

- *Coordinate System:* The AM1D probe is mounted in the DASY system for operation with a HAC Test Arch phantom with AMCC Helmholtz calibration coil according to [3], with the tip pointing to "southwest" orientation.
- *Functional Test:* The functional test preceding calibration includes test of
  Noise level
  RF immunity (1kHz AM modulated signal). The shield of the probe cable must be well connected.
  Frequency response verification from 100 Hz to 10 kHz.
- *Connector Rotation:* The connector at the end of the probe does not carry any signals and is used for fixation to the DAE only. The probe is operated in the center of the AMCC Helmholtz coil using a 1 kHz magnetic field signal. Its angle is determined from the two minima at nominally +120° and –120° rotation, so the sensor in the tip of the probe is aligned to the vertical plane in z-direction, corresponding to the field maximum in the AMCC Helmholtz calibration coil.
- *Sensor Angle:* The sensor tilting in the vertical plane from the ideal vertical direction is determined from the two minima at nominally +120° and –120°. DASY system uses this angle to align the sensor for radial measurements to the x and y axis in the horizontal plane.

Sensitivity: With the probe sensor aligned to the z-field in the AMCC, the output of the probe is compared to the magnetic field in the AMCC at 1 kHz. The field in the AMCC Helmholtz coil is given by the geometry and the current through the coil, which is monitored on the precision shunt resistor of the coil.

AM1D probe identification and configuration data

Item	**AM1DV3** Audio Magnetic 1D Field Probe
Type No	SP AM1 001 BA
Serial No	**3093**

Overall length	296 mm
Tip diameter	6.0 mm (at the tip)
Sensor offset	3.0 mm (centre of sensor from tip)
Internal Amplifier	20 dB

Manufacturer / Origin	Schmid & Partner Engineering AG, Zürich, Switzerland
Manufacturing date	March 03, 2011
Last calibration date	May 20, 2014

Calibration data

Connector rotation angle	(in DASY system)	**168.5** °	+/- 3.6 ° (k=2)
Sensor angle	(in DASY system)	**0.83** °	+/- 0.5 ° (k=2)
Sensitivity at 1 kHz	(in DASY system)	**0.00728 V / (A/m)**	+/- 2.2 % (k=2)

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

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Accreditation No.: SCS 0108

Client **Auden**

Certificate No: AM1DV3-3128_Jan16

CALIBRATION CERTIFICATE

Object	AM1DV3 - SN: 3128
Calibration procedure(s)	QA CAL-24.v4 Calibration procedure for AM1D magnetic field probes and TMFS in the audio range
Calibration date:	January 12, 2016

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	09-Sep-15 (No. 17153)	Sep-16
Reference Probe AM1DV2	SN: 1008	30-Dec-15 (No. AM1D-1008_Dec15)	Dec-16
DAE4	SN: 781	04-Sep-15 (No. DAE4-781_Sep15)	Sep-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
AMCC	1050	01-Oct-13 (in house check Sep-15)	Sep-18
AMMI Audio Measuring Instrument	1062	26-Sep-12 (in house check Sep-15)	Sep-18

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

Issued: January 13, 2016

[References

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

[2] ANSI-C63.19-2011
American National Standard, Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.

[3] DASY5 manual, Chapter: Hearing Aid Compatibility (HAC) T-Coil Extension

Description of the AM1D probe

The AM1D Audio Magnetic Field Probe is a fully shielded magnetic field probe for the frequency range from 100 Hz to 20 kHz. The pickup coil is compliant with the dimensional requirements of [1+2]. The probe includes a symmetric low noise amplifier for the signal available at the shielded 3 pin connector at the side. Power is supplied via the same connector (phantom power supply) and monitored via the LED near the connector. The 7 pin connector at the end of the probe does not carry any signals, but determines the angle of the sensor when mounted on the DAE. The probe supports mechanical detection of the surface.
The single sensor in the probe is arranged in a tilt angle allowing measurement of 3 orthogonal field components when rotating the probe by 120° around its axis. It is aligned with the perpendicular component of the field, if the probe axis is tilted nominally 35.3° above the measurement plane, using the connector rotation and sensor angle stated below.
The probe is fully RF shielded when operated with the matching signal cable (shielded) and allows measurement of audio magnetic fields in the close vicinity of RF emitting wireless devices according to [1+2] without additional shielding.

