Hearing Aid Compatibility(HAC) RF Emissions Test Report

Report No.: AGC04845170601FH05

FCC ID	:	2ADLJHOTSPOTII
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Mobile Phone
BRAND NAME	:	VORTEX
MODEL NAME	:	HotSpot II,UW2408K
CLIENT	:	Xwireless LLC
DATE OF ISSUE	:	July 11,2017
STANDARD(S)	:	FCC 47 CFR §20.19 ANSI C63.19-2011
REPORT VERSION	:	V1.0

*A*ttestation of Global Compliance(Shenzhen) Co., Ltd.

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	July 11,2017	Valid	Original Report

Test Report Certification		
Applicant Name	:	Xwireless LLC
Applicant Address	:	11426 Rockville pike, Rockville, MD 20852United States
Manufacturer Name	:	Xwireless LLC
Manufacturer Address	:	11426 Rockville pike, Rockville, MD 20852United States
Product Designation	:	Mobile Phone
Brand Name	:	VORTEX
Model Name	:	HotSpot II,UW2408K
Different Description		All the same, except for the model name. The test model is HotSpot II.
EUT Voltage	:	DC3.7V by battery
Applicable Standard	:	FCC 47 CFR §20.19 ANSI C63.19-2011
Test Date	:	July 07,2017
Performed Location		Attestation of Global Compliance(Shenzhen) Co., Ltd.
		2 F, Building 2, No.1-No.4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang Street, Bao'an District, Shenzhen, China
Report Template		AGCRT-US-2G2/HAC (2015-01-01)

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1. STATEMENT OF COMPLIANCE

The maximum results of RF Emission of Hearing Aid Compliance (HAC) found during testing for the **HotSpot II** are follows:

HAC RF Emission Test Result

Band	HAC RF Emission Test Result		M Rating
GSM850	E-Field (V/m)	93.50	M4
PCS1900	E-Field (V/m)	44.32	M3
UMTS BAND II	E-Field (V/m)	/	M4
UMTS BAND V	E-Field (V/m)	/	M4

The test plans were performed in accordance with FCC 47 CFR §20.19, ANSI C63.19:2011 and the following specific FCC Test Procedures:

- KDB285076 D01 HAC Guidance v04r01

2. GENERAL INFORMATION

2.1. EUT Description

General Information	
Product Designation	Mobile Phone
Test Model	HotSpot II
Hardware Version	V1.0
Software Version	HK500_HWV1.0_SWV0.3
Device Category	Portable
RF Exposure Environment	Uncontrolled
Antenna Type	Internal
GSM and GPRS& EGPRS	
Support Band	☒GSM 850 ☒PCS 1900 ☒GSM 900 ☒DCS 1800
GPRS & EGPRS Type	Class B
GPRS & EGPRS Class	Class 12(1Tx+4Rx, 2Tx+3Rx, 3Tx+2Rx, 4Tx+1Rx)
TX Frequency Range	GSM 850 : 820-850MHz;; PCS 1900: 1850-1910MHz;
RX Frequency Range	GSM 850 : 869~894MHz; PCS 1900: 1930~1990MHz
Release Version	R99
Type of modulation	GMSK for GSM/GPRS; GMSK & 8-PSK for EGPRS
Antenna Gain	GSM850: -0.7dBi; PCS1900: -1.0dBi
Max. Average Power	GSM850: 31.73dBm; PCS1900: 28.38dBm
WCDMA	
Support Band	☒UMTS FDD Band II ☒UMTS FDD Band V ☐UMTS FDD Band I ☐UMTS FDD Band VIII
HS Type	HSPA(HSUPA/HSDPA)
TX Frequency Range	WCDMA FDD Band II: 1850-1910MHz;WCDMA FDD Band V: 820-850MHz
RX Frequency Range	WCDMA FDD Band II: 1930-1990MHz;WCDMA FDD Band V: 869-894MHz
Release Version	Rel-6
Type of modulation	HSDPA:QPSK/16QAM; HSUPA:BPSK; WCDMA:QPSK
Antenna Gain	Band II: -1.0 dBi; Band V: -0.7 dBi
Max. Average Power	Band II: 22.53dBm; Band V: 22.33dBm

EUT Description(Continue)

Bluetooth	
Bluetooth Version	☐V2.0 ☐V2.1 ☒V2.1+EDR ☐V3.0 ☐V3.0+HS ☒V4.0 ☐V4.1
Operation Frequency	2402~2480MHz
Type of modulation	☒GFSK ☒∏/4-DQPSK ☒8-DPSK
Peak Power	3.948dBm
Antenna Gain	0.6dBi
WIFI	
WIFI Specification	☐802.11a ☒802.11b ☒802.11g ☒802.11n(20) ☒802.11n(40)
Operation Frequency	2412~2462MHz
Avg. Burst Power	11b: 15.23dBm,11g: 12.65dBm,11n(20): 12.56dBm,11n(40): 12.05dBm
Antenna Gain	0.6dBi
Accessories	
Battery	Brand name: Vortex Model No. : HotSpot II Voltage and Capacitance: 3.7 V & 1000mAh
Adapter	Brand name: Vortex Model No. : HotSpot II Input: AC 100-240V, 50/60Hz, 0.15A Output: DC 5V, 500mA
Earphone	Brand name: N/A Model No. : N/A

Note:1.CMU200 can measure the average power and Peak power at the same time
2.The sample used for testing is end product.

Product	Type
	☒ Production unit ☐ Identical Prototype

3. TEST CONFIGURATION AND SETTING

3.1 Test Configuration

The device was controlled by using a base station emulator R&S CMU200. Communication between the device and the emulator was established by air link. Measurements were performed on the low, middle and high channels of both bands. The DUT was set from the emulator to radiate maximum output power during all tests.

List of air interfaces / frequency bands as below:

Air Interface	Band (MHz)	Type	C63.19:2011 Tested	Simultaneous but not tested	OTT	Concurrent HAC Tested	Additional GSM power reduction
GSM	850	VO	Yes	Yes: WiFi/BT	N/A	Not tested①	N/A
	1900	VO	Yes	Yes: WiFi/BT	N/A	Not tested①	N/A
	GPRS/EDGE	DT	No	Yes: WiFi/BT	Yes	N/A	N/A
UMTS	Band II(1900)	VO	Yes②	Yes: WiFi/BT	N/A	Not tested①	N/A
	Band V(850)	VO	Yes②	Yes: WiFi/BT	N/A	Not tested①	N/A
	HSPA/DC-HSDPA	DT	No	Yes: WiFi/BT	Yes	N/A	N/A
WIFI	2450	DT	No	Yes: GSM/UMTS	Yes	N/A	N/A
BT	2450	DT	No	Yes: GSM/UMTS	N/A	N/A	N/A
Type Transport: VO = CMRS Voice Service DT = Digital Transport VD = CMRS IP Voice Service and Digital Transport							

Note:

1. ①-No Concurrent mode was found to be the worst case mode;
2. ②- Evaluated for MIF and low-power exemption according to ANSI C63.19-2011.
3. The device does not support VoIP over Wi-Fi for CMRS Service;

3.2 Applied Standards

ANSI C63.19-2011	American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices
KDB 285076 D01	HAC Guidance v04r01

ANSI C63.19-2011 limits

Emission Categories	E-field	
	< 960 MHz	> 960 MHz
Category M1	316.2 to 562.3(V/m)	100 to 177.8(V/m)
Category M2	177.8 to 316.2(V/m)	56.2 to 100.0(V/m)
Category M3	100.0 to 177.8(V/m)	31.6 to 56.2(V/m)
Category M4	<100(V/m)	<31.6(V/m)

3.3 Test Conditions

3.3.1 Ambient Condition

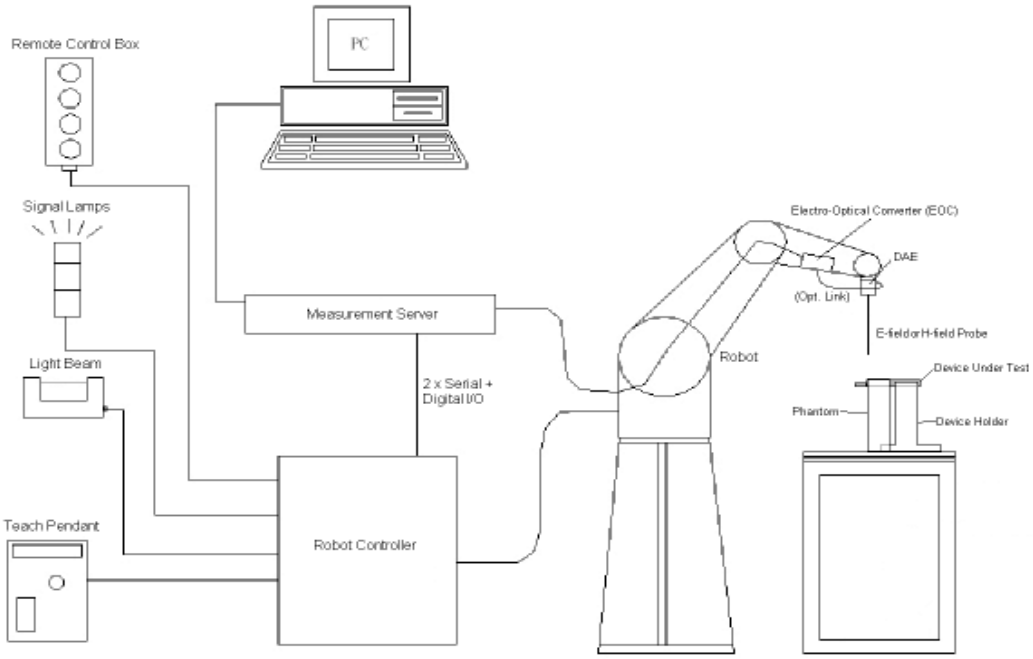
Ambient Temperature Humidity	20-24℃
	<60%
Acoustic Ambient Noise	>10dB below the measurement level

3.3.2 Test Configuration

The device was controlled by using a base station emulator R&S CMU200. Communication between the device and the emulator was established by coaxial connection. The DUT was set from the emulator to radiate maximum output power during all testing.

4. HAC RF EMISSION MEASUREMENT SETUP

4.1 System Configuration



DASY5 System Configurations

The DASY system for performance compliance tests is illustrated above graphically. This system consists of the following items:

※ A standard high precision 6-axis robot with controller, a teach pendant and software

※ A data acquisition electronic (DAE) attached to the robot arm extension

※ A dosimetric probe equipped with an optical surface detector system

※ The electro-optical converter (EOC) performs the conversion between optical and electrical signals

※ A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.

※ A probe alignment unit which improves the accuracy of the probe positioning

※ A computer operating Windows 7

※ DASY software

※ Remove control with teach pendant and additional circuitry for robot safety such as warming lamps, etc.

※ The SAM twin phantom

※ A device holder

※ Tissue simulating liquid

※ Dipole for evaluating the proper functioning of the system

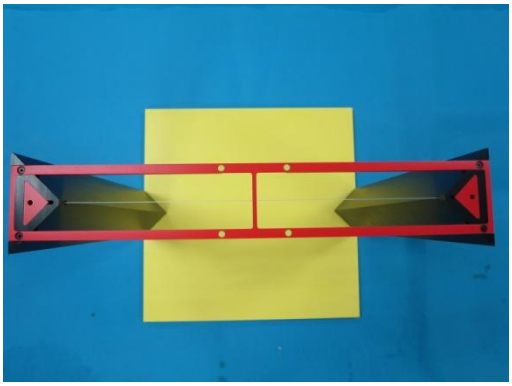
Some of the components are described in details in the following sub-sections.

4.2 Probe description

E-Field Probe Description

Construction	One dipole parallel, two dipoles normal to probe axis Built-in shielding against static charges PEEK enclosure material	
Calibration	In air from 100 MHz to 3.0 GHz (absolute accuracy ±6.0%,k=2)	
Frequency	40 MHz to > 6 GHz (can be extended to < 20 MHz) Linearity: ± 0.2 dB (100 MHz 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; Linearity: ± 0.2 dB	
Dimensions	Overall length: 330 mm (Tip: 16 mm) Tip diameter: 8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.5 mm The closest part of the sensor element is 1.1mm	
Application	General near-field measurements up to 6 GHz Field component measurements Fast automatic scanning in phantoms	

4.3 Test Arch Phantom

Construction	Enables easy and well defined positioning of the phone and validation dipoles as well as simple teaching of the robot	
Dimensions	370x370x370	

4.4 Device Holder

The Device Holder is used to adjust DUT to the suitable position.	

4.5 WD RF Emission Measurements Reference and Plane

Figure belows illustrates the references and reference plane that shall be used in the WD emissions measurement.

• The grid is 5 cm by 5 cm area that is divided into 9 evenly sized blocks or sub-grids.

• The grid is centered on the audio frequency output transducer of the WD (speaker or T-coil).

• The grid is located by reference to a reference plane. This reference plane is the planar area

that contains the highest point in the area of the WD that normally rests against the user's ear

• The measurement plane is located parallel to the reference plane and 15 mm from it, out from the phone. The grid is located in the measurement plane.

WD reference and plane for RF emission measurements

4.6 Test Equipment List

Equipment description	Manufacturer/ Model	Identification No.	Current calibration date	Next calibration date
Stäubli Robot	Stäubli-TX60	F13/5Q2UD1/A/01	N/A	N/A
Robot Controller	Stäubli-CS8	139522	N/A	N/A
Audio Magnetic Field Probe	Speag-ER3DV6	3120	09/22/2016	09/21/2017
Device Holder	Speag-SD 000 H01	SD 000 H01	N/A	N/A
DAE4	Speag-SD 000 D04 BM	1398	01/19/2017	01/18/2018
SAR Software	Speag-DASY5	DASY52.8	N/A	N/A
Radio Communication Tester	R&S-CMU200	069Y7-158-13-712	03/02/2017	03/01/2018
Dipole	Speag CD835V3	1196	09/27/2016	09/26/2019
Dipole	Speag CD1880V3	1182	09/27/2016	09/26/2019
Amplifier	EM30180	SN060552	03/02/2017	03/01/2018
Signal Generator	Agilent-E4438C	US41461365	03/02/2017	03/01/2018
Power Sensor	NRP-Z23	US38261498	03/02/2017	03/01/2018
Vector Analyzer	Agilent / E4440A	US41421290	03/02/2017	03/01/2018
Attenuator	Warison /WATT-6SR1211	N/A	N/A	N/A

Note:

Per KDB865664D01 requirements for dipole calibration, the test laboratory has adopted three-year extended calibration interval. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.

a) There is no physical damage on the dipole;

b) System check with specific dipole is within 25% of calibrated value;

c) The most recent return-loss result, measured at least annually, deviates by no more than 20% from the previous measurement.

d) The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5Ω from the previous measurement.

4.7 Measurement Uncertainty Evaluation

HAC Uncertainty					
Error Description	**Uncert. Value（±%）**	**Prob Dist.**	**Div.**	**(Ci) (E)**	**Std. Unc. (E) （±%）**
Measurement System					
Probe Calibration	10.1	N	1	1	10.10
Axial Isotropy	0.5	R	$\sqrt{3}$	1	0.29
Sensor Displacement	16.5	R	$\sqrt{3}$	1	9.53
Test Arch	7.2	R	$\sqrt{3}$	1	4.16
Linearity	0.6	R	$\sqrt{3}$	1	0.35
Scaling to Peak Envelope Power	0.0	R	$\sqrt{3}$	1	0.00
System Detection Limit	1.0	R	$\sqrt{3}$	1	0.58
Readout Electronics	0.3	N	1	1	0.3
Response Time	6.3	R	$\sqrt{3}$	1	3.64
Integration Time	2.6	R	$\sqrt{3}$	1	1.50
RF Ambient Conditions	3.0	R	$\sqrt{3}$	1	1.73
RF Reflections	3.0	R	$\sqrt{3}$	1	1.73
Probe Positioner	2	R	$\sqrt{3}$	1	1.15
Probe Positioning	0.05	R	$\sqrt{3}$	1	0.03
Extrap. And Interpolation	5	R	$\sqrt{3}$	1	2.89
Test Sample Related					
Device Positioning Vertical	4.7	R	$\sqrt{3}$	1	2.71
Device Positioning Lateral	1.0	R	$\sqrt{3}$	1	0.58
Device Holder and Phantom	0.05	R	$\sqrt{3}$	1	0.03
Power Drift	5.0	R	$\sqrt{3}$	1	2.89
Phantom and Setup Related					
Phantom Thickness	0.05	R	$\sqrt{3}$	1	0.03
Combined Standard Uncertainty					16.15
Coverage Factor for 95%					K=2
Expanded Uncertainty on Power					**32.30**
Expanded Uncertainty on Field					**16.15**

Note: Worst-Case uncertainty budget for HAC free field assessment according to ANSI C63.19. The budget represents a worst case analysis. For specific tests and configurations, the uncertainty could be considerably smaller.

5. SYSTEM VERIFICATION PROCEDURE

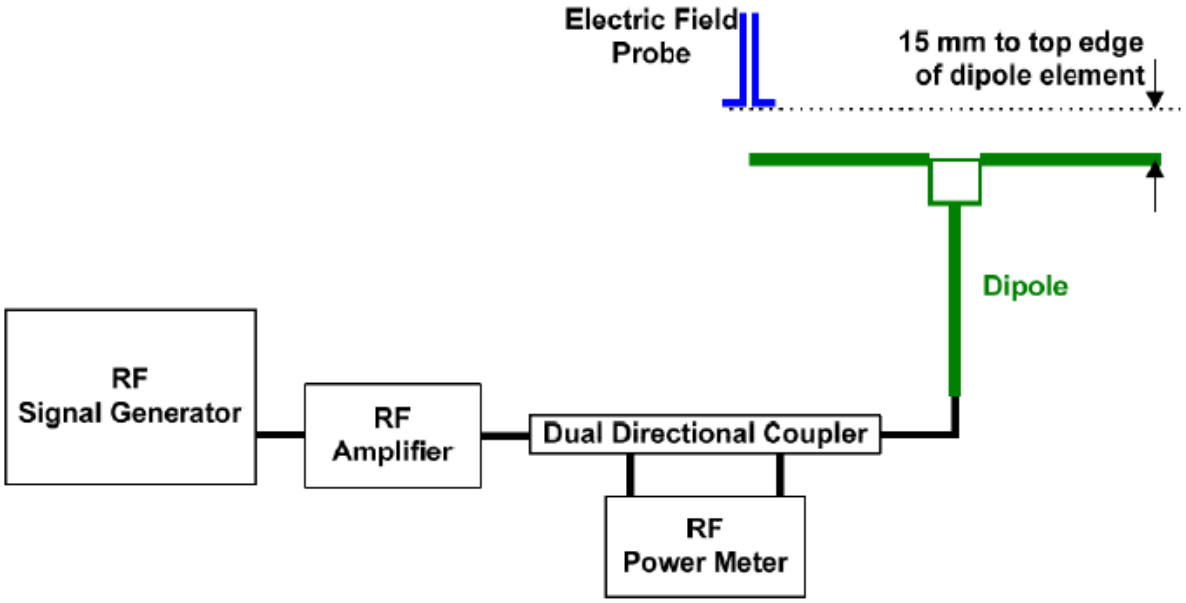
5.1System Check

Place a dipole antenna meeting the requirements given in ANSI C63.19-2011 in the position normally occupied by the WD. The dipole antenna serves as a known source for an electrical and magnetic output. Position the E-field probe so that the following occurs:

• The probes and their cables are parallel to the coaxial feed of the dipole antenna

• The probe cables and the coaxial feed of the dipole antenna approach the measurement area from opposite directions

• The center point of the probe element(s) are 15 mm from the closest surface of the dipole elements. Scan the length of the dipole with the E-field probe and record the two maximum values found near the dipole ends. Average the two readings and compare the reading to the expected value in the calibration certificate or the expected value in this standard.



System Setup of System Evaluation

5.2Validation Result

Frequency (MHz)	Input Power (dBm)	Target Value (V/m)	E-field 1 (V/m)	E-field 2 (V/m)	Average Value (V/m)	Deviation (%)	Limit (%)	Date
835	20	110.70	107.9	105.6	106.75	-3.95	±25	July 07,2017
1880	20	89.75	87.03	93.91	90.47	0.72	±25	July 07,2017

Note:

a) Please refer to the attachment for detailed measurement data and plot.

b) Target value is provided by SPEAD in the calibration certificate of specific dipoles.

c) Deviation (%) = 100 * (Measured value minus Target value) divided by Target value.

d) ANSI C63.19 requires values within ± 25% are acceptable, of which 12% is deviation and 13% is measurement uncertainty. Values independently validated for the dipole actually used in the measurements should be used, when available.

5.3 Modulation Interference Factor

The HAC Standard ANSI C63.19-2011 defines a new scaling using the Modulation Interference Factor(MIF) which replaces the need for the Articulation Weighting Factor(AWF) during the evaluation and is applicable to any modulation scheme.

The Modulation Interference Factor(MIF, in dB) is added to the measured average E-field (in dB V/m) and converts it to the RF Audio Interference level(in dB V/m). This level considers the audible amplitude modulation components in the RF E-field. CW fields without amplitude modulation are assumed to not interfere with the hearing aid electronics. Modulations without time slots and low fluctuations at low frequencies have low MIF values. TDMA modulations with narrow transmission and repetition rates of few 100 Hz have high MIF values and give similar classifications as ANSI C63.19-2011.

ER3D E-Field probes have a bandwidth <10 kHz and can therefore not evaluate the RF envelope in the full audio band. DASY52 is therefore using the “indirect” measurement method according to ANSI C63.19-2011 which is the primary method. These near field probes read the averaged E-field measurement. Especially for the new high peak-to-average(PAR) signal types, the probes shall be linearized by probe modulation response(PMR) calibration in order to not overestimate the field reading. The evaluation method or the MIF is defined in ANSI C63.19-2011 section D.7. An RMS demodulated RF signal is fed to a spectral filter(similar to

an A weighting filter) and forwarded to a temporal filter acting as a quasi-peak detector. The averaged output of these filtering is called to a 1 kHz 80% AM signal as reference. MIF measurement requires additional instrumentation and is not well suited for evaluation by the end user with reasonable uncertainty. It may alternatively be determined through analysis and simulation, because it is constraint and characteristic for a communication signal. DASY52 uses well defined signals for PMR calibration. The MIF of these signals has been determined by simulation and is automatically applied.

MIF values applied in this test report were provided by the HAC equipment provider, SPEAG. The data included in this report are for the worst case operating modes. The UIDs used are listed below:

UID	Communication System Name	MIF(dB)
10021-DAB	GSM-FDD (TDMA, GMSK)	3.69
10011-CAB	UMTS-FDD (WCDMA)	-27.15

The MIF measurement uncertainty is estimated as follows, declared by the HAC equipment provider, SPEAG, for modulation frequencies from slotted waveforms with fundamental frequency and at least 2 harmonics within 10 kHz:

a) 0.2 dB for MIF: -7 to +5 dB

b) 0.5dB for MIF: -13 to +11dB

c) 1 dB for MIF: > -20dB

6. HAC MEASUREMENT PROCEDURE

The evaluation was performed with the following procedure:

a) Confirm the proper operation of the field probe, probe measurement system, and other instrumentation and the positioning system.

b) Position the WD in its intended test position

c) Set the WD to transmit a fixed and repeatable combination of signal power and modulation characteristic that is representative of the worst case (highest interference potential) encountered in normal use. Transiently occurring start-up, changeover, or termination conditions, or other operations likely to occur less than 1% of the time during normal operation, may be excluded from consideration.

d) The center subgrid shall be centered on the T-Coil mode perpendicular measurement point or the acoustic output, as appropriate. Locate the field probe at the initial test position in the 50 mm by 50 mm grid, which is contained in the measurement plane, refer to illustrated in Figure 3. If the field alignment method is used, align the probe for maximum field reception.

e) Record the reading at the output of the measurement system.

f) Scan the entire 50 mm by 50 mm region in equally spaced increments and record the reading at each measurement point. The distance between measurement points shall be sufficient to assure the identification of the maximum reading.

g) Identify the five contiguous subgrids around the center subgrid whose maximum reading is the lowest of all available choices. This eliminates the three subgrids with the maximum readings. Thus, the six areas to be used to determine the WD's highest emissions are identified.

h) Identify the maximum reading within the nonexcluded subgrids identified in step g).

i) Convert the maximum reading identified in step h) to RF audio interference level, in, V/m, by taking the square root of the reading and then dividing it by the measurement system transfer function, established in 5.5.1.1. Convert the result to dB(V/m) by taking the base-10 logarithmand multiplying it by 20.

Indirect measurement method

Replacing step i) of 5.5.1.2, the RF audio interference level in dB(V/m) is obtained by adding the MIF (in dB) to the maximum steady-state rms field-strength reading, in dB(V/m), from step h). Use this result to determine the category rating.

j) Compare this RF audio interference level with the categories in Clause 8 and record the resulting WD category rating.

k) For the T-Coil mode M-rating assessment, determine whether the chosen perpendicular measurement point is contained in an included subgrid of the first scan. If so, then a second scan is not necessary. The first scan and resultant category rating may be used for the T-Coil mode M rating.

Otherwise, repeat step a) through step i), with the grid shifted so that it is centered on the perpendicular measurement point. Record the WD category rating.

7. HAC TEST CONFIGURATION

7.1 General Description

The phone was tested in all normal configurations for the ear use. The EUT is mounted in the device holder equivalent as for classic dosimeter measurements. The acoustic output of the EUT shall coincide with the center point of the area formed by the dielectric wire and the middle bar of the arch's top frame. The EUT shall be moved vertically upwards until it touches the frame. The fine adjustment is possible by sliding the complete. The EUT holder is on the yellow base plate of the Test Arch phantom. These test configurations are tested at the high, middle and low frequency channels of each applicable operating mode; for example, GSM, WCDMA(UMTS),CDMA and TDMA.

7.2 GSM Test Configuration

A communication link is set up with a System Simulator (SS) by air link, and a call is established. The Absolute Radiofrequency Channel Number (ARFCN) is allocated to 128, 190 and 251 in the case of GSM850, to 512, 661 and 810 in the case of GSM1900. The EUT is commanded to operate at maximum transmitting power. Using CMU200 the power level is set to "5" in HAC of GSM850, set to "0" in HAC of GSM1900.

7.3 UMTS Test Configuration

A communication link is set up with a System Simulator (SS) by air link, and a call is established. The Absolute Radiofrequency Channel Number (ARFCN) is allocated to 9262, 9400 and 9538 in the case of UMTS Band II, to 4132, 4182 and 4233 in the case of UMTS Band V. The EUT is commanded to operate at maximum transmitting power. Using CMU200 the power level is set to to all up bits for UMTS bands.

8. HAC RF MEASUREMENT RESULTS

8.1 Conducted Power (Unit: dBm)

Mode	Test Mode	Frequency(MHz)	Avg. Burst Power(dBm)	Tune-up limit(dBm)
GSM 850	GSM(CS)	824.2	**31.73**	31.73
		836.6	31.69	
		848.8	31.54	
PCS1900	GSM(CS)	1850.2	28.33	28.38
		1880	**28.38**	
		1909.8	28.09	
UMTS BAND II	RMC	1852.4	**22.53**	22.53
		1880	22.36	
		1907.6	22.33	
	AMR	1852.4	22.46	
		1880	22.37	
		1907.6	22.13	
UMTS BAND V	RMC	826.4	**22.33**	22.33
		836.6	22.29	
		846.6	22.03	
	AMR	826.4	22.11	
		836.6	22.04	
		846.6	22.09	

8.2Low-power Exemption Conclusions

According to ANSI C63.19-2011, a 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 operation modes.

Air Interface	Maximum Average Power(dBm)	MIF(dB)	Total (Power + MIF,dB)	C63.19 HAC RF testing required
GSM850	31.73	3.69	35.42	YES
PCS1900	28.38	3.69	32.07	YES
UMTS BAND II	22.53	-27.15	-4.62	NO
UMTS BAND V	22.33	-27.15	-4.82	NO

8.3 E-Field Emission Results

Band	Mode	Channel	Peak E-Field dB(V/m)	M-Rating
GSM 850	Voice	128	**79.66**	**M4**
		190	**88.78**	**M4**
		251	**93.50**	**M4**
PCS 1900	Voice	512	**41.63**	**M3**
		661	**42.48**	**M3**
		810	**44.32**	**M3**

Note:

1) The HAC measurement system applies MIF value onto the measured RMS E-field, which is indirect method in ANSI C63.19-2011 version, and reports the RF audio interference level.

2) The uncertainty is 0.2dB for MIF from -7 to +5dB, 0.5dB for MIF from -13dB to +11 dB, and 1dB for MIF ranges > -20dB.

3) UMTS bands are exempted and HAC RF Emission rating is M4 per ANSI C63.19-2011 .

4) The Hearing Aid mode of the software on this DUT is turned on during the test.

APPENDIX A. SYSTEM PERFORMANCE CHECK PLOTS

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1196

Communication System: UID 0, CW; Communication System Band: ITD835 (835.0 MHz); Frequency: 835 MHz;
Communication System PAR: 0 dB;
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

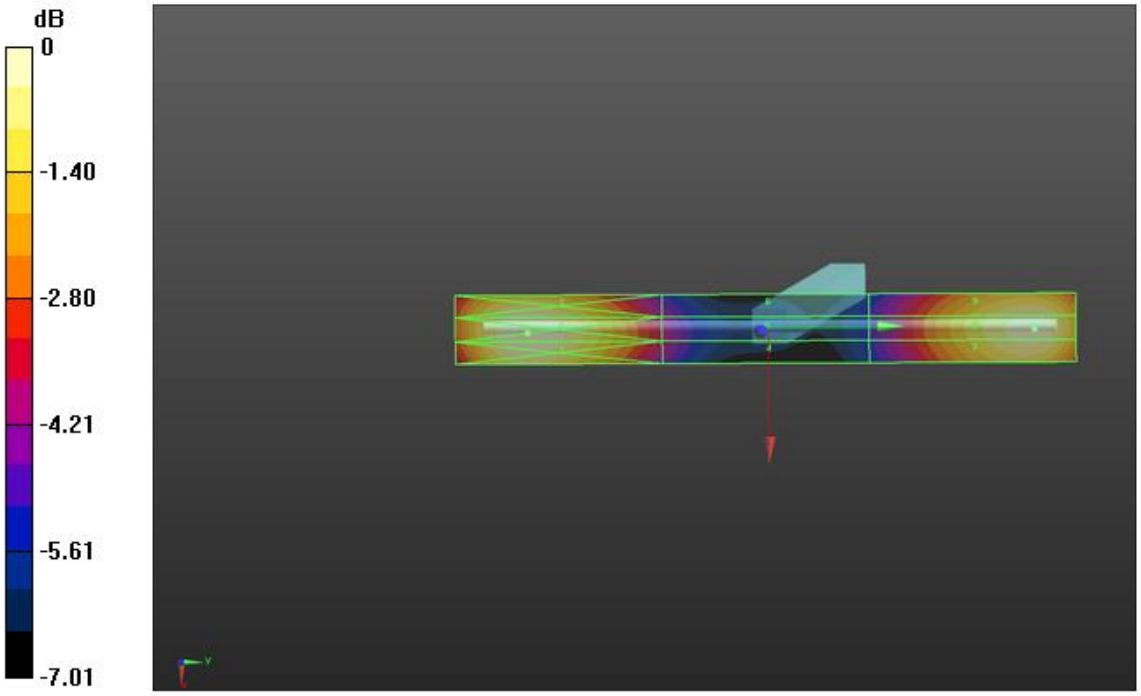
DASY Configuration:

- Probe: ER3DV6 - SN2539; ConvF(1, 1, 1); Calibrated: 9/26/2016;
- Sensor-Surface: (Fix Surface), z = 9.7
- Electronics: DAE4 Sn1398; Calibrated: 01/19/2017
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole E-Field measurement 850/E Scan/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 =106.3 V/m; Power Drift = 0.01 dB
E-field emissions = 105.6 V/m
Near-field category: M3

PMF scaled E-field

Grid 1 **M3** **107.0 V/m**	Grid 2 **M3** **107.9 V/m**	Grid 3 **M3** **104.8 V/m**
Grid 4 **M4** **69.08 V/m**	Grid 5 **M4** **69.63 V/m**	Grid 6 **M4** **67.16 V/m**
Grid 7 **M3** **104.0 V/m**	Grid 8 **M3** **105.6 V/m**	Grid 9 **M3** **103.0 V/m**



0 dB = 107.9 V/m = 40.66 dBV/m

DUT: HAC-Dipole 1880 MHz; Type: D1800V3; Serial: 1182

Communication System: UID 0, CW (0); Communication System Band: CD1880 (1880.0 MHz); Frequency: 1880 MHz; Communication System PAR: 0 dB;

Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

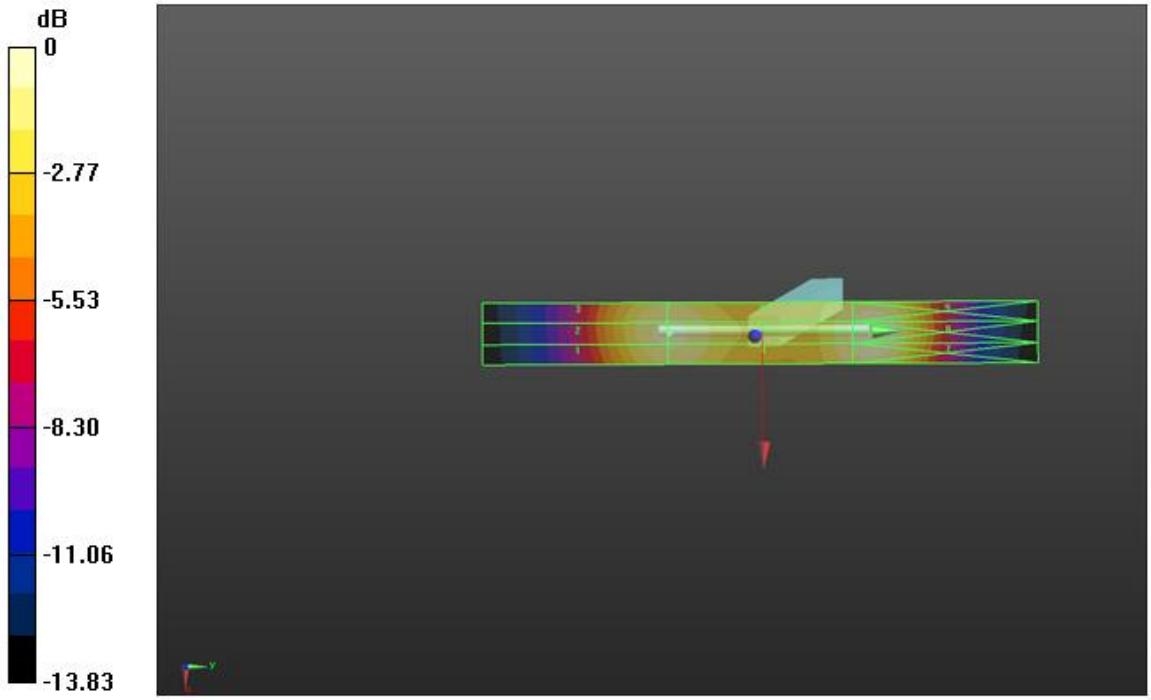
DASY Configuration:

- Probe: ER3DV6 - SN2539; ConvF(1, 1, 1); Calibrated: 9/26/2016;
- Sensor-Surface: (Fix Surface), z = 9.7
- Electronics: DAE4 Sn1398; Calibrated: 01/19/2017
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole E-Field measurement 1900/E Scan/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 = 176.7 V/m; Power Drift = -0.02 dB
E-field emissions = 87.08 V/m
Near-field category: M2

PMF scaled E-field

Grid 1 **M2** **85.65 V/m**	Grid 2 **M2** **87.03 V/m**	Grid 3 **M2** **85.47 V/m**
Grid 4 **M2** **85.81 V/m**	Grid 5 **M2** **87.08 V/m**	Grid 6 **M2** **85.48 V/m**
Grid 7 **M2** **91.93 V/m**	Grid 8 **M2** **93.91 V/m**	Grid 9 **M2** **91.12 V/m**



0 dB = 93.91 V/m = 39.45 dBV/m

APPENDIX B. RF EMISSION MEASUREMENT PLOTS

Frequency Band：GSM850

CHANNEL：Low

DUT: Mobile Phone; Type: HotSpot II;

Communication System: UID 0, Generic GSM (0); Communication System Band: GSM 850 (820-850 MHz);
Frequency: 824.2MHz; Communication System PAR: 9.191 dB;
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 0 kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

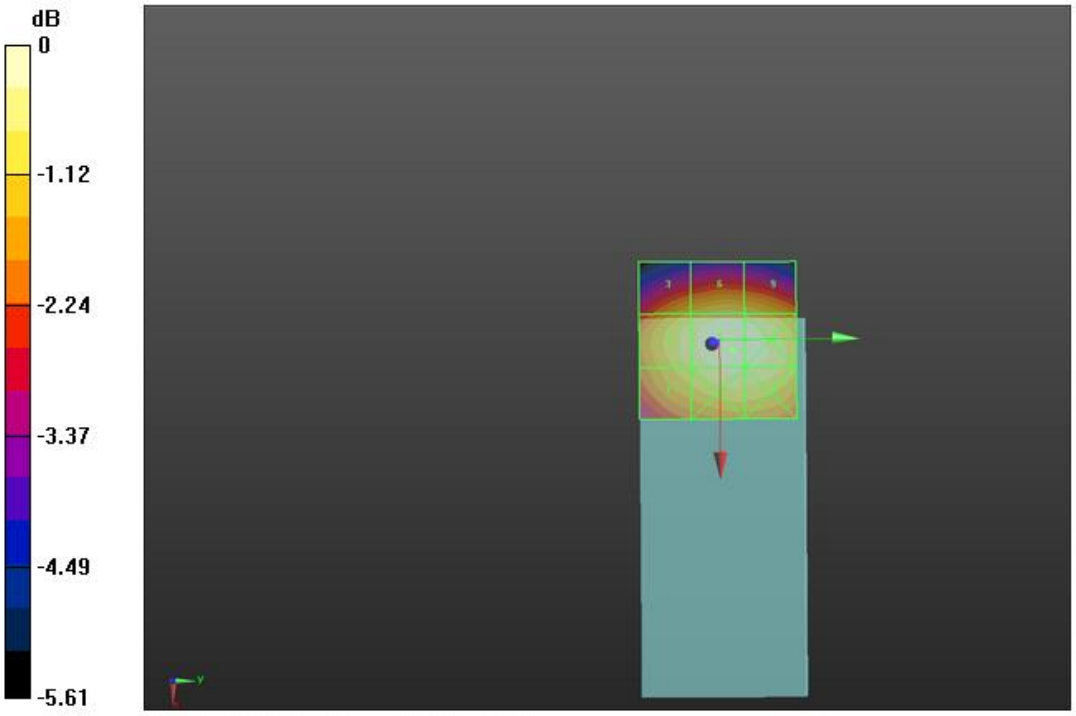
DASY Configuration:

- Probe: ER3DV6 - SN2539; ConvF(1, 1, 1); Calibrated: 9/26/2016;
- Sensor-Surface: (Fix Surface), z = 8.7
- Electronics: DAE4 Sn1398; Calibrated: 01/19/2017
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Ch128/E-Field/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 = 36.05 V/m; Power Drift = -0.06 dB
E-field emissions = 79.66 V/m
Near-field category: M4

PMF scaled E-field

Grid 1 **M4** **73.14 V/m**	Grid 2 **M4** **75.38 V/m**	Grid 3 **M4** **71.19 V/m**
Grid 4 **M4** **77.49 V/m**	Grid 5 **M4** **79.66 V/m**	Grid 6 **M4** **74.85 V/m**
Grid 7 **M4** **76.81 V/m**	Grid 8 **M4** **78.92 V/m**	Grid 9 **M4** **73.82 V/m**



0 dB = 79.66 V/m = 38.02 dBV/m

Frequency Band：GSM850

CHANNEL：Middle

DUT: Mobile Phone; Type: HotSpot II;

Communication System: UID 0, Generic GSM (0); Communication System Band: GSM 850 (820-850 MHz);
Frequency: 836.6 MHz; Communication System PAR: 9.191 dB;
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 0 kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

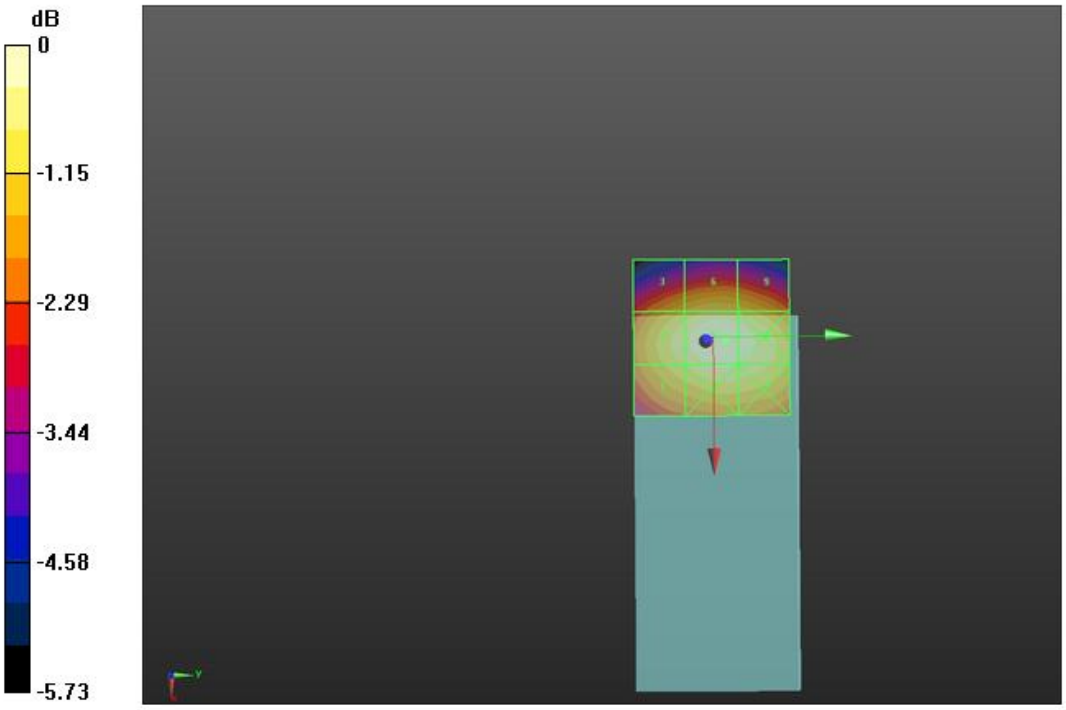
DASY Configuration:

- Probe: ER3DV6 - SN2539; ConvF(1, 1, 1); Calibrated: 9/26/2016;
- Sensor-Surface: (Fix Surface), z = 8.7
- Electronics: DAE4 Sn1398; Calibrated: 01/19/2017
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Ch190/E-Field/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 = 40.25 V/m; Power Drift = -0.01 dB
E-field emissions = 88.78 V/m
Near-field category: M4

PMF scaled E-field

Grid 1 **M4** **81.67 V/m**	Grid 2 **M4** **84.22 V/m**	Grid 3 **M4** **78.33 V/m**
Grid 4 **M4** **86.00 V/m**	Grid 5 **M4** **88.78 V/m**	Grid 6 **M4** **81.97 V/m**
Grid 7 **M4** **85.09 V/m**	Grid 8 **M4** **87.67 V/m**	Grid 9 **M4** **80.65 V/m**



0 dB = 88.78 V/m = 38.97 dBV/m

Frequency Band：GSM850

CHANNEL：High

DUT: Mobile Phone; Type: HotSpot II;

Communication System: UID 0, Generic GSM (0); Communication System Band: GSM 850 (820-850 MHz);
Frequency: 848.6 MHz; Communication System PAR: 9.191 dB;
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 0 kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

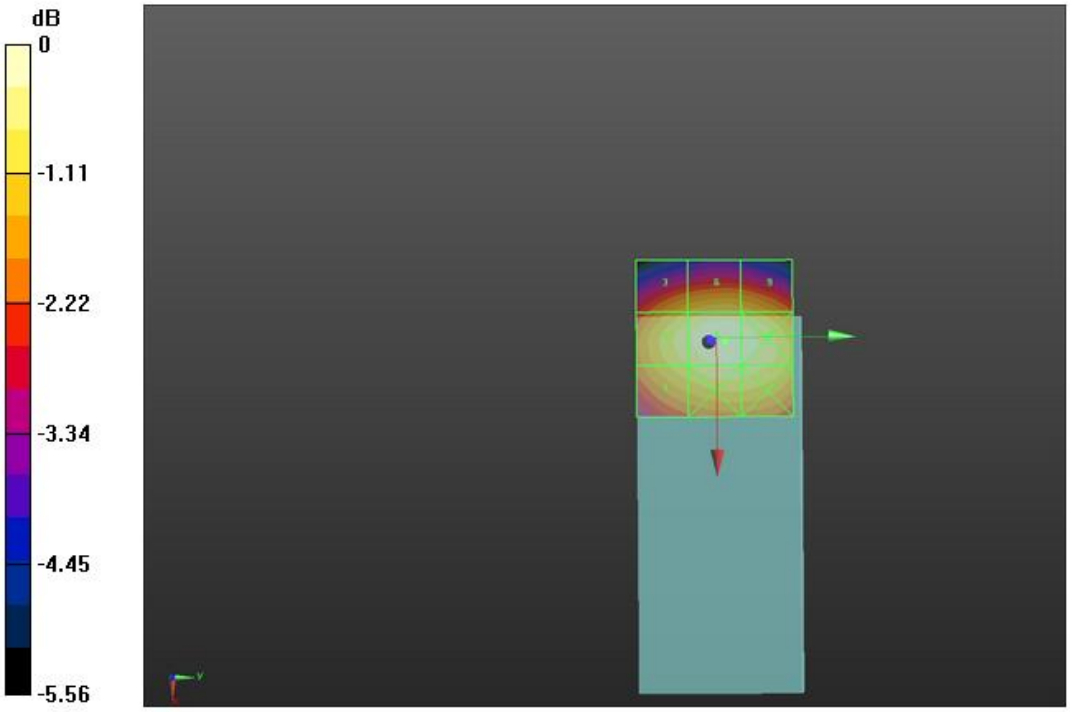
DASY Configuration:

- Probe: ER3DV6 - SN2539; ConvF(1, 1, 1); Calibrated: 9/26/2016;
- Sensor-Surface: (Fix Surface), z = 8.7
- Electronics: DAE4 Sn1398; Calibrated: 01/19/2017
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Ch 251/E-Field/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 42.09 V/m; Power Drift = 0.04 dB
E-field emissions = 93.50 V/m
Near-field category: M4

PMF scaled E-field

rid 1 **M4** **85.75 V/m**	Grid 2 **M4** **89.09 V/m**	Grid 3 **M4** **83.05 V/m**
Grid 4 **M4** **90.33 V/m**	Grid 5 **M4** **93.50 V/m**	Grid 6 **M4** **86.65 V/m**
Grid 7 **M4** **89.20 V/m**	Grid 8 **M4** **92.22 V/m**	Grid 9 **M4** **85.09 V/m**



0 dB = 93.50 V/m = 39.42 dBV/m

Frequency Band：PCS1900

CHANNEL：Low

DUT: Mobile Phone; Type: HotSpot II;

Communication System: UID 0, Generic GSM (0); Communication System Band: PCS 1900 (1850-1910 MHz);
Frequency: 1852.4 MHz; Communication System PAR: 9.191 dB;
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 0 kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

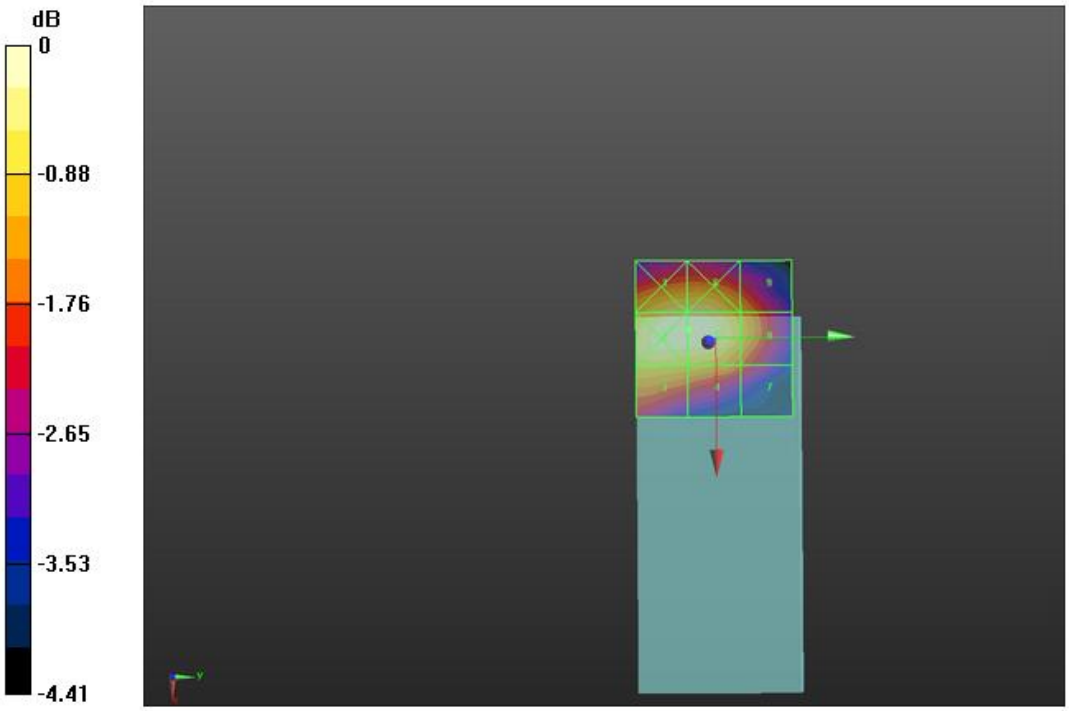
DASY Configuration:

- Probe: ER3DV6 - SN2539; ConvF(1, 1, 1); Calibrated: 9/26/2016;
- Sensor-Surface: (Fix Surface), z = 8.7
- Electronics: DAE4 Sn1398; Calibrated: 01/19/2017
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Ch512/E-Field/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 = 17.88 V/m; Power Drift = 0.03 dB
E-field emissions = 41.63 V/m
Near-field category: M3

PMF scaled E-field

Grid 1 **M3** **38.01 V/m**	Grid 2 **M3** **41.63 V/m**	Grid 3 **M3** **40.21 V/m**
Grid 4 **M3** **37.42 V/m**	Grid 5 **M3** **41.63 V/m**	Grid 6 **M3** **40.24 V/m**
Grid 7 **M3** **34.13 V/m**	Grid 8 **M3** **37.58 V/m**	Grid 9 **M3** **36.59 V/m**



0 dB = 41.63 V/m = 32.39 dBV/m

Frequency Band：PCS1900

CHANNEL：Middle

DUT: Mobile Phone; Type: HotSpot II;

Communication System: UID 0, Generic GSM (0); Communication System Band: PCS 1900 (1850-1910 MHz); Frequency: 1880 MHz; Communication System PAR: 9.191 dB;
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 0 kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

