TEST REPORT

No.I19N02705-HAC RF

For

Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd

Smartphone

Model Name: CP3706AS

With

Hardware Version: P1

Software Version: 3706AS.SPRINT.191220.2D

FCC ID: R38YLCP3706AS

Results Summary: M Category = M4

Issued Date: 2020-01-10

Designation Number: CN1210

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of SAICT.

Test Laboratory:

Shenzhen Academy of Information and Communications Technology

Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China 518026.

Tel: +86(0)755-33322000, Fax: +86(0)755-33322001

Email: yewu@caict.ac.cn, website: www.cszit.com

REPORT HISTORY

Report Number	Revision	Issue Date	Description
I19N02705-HAC RF	Rev.0	2020-01-10	Initial creation of test report

TABLE OF CONTENT

1 Summary of Test Report

1.1 Test Items

Description:	Smartphone
Model Name:	CP3706AS
Applicant's name:	Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Manufacturer's Name:	Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd

1.2 Test Standards

ANSI C63.19-2011

1.3 Test Result

Please refer to "13. Measurement Results (E-Field)"

1.4 Testing Location

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China

1.5 Project Data

Testing Start Date:	November 24, 2019
Testing End Date:	November 24, 2019

1.6 Signature

Li yongfu
(Prepared this test report)

Zhang Yunzhuan
(Reviewed this test report)

Cao Junfei
Deputy Director of the laboratory
(Approved this test report)

2 Client Information

2.1 Applicant Information

Company Name:	Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address /Post:	Building B, Boton Science Park, Chaguang Road, Xili Town, Nanshan District, Shenzhen
Contact:	Emily zhang
Email:	zhangxuzhu@yulong.com
Telephone:	+86 15089742056
Fax:	/

2.2 Manufacturer Information

Company Name:	Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address /Post:	Building B, Boton Science Park, Chaguang Road, Xili Town, Nanshan District, Shenzhen
Contact:	Emily zhang
Email:	zhangxuzhu@yulong.com
Telephone:	+86 15089742056
Fax:	/

3 Equipment under Test (EUT) and Ancillary Equipment (AE)

3.1 About EUT

Description:	Smartphone
Mode Name:	CP3706AS
Operating mode(s):	GSM 850/1900, CDMA BC0/BC1/BC10, WCDMA Band 2/4/5 LTE Band 2/4/5/7/12/13/25/26/41/66/71, BT, Wi-Fi 2.4G/5G
Condition of EUT as received	No obvious damage in appearance

3.2 Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version
EUT1	990015570002444	P1	3706AS.SPRINT.191220.2D
EUT2	990015570002378	P1	3706AS.SPRINT.191220.2D

*EUT ID: is used to identify the test sample in the lab internally.

Note: It is performed to test HAC with the EUT 1 & 2.

3.3 Internal Identification of AE used during the test

AE ID*	Description	Type	Manufacturer
AE1	Battery	3706AS_CA406787G	CosMX

*AE ID: is used to identify the test sample in the lab internally.

3.4 Air Interfaces / Bands Indicating Operating Modes

Air-interface	Band(MHz)	Type	C63.19 / tested	Simultaneous Transmissions	Name of Voice Service	Power Reduction
GSM	850 /1900	VO	Yes	BT,WLAN	CMRS Voice	No
EDGE	850 /1900	DT	Yes	BT,WLAN	Google Duo	
WCDMA	B2 / B4/ B5	VO	Yes	BT,WLAN	CMRS Voice	No
	HSPA	DT	Yes	BT,WLAN	Google Duo	
CDMA	BC0 / BC1 / BC10	VO	Yes	BT,WLAN	CMRS Voice	No
	1XRTT / EVDO	DT	Yes	BT,WLAN	Google Duo	
LTE (FDD)	2/4/5/7/12/13/ 25/26/66/71	VD	Yes	BT,WLAN	VoLTE Google Duo	No
LTE (TDD)	41	VD	Yes	BT,WLAN	VoLTE Google Duo	
WLAN	2.4G	VD	Yes	WWAN	Google Duo	No
WLAN	5G	VD	Yes	WWAN	Google Duo	No
BT	2.4G	DT	No	WWAN	NA	No

VO: Voice CMRS/PSTN Service Only

VD: Voice CMRS/PSTN and Data Service

DT: Digital Transport

* HAC Rating was not based on concurrent voice and data modes; Non-current mode was found to represent worst case rating for both M and T rating

4. Reference Documents

ANSI C63.19-2011: American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids

FCC KDB 285076 D01v05: Equipment Authorization Guidance for Hearing Aid Compatibility

5 Operational Conditions During Test

5.1 HAC Measurement Set-up

These measurements are performed using the DASY5 NEO automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Stäubli), robot controller, Intel Core2 computer, near-field probe, probe alignment sensor. The robot is a six-axis industrial robot performing precise movements. A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The PC consists of the HP Intel Core2 1.86 GHz computer with Windows XP system and HAC Measurement Software DASY5 NEO, A/D interface card, monitor, mouse, and keyboard. The Stäubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

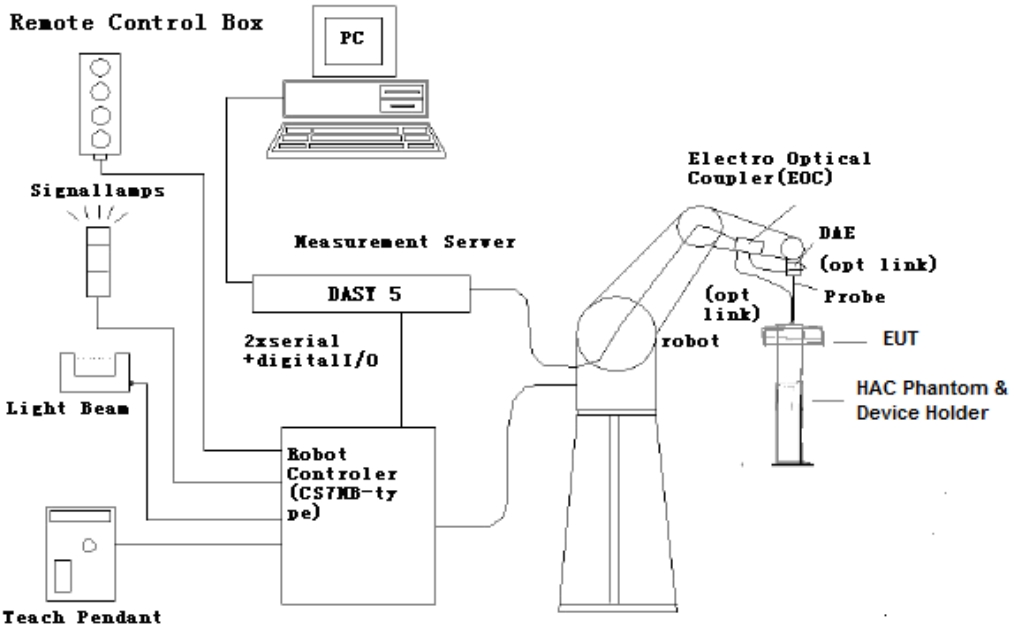


Fig. 1 HAC Test Measurement Set-up

The DAE4 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

5.2 Probe Specification

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
Application	General near-field measurements up to 6 GHz Field component measurements Fast automatic scanning in phantoms

[ER3DV6]

5.3 Test Arch Phantom & Phone Positioner

The Test Arch phantom should be positioned horizontally on a stable surface. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. It enables easy and well defined positioning of the phone and validation dipoles as well as simple teaching of the robot (Dimensions: 370 x 370 x 370 mm).

The Phone Positioner supports accurate and reliable positioning of any phone with effect on near field <±0.5 dB.

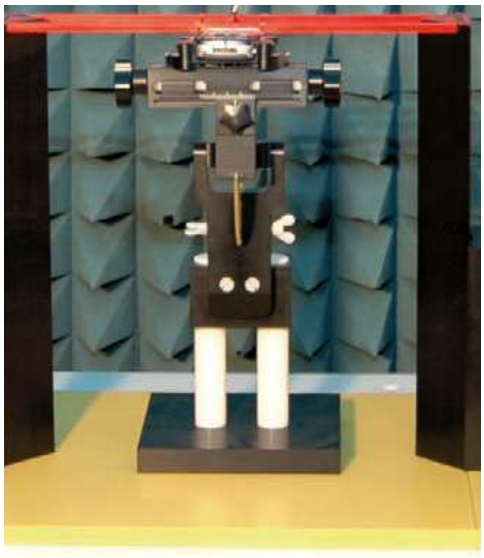


Fig. 2 HAC Phantom & Device Holder

4.4 Robotic System Specifications

Specifications

Positioner: Stäubli Unimation Corp. Robot Model: RX160XL
Repeatability: ±0.02 mm
No. of Axis: 6

Data Acquisition Electronic (DAE) System

Cell Controller
Processor: Intel Core2
Clock Speed: 1.86 GHz
Operating System: Windows XP
Data Converter
Features: Signal Amplifier, multiplexer, A/D converter, and control logic
Software: DASY5 software
Connecting Lines: Optical downlink for data and status info.
Optical uplink for commands and clock

6 EUT Arrangement

6.1 WD RF Emission Measurements Reference and Plane

Figure 4 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.

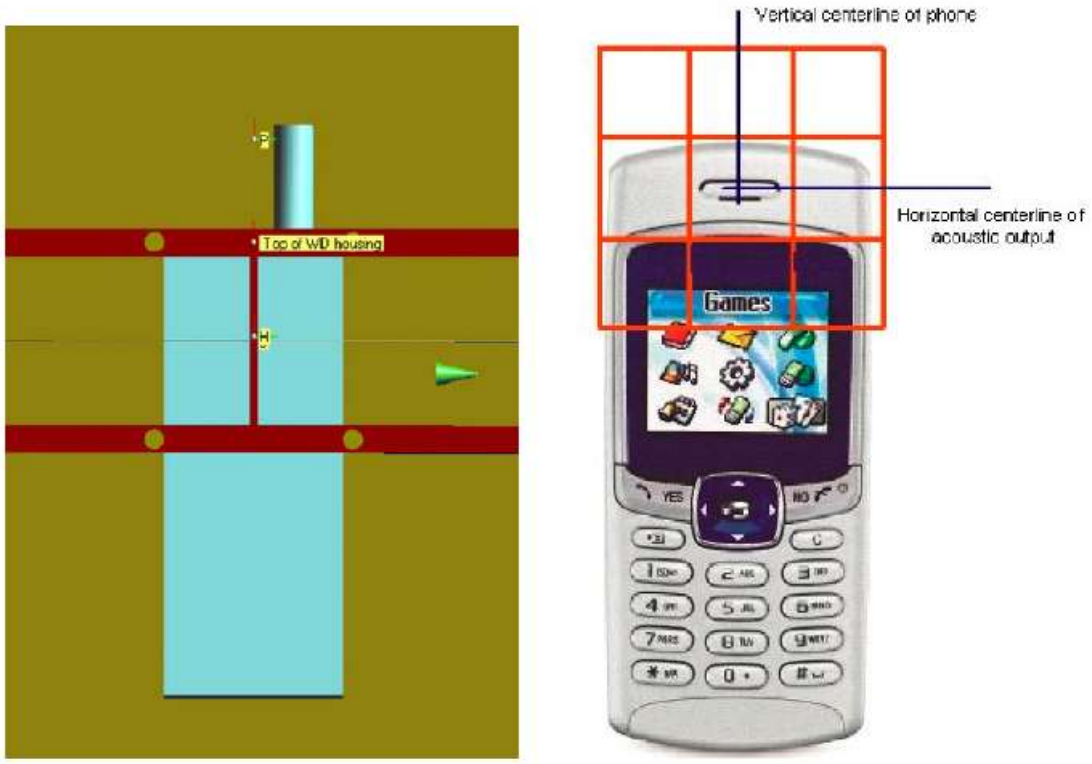


Fig. 3 WD reference and plane for RF emission measurements

7 System Validation

7.1 Validation Procedure

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

• 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.

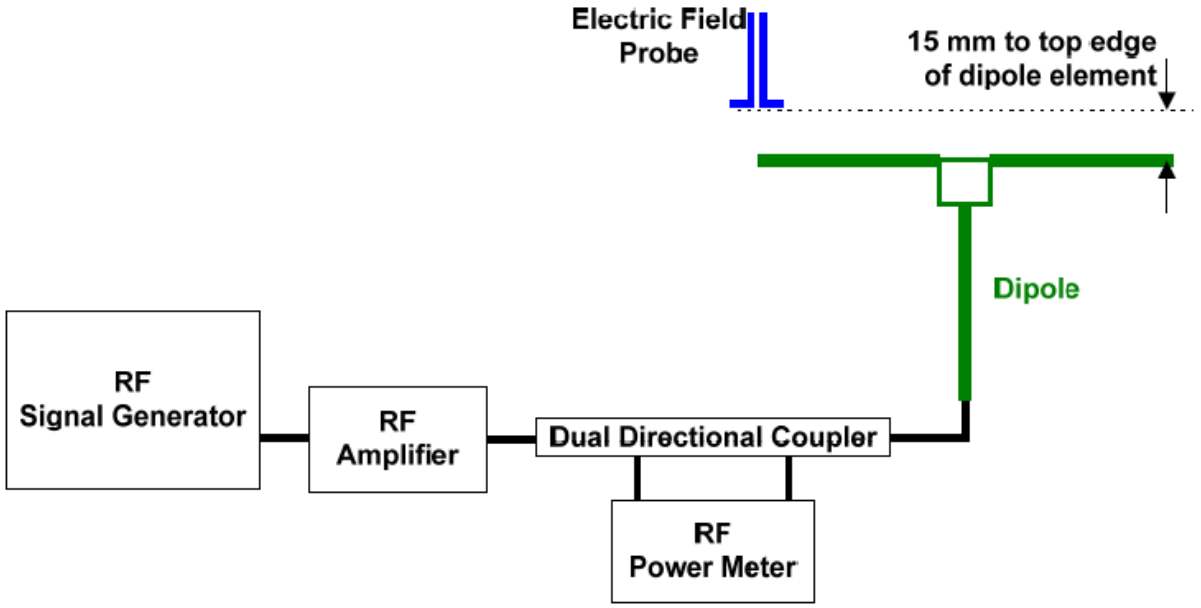


Fig. 4 Dipole Validation Setup

7.2 Validation Result

E-Field Scan						
Mode	**Frequency (MHz)**	**Input Power (mW)**	**Measured[1] Value(dBV/m)**	**Target[2] Value(dBV/m)**	**Deviation[3] (%)**	**Limit[4] (%)**
CW	835	100	43.62	40.72	7.1	±25
CW	1880	100	39.95	39.06	2.3	±25
CW	2600	100	39.68	38.71	2.5	±25

Notes:

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

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

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

4. 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.

8 Modulation Interference Factor (MIF)

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 dBV/m) and converts it to the RF Audio Interference level (in dBV/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 C63-2007.

Definitions

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 were not tested by a probe or as specified in the standards but are based on analysis provided by SPEAG for all the air interfaces (GSM, WCDMA, CDMA, LTE). 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	GSM-FDD (TDMA, GMSK)	3.63
10025	EDGE-FDD (TDMA, 8PSK, TN 0)	3.75
10011	UMTS-FDD (WCDMA)	-27.23
10225	UMTS-FDD (HSPA+)	-20.39
10295	CDMA2000 (RC1, SO3, 1/8th Rate 25 fr.)	3.26
10403	CDMA2000 (1xEV-DO, Rev. 0)	-17.67
10170	LTE-FDD(SC-FDMA, 1RB, 20MHz, 16-QAM)	-9.76
10176	LTE-FDD(SC-FDMA, 1RB, 10MHz, 16-QAM)	-9.76
10173	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16QAM)	-1.44
10061	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	-2.02
10069	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	-3.15

A PMR calibrated probe is linearized for the selected waveform over the full dynamic range within the uncertainty specified in its calibration certificate. ER3D, EF3D and EU2D 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 PMR calibration in order to not overestimate the field reading.

The MIF measurement uncertainty is estimated as follows, for modulation frequencies from slotted waveforms with fundamental frequency and at least 2 harmonics within 10 kHz:

0.2 dB for MIF -7 to +5 dB,
0.5 dB for MIF -13 to +11 dB
1 dB for MIF > -20 dB

9 Evaluation for low-power exemption

9.1 Product testing threshold

There are two methods for exempting an RF air interface technology from testing. The first method requires evaluation of the MIF for the worst-case operating mode. 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. The second method does not require determination of the MIF. The RF emissions testing exemption shall be applied to an RF air interface technology in a device whose peak antenna input power, averaged over intervals ≤50 μs20, is ≤23 dBm. An RF air interface technology that is exempted from testing by either method shall be rated as M4.
The first method is used to be exempt from testing for the RF air interface technology in this report.

9.2 Conducted power

Band	power (dBm)	MIF (dB)	Sum (dBm)	HAC Test
GSM 850	33.5	3.63	37.13	Yes
EGPRS 850	28	3.75	31.75	Yes
GSM 1900	31	3.63	34.63	Yes
EGPRS 1900	27	3.75	30.75	Yes
CDMA BC0	25	3.26	28.26	Yes
CDMA BC0 -EVDO	25	-17.67	7.33	No
CDMA BC1	25	3.26	28.26	Yes
CDMA BC1 -EVDO	25	-17.67	7.33	No
CDMA BC10	25	3.26	28.26	Yes
CDMA BC10 -EVDO	25	-17.67	7.33	No
WCDMA B2	25.5	-27.23	-1.73	No
WCDMA B2 -HSPA	25	-20.39	4.61	No
WCDMA B4	25.5	-27.23	-1.73	No
WCDMA B4 -HSPA	24.5	-20.39	4.11	No
WCDMA B5	25.5	-27.23	-1.73	No
WCDMA B5 -HSPA	24.5	-20.39	4.11	No
LTE Band 2	24.5	-9.76	14.74	No
LTE Band 4	24	-9.76	14.24	No
LTE Band 5	24	-9.76	14.24	No
LTE Band 7	24.5	-9.76	14.74	No
LTE Band 12	24	-9.76	14.24	No
LTE Band 13	24	-9.76	14.24	No
LTE Band 25	24.5	-9.76	14.74	No
LTE Band 26	25.5	-9.76	15.74	No
LTE Band 41	24.5	-1.44	23.06	Yes
LTE Band 66	24	-9.76	14.24	No
LTE Band 71	24	-9.76	14.24	No
WIFI 2.4G	17.5	-2.02	15.48	No
WIFI 5G	15.5	-3.15	12.35	No

Note:

1. Power = Max turn-up limit.
2. EGPRS data modes are not necessary due the GSM Voice mode is the worst case.

10 RF Test Procedures

The evaluation was performed with the following procedure:

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

2) Position the WD in its intended test position. The gauge block can simplify this positioning.

3) Configure the WD normal operation for maximum rated RF output power, at the desired channel and other operating parameters (e.g., test mode), as intended for the test.

4) The center sub-grid shall centered on the center of the T-Coil mode axial 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. If the field alignment method is used, align the probe for maximum field reception.

5) Record the reading.

6) 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.

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

8) Identify the maximum field reading within the non-excluded sub-grids identified in Step 7)

9) Evaluate the MIF and add to the maximum steady-state rms field-strength reading to obtain the RF audio interference level..

10) Compare this RF audio interference level with the categories and record the resulting WD category rating.

11 Measurement Results (E-Field)

Frequency		Measured Value (dBV/m)	Power Drift (dB)	Category
MHz	Channel			
GSM 850				
848.8	251	26.62	0.03	**M4** (see Fig A.1)
836.6	190	29.28	0.04	**M4** (see Fig A.2)
824.2	128	29.40	0.01	**M4** (see Fig A.3)
GSM 1900				
1909.8	810	20.76	0.01	**M4** (see Fig A.4)
1880	661	21.08	0.10	**M4** (see Fig A.5)
1850.2	512	21.40	0.04	**M4** (see Fig A.6)
CDMA BC0				
848.31	777	35.13	-0.03	**M4** (see Fig A.7)
836.52	384	35.26	-0.01	**M4** (see Fig A.8)
824.70	1013	34.77	-0.02	**M4** (see Fig A.9)
CDMA BC1				
1908.75	1175	28.00	0.05	**M4** (see Fig A.10)
1880	600	27.72	0.08	**M4** (see Fig A.11)
1851.25	25	27.48	0.06	**M4** (see Fig A.12)
CDMA BC10				
823.1	684	34.63	-0.01	**M4** (see Fig A.13)
820.5	580	34.74	-0.08	**M4** (see Fig A.14)
817.9	476	34.96	-0.07	**M4** (see Fig A.15)
LTE Band 41				
2680	41490	18.50	-0.05	**M4** (see Fig A.16)
2636.5	41055	17.55	-0.02	**M4** (see Fig A.17)
2593	40620	17.99	-0.12	**M4** (see Fig A.18)
2549.5	40185	19.27	-0.07	**M4** (see Fig A.19)
2506	39750	19.09	-0.07	**M4** (see Fig A.20)

12 ANSI C 63.19-2011 Limits

WD RF audio interference level categories in logarithmic units

Emission categories	**< 960 MHz**	
	E-field emissions	
Category M1	50 to 55	dB (V/m)
Category M2	45 to 50	dB (V/m)
Category M3	40 to 45	dB (V/m)
Category M4	< 40	dB (V/m)
Emission categories	**> 960 MHz**	
	E-field emissions	
Category M1	40 to 45	dB (V/m)
Category M2	35 to 40	dB (V/m)
Category M3	30 to 35	dB (V/m)
Category M4	< 30	dB (V/m)

13 Measurement Uncertainty

No.	Error source	Type	Uncertainty Value (%)	Prob. Dist.	k	c_i E	Standard Uncertainty (%) u_i' (%) E	Degree of freedom V_{eff} or v_i	source
1	System repeatability	A	0.24	N	1	1	0.24	9	Measurement
Measurement System									
2	Probe Calibration	B	10.1	N	1	1	10.1	∞	Manufacturer
3	Axial Isotropy	B	0.5	R	$\sqrt{3}$	1	0.5	∞	Cal report
4	Sensor Displacement	B	16.5	R	$\sqrt{3}$	1	9.5	∞	Manufacturer
5	Boundary Effects	B	2.4	R	$\sqrt{3}$	1	1.4	∞	Manufacturer
6	Linearity	B	0.6	R	$\sqrt{3}$	1	0.35	∞	Cal report
7	Scaling to Peak Envolope Power	B	2.0	R	$\sqrt{3}$	1	1.2	∞	Standard
8	System Detection Limit	B	1.0	R	$\sqrt{3}$	1	0.6	∞	Manufacturer
9	Readout Electronics	B	0.3	N	1	1	0.3	∞	Manufacturer
10	Response Time	B	0.8	R	$\sqrt{3}$	1	0.5	∞	Manufacturer
11	Integration Time	B	2.6	R	$\sqrt{3}$	1	1.5	∞	Manufacturer
12	RF Ambient Conditions	B	3.0	R	$\sqrt{3}$	1	1.7	∞	Measurement
13	RF Reflections	B	12.0	R	$\sqrt{3}$	1	6.9	∞	Measurement
14	Probe Positioner	A	1.2	R	$\sqrt{3}$	1	0.7	∞	Manufacturer
15	Probe Positioning	A	4.7	R	$\sqrt{3}$	1	2.7	∞	Manufacturer
16	Extra. And Interpolation	B	1.0	R	$\sqrt{3}$	1	0.6	∞	Manufacturer
Test Sample Related									
17	Device Positioning Vertical	B	4.7	R	$\sqrt{3}$	1	2.7	∞	Manufacturer
18	Device Positioning Lateral	B	1.0	R	$\sqrt{3}$	1	0.6	∞	Manufacturer
19	Device Holder and Phantom	B	2.4	R	$\sqrt{3}$	1	1.4	∞	Manufacturer
20	Power Drift	B	5.0	R	$\sqrt{3}$	1	2.9	∞	Measurement
Phantom and Setup related									
21	Phantom Thickness	B	2.4	R	$\sqrt{3}$	1	1.4	∞	Manufacturer
PMF related									
22	Monitor amplitude	B	3.5	R	$\sqrt{3}$	1	2.02	∞	Manufacturer
23	Setup repeatability	A	2.3	N	1	1	2.3	9	Manufacturer
24	Sensor amplitude	B	12	R	$\sqrt{3}$	1	6.93	∞	Manufacturer
	Combined standard uncertainty(%)						18.3		
	Expanded uncertainty (confidence interval of 95 %)	$u_e = 2u_c$		N	k=2		36.6		

14 Main Test Instruments

Table 14-1: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Signal Generator	E8257D	MY47461211	2019-06-03	One year
02	Power meter	E4418B	MY50000366	2018-12-14	One year
03	Power sensor	E9304A	MY50000188		
04	Amplifier	VTL5400	0404	/	
05	HAC Test Arch	N/A	1150	/	
06	DAE	DAE4	1527	2019-11-11	One year
07	E-Field Probe	ER3DV6	2424	2018-02-23	Three year
08	HAC Dipole	CD835V3	1165	2018-07-19	Three year
09	HAC Dipole	CD1880V3	1149	2018-07-19	Three year
10	HAC Dipole	CD2600V3	1020	2018-10-23	Three year
11	BTS	CMU200	114544	2019-09-02	One year
12	BTS	CMU500	152499	2019-07-18	One year

ANNEX A RF Emission Test Plot

HAC RF E-Field GSM 850 High

Date: 2019-11-24

Electronics: DAE4 Sn1527

Medium: Air

Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3

Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C

Communication System: UID 0, GSM Frequency: 848.8 MHz Duty Cycle: 1:8.3

Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 16.71 V/m; Power Drift = 0.03 dB

Applied MIF = 3.63 dB

RF audio interference level = 26.62 dBV/m

Emission category: M4

MIF scaled E-field

Grid 1 **M4** **24.65 dBV/m**	Grid 2 **M4** **25.94 dBV/m**	Grid 3 **M4** **25.66 dBV/m**
Grid 4 **M4** **25.46 dBV/m**	Grid 5 **M4** **26.62 dBV/m**	Grid 6 **M4** **26.52 dBV/m**
Grid 7 **M4** **26.79 dBV/m**	Grid 8 **M4** **27.05 dBV/m**	Grid 9 **M4** **26.67 dBV/m**

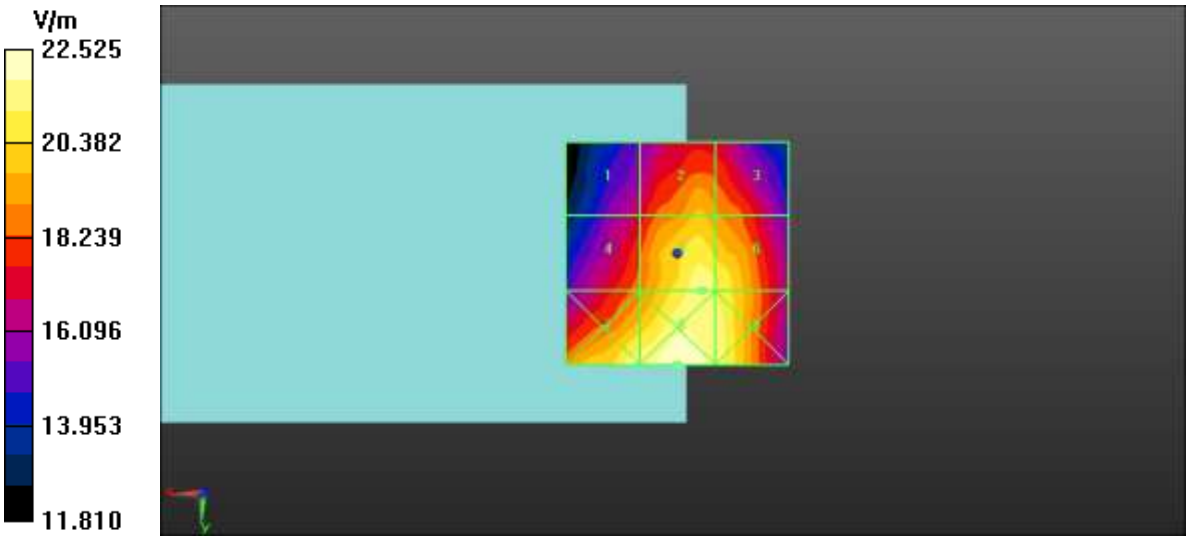


Fig A.1 HAC RF E-Field GSM850

HAC RF E-Field GSM 850 Middle
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, GSM Frequency: 836.6 MHz Duty Cycle: 1:8.3
Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 21.44 V/m; Power Drift = 0.04 dB
Applied MIF = 3.63 dB
RF audio interference level = 29.28 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **27.48 dBV/m**	Grid 2 **M4** **27.68 dBV/m**	Grid 3 **M4** **26.76 dBV/m**
Grid 4 **M4** **29.13 dBV/m**	Grid 5 **M4** **29.28 dBV/m**	Grid 6 **M4** **28.68 dBV/m**
Grid 7 **M4** **30.67 dBV/m**	Grid 8 **M4** **30.68 dBV/m**	Grid 9 **M4** **29.78 dBV/m**

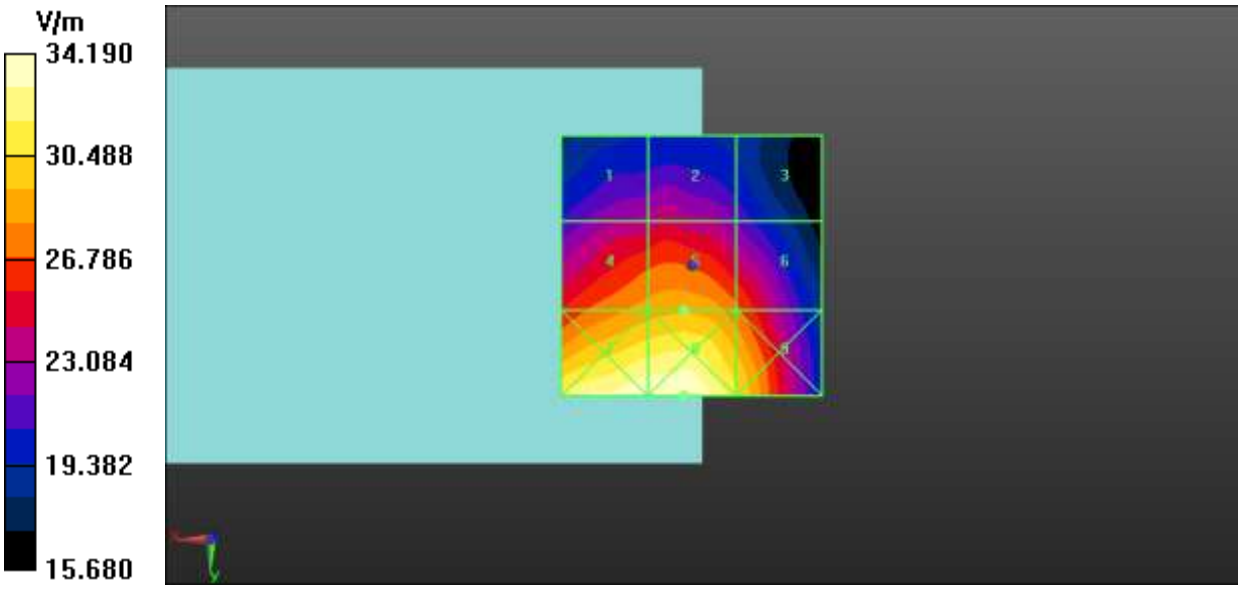


Fig A.2 HAC RF E-Field GSM850

HAC RF E-Field GSM 850 Low
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, GSM Frequency: 824.2 MHz Duty Cycle: 1:8.3
Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 21.91 V/m; Power Drift = 0.01 dB
Applied MIF = 3.63 dB
RF audio interference level = 29.40 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **27.71 dBV/m**	Grid 2 **M4** **27.82 dBV/m**	Grid 3 **M4** **26.94 dBV/m**
Grid 4 **M4** **29.23 dBV/m**	Grid 5 **M4** **29.4 dBV/m**	Grid 6 **M4** **28.83 dBV/m**
Grid 7 **M4** **30.76 dBV/m**	Grid 8 **M4** **30.76 dBV/m**	Grid 9 **M4** **29.93 dBV/m**

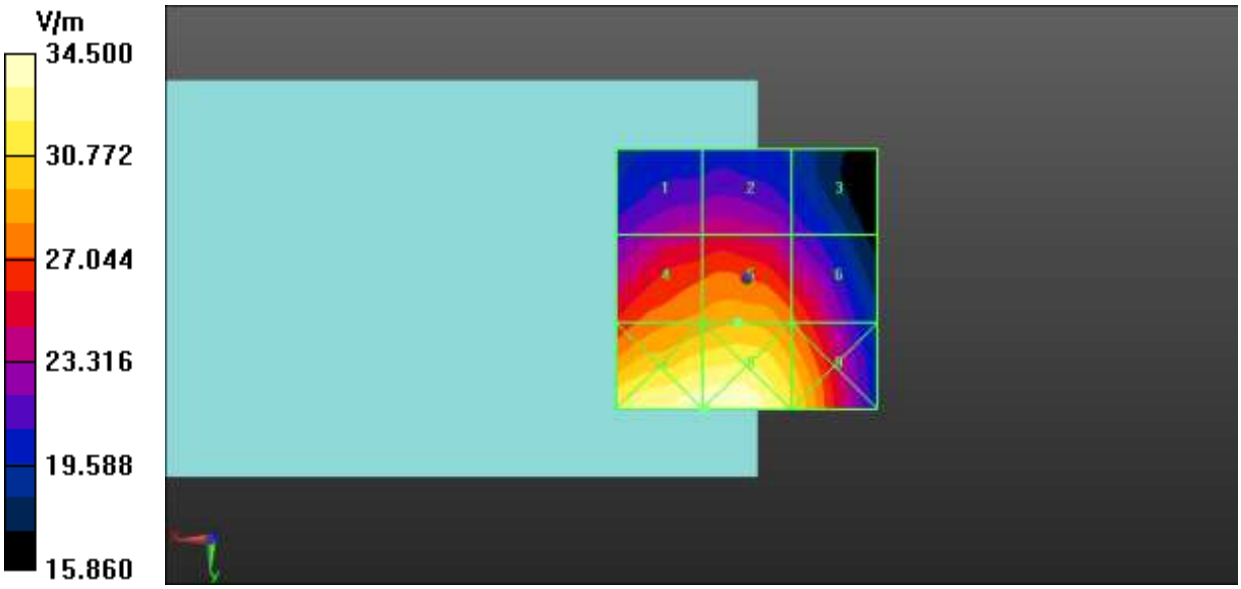


Fig A.3 HAC RF E-Field GSM850

HAC RF E-Field GSM 1900 High
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, GSM Frequency: 1910 MHz Duty Cycle: 1:8.3
Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 7.682 V/m; Power Drift = 0.01 dB
Applied MIF = 3.63 dB
RF audio interference level = 20.76 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **19.65 dBV/m**	Grid 2 **M4** **20.86 dBV/m**	Grid 3 **M4** **20.15 dBV/m**
Grid 4 **M4** **19.52 dBV/m**	Grid 5 **M4** **20.76 dBV/m**	Grid 6 **M4** **20.45 dBV/m**
Grid 7 **M4** **18.11 dBV/m**	Grid 8 **M4** **20.19 dBV/m**	Grid 9 **M4** **20.12 dBV/m**

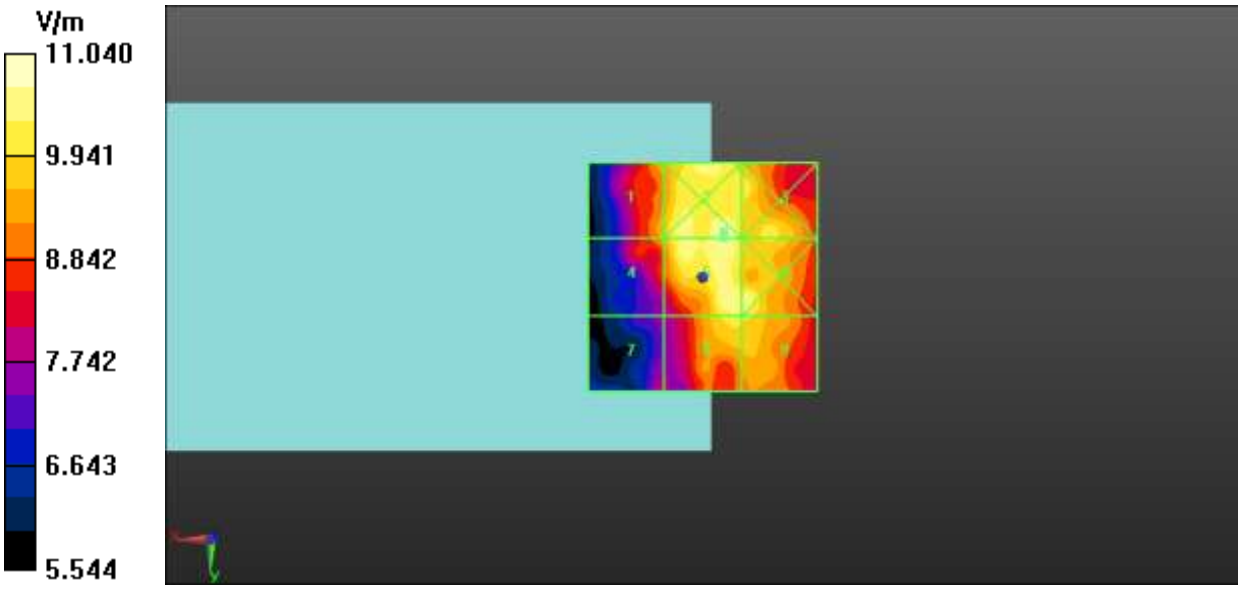


Fig A.4 HAC RF E-Field GSM1900

HAC RF E-Field GSM 1900 Middle
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, GSM Frequency: 1880 MHz Duty Cycle: 1:8.3
Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 8.313 V/m; Power Drift = 0.10 dB
Applied MIF = 3.63 dB
RF audio interference level = 21.08 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **19.78 dBV/m**	Grid 2 **M4** **21.06 dBV/m**	Grid 3 **M4** **20.04 dBV/m**
Grid 4 **M4** **19.77 dBV/m**	Grid 5 **M4** **21.08 dBV/m**	Grid 6 **M4** **21 dBV/m**
Grid 7 **M4** **19.45 dBV/m**	Grid 8 **M4** **20.93 dBV/m**	Grid 9 **M4** **20.81 dBV/m**

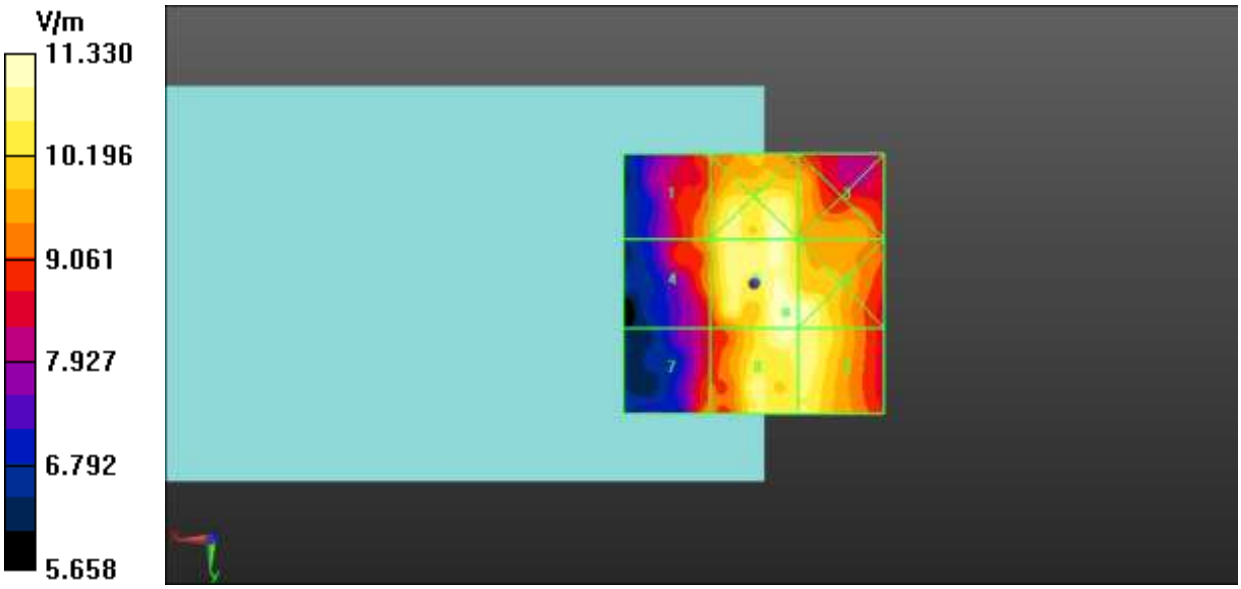


Fig A.5 HAC RF E-Field GSM1900

HAC RF E-Field GSM 1900 Low
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, GSM Frequency: 1850.2 MHz Duty Cycle: 1:8.3
Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 8.673 V/m; Power Drift = 0.04 dB
Applied MIF = 3.63 dB
RF audio interference level = 21.40 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **20.03 dBV/m**	Grid 2 **M4** **21.09 dBV/m**	Grid 3 **M4** **20.1 dBV/m**
Grid 4 **M4** **20.02 dBV/m**	Grid 5 **M4** **21.4 dBV/m**	Grid 6 **M4** **21.33 dBV/m**
Grid 7 **M4** **20.34 dBV/m**	Grid 8 **M4** **21.51 dBV/m**	Grid 9 **M4** **21.4 dBV/m**

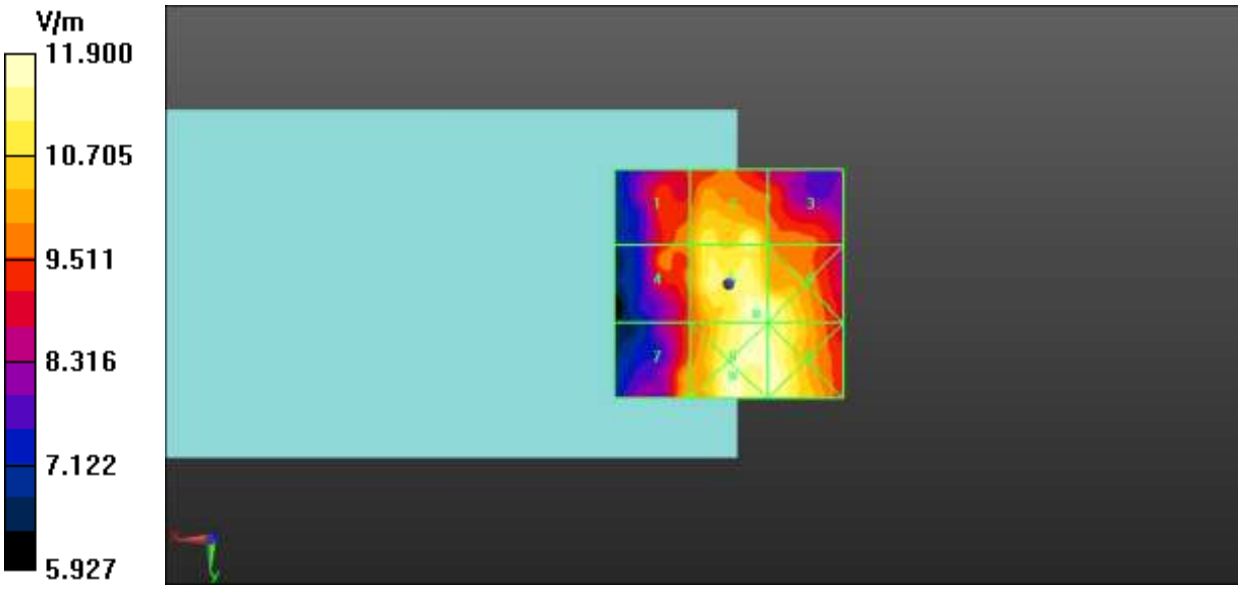


Fig A.6 HAC RF E-Field GSM1900

HAC RF E-Field CDMA BC0 High
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, CDMA Frequency: 848.31 MHz Duty Cycle: 1:1
Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device H/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 = 48.44 V/m; Power Drift = -0.03 dB
Applied MIF = 3.26 dB
RF audio interference level = 35.13 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **33.43 dBV/m**	Grid 2 **M4** **34.83 dBV/m**	Grid 3 **M4** **34.78 dBV/m**
Grid 4 **M4** **33.9 dBV/m**	Grid 5 **M4** **35.13 dBV/m**	Grid 6 **M4** **35.09 dBV/m**
Grid 7 **M4** **34.62 dBV/m**	Grid 8 **M4** **35.13 dBV/m**	Grid 9 **M4** **35.08 dBV/m**

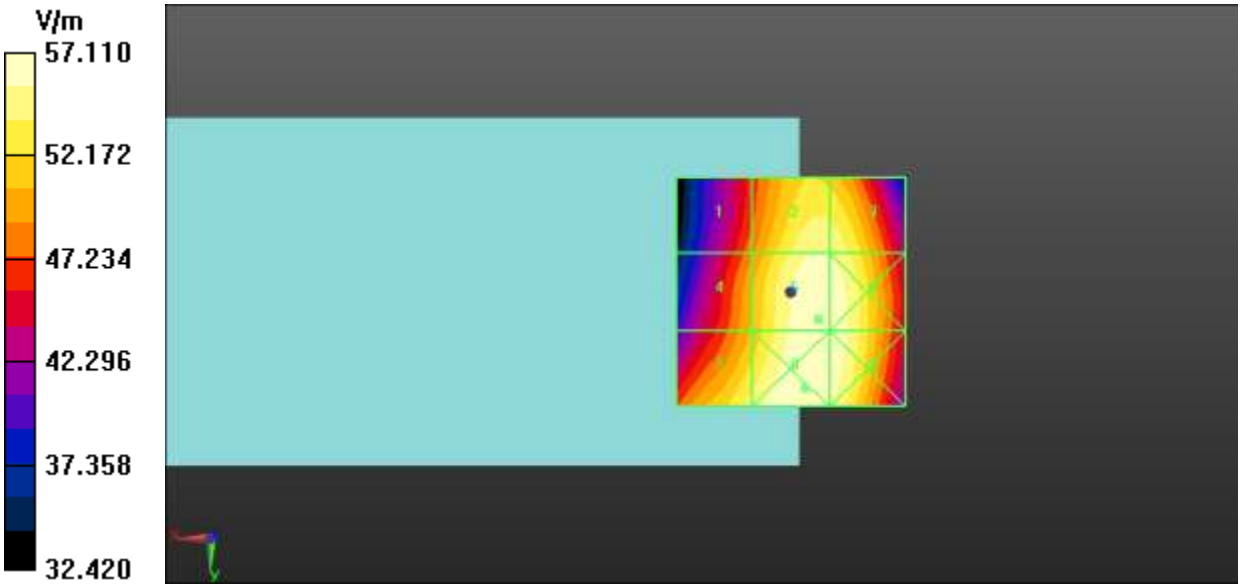


Fig A.7 HAC RF E-Field CDMA BC0

HAC RF E-Field CDMA BC0 Middle
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, CDMA Frequency: 836.52 MHz Duty Cycle: 1:1
Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 48.98 V/m; Power Drift = -0.01 dB
Applied MIF = 3.26 dB
RF audio interference level = 35.26 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **33.64 dBV/m**	Grid 2 **M4** **34.96 dBV/m**	Grid 3 **M4** **34.9 dBV/m**
Grid 4 **M4** **34.08 dBV/m**	Grid 5 **M4** **35.26 dBV/m**	Grid 6 **M4** **35.23 dBV/m**
Grid 7 **M4** **34.76 dBV/m**	Grid 8 **M4** **35.28 dBV/m**	Grid 9 **M4** **35.21 dBV/m**

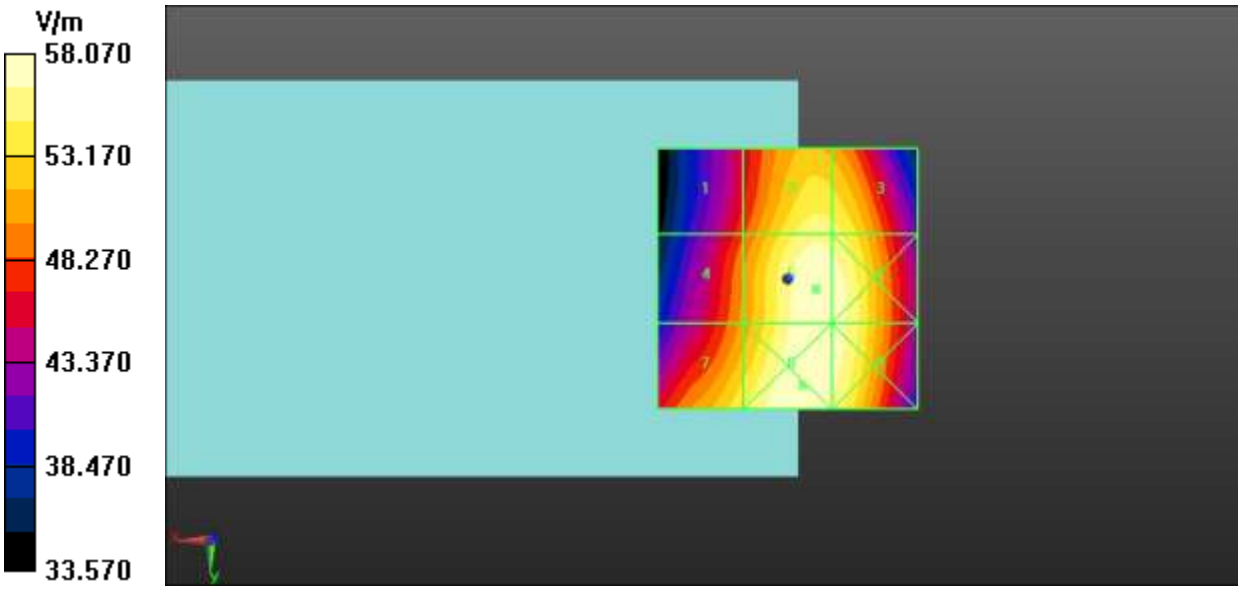


Fig A.8 HAC RF E-Field CDMA BC0

HAC RF E-Field CDMA BC0 Low
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, CDMA Frequency: 824.7 MHz Duty Cycle: 1:1
Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 46.35 V/m; Power Drift = -0.02 dB
Applied MIF = 3.26 dB
RF audio interference level = 34.77 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **33.22 dBV/m**	Grid 2 **M4** **34.48 dBV/m**	Grid 3 **M4** **34.41 dBV/m**
Grid 4 **M4** **33.6 dBV/m**	Grid 5 **M4** **34.77 dBV/m**	Grid 6 **M4** **34.71 dBV/m**
Grid 7 **M4** **34.25 dBV/m**	Grid 8 **M4** **34.78 dBV/m**	Grid 9 **M4** **34.7 dBV/m**