Handling of the item

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

Methods Applied and Interpretation of Parameters

- *Coordinate System:* The AM1D probe is mounted in the DASY system for operation with a HAC Test Arch phantom with AMCC Helmholtz calibration coil according to [3], with the tip pointing to "southwest" orientation.
- *Functional Test:* The functional test preceding calibration includes test of
  Noise level
  RF immunity (1kHz AM modulated signal). The shield of the probe cable must be well connected.
  Frequency response verification from 100 Hz to 10 kHz.
- *Connector Rotation:* The connector at the end of the probe does not carry any signals and is used for fixation to the DAE only. The probe is operated in the center of the AMCC Helmholtz coil using a 1 kHz magnetic field signal. Its angle is determined from the two minima at nominally +120° and –120° rotation, so the sensor in the tip of the probe is aligned to the vertical plane in z-direction, corresponding to the field maximum in the AMCC Helmholtz calibration coil.
- *Sensor Angle:* The sensor tilting in the vertical plane from the ideal vertical direction is determined from the two minima at nominally +120° and –120°. DASY system uses this angle to align the sensor for radial measurements to the x and y axis in the horizontal plane.

Sensitivity: With the probe sensor aligned to the z-field in the AMCC, the output of the probe is compared to the magnetic field in the AMCC at 1 kHz. The field in the AMCC Helmholtz coil is given by the geometry and the current through the coil, which is monitored on the precision shunt resistor of the coil.

AM1D probe identification and configuration data

Item	**AM1DV3** Audio Magnetic 1D Field Probe
Type No	SP AM1 001 BA
Serial No	**3128**

Overall length	296 mm
Tip diameter	6.0 mm (at the tip)
Sensor offset	3.0 mm (centre of sensor from tip)
Internal Amplifier	20 dB

Manufacturer / Origin	Schmid & Partner Engineering AG, Zürich, Switzerland
Manufacturing date	April 26, 2012
Last calibration date	January 6, 2015

Calibration data

Connector rotation angle	(in DASY system)	**153.7 °**	+/- 3.6 ° (k=2)
Sensor angle	(in DASY system)	**1.32 °**	+/- 0.5 ° (k=2)
Sensitivity at 1 kHz	(in DASY system)	**0.00780 V / (A/m)**	+/- 2.2 % (k=2)

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

Appendix D. Product Equality Declaration

TCT Mobile

5F, C building, No. 232, Liang Jing Road
ZhangJiang High-Tech Park, Pudong Area
Shanghai, P.R. China. 201203
TEL: +86(0)21 61460666
FAX: +86(0)21 61460602

Declaration of changes from Initial to Variant

General: 6055A is a variant product of 6055U

- **SOFTWARE MODIFICATIONS:**
  - Protocol Stack changes: No
  - MMS/STK/USAT/USIM changes: No
  - DM/SUPL/VT/FUMO/SWP/HCI: Yes (6055A does not support DM/FUMO)
  - Other changes detailed:
    1. Enable FDD band17
    2. Add UICC base NFC

- **HARDWARE MODIFICATIONS:**
  - Band changes: No
  - PCB Layout changes: No
  - Main RF components changes:

	Antenna	AP	Modem	Transceiver	Power Amplifier	Rx SAW Filter	ASM
GSM850	No	No	No	No	No	No	No
GSM900	No	No	No	No	No	No	No
GSM1800	No	No	No	No	No	No	No
GSM1900	No	No	No	No	No	No	No

	Antenna	AP	Modem	Transceiver	Power Amplifier	Tx SAW Filter	Duplexer	ASM
UMTS band X	No	No	No	No	No	No	No	No

	Antenna	AP	Modem	Transceiver	Power Amplifier	Tx SAW Filter	Rx SAW Filter	Duplexer	ASM
LTE Band x	No	No	No	No	No	No	No	No	No
LTE Band x	No	No	No	No	No	No	No	No	No

	Antenna	AP	Modem	Transceiver	Power Amplifier	Balun	Band pass filter	Diplexer
Bluetooth	No	No	No	No	No	No	No	No

Wi-Fi	No	No	No	No	No	No	No	No

- FM changes: No
- LCD/ Speaker/ Camera/ Vibrator changes: No (indicated the changed items if yes)
- Other changes detailed:
  Reduce 2db power in band 7.

- **MECHANICAL MODIFICATIONS:**
  - Use new metal front/back cover or keypad: No
  - Mechanical shell changes:
    Whole size of EUT: No
    Distance of Ear reference point to bottom of handset: No
    Other trinkets to change the surface of handset: No
  - Other changes detailed:
    1. Different logo on backcover.

APPROVED BY:

Project Manager: Freda.
Signature: 8.10.
Date: