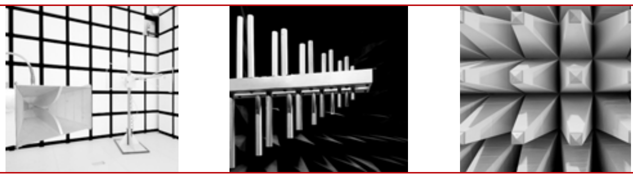

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TEST REPORT

Test Report No.: 1-6965/13-20-30

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

Testing Laboratory

CETECOM ICT Services GmbH
Untertürkheimer Straße 6 – 10
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Accredited Test Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01

Applicant

Sony Mobile Communications AB
Nya Vattentornet
22188 Lund/SWEDEN

Phone: +46 46 19 30 00

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Manufacturer

Sony Mobile Communications AB
Nya Vattentornet
22188 Lund/SWEDEN

Test Standard/s

ANSI C63.19-2011	Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids
FCC 47 CFR §20.19	Hearing Aid Compatible Mobile Headsets

Test Item

Kind of test item:	Smart Phone
Device type:	portable device
Model name:	**PY7PM-0742**
S/N serial number:	CB5A1Z1Y2X
FCC-ID:	PY7PM-0742
IC:	4170B-PM0742
IMEI-Number:	004402452670411
Hardware status:	AP1.0
Software status:	23.0.E0.81
Frequency:	see technical details
Antenna:	integrated antenna
Battery option:	Integrated Li-polymer battery 3.7V
Accessories:	---
Test sample status:	identical prototype
HAC-Rating:	M4

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test Report authorised:

Thomas Vogl

DN: cn=Thomas Vogler, o=CETECOM ICT Services GmbH, ou=VOG-100727, email=thomas.vogler@cetecom.com , c=DE
Datum: 2014.06.24 09:17:38 +02'00'

Thomas Vogler
Senior Testing Manager

Test performed:

cn=Oleksandr Hnatovskiy, o=CETECOM ICT, ou=HNA-100728, email=Oleksandr.Hnatovskiy@cetecom.com, c=DE
2014.06.24 09:12:39 +02'00'

Oleksandr Hnatovskiy
Testing Manager

1 Table of contents

2 General information

2.1 Notes and disclaimer

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2.2 Application details

Date of receipt of order:	2014-05-19
Date of receipt of test item:	2014-05-26
Start of test:	2014-06-13
End of test:	2014-06-13
Person(s) present during the test:	

2.3 Statement of compliance

The PY7PM-0742 Smart Phone has been tested in accordance with ANSI C63.19-2011: American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids.

C63.19 HAC Rated Category: M4

2.4 Technical details

Band tested for this test report	Technology	Lowest transmit frequency/MHz	Highest transmit frequency/MHz	Lowest receive Frequency/MHz	Highest receive Frequency/MHz	Kind of modulation	Power Class	Tested power control level	GPRS/EGPRS mobile station class	GPRS/EGPRS multislot class	(E)GPRS voice mode or DTM	Test channel low	Test channel middle	Test channel high	Maximum output power/dBm)*
☐	GSM	880.2	914.8	925.2	959.8	GMSK 8-PSK	4 E2	5	A	33	11	975	37	124	30.0
☐	GSM DCS	1710.2	1784.8	1805.2	1879.8	GMSK 8-PSK	1 E2	0	A	33	11	512	698	885	26.8
☒	GSM cellular	824.2	848.8	869.2	893.8	GMSK 8-PSK	4 E2	5	A	33	11	128	190	251	31.0
☒	GSM PCS	1850.2	1909.8	1930.2	1989.8	GMSK 8-PSK	1 E2	0	A	33	11	512	661	810	25.5
☐	CDMA BC0	815	849	860	894	QPSK	3	max	--	--	--	1013	384	777	24.6
☐	CDMA BC1	1850	1910	1930	1990	QPSK	3	max	--	--	--	25	600	1175	23.5
☐	UMTS FDD I	1922.4	1977.6	2112.4	2167.6	QPSK	3	max	--	--	--	9612	9750	9888	24.5
☐	UMTS FDD II	1852.4	1907.6	1932.4	1987.6	QPSK	3	max	--	--	--	9262	9400	9538	23.5
☐	UMTS FDD V	826.4	846.6	871.4	891.6	QPSK	3	max	--	--	--	4132	4182	4233	24.5
☐	UMTS FDD VIII	882.4	912.6	927.4	957.6	QPSK	3	max	--	--	--	2712	2788	2863	24.5
☐	LTE FDD 2	1850	1910	1930	1990	QPSK	3	max	--	--	--	18700	18900	19100	23.3
☐	LTE FDD 3	1710	1785	1805	1880	QPSK	3	max	--	--	--	19300	19575	19850	23.6
☐	LTE FDD 4	1710	1755	2110	2155	QPSK	3	max	--	--	--	20050	20175	20300	23.5
☐	LTE FDD 7	2500	2570	2620	2690	QPSK	3	max	--	--	--	20850	21100	21350	17.3
☐	LTE FDD 13	777	787	746	756	QPSK	3	max	--	--	--	23205	23230	23255	23.7
☐	WLAN	2412	2472	2412	2472	CCK OFDM	--	max	--	--	--	1	7	13	15.6
☐	WLAN US	2412	2462	2412	2462	CCK OFDM	--	max	--	--	--	1	6	11	15.5
☐	WLAN	5180	5240	5180	5240	OFDM	--	max	--	--	--	--	--	48	15.5
☐	WLAN	5260	5320	5260	5320	OFDM	--	max	--	--	--	--	56	--	12.0
☐	WLAN	5500	5700	5500	5700	OFDM	--	max	--	--	--	--	--	140	11.9
☐	WLAN	5745	5825	5745	5825	OFDM	--	max	--	--	--	--	--	161	13.8
☐	BT	2402	2480	2402	2480	GFSK	3	max	--	--	--	0	39	78	9.2

)*: measured slotted peak power for GSM, averaged max. RMS power for UMTS, LTE, WLAN and BT.

supported UMTS features	category	remarks
Release 9 HSDPA	24	QPSK,16 QAM, 64QAM, 42.2 Mbit/s, Dual-Cell
Release 6 HSUPA	6	no 16QAM , no MIMO, 5.76 Mbit/s

LTE: Release 10, Category 4

2.5 Transmitter and Antenna Operating Configurations

Simultaneous transmission conditions		
GSM / GPRS / EDGE / DTM	+	BT/BLE[1]
GSM / GPRS / EDGE / DTM	+	WLAN 2.4GHz
GSM / GPRS / EDGE / DTM	+	WLAN 5GHz
UMTS / HSPA	+	BT/BLE
UMTS / HSPA	+	WLAN 2.4GHz
UMTS / HSPA	+	WLAN 5GHz
CDMA	+	BT/BLE
CDMA	+	WLAN 2.4GHz
CDMA	+	WLAN 5GHz
LTE	+	BT/BLE
LTE	+	WLAN 2.4GHz
LTE	+	WLAN 5GHz

Table 1: Simultaneous transmission conditions

Note: BT and WLAN can be active at the same time, but only with interleaving of packages switched on board level. That means that they don’t transmit at the same time.

BLE[1] - Bluetooth low energy

Supported modes relevant for HAC testing:

Technology	Frequency band	Transmission	Voice over IP	Tested
GSM	850 MHz	Voice Only	n.a.	x
		Data (GPRS/EDGE)	n.a.	
	1900 MHz	Voice Only	n.a.	x
		Data (GPRS/EDGE)	n.a.	
WCDMA	FDD II 1900 MHz	Voice Only	n.a.	
		Data (HSPA)	n.a.	
	FDD IV 1700 MHz	Voice Only	n.a.	
		Data (HSPA)	n.a.	
	FDD V 850 MHz	Voice Only	n.a.	
		Data (HSPA)	n.a.	
LTE	FDD 2 1900 MHz	Voice and Data	X)*	
	FDD 4 1700 MHz	Voice and Data	X)*	
	FDD 5 850 MHz	Voice and Data	X)*	
	FDD 13 700 MHz	Voice and Data	X)*	
	FDD 17 700 MHz	Voice and Data	X)*	
WLAN	2.4 GHz	Voice and Data	X)*	
WLAN	5 GHz	Voice and Data	X)*	
Bluetooth	2.4 GHz	Data		

)*
Note: HAC rating was tested only for communication systems offering voice mode in Commercial Mobile Radio Services (CMRS). VoLTE and VoIP over WiFi air interfaces were not tested in accordance with FCC KDB publication 285076D02 (T-Coil testing for CMRS IP).

3 Test standard/s:

Test Standard	Version	Test Standard Description
ANSI C63.19	2011	Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids
FCC 47 CFR §20.19		Hearing Aid Compatible Mobile Headsets

3.1 Categories of hearing aid compatibility for wireless devices

Telephone RF Parameters		
Category	Limits for E-Field Emissions < 960 MHz	Limits for E-Field Emissions > 960 MHz
	dBV/m	dBV/m
M1	50 – 55	40 – 45
M2	45 – 50	35 – 40
M3	40 – 45	30 – 35
M4	< 40	< 30

4 Summary of Measurement Results

☒	**No deviations from the technical specifications ascertained**
	HAC-Category : M4
☐	Deviations from the technical specifications ascertained

5 Test Environment

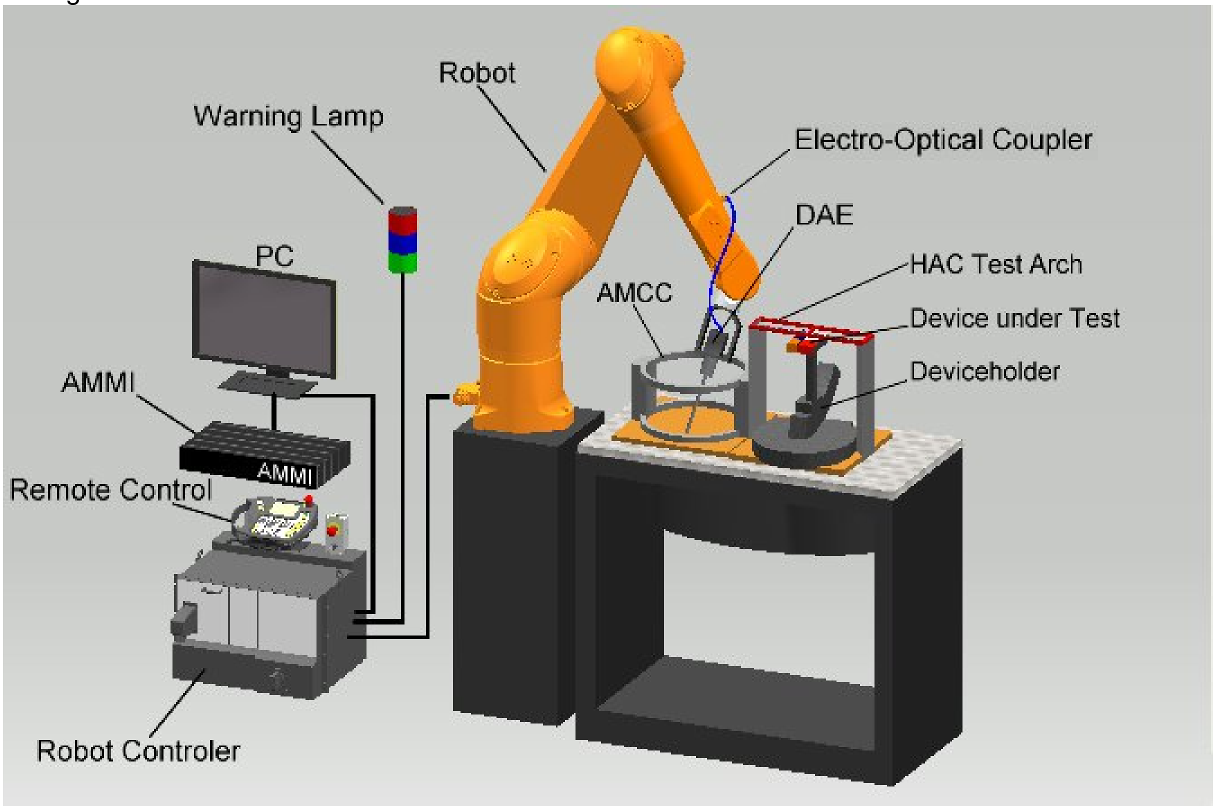
Ambient temperature:	20 – 24 °C
Relative humidity content:	40 – 50 %
Air pressure:	not relevant for this kind of testing
Power supply:	230 V / 50 Hz

6 Test Set-up

6.1 Measurement system

6.1.1 System Description

For performing HAC measurements the Schmid & Partner DASY52 dosimetric assessment system is used which is described below. Instead of dosimetric probes E-field and H-field probes for measurement in air are in use together with a HAC test arch:



The DASY5 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- A unit to operate the optical surface detector which is connected to the EOC.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.
- The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 7
- DASY5 software and SEMCAD data evaluation software.
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- System validation dipoles allowing to validate the proper functioning of the system.

6.1.2 Test environment

The DASY52 measurement system is placed at the head end of a room with dimensions: 5 x 2.5 x 3 m³, the SAM phantom is placed in a distance of 75 cm from the side walls and 1.1m from the rear wall. Above the test system a 1.5 x 1.5 m² array of pyramid absorbers is installed to reduce reflections from the ceiling.
Additional absorbers are placed around the HAC test set-up to prevent reflections from the robot arm.
Picture 1 of the photo documentation shows a complete view of the the test environment.
The system allows the measurement of E-field values larger than 2 V/m and H-field values larger than 10mA/m.

6.1.3 Probe description

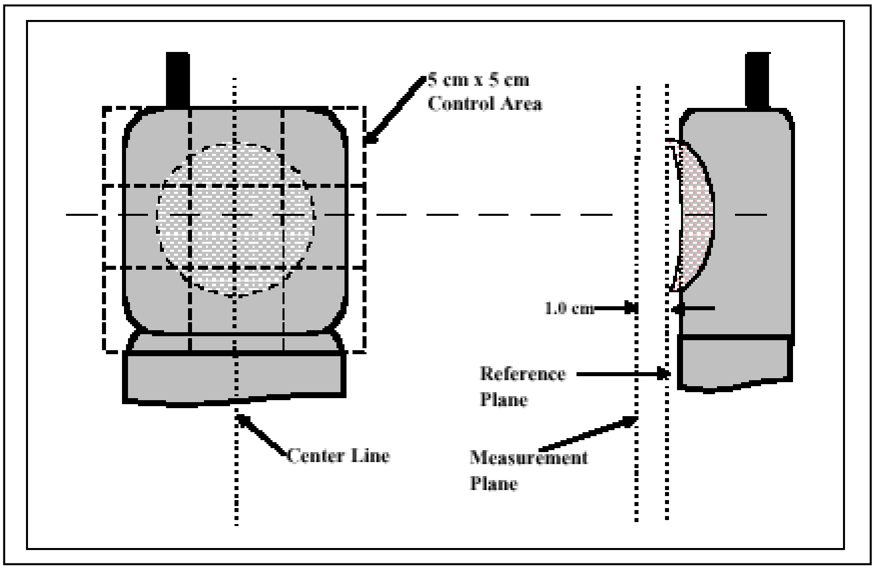
E-Field Probe ER3DV6 (Technical data according to manufacturer information)	
Construction	One dipole parallel and two dipoles normal to probe axis Built-in shielding against static charges
Calibration	In air from 100 MHz to 3 GHz (absolute accuracy ± 6.0%; k=2)
Frequency	100 MHz to >6 GHz; Linearity: ± 0.2 dB (100MHz to 3 GHz)
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 (M3/M4 device readings fall well below diode compression point)
Dimensions	Overall length: 330 mm; Tip length: 16 mm Body diameter: 12 mm; Tip diameter: 8 mm Distance from probe tip to dipole centers: 2.5mm

H-Field Probe H3DV6 (Technical data according to manufacturer information)	
Construction	Three concentric loop sensors with 3.8 mm loop diameters. Resistively loaded detector diodes for linear response Built-in shielding against static charges
Calibration	In air from 100 MHz to 3 GHz (absolute accuracy ± 6.0%; k=2)
Frequency	200 MHz to 3 GHz; Linearity: ± 0.2 dB (100MHz to 3 GHz)
Directivity	± 0.25 dB (spherical isotropy error)
Dynamic range	10 mA/m to 2 A/m at 1 GHz (M3/M4 device readings fall well below diode compression point)
Dimensions	Overall length: 330 mm; Tip length: 40 mm Body diameter: 12 mm; Tip diameter: 6 mm Distance from probe tip to loop centers: 3 mm
E-Field Interference	< 10% at 3 GHz (for plane wave)

6.1.4 HAC test arch description

The HAC test arch is especially designed for performing measurements according to the requirements of ANSI C63.19. It allows centering the wireless device inside a 5 x 5 cm control area marked with 4 points for position adjustment. Plastic bridges allow an exact adjustment of the measurement distance to 1 cm from the DUT, which also includes the distance of the dipole center to the probe tip.
For centering the mobile phone speaker inside the control area and for adjusting the validation dipole position the test arch contains a nylon thread for alignment (see picture).

The HAC test arch is placed on the cover of the DASY5 SAM phantom.



6.1.5 Device holder description

The DASY52 device holder (see picture above) has three scales for device inclination, height and side adjustment. The device holder position is adjusted to the standard measurement position e.g. center of the DUT speaker to the center of the 5 x 5 cm² control area with the device touching the plastic bridge of the HAC test arch. This device holder is used for standard mobile phones or PDA's only. If necessary an additional support of polystyrene material is used.

6.1.6 Scanning procedure

The DASY52 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All tests are performed with the same configuration of test steps an in accordance with the requirements described in ANSI C63.19

1. The HAC test setup is placed at the pre-defined position on top of the SAR phantom cover.
2. A phantom adjustment and verification is performed, which allows checking the borders and center position of the 5 x 5 cm² control area. The probe tip touches down on the 4 points at the corners of the control area
3. The wireless device (WD) is oriented in its intended test position (see photo documentation) with the reference plane in the horizontal plane and secured by the device holder. The acoustical output is placed in the center of the control area (predefined by the HAC test arch)
4. The DUT is set to transmit at maximum output power at the desired test channel(s).
5. „Reference“ and „drift“ measurements are located at the beginning and the end of the test batch process. They measure the field drift at one single point above the DUT over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max. +/- 5 % (+/- 0.2 dB).
6. The „area scan“ measures the electrical or magnetic field strength above the WD on a parallel plane to the surroundings of the control area at the upper end of the HAC test arch. It is used to locate the approximate location of the peak field strength with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical or magnetic field strength is measured by the probe. The probe is moving at a distance of 1 cm to a defined plane above the WD during acquisition of measurement values. Standard grid spacing is 5 mm in x- and y- dimension. If a finer resolution is needed, the grid spacing can be reduced. Results of this scan are shown in annex 2.
7. At the maximum interpolated position a 360° rotation of the probe around the azimuth is performed. The maximum and delta reading from this rotation is used in re-evaluating the HAC category.
8. The automatic data evaluation performed by the software in respect of the requirements of the test standard subdivides the tested area of 5 x 5 cm into 9 squares. Within each square the maximum electrical or magnetic field strength is detected. For classification of M categories the 3 squares with highest field values are excluded. Among the remaining 6, one of which is the center square, 4 squares with highest values both in E-field and in H-field scan are evaluated. The results are automatically exported by the SEMCAD evaluation software together with the measurement plots.

The SEMCAD software also respects the articulation weighing factor (AWF), and converts the measured values to peak V/m or peak A/m using appropriate factors derived from the probe modulation factor, which is determined by system validation measurements.

6.1.7 Data Storage and Evaluation

Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DA52". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	Dcpi
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY5 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot cf/dcp_i$$

with	V_i	= compensated signal of channel i	(i = x, y, z)
	U_i	= input signal of channel i	(i = x, y, z)
	cf	= crest factor of exciting field	(DASY parameter)
	dcp_i	= diode compression point	(DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes: $$E_i = (V_i \,/\, Norm_i \cdot ConvF)^{1/2}$$

H-field probes: $$H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1}f + a_{i2}f^2)/f$$

with	V_i	= compensated signal of channel i	(i = x, y, z)
	$Norm_i$	= sensor sensitivity of channel i [mV/(V/m)^2] for E-field Probes	(i = x, y, z)
	ConvF	= sensitivity enhancement in solution	
	a_{ij}	= sensor sensitivity factors for H-field probes	
	f	= carrier frequency [GHz]	
	E_i	= electric field strength of channel i in V/m	
	H_i	= magnetic field strength of channel i in A/m	

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}$$

with	P_{pwe}	= equivalent power density of a plane wave in mW/cm^2
	E_{tot}	= total electric field strength in V/m
	H_{tot}	= total magnetic field strength in A/m

6.1.8 Measurement uncertainty evaluation for HAC measurements

This measurement uncertainty budget is suggested by ANSI-C63.19 and determined by Schmid & Partner Engineering AG. The breakdown of the individual uncertainties is as follows:

Error Sources	Uncertainty Value	Probability Distribution	Divi -sor	c_i E	Standard Uncertainty E
Measurement System					
Probe calibration	± 5.1%	Normal	1	1	± 5.1%
Axial isotropy)*	± 4.7%	Rectangular	√3	1	± 2.7%
Sensor displacement	±16.5%	Rectangular	√3	1	± 9.5%
Boundary effects	± 2.4%	Rectangular	√3	1	± 1.4%
Phantom Boundary Effect	± 7.2%	Rectangular	√3	1	± 4.1%
Probe linearity	± 4.7%	Rectangular	√3	1	± 2.7%
Scaling with PMR calibration	± 10.0%	Rectangular	√3	1	± 1.2%
System detection limits	± 1.0%	Rectangular	√3	1	± 0.6%
Readout electronics	± 0.3%	Normal	1	1	± 0.3%
Response time	± 0.8%	Rectangular	√3	1	± 0.5%
Integration time	± 2.6%	Rectangular	√3	1	± 1.5%
RF ambient conditions)*	± 3.0%	Rectangular	√3	1	± 1.7%
RF reflections)*	± 7.5%	Rectangular	√3	1	± 4.3%
Probe positioner	± 1.2%	Rectangular	√3	1	± 0.7%
Probe positioning	± 4.7%	Rectangular	√3	1	± 2.7%
Extrapolation and Interpolation	± 1.0%	Rectangular	√3	1	± 0.6%
Test sample related					
Device positioning vertical	± 4.7%	Rectangular	√3	1	± 2.7%
Device positioning lateral	± 1.0%	Rectangular	√3	1	± 0.6%
Device holder and Phantom	± 2.4%	Rectangular	√3	1	± 1.4%
Power drift	± 5.0%	Rectangular	√3	1	± 2.9%
Phantom and Setup Related					
Phantom Thickness	± 2.4%	Rectangular	√3	1	± 1.4%
Combined Uncertainty					**± 14.3%**
Expanded Std. Uncertainty on Power					**± 28.6%**

)* : site specific

Table 2: Measurement uncertainties

6.1.9 Measurement uncertainty evaluation for system validation

This measurement uncertainty budget is suggested by ANSI-C63.19 and determined by Schmid & Partner Engineering AG. The breakdown of the individual uncertainties is as follows:

Error Sources	Uncertainty Value	Probability Distribution	Divi -sor	c_i E	Standard Uncertainty E
Measurement System					
Probe calibration	± 5.1%	Normal	1	1	± 5.1%
Axial isotropy)*	± 4.7%	Rectangular	√3	1	± 2.7%
Sensor displacement	±16.5%	Rectangular	√3	1	± 9.5%
Boundary effects	± 2.4%	Rectangular	√3	1	± 1.4%
Phantom Boundary Effect	± 7.2%	Rectangular	√3	1	± 4.1%
Probe linearity	± 4.7%	Rectangular	√3	1	± 2.7%
Scaling with PMR calibration	± 10.0%	Rectangular	√3	1	± 1.2%
System detection limits	± 1.0%	Rectangular	√3	1	± 0.6%
Readout electronics	± 0.3%	Normal	1	1	± 0.3%
Response time	± 0.8%	Rectangular	√3	1	± 0.5%
Integration time	± 2.6%	Rectangular	√3	1	± 1.5%
RF ambient conditions)*	± 3.0%	Rectangular	√3	1	± 1.7%
RF reflections)*	± 7.5%	Rectangular	√3	1	± 4.3%
Probe positioner	± 1.2%	Rectangular	√3	1	± 0.7%
Probe positioning	± 4.7%	Rectangular	√3	1	± 2.7%
Extrapolation and Interpolation	± 1.0%	Rectangular	√3	1	± 0.6%
Dipole related					
Distance dipole – scanning plane	± 5.2%	Rectangular	√3	1	± 3.0%
Input power	± 4.7%	Normal	1	1	± 4.7%
Phantom and Setup Related					
Phantom Thickness	± 2.4%	Rectangular	√3	1	± 1.4%
Combined Uncertainty					**± 14.7%**
Expanded Std. Uncertainty on Power					**± 29.4%**

)* : site specific

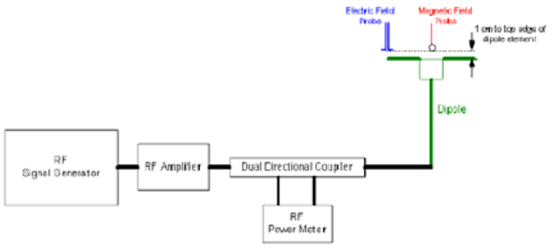
Table 3: Measurement uncertainties

6.1.10 System validation

The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The following table shows system check results for all frequency bands (graphic plot(s) see annex A).

6.1.11 System validation procedure

According to the requirements of ANSI C63.19 chapter 5.4.3.1 the system check is performed by using a validation dipole which is positioned parallel to the nylon fibre of the HAC test arch. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 100 mW (20 dBm). To adjust this power a power meter is used. The power sensor is connected to the cable before the system check to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the system check to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).
During the system check the measurement system scans a grid along the length of the dipole and the maximum value is recorded.
This system check is performed periodically both with E field probes on the center frequencies of the frequency bands used by the wireless device.
System check results have to be equal or near the values determined during dipole calibration (target HAC in table below) with the same test system set-up.



System performence check (100 mW) 15 mm distance						
Freq. (MHz)	Signal type	Peak output power (dBm)	Target field strength V/m (+/-10%)	Measured field strength V/m	dev. %	Measured date
835	CW	20.0	107.2	109.5	2.1%	2014-06-13
1880	CW	20.0	89.3	93.1	4.3%	2014-06-13

Table 4: Results system check

According to ANSI C63.19 Chapter 5.4.3.1.2.2 it is recommended to compare measurement results of 3 different test cases: CW, 80% AM and signal of the wireless device.

The probe is moved to the position with the highest field strength found during system check with CW.
The wireless device (WD) or an emulated signal source (e.g. CMU 200) is set to apply full rated power into the reference dipole.
Average and peak output power of the WD or emulated signal source are measured using a peak power meter.
Average power emitted by the dipole is measured with the DASY5 system.
The same procedure is repeated with a CW and an AM signal with 80% modulation index which have the same peak power as determined with the signal modulation format of the wireless device.

From the measured results the peak-to-average-ratio (PAR) is determined.

Estimation of expected values:

CW

Peak-to-Average-Ratio: 0.0 dB

80% AM

Peak-to-Average Ratio (dB) = $10*\log(m+1)^2$ with modulation index m = 0.8

PAR_{log} = 5.1 dB
PAR_{lin} = 1.8

c) GSM

PAR_{log} = 9 dB
PAR_{lin} = 8 (for one of eight timeslots in use)

The linear PAR corresponds to the crest factor of the corresponding signal type.

6.1.12 Determination of modulation interference factor

ANSI C63.19-2011 replaces the previously used Articulation Weighting Factor by the Modulation Interference Factor (MIF). By using the MIF during data evaluation the formerly applied probe modulation factor does not need to be taken into account during data evaluation either.

The MIF evaluation as defined in chapter D.7 of ANSI C63.19-2011 has been performed during probe calibration together with the determination of PMR (probe modulation ratio) to be used in DASY52.
This calibration is required to cover higher peak-to-average ratios of communication systems like UMTS and LTE.
As SPEAG's E-field probes (ER3DV6) have a bandwith smaller than 10 kHz the indirect measurement method according to chapter 5.2 of ANSI C63.19-2011 is used. A correct calibration of PMR allows better linearization of the probes and prevents overestimation of the measured E-field.

The calibration document of the used E-field probe lists the detailed calibration parameters, which are automatically applied during the measurement.
The following table shows the calibrated and applied MIF values.

SPEAG UID	Communication System	MIF (dB)	UID Version / Date
10011	UMTS-FDD (WCDMA)	-27.23	3.1.1 /
10021	GSM-FDD (TDMA, GMSK)	3.63	3.1.1

with the following measurement uncertainty:

MIF (dB)	Measurement Uncertainty (dB)
-7 to +5	0.2
-13 to +11	0.5
> -20	1.0

As with probe modulation factor the worst case of MIF is also for TDMA systems. For communication systems with lower MIF a product testing threshold according to ANSI C63.19-2011 chapter 4.4 can be applied:

''An RF air interface technology of a device is exempt from testing when its average antenna input power plus its MIF is ≤17 dBm for any of its operating modes.''

6.2 Conducted power measurements

For the measurements a Rohde & Schwarz Radio Communication Tester CMU 200 was used.
The output power was measured using an integrated RF connector and attached RF cable.
The conducted output power was also checked before and after each SAR measurement. The resulting power values were within a 0.2 dB tolerance of the values shown below.

6.2.1 Conducted power measurements GSM 850 MHz

Channel / frequency	modulation	timeslots	slotted avg. power		time based avg. Power (calculated)	
128 / 824.2 MHz	GMSK	1	32.6	dBm	23.6	dBm
190 / 836.6 MHz	GMSK	1	32.7	dBm	23.7	dBm
251 / 848.8 MHz	GMSK	1	32.9	dBm	23.9	dBm

Table 5: Test results conducted power measurement GSM 850 MHz

6.2.2 Conducted power measurements GSM 1900 MHz

Channel / frequency	modulation	timeslots	slotted avg. power		time based avg. Power (calculated)	
512 / 1850.2 MHz	GMSK	1	32.6	dBm	23.6	dBm
661 / 1880.0 MHz	GMSK	1	32.7	dBm	23.7	dBm
810 / 1909.8 MHz	GMSK	1	32.9	dBm	23.9	dBm

Table 6: Test results conducted power measurement GSM 1900 MHz

6.2.3 Conducted power measurements WCDMA FDD II (1900 MHz)

Max. RMS output power 1900 MHz (FDD II) / dBm			
	Channel / frequency		
mode	9262 / 1852.4 MHz	9400 / 1880.0 MHz	9538 / 1907.6 MHz
RMC 12.2 kbit/s	**23.5**	**23.5**	**23.4**
AMR 4.75 kbit/s	23.5	23.5	23.4
AMR 5.15 kbit/s	23.5	23.5	23.4
AMR 5.9 kbit/s	23.5	23.5	23.3
AMR 6.7 kbit/s	23.5	23.4	23.4
AMR 7.4 kbit/s	23.5	23.5	23.4
AMR 7.95 kbit/s	23.5	23.4	23.3
AMR 10.2 kbit/s	23.5	23.5	23.4
AMR 12.2 kbit/s	23.5	23.5	23.4

Table 7: Test results conducted power measurement UMTS FDD II 1900MHz

6.2.4 Conducted power measurements WCDMA FDD V (850 MHz)

Max. RMS output power 850 MHz (FDD V) / dBm			
	Channel / frequency		
mode	4132 / 826.4 MHz	4182 / 836.6 MHz	4233 / 846.6 MHz
RMC 12.2 kbit/s	**24.5**	**24.5**	**24.4**
AMR 4.75 kbit/s	24.5	24.5	24.3
AMR 5.15 kbit/s	24.4	24.4	24.2
AMR 5.9 kbit/s	24.4	24.5	24.3
AMR 6.7 kbit/s	24.5	24.5	24.3
AMR 7.4 kbit/s	24.5	24.5	24.3
AMR 7.95 kbit/s	24.4	24.5	24.3
AMR 10.2 kbit/s	24.5	24.5	24.3
AMR 12.2 kbit/s	24.5	24.5	24.3

Table 8: Test results conducted power measurement UMTS FDD V 850MHz

6.3 Test results

The following tables summarize the worst case E-field results of the measured field distributions shown in Annex B. In GSM band no exclusion blocks have been applied in the area of highest E-field.

6.3.1 Test Results at speaker position

Hearing Aid Compatibility results for E-Field					
Channel / frequency	Location (x, y)	Max E-Field (peak)	M3 limit	category	air temperature
128 / 824.2 MHz	(-2.0, 21.0)	37.8 dBV/m	45 dBV/m	M4	23.2 °C
190 / 836.6 MHz	(7.0, 25.8)	37.6 dBV/m	45 dBV/m	M4	23.2 °C
251 / 848.8 MHz	(7.0, 25.0)	36.6 dBV/m	45 dBV/m	M4	23.2 °C
128 / 824.2 MHz	worst case	**38.5** dBV/m	45 dBV/m	M4	23.2 °C
512 / 1850.2 MHz	(20.5, -25.0)	29.2 dBV/m	35 dBV/m	M4	23.2 °C
661 / 1880.0 MHz	(18.5, -25.0)	29.3 dBV/m	35 dBV/m	M4	23.2 °C
810 / 1909.8 MHz	(15.5, -25.0)	28.7 dBV/m	35 dBV/m	M4	23.2 °C
661 / 1880.0 MHz	worst case	**29.4** dBV/m	35 dBV/m	M4	23.2 °C

Table 9: Test results GSM 850 and 1900 MHz (E-field) at speaker position

Overall category: M4

Note: Acquired measurement data in this report represent worst case modes. Refer to a separate attestation letter signed by the grantee that the applied MIF values represent worst case operation modes.

6.3.2 General description of test procedures

The device was tested using a CMU 200 communications tester as controller unit to set test channels and maximum output power to the DUT, as well as for measuring the conducted peak power. The conducted output power was measured using an integrated RF connector and attached RF cable.
Worst case configuration evaluation was performed at channel with highest field level by rotating the probe 360° at azimuth axis (see annex A.2) and calculation to maximum peak.

7 Test equipment and ancillaries used for tests

To simplify the identification of the test equipment and/or ancillaries which were used, the reporting of the relevant test cases only refer to the test item number as specified in the table below.

Equipment	Type	Manufacturer	Serial No.	Last Calibration	Frequency (months)
E-Field Probe	ER3DV6	Schmid & Partner Engineering AG	2262	January 17, 2014	12
835 MHz System Validation Dipole	CD900V3	Schmid & Partner Engineering AG	1027	May 13, 2014	12
1880 MHz System Validation Dipole	CD1880V3	Schmid & Partner Engineering AG	1021	May 13, 2014	12
Data acquisition electronics	DAE3V1	Schmid & Partner Engineering AG	477	May 14, 2014	12
Software	DASY52 52.8.1	Schmid & Partner Engineering AG	---	N/A	--
HAC test arch	SD HAC P01 BA	Schmid & Partner Engineering AG	1022	N/A	--
Universal Radio Communication Tester	CMU 200	Rohde & Schwarz	106826	January 27, 2014	24
Amplifier	25S1G4 (25 Watt)	Amplifier Reasearch	20452	N/A	--
Power Meter	NRP	Rohde & Schwarz	101367	January 21, 2014	24
Power Meter Sensor	NRP Z22	Rohde & Schwarz	100227	January 21, 2014	12
Power Meter Sensor	NRP Z22	Rohde & Schwarz	100234	January 21, 2014	12
Directional Coupler	778D	Hewlett Packard	19171	January 21, 2014	12

8 Observations

No observations exceeding those reported with the single test cases have been made.

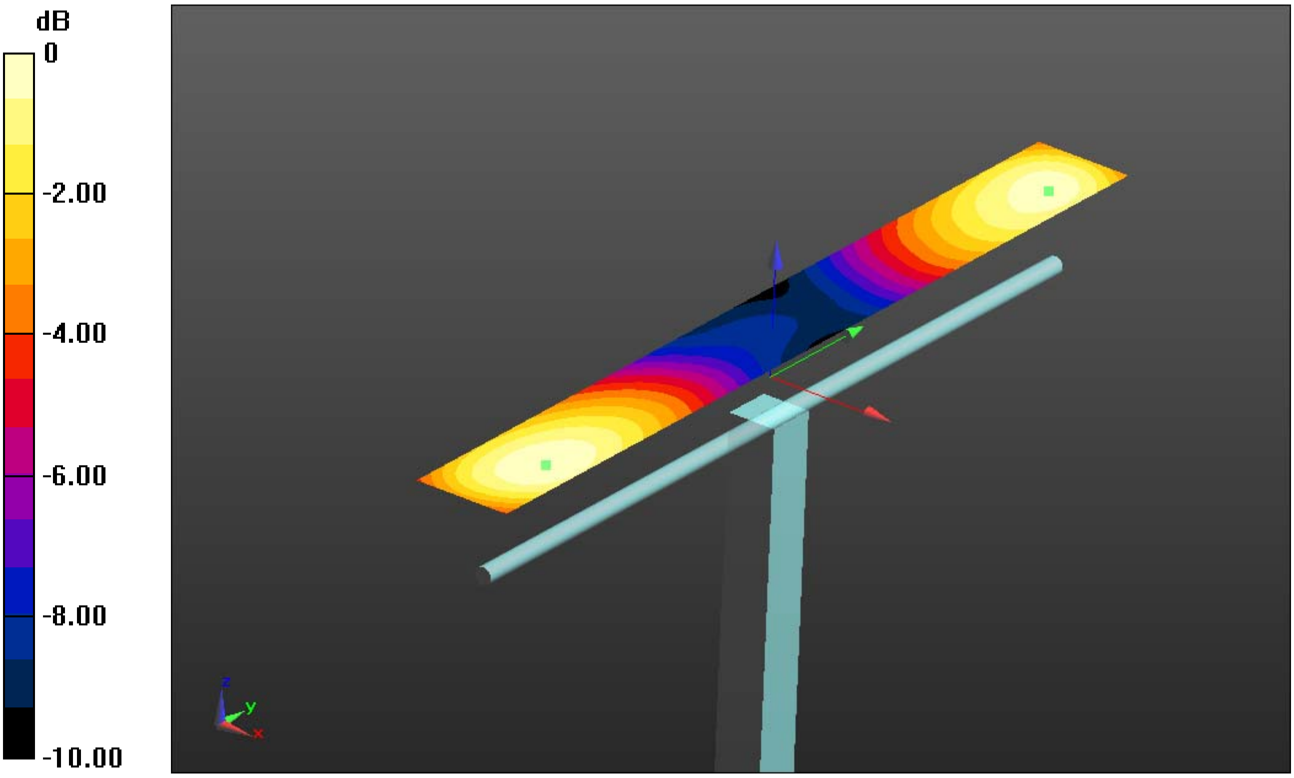
Annex A: System performance check

Date/Time: 13.06.2014 17:19:02

HAC-RF-SystemCheck835

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1027
Communication System: UID 0, CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Phantom section: TCoil Section
DASY5 Configuration:
- Probe: ER3DV6 - SN2262; ConvF(1, 1, 1); Calibrated: 17.01.2014;
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn477; Calibrated: 14.05.2014
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1007+1022
- Measurement SW: DASY52 52.8.7(1137); Postprocessing SW: SEMCAD X 14.6.10(7164)

Dipole E-Field 835 measurement/E Scan - measurement distance from the probe sensor center to CD835 = 10mm & 15mm/Hearing Aid Compatibility Test at 15mm distance (41x361x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 107.7 V/m; Power Drift = -0.09 dB
PMR not calibrated. PMF = 1.000 is applied.
Maximum value of Total (interpolated) = 109.5 V/m



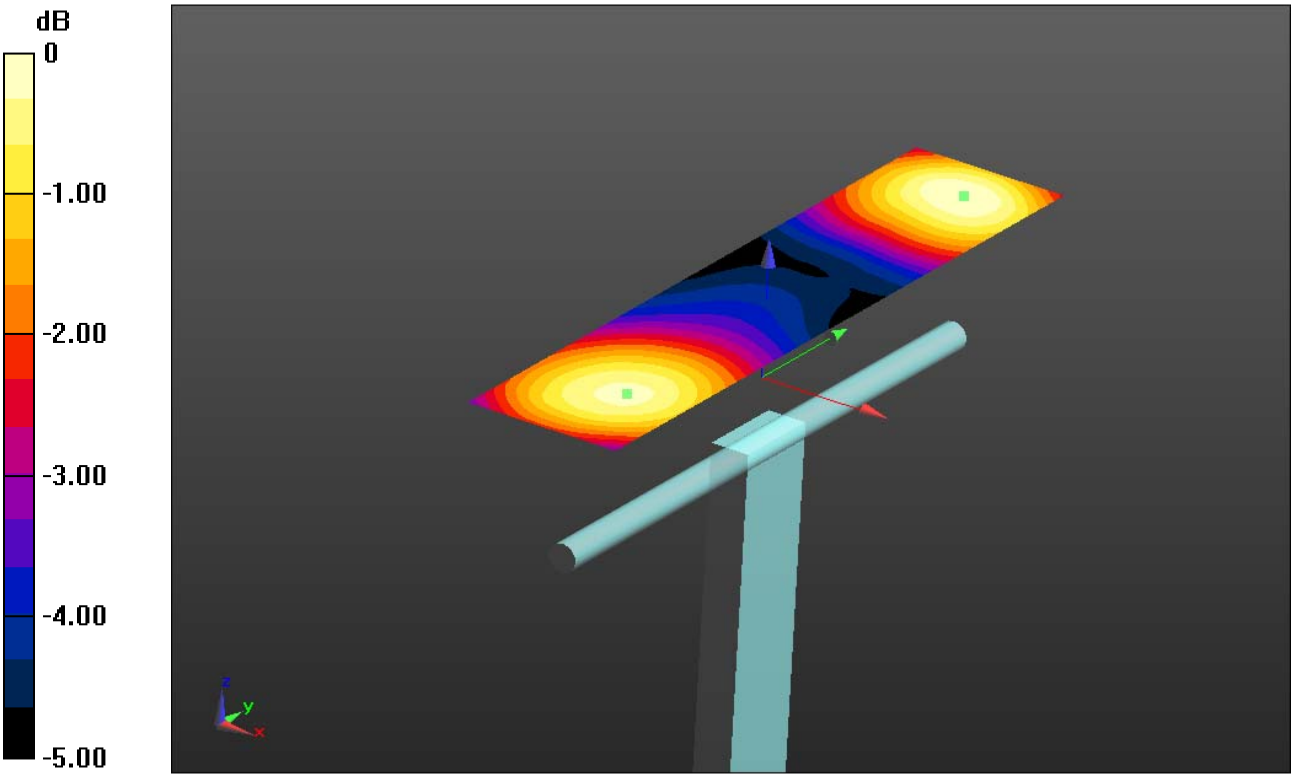
0 dB = 109.5 V/m = 40.79 dBV/m

Date/Time: 13.06.2014 17:45:18

HAC-RF-SystemCheck1880

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: 1021
Communication System: UID 0, CW; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Phantom section: TCoil Section
DASY5 Configuration:
- Probe: ER3DV6 - SN2262; ConvF(1, 1, 1); Calibrated: 17.01.2014;
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn477; Calibrated: 14.05.2014
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1007+1022
- Measurement SW: DASY52 52.8.7(1137); Postprocessing SW: SEMCAD X 14.6.10(7164)

Dipole E-Field 1880 measurement/E Scan - measurement distance from the probe sensor center to CD1880 = 10mm & 15mm/Hearing Aid Compatibility Test at 15mm distance (41x181x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 175.5 V/m; Power Drift = 0.01 dB
PMR not calibrated. PMF = 1.000 is applied.
Maximum value of Total (interpolated) = 93.13 V/m



0 dB = 93.13 V/m = 39.38 dBV/m

Annex B: DASY5 measurement results

Annex B.1: GSM 835MHz

Date/Time: 13.06.2014 15:37:42

HAC-RF-GSM850

DUT: Sony; Type: PY7PM-0742; Serial: CB5A1Z1Y2X
Communication System: UID 10021, GSM-FDD (TDMA, GMSK); Frequency: 824.2 MHz;Duty Cycle: 1:8.6896
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Phantom section: TCoil Section
DASY5 Configuration:
- Probe: ER3DV6 - SN2262; ConvF(1, 1, 1); Calibrated: 17.01.2014;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn477; Calibrated: 14.05.2014
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1007+1022
- Measurement SW: DASY52 52.8.7(1137); Postprocessing SW: SEMCAD X 14.6.10(7164)

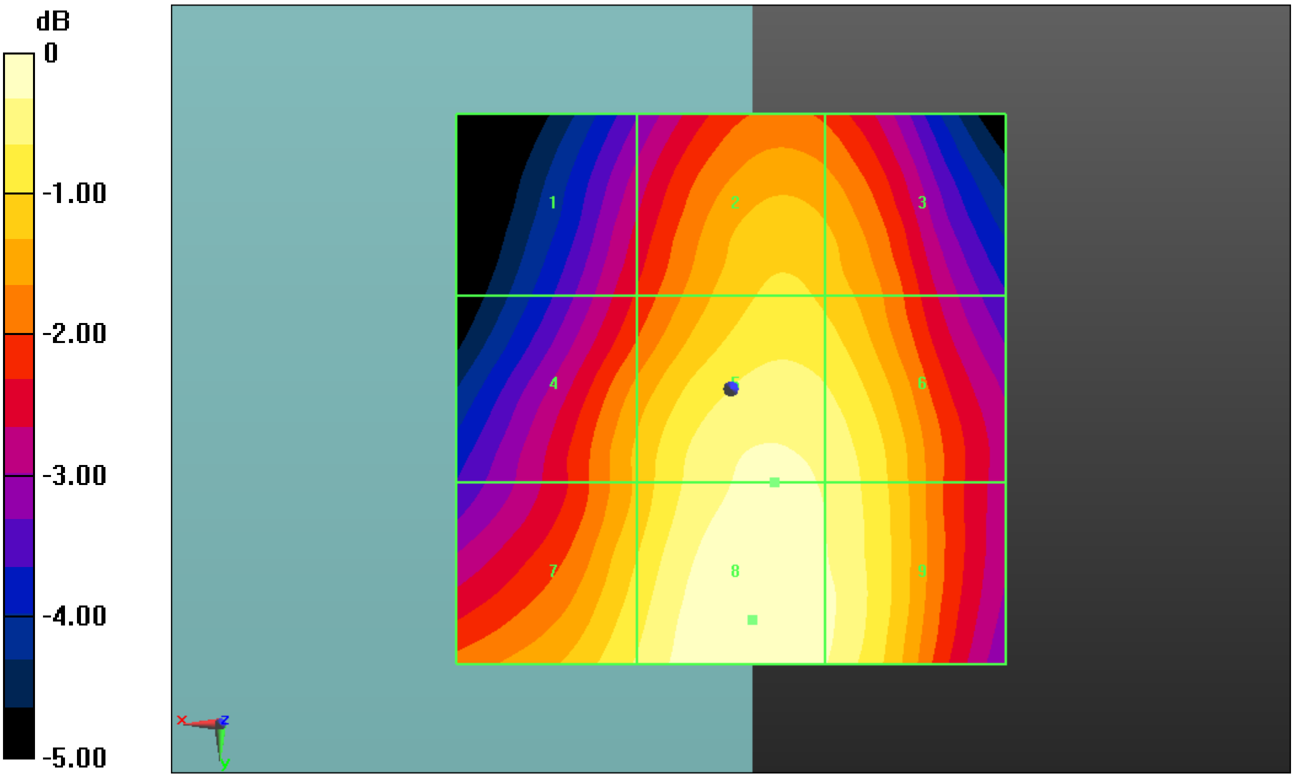
Device E-Field measurement GSM850/E Scan - ER3D - 2011: 15 mm from Probe Center to the Device low/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 27.42 V/m; Power Drift = 0.01 dB
Applied MIF = 3.63 dB
RF audio interference level = 37.84 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **35.58 dBV/m**	Grid 2 **M4** **36.93 dBV/m**	Grid 3 **M4** **36.77 dBV/m**
Grid 4 **M4** **36.6 dBV/m**	Grid 5 **M4** **37.61 dBV/m**	Grid 6 **M4** **37.47 dBV/m**
Grid 7 **M4** **37.22 dBV/m**	Grid 8 **M4** **37.84 dBV/m**	Grid 9 **M4** **37.6 dBV/m**

Category	Limits for E-Field Emissions < 960MHz	Limits for E-Field Emissions > 960MHz
M1	50 dBV/m - 55 dB V/m	40 dBV/m - 45 dB V/m
M2	45 dBV/m - 50 dB V/m	35 dBV/m - 40 dB V/m
M3	40 dBV/m - 45 dB V/m	30 dBV/m - 35 dB V/m
M4	<40 dBV/m	<30 dBV/m

Cursor:
Total = 37.84 dBV/m
E Category: M4
Location: -2, 21, 8.7 mm



0 dB = 77.99 V/m = 37.84 dBV/m

Date/Time: 13.06.2014 15:42:55

HAC-RF-GSM850

DUT: Sony; Type: PY7PM-0742; Serial: CB5A1Z1Y2X
Communication System: UID 10021, GSM-FDD (TDMA, GMSK); Frequency: 836.6 MHz;Duty Cycle: 1:8.6896
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 0 kg/m^3
Phantom section: TCoil Section
DASY5 Configuration:
- Probe: ER3DV6 - SN2262; ConvF(1, 1, 1); Calibrated: 17.01.2014;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn477; Calibrated: 14.05.2014
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1007+1022
- Measurement SW: DASY52 52.8.7(1137); Postprocessing SW: SEMCAD X 14.6.10(7164)

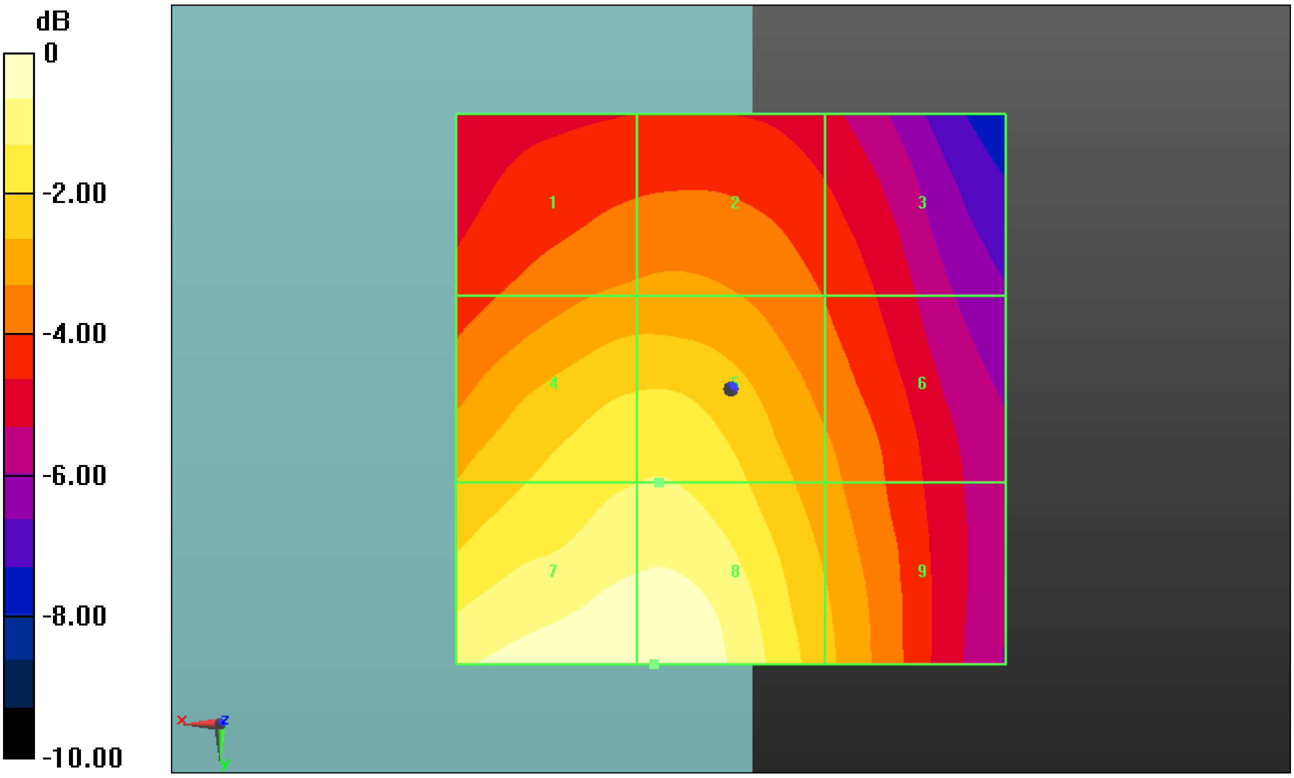
Device E-Field measurement GSM850/E Scan - ER3D - 2011: 15 mm from Probe Center to the Device middle/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 19.78 V/m; Power Drift = -0.09 dB
Applied MIF = 3.63 dB
RF audio interference level = 37.55 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **34.4 dBV/m**	Grid 2 **M4** **34.46 dBV/m**	Grid 3 **M4** **33.54 dBV/m**
Grid 4 **M4** **36.22 dBV/m**	Grid 5 **M4** **36.25 dBV/m**	Grid 6 **M4** **34.49 dBV/m**
Grid 7 **M4** **37.51 dBV/m**	Grid 8 **M4** **37.55 dBV/m**	Grid 9 **M4** **35.12 dBV/m**

Category	Limits for E-Field Emissions < 960MHz	Limits for E-Field Emissions > 960MHz
M1	50 dBV/m - 55 dB V/m	40 dBV/m - 45 dB V/m
M2	45 dBV/m - 50 dB V/m	35 dBV/m - 40 dB V/m
M3	40 dBV/m - 45 dB V/m	30 dBV/m - 35 dB V/m
M4	<40 dBV/m	<30 dBV/m

Cursor:
Total = 37.55 dBV/m
E Category: M4
Location: 7, 25, 8.7 mm



0 dB = 75.39 V/m = 37.55 dBV/m

Date/Time: 13.06.2014 15:48:01

HAC-RF-GSM850

DUT: Sony; Type: PY7PM-0742; Serial: CB5A1Z1Y2X
Communication System: UID 10021, GSM-FDD (TDMA, GMSK); Frequency: 848.6 MHz;Duty Cycle: 1:8.6896
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Phantom section: TCoil Section
DASY5 Configuration:
- Probe: ER3DV6 - SN2262; ConvF(1, 1, 1); Calibrated: 17.01.2014;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn477; Calibrated: 14.05.2014
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1007+1022
- Measurement SW: DASY52 52.8.7(1137); Postprocessing SW: SEMCAD X 14.6.10(7164)

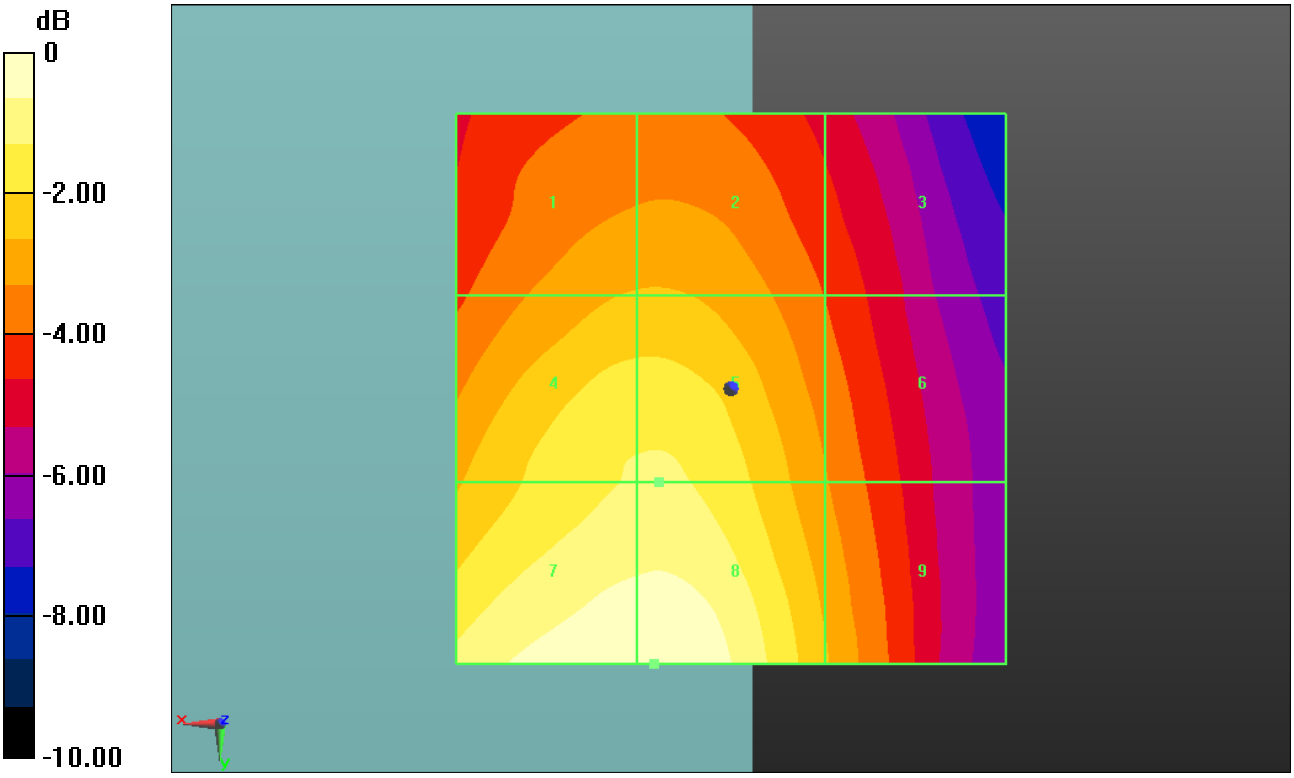
Device E-Field measurement GSM850/E Scan - ER3D - 2011: 15 mm from Probe Center to the Device high/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 17.64 V/m; Power Drift = -0.02 dB
Applied MIF = 3.63 dB
RF audio interference level = 36.62 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **34.02 dBV/m**	Grid 2 **M4** **34.04 dBV/m**	Grid 3 **M4** **32.62 dBV/m**
Grid 4 **M4** **35.35 dBV/m**	Grid 5 **M4** **35.4 dBV/m**	Grid 6 **M4** **33.37 dBV/m**
Grid 7 **M4** **36.58 dBV/m**	Grid 8 **M4** **36.62 dBV/m**	Grid 9 **M4** **34.07 dBV/m**

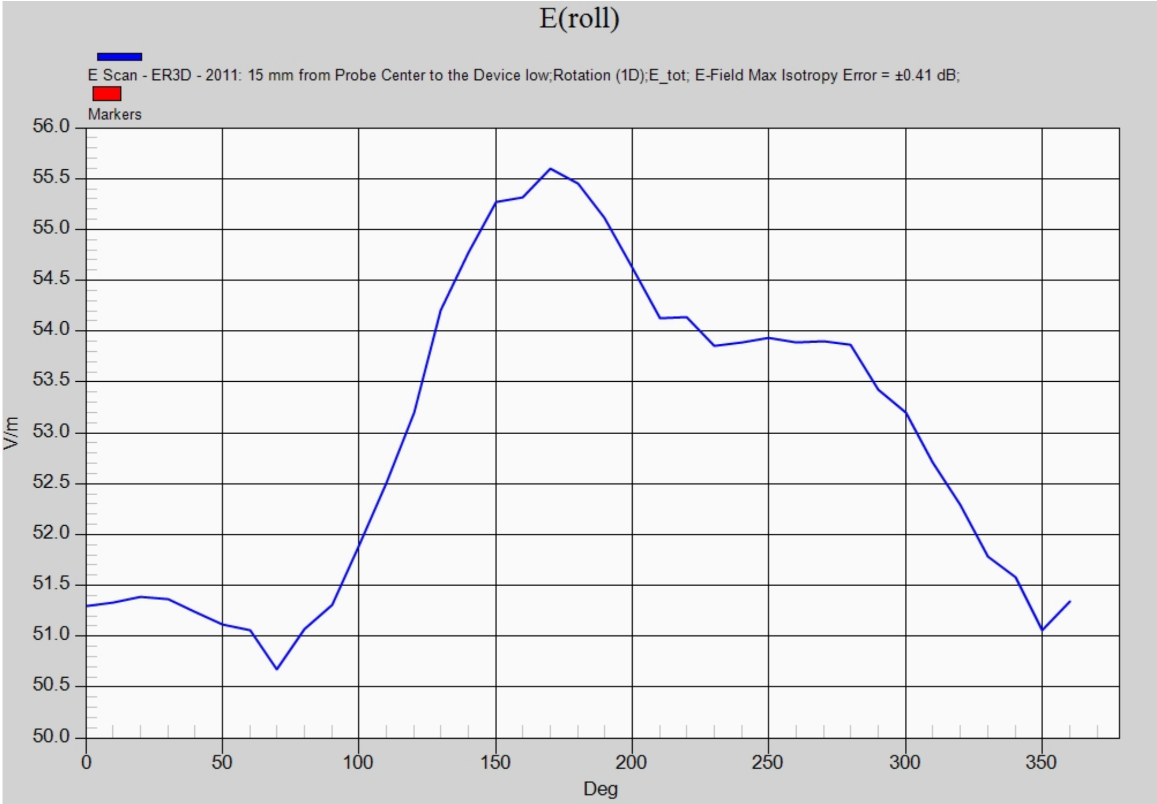
Category	Limits for E-Field Emissions < 960MHz	Limits for E-Field Emissions > 960MHz
M1	50 dBV/m - 55 dB V/m	40 dBV/m - 45 dB V/m
M2	45 dBV/m - 50 dB V/m	35 dBV/m - 40 dB V/m
M3	40 dBV/m - 45 dB V/m	30 dBV/m - 35 dB V/m
M4	<40 dBV/m	<30 dBV/m

Cursor:
Total = 36.62 dBV/m
E Category: M4
Location: 7, 25, 8.7 mm



0 dB = 67.75 V/m = 36.62 dBV/m

E(roll) checked at worst case (Low Channel):



rot 0°	rot max.	percentage deviation	max. field strength (dBV/m)	worst case calculated (dBV/m)
51.3	55.6	7.73%	37.8	**38.45**

Annex B.2: GSM 1880MHz

Date/Time: 13.06.2014 15:55:04

HAC-RF-GSM1900

DUT: Sony; Type: PY7PM-0742; Serial: CB5A1Z1Y2X
Communication System: UID 10021, GSM-FDD (TDMA, GMSK); Frequency: 1850.2 MHz;Duty Cycle: 1:8.6896
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Phantom section: TCoil Section
DASY5 Configuration:
- Probe: ER3DV6 - SN2262; ConvF(1, 1, 1); Calibrated: 17.01.2014;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn477; Calibrated: 14.05.2014
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1007+1022
- Measurement SW: DASY52 52.8.7(1137); Postprocessing SW: SEMCAD X 14.6.10(7164)

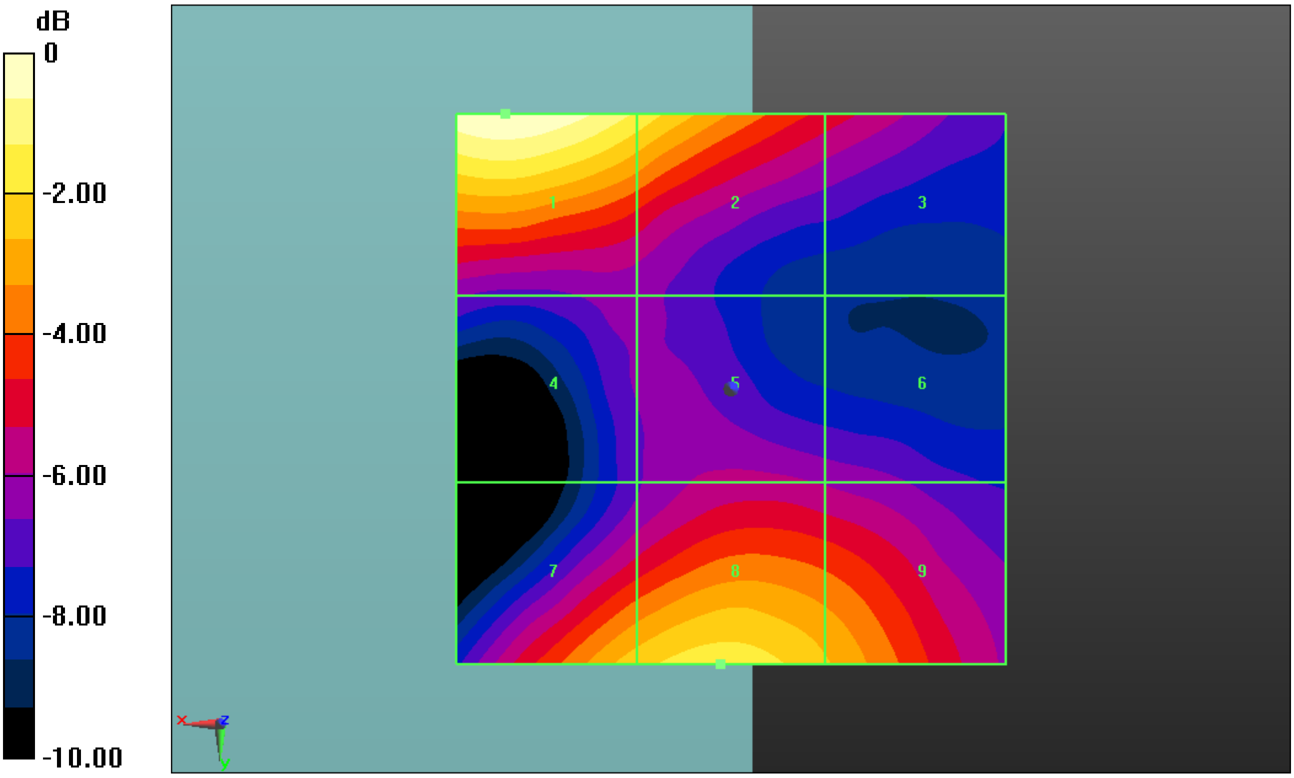
Device E-Field measurement GSM 1900/E Scan - ER3D - 2011: 15 mm from Probe Center to the Device low/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 7.912 V/m; Power Drift = 0.04 dB
Applied MIF = 3.63 dB
RF audio interference level = 29.22 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **29.22 dBV/m**	Grid 2 **M4** **27.77 dBV/m**	Grid 3 **M4** **24.37 dBV/m**
Grid 4 **M4** **22.85 dBV/m**	Grid 5 **M4** **23.51 dBV/m**	Grid 6 **M4** **23.17 dBV/m**
Grid 7 **M4** **26.98 dBV/m**	Grid 8 **M4** **27.57 dBV/m**	Grid 9 **M4** **26.68 dBV/m**

Category	Limits for E-Field Emissions < 960MHz	Limits for E-Field Emissions > 960MHz
M1	50 dBV/m - 55 dB V/m	40 dBV/m - 45 dB V/m
M2	45 dBV/m - 50 dB V/m	35 dBV/m - 40 dB V/m
M3	40 dBV/m - 45 dB V/m	30 dBV/m - 35 dB V/m
M4	<40 dBV/m	<30 dBV/m

Cursor:
Total = 29.22 dBV/m
E Category: M4
Location: 20.5, -25, 8.7 mm



0 dB = 28.91 V/m = 29.22 dBV/m

Date/Time: 13.06.2014 16:00:16

HAC-RF-GSM1900

DUT: Sony; Type: PY7PM-0742; Serial: CB5A1Z1Y2X
Communication System: UID 10021, GSM-FDD (TDMA, GMSK); Frequency: 1880 MHz;Duty Cycle: 1:8.6896
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Phantom section: TCoil Section
DASY5 Configuration:
- Probe: ER3DV6 - SN2262; ConvF(1, 1, 1); Calibrated: 17.01.2014;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn477; Calibrated: 14.05.2014
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1007+1022
- Measurement SW: DASY52 52.8.7(1137); Postprocessing SW: SEMCAD X 14.6.10(7164)

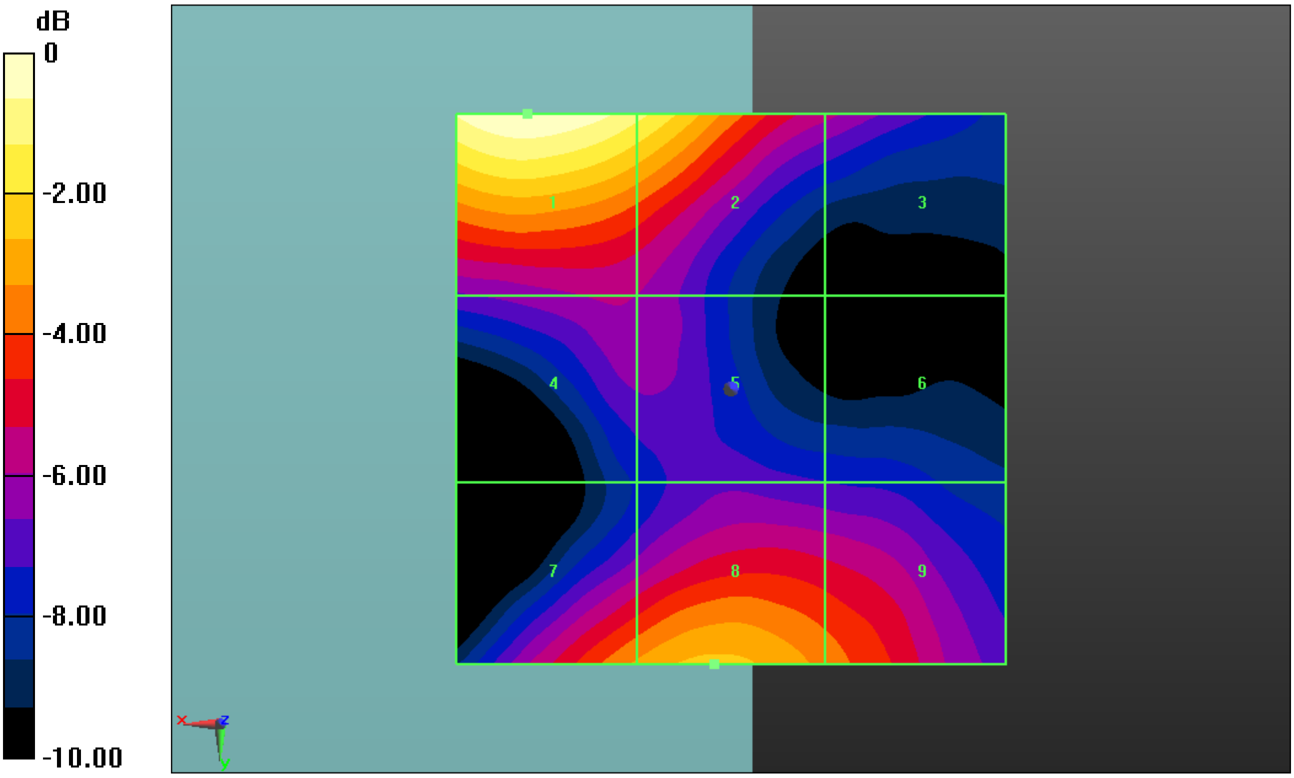
Device E-Field measurement GSM 1900/E Scan - ER3D - 2011: 15 mm from Probe Center to the Device middle/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 7.117 V/m; Power Drift = 0.18 dB
Applied MIF = 3.63 dB
RF audio interference level = 29.31 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **29.31 dBV/m**	Grid 2 **M4** **28.2 dBV/m**	Grid 3 **M4** **23.59 dBV/m**
Grid 4 **M4** **23.43 dBV/m**	Grid 5 **M4** **23.31 dBV/m**	Grid 6 **M4** **22.03 dBV/m**
Grid 7 **M4** **26.11 dBV/m**	Grid 8 **M4** **26.83 dBV/m**	Grid 9 **M4** **25.75 dBV/m**

Category	Limits for E-Field Emissions < 960MHz	Limits for E-Field Emissions > 960MHz
M1	50 dBV/m - 55 dB V/m	40 dBV/m - 45 dB V/m
M2	45 dBV/m - 50 dB V/m	35 dBV/m - 40 dB V/m
M3	40 dBV/m - 45 dB V/m	30 dBV/m - 35 dB V/m
M4	<40 dBV/m	<30 dBV/m

Cursor:
Total = 29.31 dBV/m
E Category: M4
Location: 18.5, -25, 8.7 mm



0 dB = 29.19 V/m = 29.30 dBV/m

Date/Time: 13.06.2014 16:05:57

HAC-RF-GSM1900

DUT: Sony; Type: PY7PM-0742; Serial: CB5A1Z1Y2X
Communication System: UID 10021, GSM-FDD (TDMA, GMSK); Frequency: 1909.8 MHz;Duty Cycle: 1:8.6896
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Phantom section: TCoil Section
DASY5 Configuration:
- Probe: ER3DV6 - SN2262; ConvF(1, 1, 1); Calibrated: 17.01.2014;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn477; Calibrated: 14.05.2014
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1007+1022
- Measurement SW: DASY52 52.8.7(1137); Postprocessing SW: SEMCAD X 14.6.10(7164)

Device E-Field measurement GSM 1900/E Scan - ER3D - 2011: 15 mm from Probe Center to the Device high/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

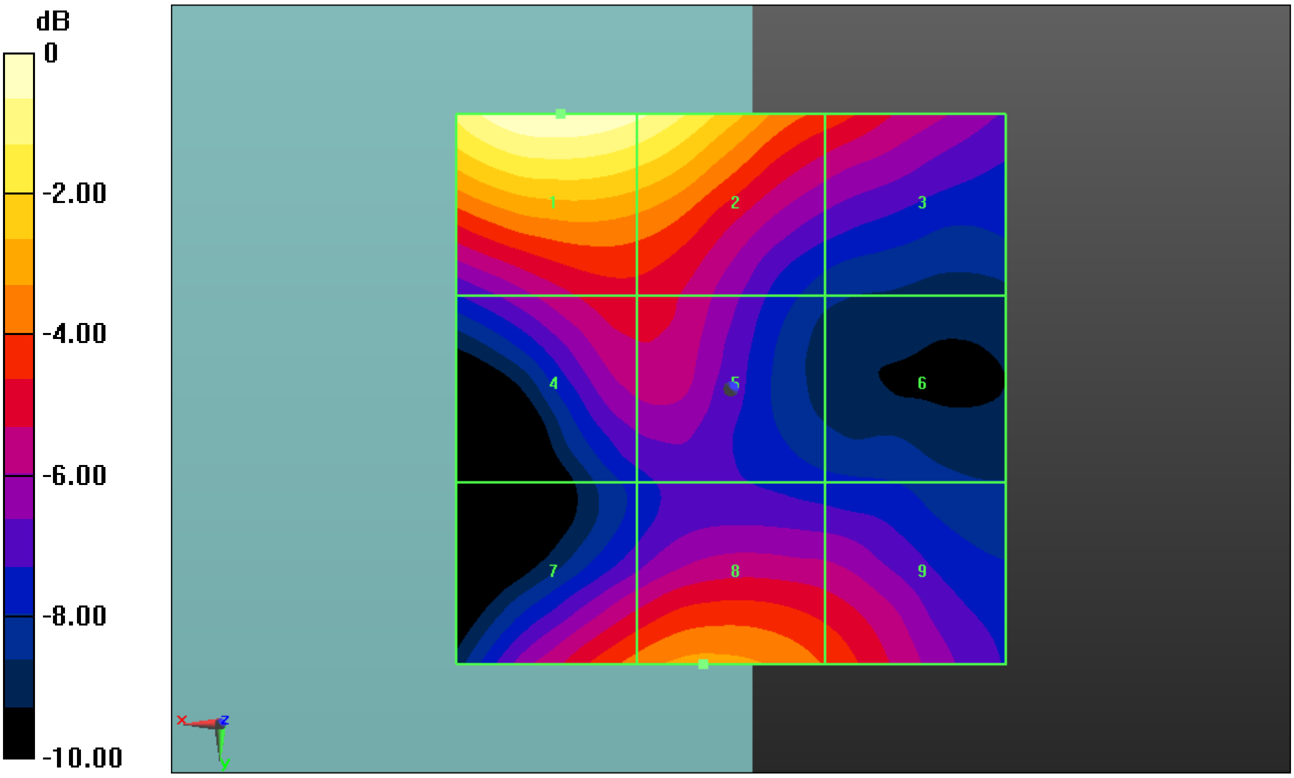
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 8.090 V/m; Power Drift = 0.11 dB
Applied MIF = 3.63 dB
RF audio interference level = 28.73 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **28.73 dBV/m**	Grid 2 **M4** **28.22 dBV/m**	Grid 3 **M4** **24.57 dBV/m**
Grid 4 **M4** **23.82 dBV/m**	Grid 5 **M4** **23.82 dBV/m**	Grid 6 **M4** **21 dBV/m**
Grid 7 **M4** **25.05 dBV/m**	Grid 8 **M4** **25.63 dBV/m**	Grid 9 **M4** **24.68 dBV/m**

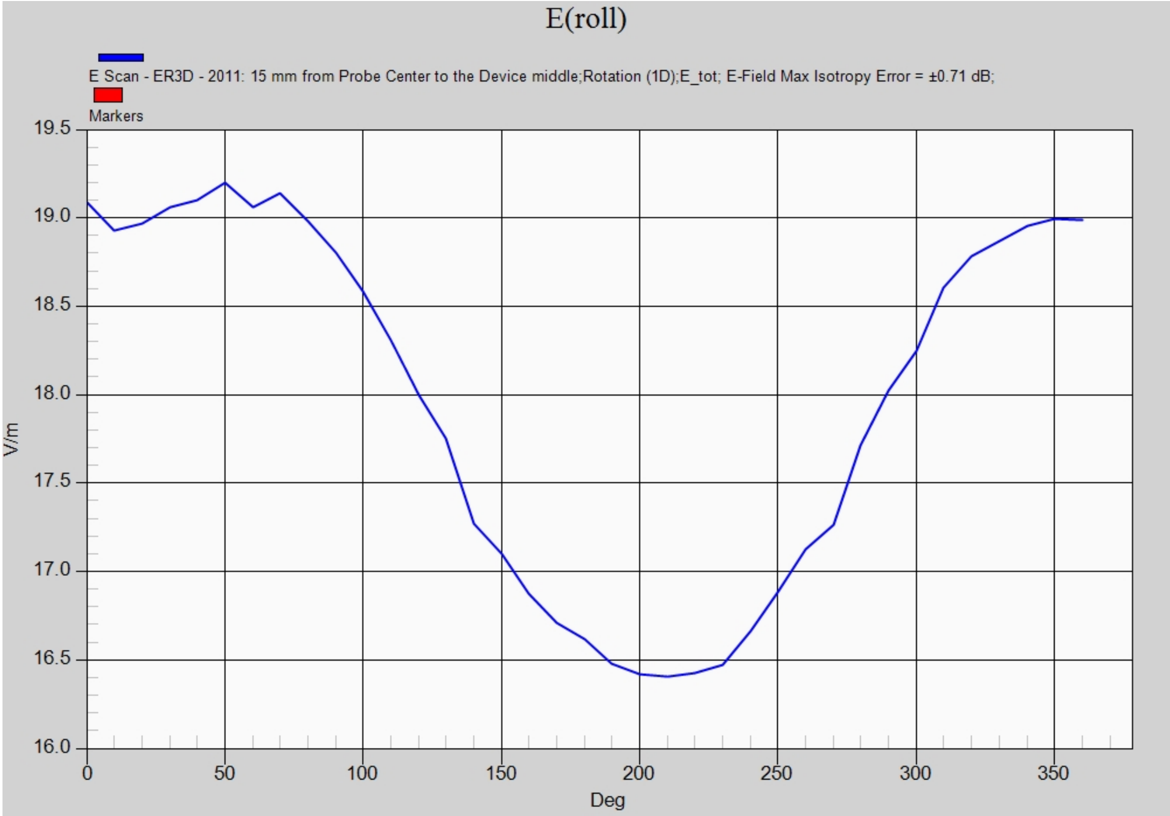
Category	Limits for E-Field Emissions < 960MHz	Limits for E-Field Emissions > 960MHz
M1	50 dBV/m - 55 dB V/m	40 dBV/m - 45 dB V/m
M2	45 dBV/m - 50 dB V/m	35 dBV/m - 40 dB V/m
M3	40 dBV/m - 45 dB V/m	30 dBV/m - 35 dB V/m
M4		

Cursor:
Total = 28.73 dBV/m
E Category: M4
Location: 15.5, -25, 8.7 mm



0 dB = 27.32 V/m = 28.73 dBV/m

E(roll) checked at worst case (Low Channel):



rot 0°	rot max.	percentage deviation	max. field strength (dBV/m)	worst case calculated (dBV/m)
19.1	19.2	0.52%	29.3	**29.35**

Annex C: Photo documentation

Photo documentation is described in the additional document:

Appendix to test report no. 1-6965/13-20-30 Photo documentation

Annex D: Calibration parameters

Calibration parameters are described in the additional document:

Appendix to test report no. 1-6965/13-20-30
Calibration data and system validation information

Annex E: Document History

Version	Applied Changes	Date of Release
	Initial Release	2014-06-23

Annex F: Further Information

Glossary

BW - Bandwidth
DUT - Device under Test
EUT - Equipment under Test
FCC - Federal Communication Commission
FCC ID - Company Identifier at FCC
HW - Hardware
IC - Industry Canada
Inv. No. - Inventory number
LTE - Long Term Evolution
N/A - not applicable
OET - Office of Engineering and Technology
RB - resource block(s)
SAR - Specific Absorption Rate
S/N - Serial Number
SW - Software