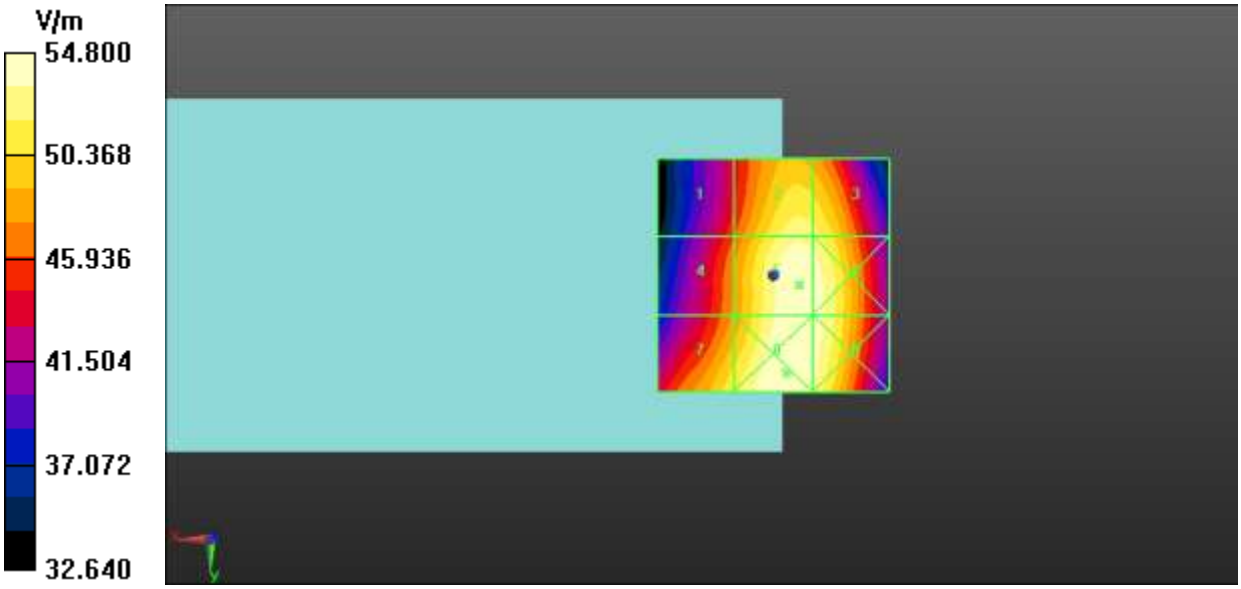


Fig A.9 HAC RF E-Field CDMA BC0

HAC RF E-Field CDMA BC1 High
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, CDMA Frequency: 1908.75 MHz Duty Cycle: 1:1
Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 13.23 V/m; Power Drift = 0.05 dB
Applied MIF = 3.26 dB
RF audio interference level = 28.00 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **28.6 dBV/m**	Grid 2 **M3** **30.97 dBV/m**	Grid 3 **M3** **30.92 dBV/m**
Grid 4 **M4** **24.78 dBV/m**	Grid 5 **M4** **27.85 dBV/m**	Grid 6 **M4** **28 dBV/m**
Grid 7 **M4** **27.64 dBV/m**	Grid 8 **M4** **27.61 dBV/m**	Grid 9 **M4** **26.32 dBV/m**

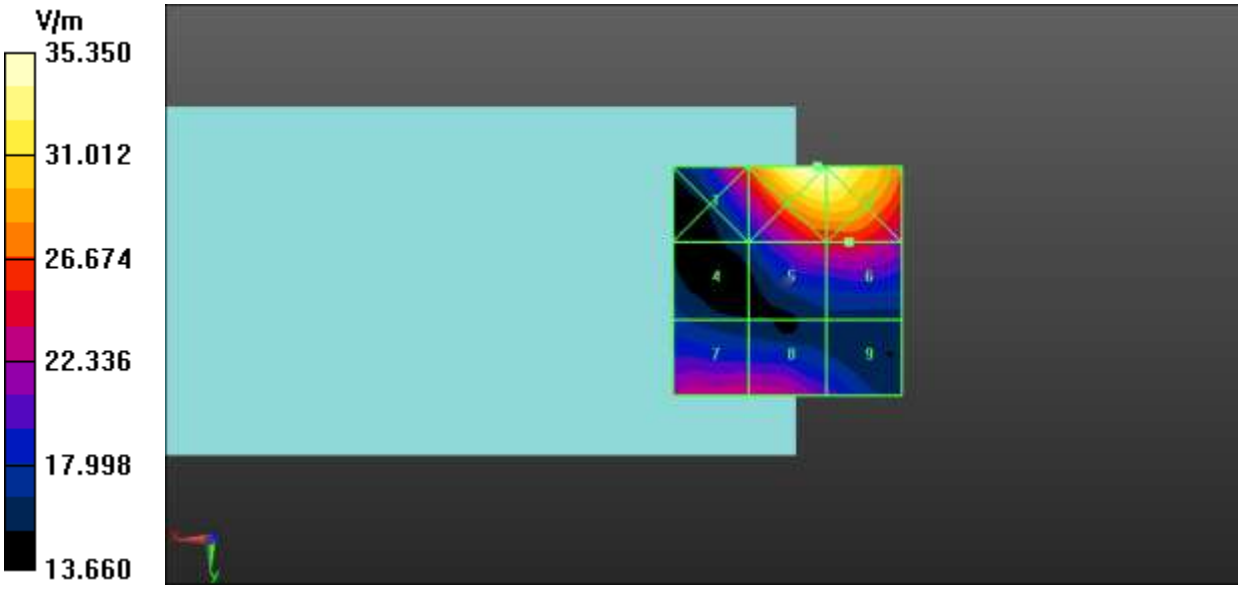


Fig A.10 HAC RF E-Field CDMA BC1

HAC RF E-Field CDMA BC1 Middle
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, CDMA Frequency: 1880 MHz Duty Cycle: 1:8.3
Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 11.20 V/m; Power Drift = 0.08 dB
Applied MIF = 3.26 dB
RF audio interference level = 27.72 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **28.63 dBV/m**	Grid 2 **M3** **30.39 dBV/m**	Grid 3 **M3** **30.32 dBV/m**
Grid 4 **M4** **24.13 dBV/m**	Grid 5 **M4** **26.49 dBV/m**	Grid 6 **M4** **26.56 dBV/m**
Grid 7 **M4** **27.54 dBV/m**	Grid 8 **M4** **27.72 dBV/m**	Grid 9 **M4** **26.85 dBV/m**

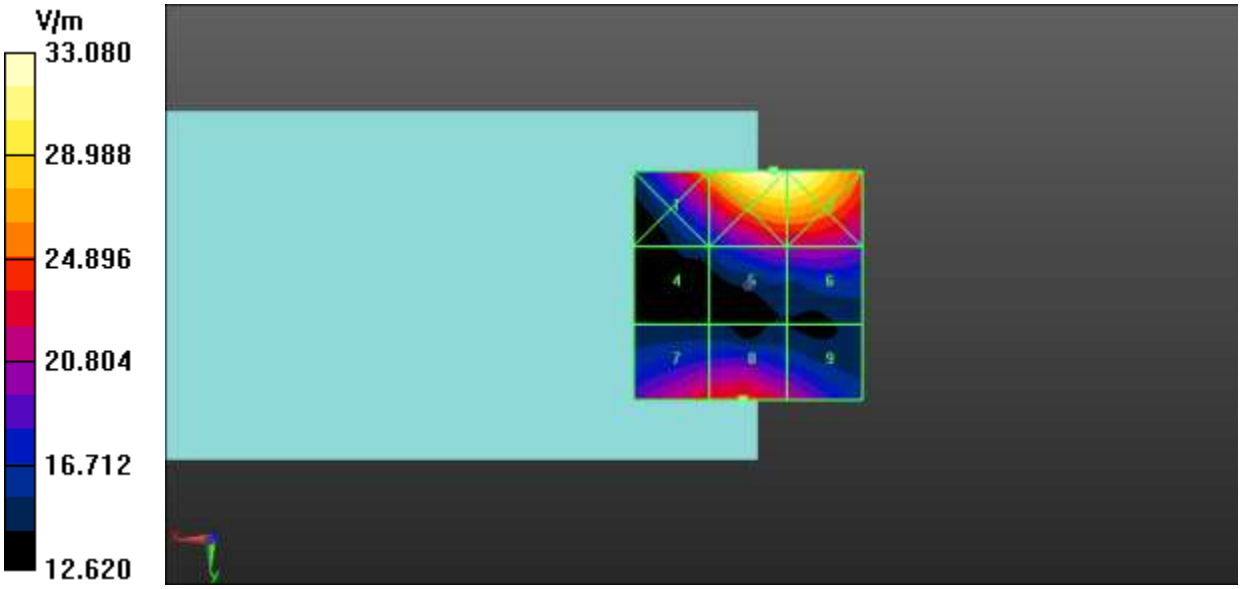


Fig A.11 HAC RF E-Field CDMA BC1

HAC RF E-Field CDMA BC1 Low

Date: 2019-11-24

Electronics: DAE4 Sn1527

Medium: Air

Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3

Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C

Communication System: UID 0, CDMA Frequency: 1851.25 MHz Duty Cycle: 1:8.3

Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 9.971 V/m; Power Drift = 0.06 dB

Applied MIF = 3.26 dB

RF audio interference level = 27.48 dBV/m

Emission category: M4

MIF scaled E-field

Grid 1 **M4** **29.02 dBV/m**	Grid 2 **M3** **30.64 dBV/m**	Grid 3 **M3** **30.59 dBV/m**
Grid 4 **M4** **24.33 dBV/m**	Grid 5 **M4** **26.59 dBV/m**	Grid 6 **M4** **26.82 dBV/m**
Grid 7 **M4** **27.48 dBV/m**	Grid 8 **M4** **27.47 dBV/m**	Grid 9 **M4** **25.95 dBV/m**

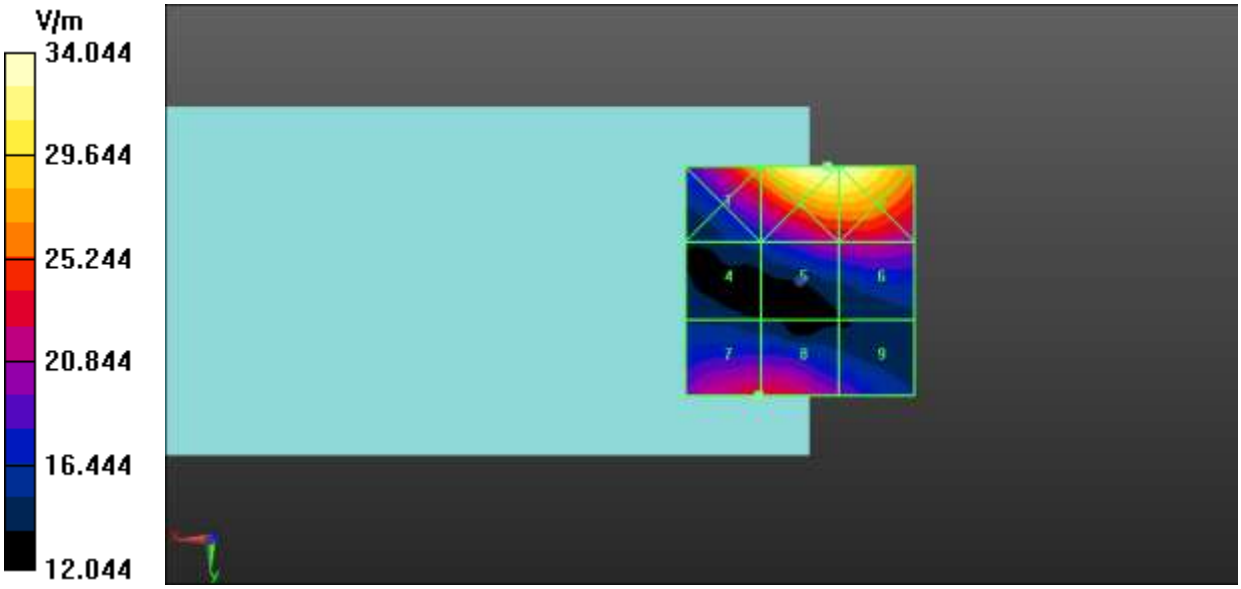


Fig A.12 HAC RF E-Field CDMA BC1

HAC RF E-Field CDMA BC10 High
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, CDMA Frequency: 823.1 MHz Duty Cycle: 1:1
Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 46.29 V/m; Power Drift = -0.01 dB
Applied MIF = 3.26 dB
RF audio interference level = 34.63 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **33.16 dBV/m**	Grid 2 **M4** **34.39 dBV/m**	Grid 3 **M4** **34.31 dBV/m**
Grid 4 **M4** **33.56 dBV/m**	Grid 5 **M4** **34.63 dBV/m**	Grid 6 **M4** **34.54 dBV/m**
Grid 7 **M4** **34.27 dBV/m**	Grid 8 **M4** **34.62 dBV/m**	Grid 9 **M4** **34.51 dBV/m**

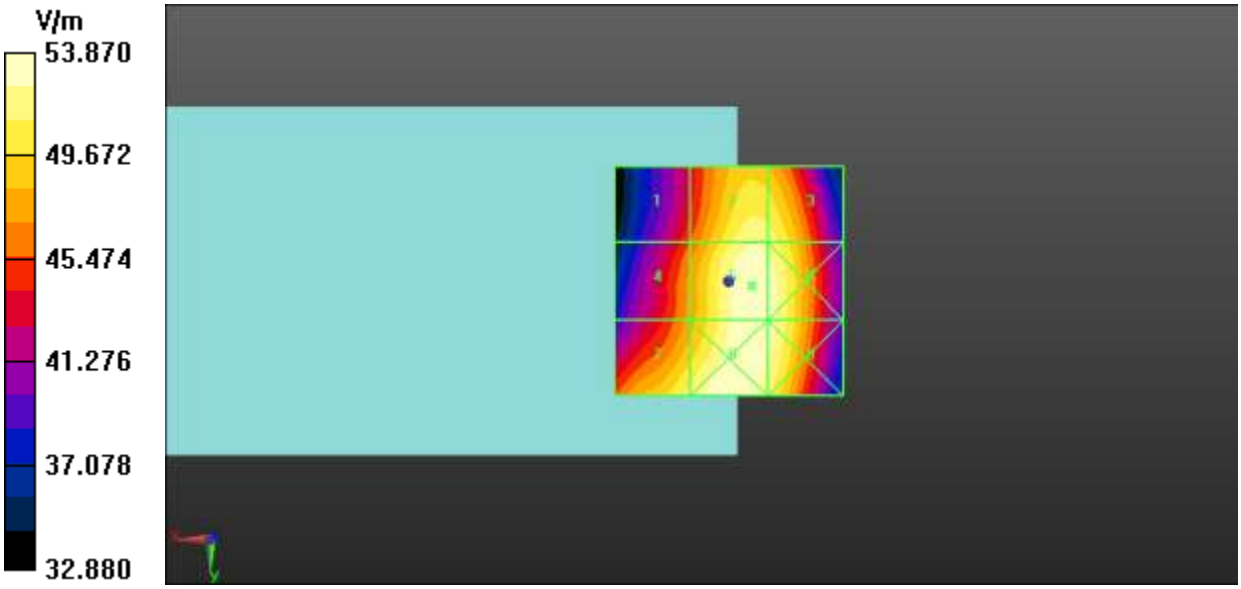


Fig A.13 HAC RF E-Field CDMA BC10

HAC RF E-Field CDMA BC10 Middle
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, CDMA Frequency: 820.5 MHz Duty Cycle: 1:1
Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 46.71 V/m; Power Drift = -0.08 dB
Applied MIF = 3.26 dB
RF audio interference level = 34.74 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **33.26 dBV/m**	Grid 2 **M4** **34.5 dBV/m**	Grid 3 **M4** **34.43 dBV/m**
Grid 4 **M4** **33.65 dBV/m**	Grid 5 **M4** **34.74 dBV/m**	Grid 6 **M4** **34.66 dBV/m**
Grid 7 **M4** **34.35 dBV/m**	Grid 8 **M4** **34.72 dBV/m**	Grid 9 **M4** **34.62 dBV/m**