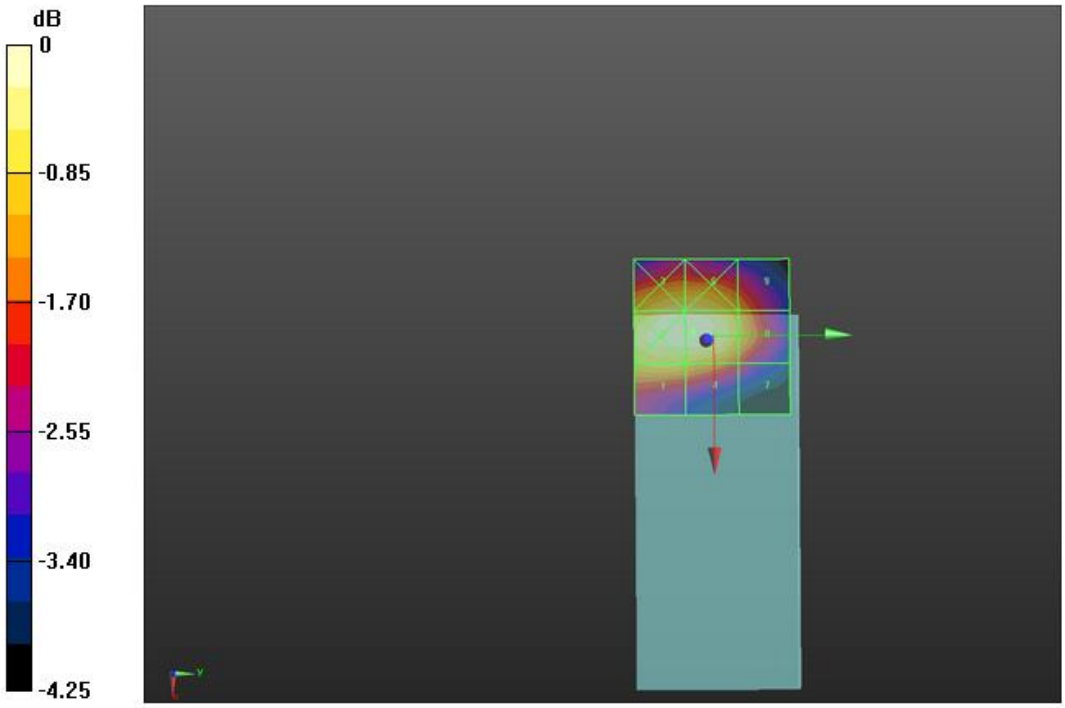
DASY Configuration:

- Probe: ER3DV6 - SN2539; ConvF(1, 1, 1); Calibrated: 9/26/2016;
- Sensor-Surface: (Fix Surface), z = 8.7
- Electronics: DAE4 Sn1398; Calibrated: 01/19/2017
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Ch661/E-Field/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 = 17.98 V/m; Power Drift = -0.04 dB
E-field emissions = 42.48 V/m
Near-field category: M3

PMF scaled E-field

Grid 1 **M3** **39.28 V/m**	Grid 2 **M3** **42.44 V/m**	Grid 3 **M3** **40.84 V/m**
Grid 4 **M3** **38.64 V/m**	Grid 5 **M3** **42.48 V/m**	Grid 6 **M3** **40.84 V/m**
Grid 7 **M3** **34.05 V/m**	Grid 8 **M3** **38.36 V/m**	Grid 9 **M3** **37.00 V/m**



0 dB = 42.48 V/m = 32.56 dBV/m

Frequency Band：PCS1900

CHANNEL：High

DUT: Mobile Phone; Type: HotSpot II;

Communication System: UID 0, Generic GSM (0); Communication System Band: PCS 1900 (1850-1910 MHz);
Frequency: 1909.8 MHz; Communication System PAR: 9.191 dB;
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 0 kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

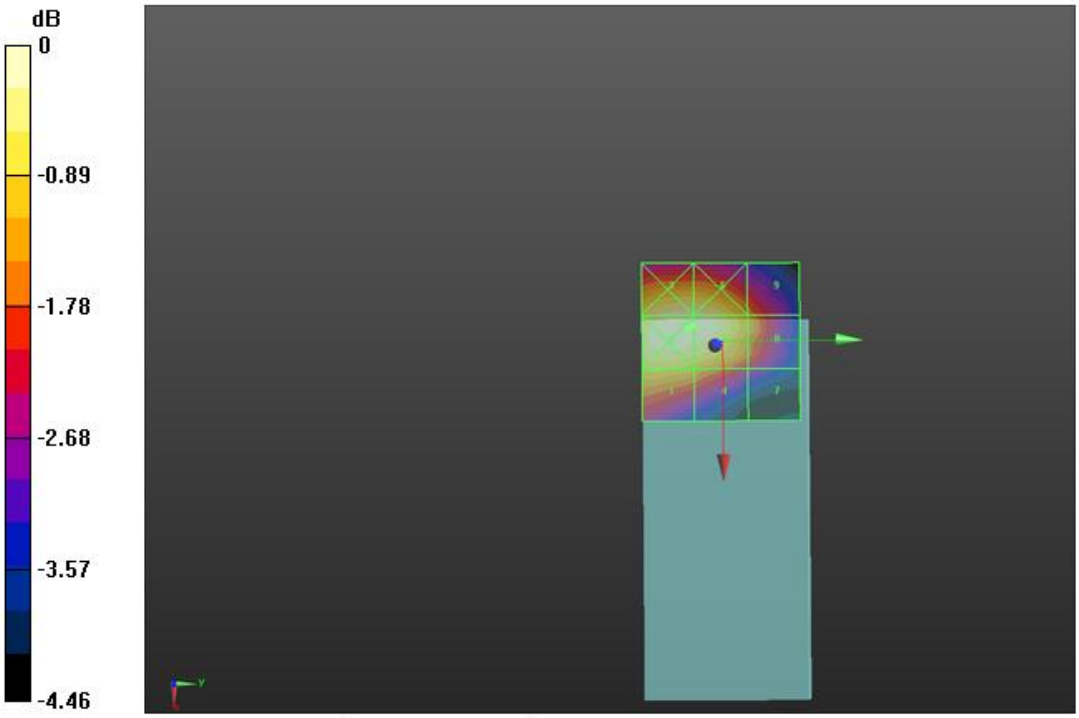
DASY Configuration:

- Probe: ER3DV6 - SN2539; ConvF(1, 1, 1); Calibrated: 9/26/2016;
- Sensor-Surface: (Fix Surface), z = 8.7
- Electronics: DAE4 Sn1398; Calibrated: 01/19/2017
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Ch810/E-Field/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 = 18.25 V/m; Power Drift = -0.01 dB
E-field emissions = 44.32 V/m
Near-field category: M3

PMF scaled E-field

Grid 1 **M3** **40.56 V/m**	Grid 2 **M3** **44.46 V/m**	Grid 3 **M3** **43.90 V/m**
Grid 4 **M3** **39.21 V/m**	Grid 5 **M3** **44.32 V/m**	Grid 6 **M3** **43.80 V/m**
Grid 7 **M3** **33.60 V/m**	Grid 8 **M3** **39.03 V/m**	Grid 9 **M3** **37.71 V/m**



0 dB = 44.46 V/m = 32.96 dBV/m

APPENDIX C. TEST SETUP PHOTOGRAPHS

APPENDIX D. CALIBRATION DATA

Refer to Attached files.