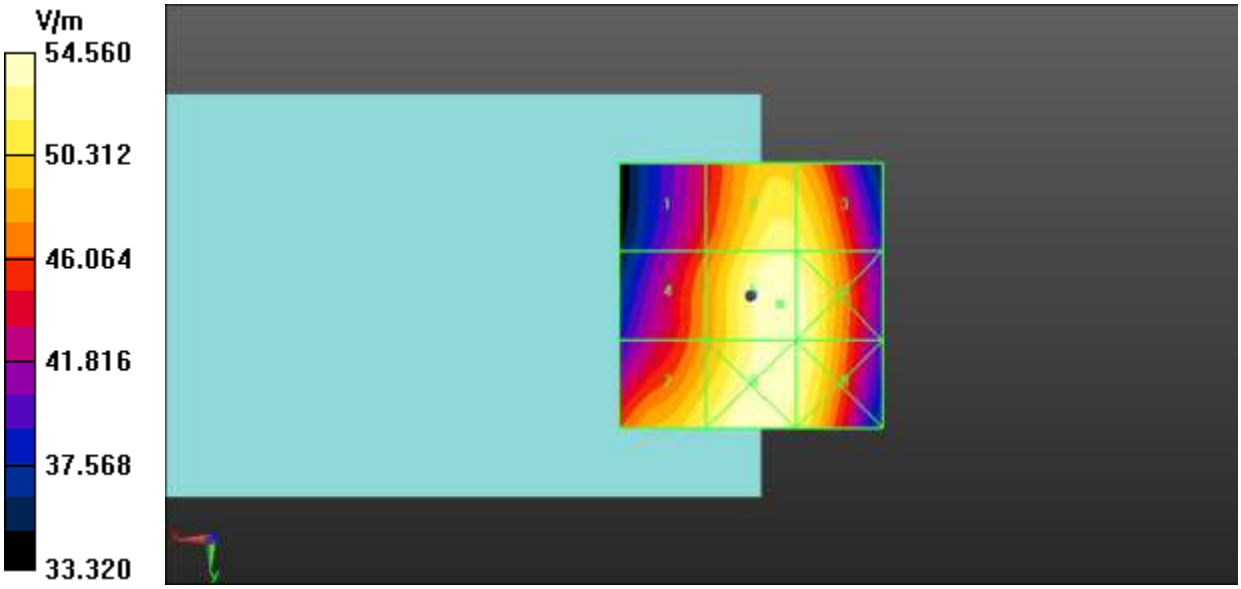


Fig A.14 HAC RF E-Field CDMA BC10

HAC RF E-Field CDMA BC10 Low
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, CDMA Frequency: 817.9 MHz Duty Cycle: 1:1
Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 48.01 V/m; Power Drift = -0.07 dB
Applied MIF = 3.26 dB
RF audio interference level = 34.96 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **33.52 dBV/m**	Grid 2 **M4** **34.75 dBV/m**	Grid 3 **M4** **34.65 dBV/m**
Grid 4 **M4** **33.87 dBV/m**	Grid 5 **M4** **34.96 dBV/m**	Grid 6 **M4** **34.85 dBV/m**
Grid 7 **M4** **34.55 dBV/m**	Grid 8 **M4** **34.93 dBV/m**	Grid 9 **M4** **34.8 dBV/m**

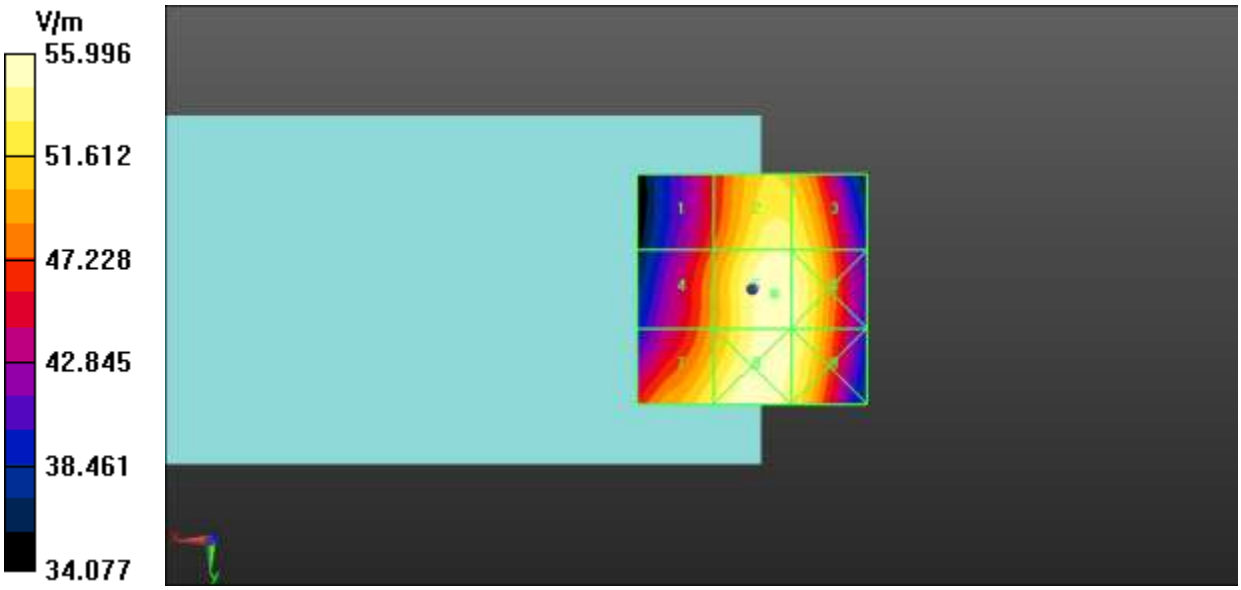


Fig A.15 HAC RF E-Field CDMA BC10

HAC RF E-Field LTE-Band 41 High
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, LTE_TDD Frequency: 2680 MHz Duty Cycle: 1:1.58
Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 6.643 V/m; Power Drift = -0.05 dB
Applied MIF = -1.44 dB
RF audio interference level = 18.50 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **17.86 dBV/m**	Grid 2 **M4** **20.32 dBV/m**	Grid 3 **M4** **20.57 dBV/m**
Grid 4 **M4** **15.32 dBV/m**	Grid 5 **M4** **16.46 dBV/m**	Grid 6 **M4** **17.83 dBV/m**
Grid 7 **M4** **17.54 dBV/m**	Grid 8 **M4** **18.5 dBV/m**	Grid 9 **M4** **18.14 dBV/m**

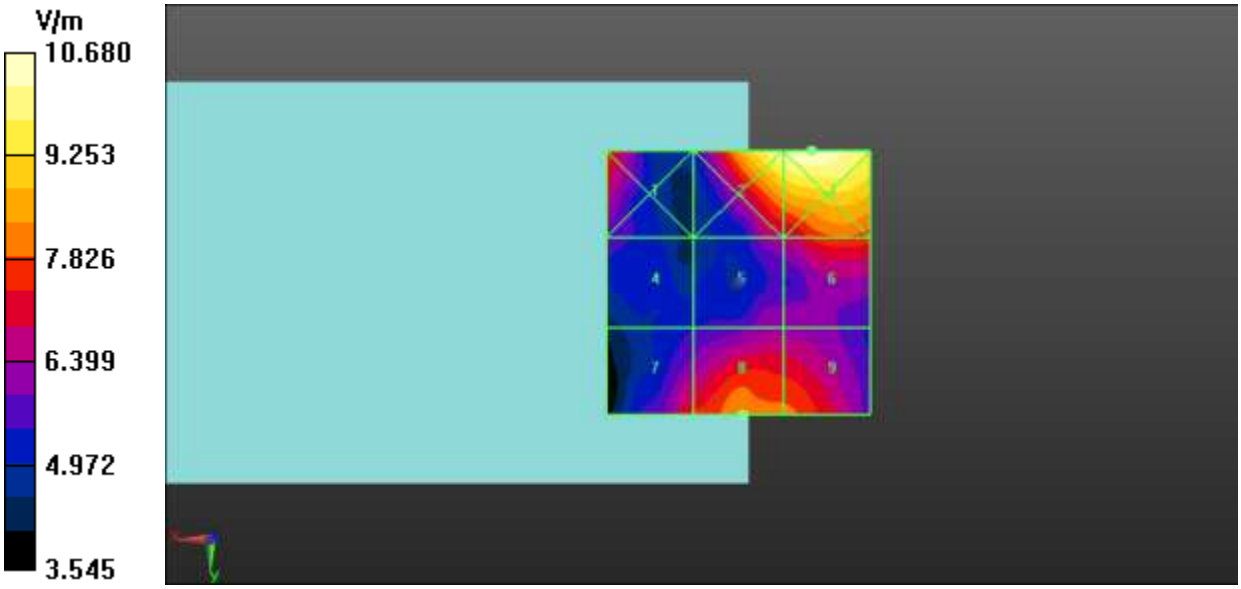


Fig A.16 HAC RF E-Field LTE-Band 41 High

HAC RF E-Field LTE-Band 41 High-2
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, LTE_TDD Frequency: 2636.5 MHz Duty Cycle: 1:1.58
Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 6.091 V/m; Power Drift = -0.02 dB
Applied MIF = -1.44 dB
RF audio interference level = 17.55 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **17.87 dBV/m**	Grid 2 **M4** **19.85 dBV/m**	Grid 3 **M4** **20.03 dBV/m**
Grid 4 **M4** **15.59 dBV/m**	Grid 5 **M4** **16.14 dBV/m**	Grid 6 **M4** **17.17 dBV/m**
Grid 7 **M4** **16.95 dBV/m**	Grid 8 **M4** **17.55 dBV/m**	Grid 9 **M4** **16.89 dBV/m**

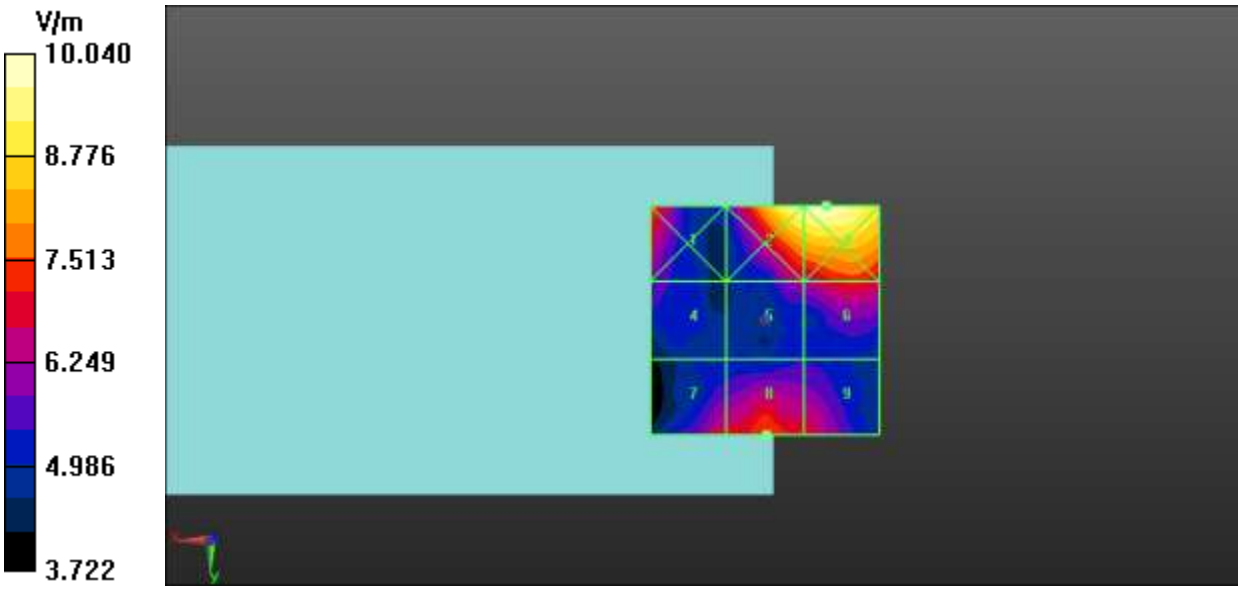


Fig A.17 HAC RF E-Field LTE-Band 41 High-2

HAC RF E-Field LTE-Band 41 Middle
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, LTE_TDD Frequency: 2593 MHz Duty Cycle: 1:1.58
Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 5.350 V/m; Power Drift = -0.12 dB
Applied MIF = -1.44 dB
RF audio interference level = 17.99 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 **M4** **16.92 dBV/m**	Grid 2 **M4** **20.02 dBV/m**	Grid 3 **M4** **20.12 dBV/m**
Grid 4 **M4** **13.94 dBV/m**	Grid 5 **M4** **16.27 dBV/m**	Grid 6 **M4** **17.1 dBV/m**
Grid 7 **M4** **16.66 dBV/m**	Grid 8 **M4** **17.99 dBV/m**	Grid 9 **M4** **17.49 dBV/m**

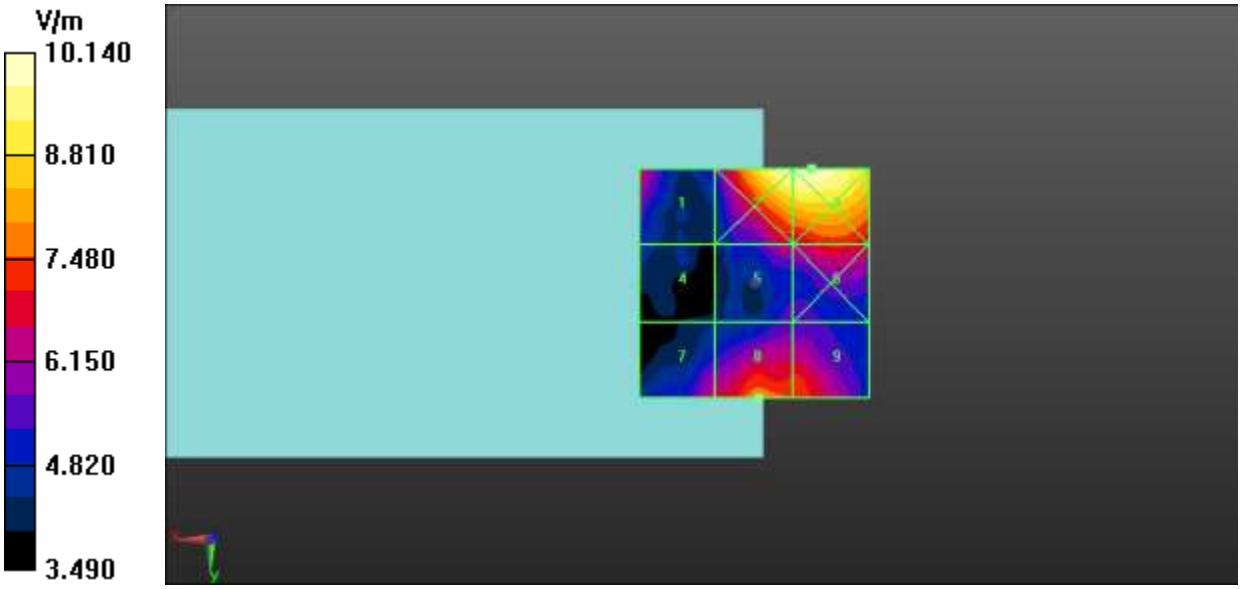


Fig A.18 HAC RF E-Field LTE-Band 41 Middle

HAC RF E-Field LTE-Band 41 Low-2

Date: 2019-11-24

Electronics: DAE4 Sn1527

Medium: Air

Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3

Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C

Communication System: UID 0, LTE_TDD Frequency: 2549.5 MHz Duty Cycle: 1:1.58

Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 4.649 V/m; Power Drift = -0.07 dB

Applied MIF = -1.44 dB

RF audio interference level = 19.27 dBV/m

E-field without scaling

Grid 1 **16 dBV/m**	Grid 2 **19.86 dBV/m**	Grid 3 **19.89 dBV/m**
Grid 4 **13.35 dBV/m**	Grid 5 **15.39 dBV/m**	Grid 6 **16.08 dBV/m**
Grid 7 **17.9 dBV/m**	Grid 8 **19.27 dBV/m**	Grid 9 **18.86 dBV/m**

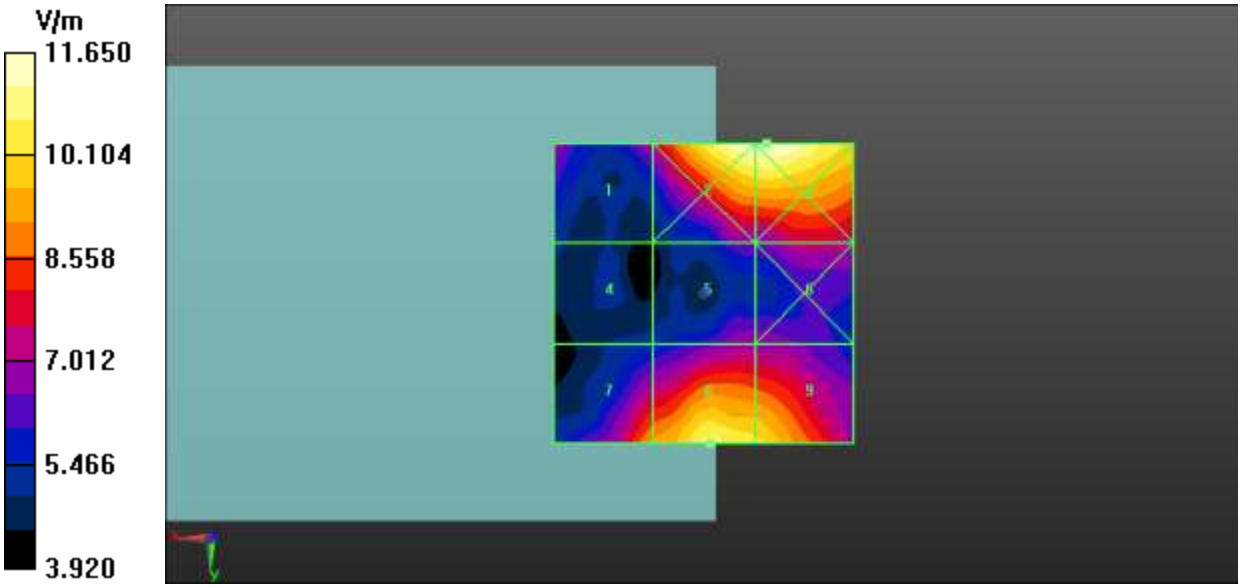


Fig A.19 HAC RF E-Field LTE-Band 41 Low-2

HAC RF E-Field LTE-Band 41 Low

Date: 2019-11-24

Electronics: DAE4 Sn1527

Medium: Air

Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3

Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C

Communication System: UID 0, LTE_TDD Frequency: 2506 MHz Duty Cycle: 1:1.58

Probe: ER3DV6 - SN2424 ConvF (1, 1, 1);

E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device /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 = 5.432 V/m; Power Drift = -0.07 dB

Applied MIF = -1.44 dB

RF audio interference level = 19.09 dBV/m

Emission category: M4

MIF scaled E-field

Grid 1 **M4** **16.05 dBV/m**	Grid 2 **M4** **19.03 dBV/m**	Grid 3 **M4** **19.09 dBV/m**
Grid 4 **M4** **14.42 dBV/m**	Grid 5 **M4** **16.17 dBV/m**	Grid 6 **M4** **16.13 dBV/m**
Grid 7 **M4** **18.42 dBV/m**	Grid 8 **M4** **19.37 dBV/m**	Grid 9 **M4** **18.97 dBV/m**

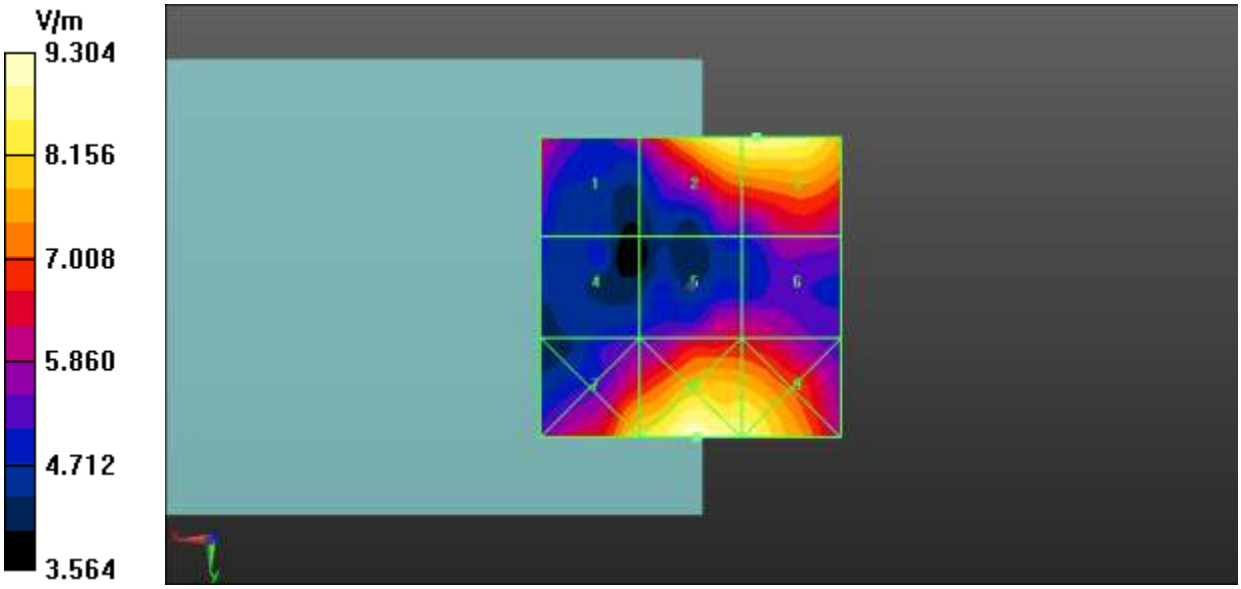


Fig A.20 HAC RF E-Field LTE-Band 41 Low

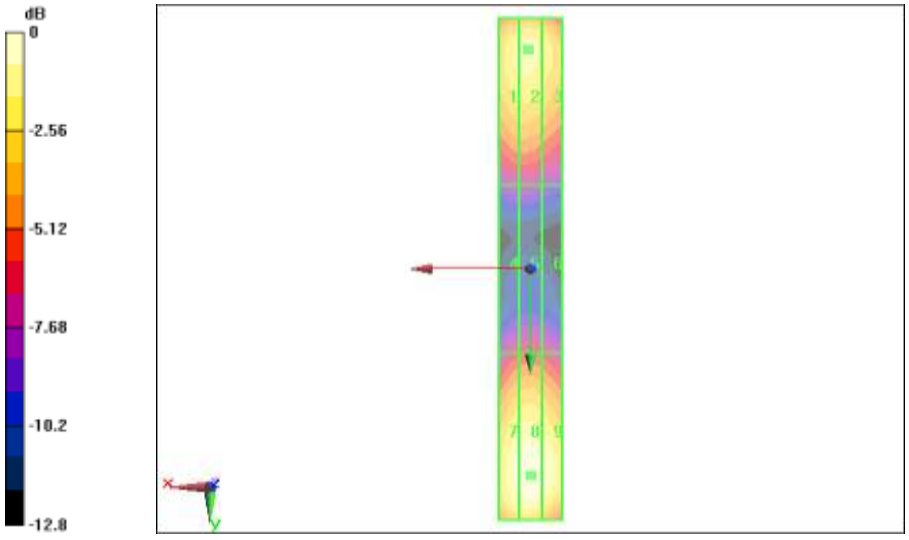
ANNEX B System Validation Result

835 MHz
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 mho/m, εr = 1; ρ = 1000 kg/m3
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Probe: ER3DV6 - SN2424; ConvF (1, 1, 1)

E Scan - measurement distance from the probe sensor center to CD835 Dipole = 15mm /Hearing Aid Compatibility Test (41x361x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 111.5 V/m; Power Drift = 0.03 dB
Applied MIF = 0.00 dB
RF audio interference level = 43.62 dBV/m
Emission category: M3

MIF scaled E-field

Grid 1 **M3** **42.95 dBV/m**	Grid 2 **M3** **43.52 dBV/m**	Grid 3 **M3** **43.38 dBV/m**
Grid 4 **M4** **38.46 dBV/m**	Grid 5 **M4** **38.81 dBV/m**	Grid 6 **M4** **38.76 dBV/m**
Grid 7 **M3** **42.12 dBV/m**	Grid 8 **M3** **43.62 dBV/m**	Grid 9 **M3** **43.44 dBV/m**



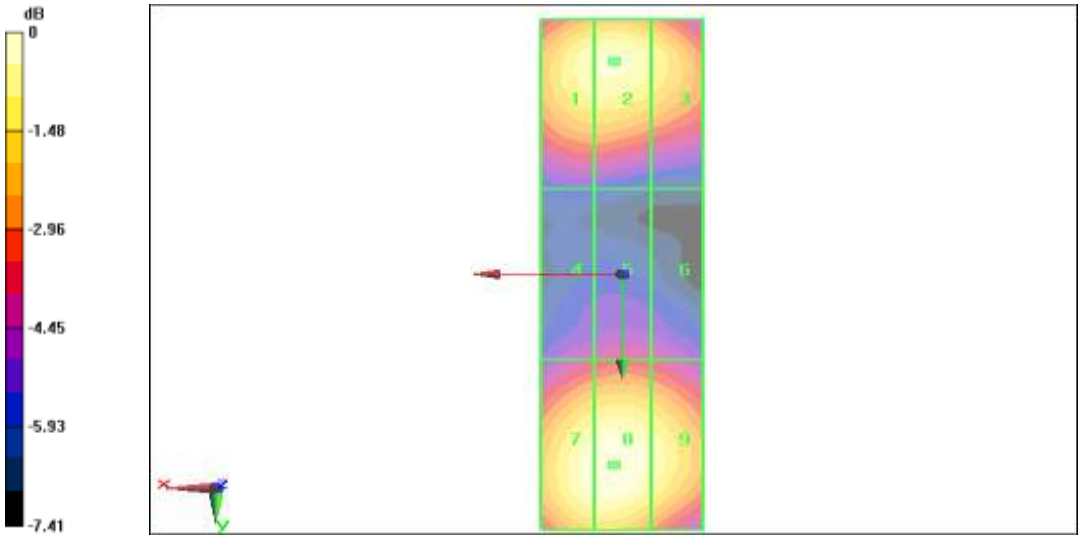
0 dB = 43.62 dBV/m

1880 MHz
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 mho/m, ε_r = 1; ρ = 1000 kg/m^3
Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1
Probe: ER3DV6 - SN2424; ConvF (1, 1, 1)

E Scan - measurement distance from the probe sensor center to CD1880 Dipole = 15mm /Hearing Aid Compatibility Test (41x181x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 101.2 V/m; Power Drift = 0.08 dB
Applied MIF = 0.00 dB
RF audio interference level = 39.95 dBV/m
Emission category: M2

MIF scaled E-field

Grid 1 **M2** **39.50 dBV/m**	Grid 2 **M2** **39.96 dBV/m**	Grid 3 **M2** **39.88 dBV/m**
Grid 4 **M2** **37.72 dBV/m**	Grid 5 **M2** **38.05 dBV/m**	Grid 6 **M2** **38.01 dBV/m**
Grid 7 **M2** **39.46 dBV/m**	Grid 8 **M2** **39.92 dB V/m**	Grid 9 **M2** **39.85 dBV/m**



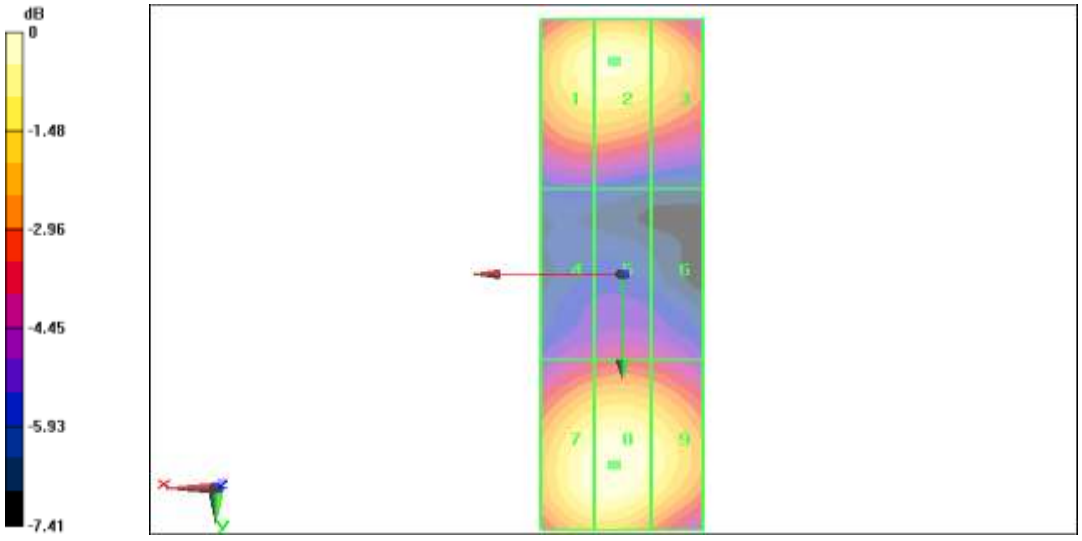
0 dB = 39.95 dBV/m

2600 MHz
Date: 2019-11-24
Electronics: DAE4 Sn1527
Medium: Air
Medium parameters used: σ = 0 mho/m, ε_r = 1; ρ = 1000 kg/m^3
Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1
Probe: ER3DV6 - SN2424; ConvF (1, 1, 1)

E Scan - measurement distance from the probe sensor center to CD2600 Dipole = 15mm /Hearing Aid Compatibility Test (41x181x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 98.84 V/m; Power Drift = 0.10 dB
Applied MIF = 0.00 dB
RF audio interference level = 39.68 dBV/m
Emission category: M2

MIF scaled E-field

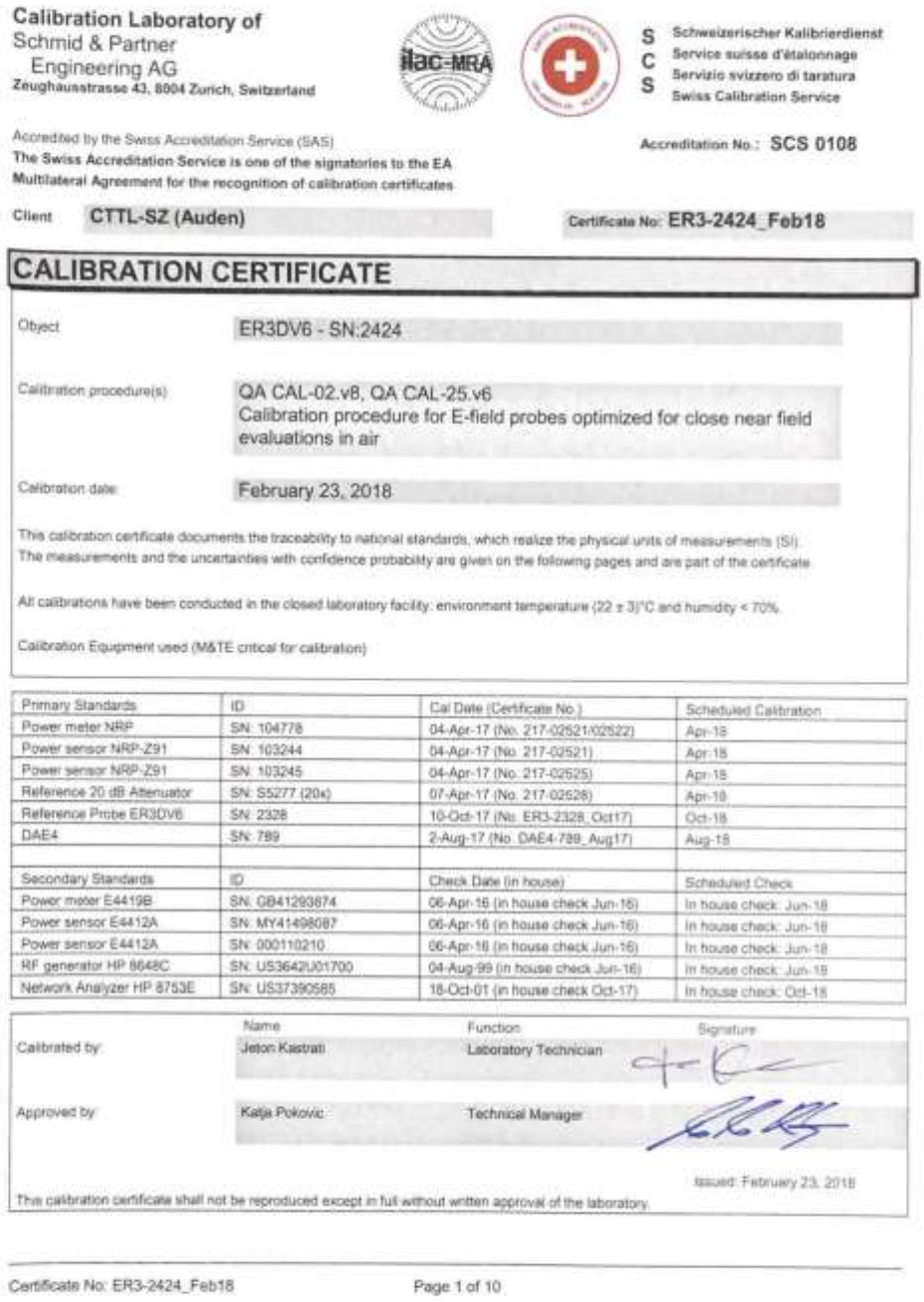
Grid 1 **M2** **39.22 dBV/m**	Grid 2 **M2** **39.48 dBV/m**	Grid 3 **M2** **39.44 dBV/m**
Grid 4 **M2** **38.88 dBV/m**	Grid 5 **M2** **39.05 dBV/m**	Grid 6 **M2** **39.00 dBV/m**
Grid 7 **M2** **39.52 dBV/m**	Grid 8 **M2** **39.68 dB V/m**	Grid 9 **M2** **39.59 dBV/m**



0 dB = 39.68 dBV/m

ANNEX C Probe Calibration Certificate

E_Probe ER3DV6



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

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Servizio svizzero di taratura
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: CTTL-SZ (Auden)

Certificate No: ER3-2424_Feb18

CALIBRATION CERTIFICATE

Object: ER3DV6 - SN:2424

Calibration procedure(s): QA CAL-02.v8, QA CAL-25.v6
Calibration procedure for E-field probes optimized for close near field evaluations in air

Calibration date: February 23, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02525)	Apr-18
Reference 20 dB Attenuator	SN: S5277 (20x)	07-Apr-17 (No. 217-02526)	Apr-18
Reference Probe ER3DV6	SN: 2328	10-Oct-17 (No. ER3-2328_Oct17)	Oct-18
DAE4	SN: 789	2-Aug-17 (No. DAE4-789_Aug17)	Aug-18
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-16)	In house check: Jun-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

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

Issued: February 23, 2018

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

Certificate No: ER3-2424_Feb18 Page 1 of 10

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Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1309-2005, " IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", December 2005
b) CTIA Test Plan for Hearing Aid Compatibility, Rev 3.0, November 2013

Methods Applied and Interpretation of Parameters:

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

Probe ER3DV6

SN:2424

Manufactured: November 12, 2007
Calibrated: February 23, 2018

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

DASY/EASY - Parameters of Probe: ER3DV6 - SN:2424

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)	1.46	1.51	1.82	± 10.1 %
DCP (mV)[B]	100.0	98.3	100.6	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[F] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	189.6	±3.5 %
		Y	0.0	0.0	1.0		204.8	
		Z	0.0	0.0	1.0		200.6	
10021-DAC	GSM-FDD (TDMA, GMSK)	X	21.68	99.9	28.7	9.39	106.2	±2.2 %
		Y	19.41	99.7	28.8		111.3	
		Z	24.71	99.5	28.2		119.2	
10061-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS; 11 Mbps)	X	8.35	84.6	25.4	3.60	146.9	±1.9 %
		Y	4.81	74.8	21.7		112.9	
		Z	6.43	78.8	22.9		111.9	
10077-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	X	13.28	77.7	29.3	11.00	139.0	±3.8 %
		Y	11.65	73.4	26.9		100.8	
		Z	11.41	72.1	25.6		99.2	
10172-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	9.48	80.8	29.7	9.21	125.2	±3.8 %
		Y	9.49	81.9	30.6		134.1	
		Z	10.82	83.6	30.5		136.8	
10173-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	9.87	81.2	29.9	9.48	125.1	±2.5 %
		Y	10.11	83.1	31.3		134.2	
		Z	11.30	84.2	30.8		136.9	
10285-AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	X	16.69	99.5	40.3	12.49	96.6	±2.5 %
		Y	15.42	99.3	41.1		100.6	
		Z	17.91	99.9	39.8		104.3	

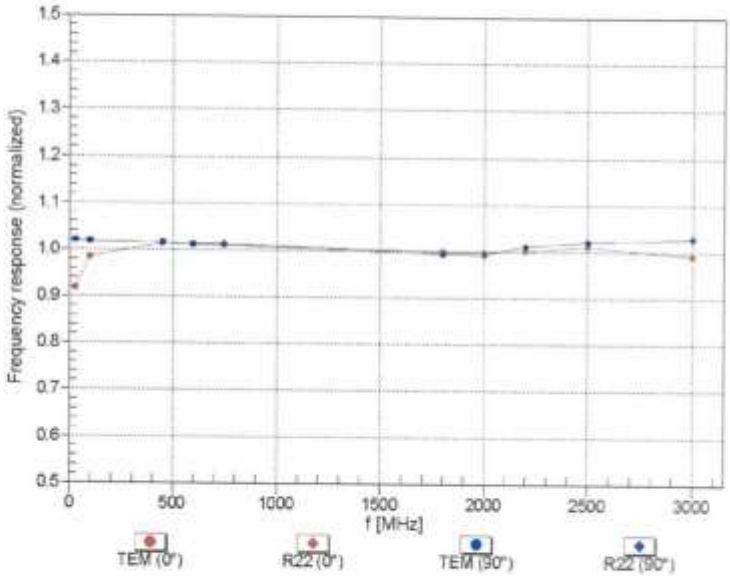
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[B] Numerical linearization parameter: uncertainty not required.
[F] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

ER3DV6 – SN:2424

February 23, 2016

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

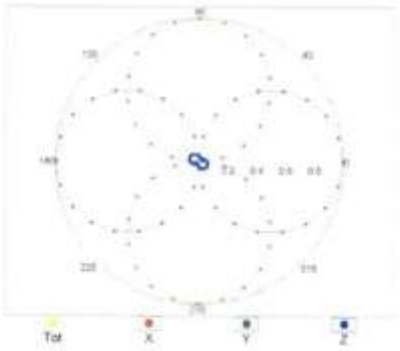


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°

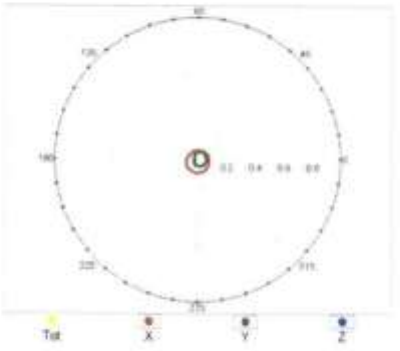
f=600 MHz,TEM,0°

f=2500 MHz,R22,0°

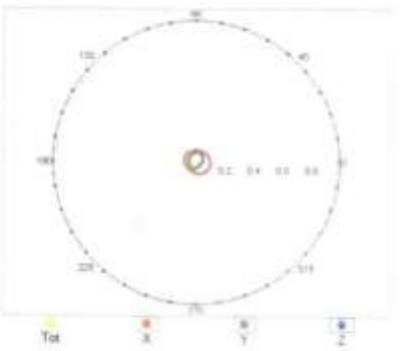


Receiving Pattern (ϕ), ϑ = 90°

f=600 MHz,TEM,90°

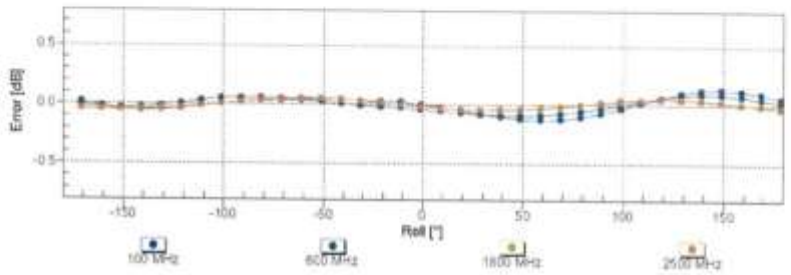


f=2500 MHz,R22,90°



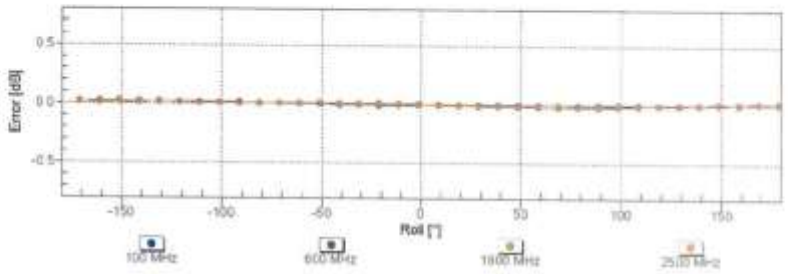
ER3DV6 – SN:2424 February 23, 2018

Receiving Pattern (ϕ), ϑ = 0°



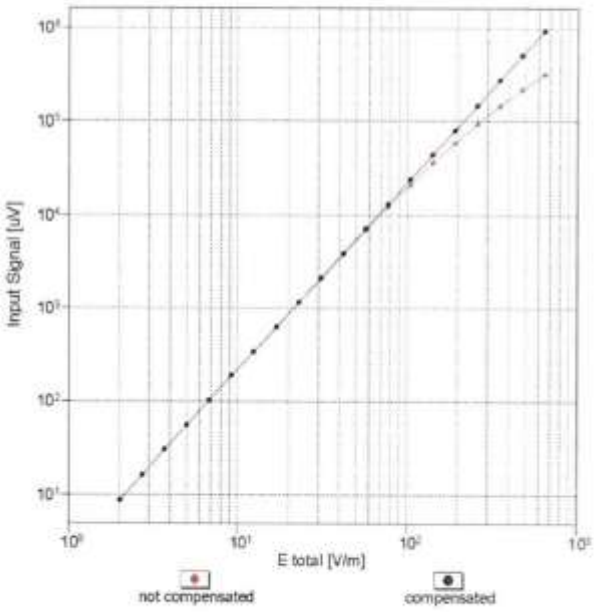
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

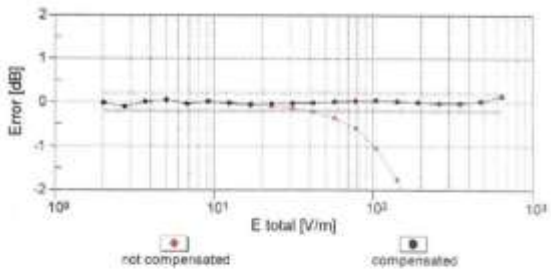
Receiving Pattern (ϕ), ϑ = 90°



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

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



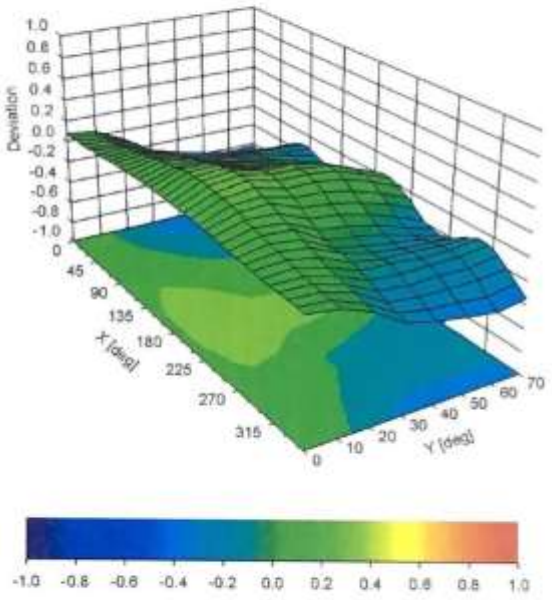


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

ER3DV6 – SN:2424 February 23, 2018

Deviation from Isotropy in Air

Error (ϕ, ϑ), f = 900 MHz



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

DASY/EASY - Parameters of Probe: ER3DV6 - SN:2424

Other Probe Parameters

Sensor Arrangement	Rectangular
Connector Angle (°)	-11.2
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	8 mm
Probe Tip to Sensor X Calibration Point	2.5 mm
Probe Tip to Sensor Y Calibration Point	2.5 mm
Probe Tip to Sensor Z Calibration Point	2.5 mm

ANNEX D Dipole Calibration Certificate

Dipole 835 MHz

Calibration Laboratory of
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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 0108

Client CTTL (Auden)

Certificate No: CD835V3-1165_Jul18

CALIBRATION CERTIFICATE

Object CD835V3 - SN: 1165

Calibration procedure(s) QA CAL-20.v6
Calibration procedure for dipoles in air

Calibration date: July 19, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Probe EF3DV3	SN: 4013	05-Mar-18 (No. EF3-4013_Mar18)	Mar-19
Probe H3DV6	SN: 6065	30-Dec-17 (No. H3-6065_Dec17)	Dec-18
DAE4	SN: 781	17-Jan-18 (No. DAE4-781_Jan18)	Jan-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Oct-17)	In house check: Oct-20
Power sensor HP E4412A	SN: US38485102	05-Jan-10 (in house check Oct-17)	In house check: Oct-20
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-17)	In house check: Oct-20
RF generator R&S SMT-06	SN: 832283/011	27-Aug-12 (in house check Oct-17)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-17)	In house check: Oct-18

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

Issued: July 19, 2018

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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Swiss Calibration Service

Accreditation No.: SCS 0108

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

References

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

Methods Applied and Interpretation of Parameters:

- *Coordinate System:* y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes. In coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a distance of 15 mm above the top metal edge of the dipole arms.
- *Measurement Conditions:* Further details are available from the hardcopies at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- *Antenna Positioning:* The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections.
  It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- *Feed Point Impedance and Return Loss:* These parameters are measured using a HP 8753E Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- *E-field distribution:* E field is measured in the x-y-plane with an isotropic ER3D-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 15 mm (in z) above the metal top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, in the plane above the dipole surface.

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%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.1
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	15 mm	
Scan resolution	dx, dy = 5 mm	
Frequency	835 MHz ± 1 MHz	
Input power drift	< 0.05 dB	

Maximum Field values at 835 MHz

E-field 15 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	108.7 V/m = 40.72 dBV/m
Maximum measured above low end	100 mW input power	108.6 V/m = 40.72 dBV/m
Averaged maximum above arm	100 mW input power	**108.7 V/m ± 12.8 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters

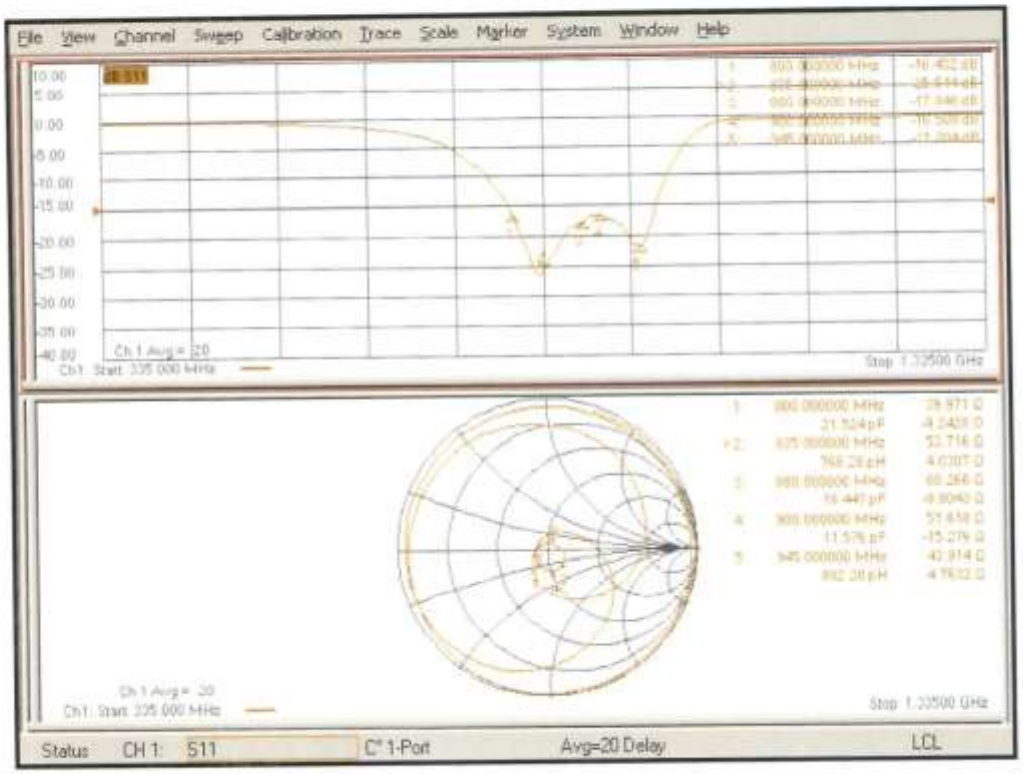
Frequency	Return Loss	Impedance
800 MHz	16.4 dB	40.0 Ω - 9.2 jΩ
835 MHz	25.5 dB	53.7 Ω + 4.0 jΩ
880 MHz	17.8 dB	60.3 Ω - 9.8 jΩ
900 MHz	16.5 dB	51.6 Ω - 15.3 jΩ
945 MHz	21.7 dB	43.9 Ω + 4.8 jΩ

3.2 Antenna Design and Handling

The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.
The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.
Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

Impedance Measurement Plot



DASY5 E-field Result

Date: 19.07.2018

Test Laboratory: SPEAG Lab2

DUT: HAC-Dipole 835 MHz: Type: CD835V3; Serial: CD835V3 - SN: 1165

Communication System: UID 0 - CW ; Frequency: 835 MHz
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)

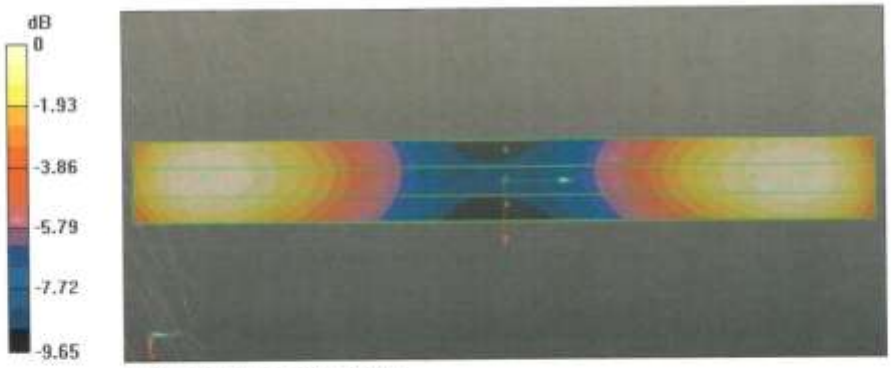
DASY52 Configuration:

- Probe: EF3DV3 - SN4013; ConvF(1, 1, 1) @ 835 MHz; Calibrated: 05.03.2018
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 17.01.2018
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

Dipole E-Field measurement @ 835MHz/E-Scan - 835MHz d=15mm/Hearing Aid Compatibility Test (41x361x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 130.9 V/m; Power Drift = 0.02 dB
Applied MIF = 0.00 dB
RF audio interference level = 40.73 dBV/m
Emission category: M3

MIF scaled E-field

Grid 1 **M3** 40.28 dBV/m	Grid 2 **M3** 40.72 dBV/m	Grid 3 **M3** 40.67 dBV/m
Grid 4 **M4** 35.61 dBV/m	Grid 5 **M4** 35.96 dBV/m	Grid 6 **M4** 35.94 dBV/m
Grid 7 **M3** 40.41 dBV/m	Grid 8 **M3** 40.73 dBV/m	Grid 9 **M3** 40.67 dBV/m



0 dB = 108.7 V/m = 40.72 dBV/m

Dipole 1880 MHz

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Accreditation No.: SCS 0108

Client CTTL (Auden)

Certificate No: CD1880V3-1149_Jul18

CALIBRATION CERTIFICATE

Object CD1880V3 - SN: 1149

Calibration procedure(s) QA CAL-20.v6
Calibration procedure for dipoles in air

Calibration date: July 19, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Probe EF3DV3	SN: 4013	05-Mar-18 (No. EF3-4013_Mar18)	Mar-19
Probe H3DV6	SN: 6065	30-Dec-17 (No. H3-6065_Dec17)	Dec-18
DAE4	SN: 781	17-Jan-18 (No. DAE4-781_Jan18)	Jan-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Oct-17)	In house check: Oct-20
Power sensor HP E4412A	SN: US38485102	06-Jan-10 (in house check Oct-17)	In house check: Oct-20
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-17)	In house check: Oct-20
RF generator R&S SMT-06	SN: 832283/011	27-Aug-12 (in house check Oct-17)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-17)	In house check: Oct-18

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

Issued: July 19, 2018

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Accreditation No.: **SCS 0108**

References

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

Methods Applied and Interpretation of Parameters:

- *Coordinate System:* y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes. In coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a distance of 15 mm above the top metal edge of the dipole arms.
- *Measurement Conditions:* Further details are available from the hardcopies at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- *Antenna Positioning:* The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections.
  It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- *Feed Point Impedance and Return Loss:* These parameters are measured using a HP 8753E Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- *E-field distribution:* E field is measured in the x-y-plane with an isotropic ER3D-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 15 mm (in z) above the metal top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, in the plane above the dipole surface.

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%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.1
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	15 mm	
Scan resolution	dx, dy = 5 mm	
Frequency	1880 MHz ± 1 MHz	
Input power drift	< 0.05 dB	

Maximum Field values at 1880 MHz

E-field 15 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	89.8 V/m = 39.06 dBV/m
Maximum measured above low end	100 mW input power	89.3 V/m = 39.02 dBV/m
Averaged maximum above arm	100 mW input power	**89.5 V/m ± 12.8 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters

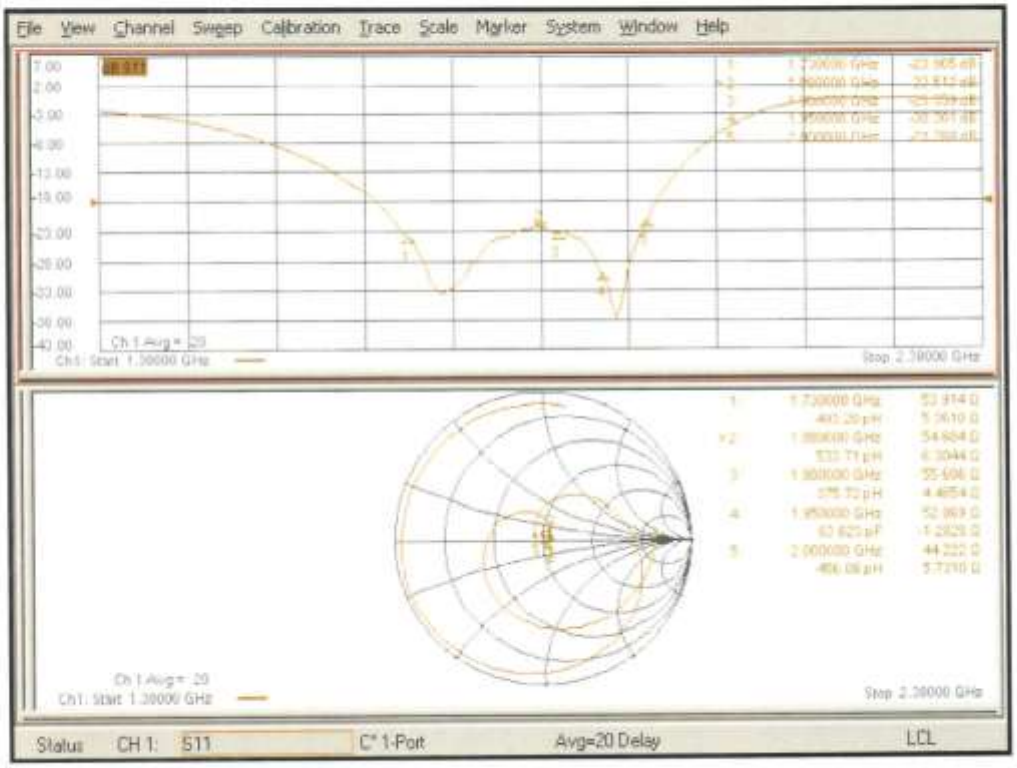
Frequency	Return Loss	Impedance
1730 MHz	23.9 dB	53.9 Ω + 5.4 jΩ
1880 MHz	22.5 dB	54.7 Ω + 6.3 jΩ
1900 MHz	23.4 dB	55.6 Ω + 4.5 jΩ
1950 MHz	30.3 dB	52.9 Ω - 1.3 jΩ
2000 MHz	21.3 dB	44.2 Ω + 5.7 jΩ

3.2 Antenna Design and Handling

The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.
The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.
Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

Impedance Measurement Plot



DASY5 E-field Result

Date: 19.07.2018

Test Laboratory: SPEAG Lab2

DUT: HAC Dipole 1880 MHz: Type: CD1880V3: Serial: CD1880V3 - SN: 1149

Communication System: UID 0 - CW ; Frequency: 1880 MHz
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)

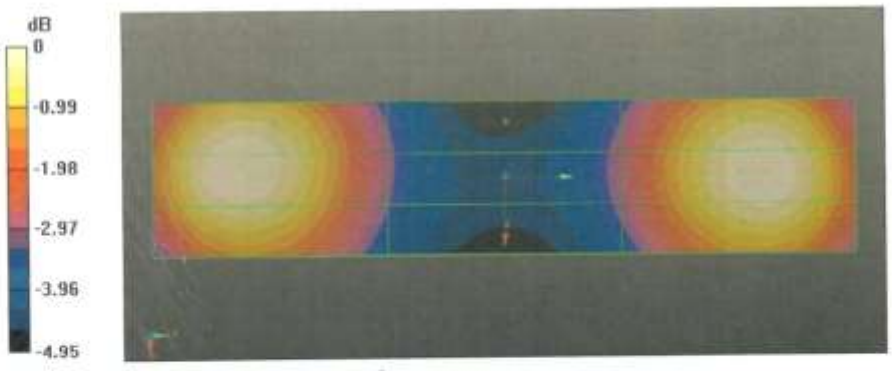
DASY52 Configuration:

- Probe: EF3DV3 - SN4013; ConvF(1, 1, 1) @ 1880 MHz; Calibrated: 05.03.2018
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 17.01.2018
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

Dipole E-Field measurement @ 1880MHz/E-Scan - 1880MHz d=15mm/Hearing Aid Compatibility Test (41x181x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 160.1 V/m; Power Drift = -0.04 dB
Applied MIF = 0.00 dB
RF audio interference level = 39.06 dBV/m
Emission category: M2

MIF scaled E-field

Grid 1 **M2** **38.67 dBV/m**	Grid 2 **M2** **39.06 dBV/m**	Grid 3 **M2** **39.01 dBV/m**
Grid 4 **M2** **36 dBV/m**	Grid 5 **M2** **36.15 dBV/m**	Grid 6 **M2** **36.1 dBV/m**
Grid 7 **M2** **38.79 dBV/m**	Grid 8 **M2** **39.02 dBV/m**	Grid 9 **M2** **38.91 dBV/m**



0 dB = 89.78 V/m = 39.06 dBV/m

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Accreditation No.: **SCS 0108**

Client CTTL-SZ (Auden)

Certificate No: **CD2600V3-1020_Oct18**

CALIBRATION CERTIFICATE

Object	CD2600V3 - SN: 1020
Calibration procedure(s)	QA CAL-20.v6 Calibration procedure for dipoles in air
Calibration date:	October 23, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Probe EF3DV3	SN: 4013	06-Mar-18 (No. EF3-4013_Mar18)	Mar-19
DAE4	SN: 781	17-Jan-18 (No. DAE4-781_Jan18)	Jan-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Oct-17)	In house check: Oct-20
Power sensor HP E4412A	SN: US38485102	05-Jan-10 (in house check Oct-17)	In house check: Oct-20
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-17)	In house check: Oct-20
RF generator R&S SMT-06	SN: 832283/011	27-Aug-12 (in house check Oct-17)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

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

Issued: October 23, 2018

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Accreditation No.: **SCS 0108**

References

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

Methods Applied and Interpretation of Parameters:

- *Coordinate System:* y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes. In coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a distance of 15 mm above the top metal edge of the dipole arms.
- *Measurement Conditions:* Further details are available from the hardcopies at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- *Antenna Positioning:* The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections.
  It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- *Feed Point Impedance and Return Loss:* These parameters are measured using a HP 8753E Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- *E-field distribution:* E field is measured in the x-y-plane with an isotropic ER3D-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 15 mm (in z) above the metal top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, in the plane above the dipole surface.

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%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.2
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	15 mm	
Scan resolution	dx, dy = 5 mm	
Frequency	2600 MHz ± 1 MHz	
Input power drift	< 0.05 dB	

Maximum Field values at 2600 MHz

E-field 15 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	86.2 V/m = 38.71 dBV/m
Maximum measured above low end	100 mW input power	85.2 V/m = 38.61 dBV/m
Averaged maximum above arm	100 mW input power	**85.7 V/m ± 12.8 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters

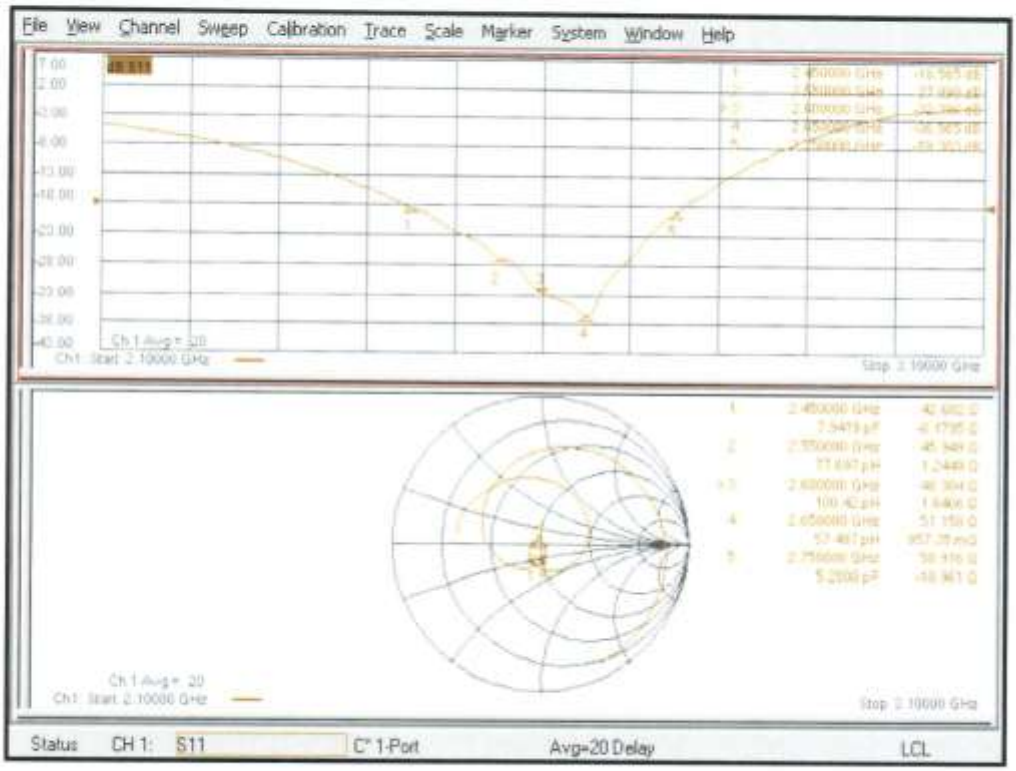
Frequency	Return Loss	Impedance
2450 MHz	18.6 dB	42.7 Ω - 8.2 jΩ
2550 MHz	27.1 dB	45.9 Ω + 1.2 jΩ
2600 MHz	32.4 dB	48.3 Ω + 1.6 jΩ
2650 MHz	36.6 dB	51.2 Ω + 1.0 jΩ
2750 MHz	19.3 dB	50.9 Ω - 11.0 jΩ

3.2 Antenna Design and Handling

The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.
The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.
Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

Impedance Measurement Plot



DASY5 E-field Result

Date: 23.10.2018

Test Laboratory: SPEAG Lab2

DUT: HAC Dipole 2600 MHz: Type: CD2600V3; Serial: CD2600V3 - SN: 1020

Communication System: UID 0 - CW ; Frequency: 2600 MHz
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Phantom section: RF Section w
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

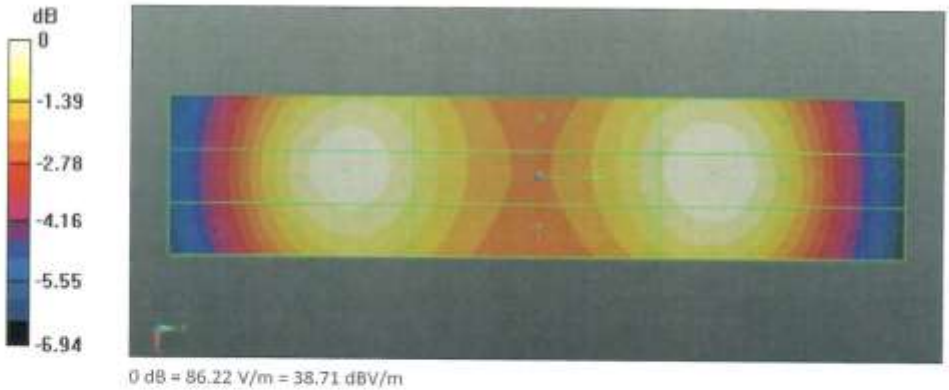
DASY52 Configuration:

- Probe: EF3DV3 - SN4013; ConvF(1, 1, 1) @ 2600 MHz; Calibrated: 05.03.2018
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 17.01.2018
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Dipole E-Field measurement @ 2600MHz/E-Scan - 2600MHz d=15mm/Hearing Aid Compatibility Test (41x181x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 64.09 V/m; Power Drift = 0.01 dB
Applied MIF = 0.00 dB
RF audio interference level = 38.71 dBV/m
Emission category: M2

MIF scaled E-field

Grid 1 **M2** **38.32 dBV/m**	Grid 2 **M2** **38.61 dBV/m**	Grid 3 **M2** **38.53 dBV/m**
Grid 4 **M2** **37.96 dBV/m**	Grid 5 **M2** **38.19 dBV/m**	Grid 6 **M2** **38.15 dBV/m**
Grid 7 **M2** **38.48 dBV/m**	Grid 8 **M2** **38.71 dBV/m**	Grid 9 **M2** **38.63 dBV/m**



0 dB = 86.22 V/m = 38.71 dBV/m

ANNEX E UID Specification

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Name:	**GSM-FDD (TDMA, GMSK)**
Group:	GSM
UID:	10021-DAC
PAR: [1]	**9.39 dB**
MIF: [2]	**3.63 dB**
Standard Reference:	ETSI TS 100 909 V8.9.0 (2005-01) FCC OET KDB 941225, D03 and D04
Category:	Periodic pulsed modulation
Modulation:	GMSK
Frequency Band:	GSM 450 (450.4 - 457.6 MHz) GSM 480 (478.8 - 486.0 MHz) GSM 710 (698.0 - 716.0 MHz) GSM 750 (747.0 - 763.0 MHz) GSM 850 (824.0 - 849.0 MHz) P-GSM 900 (890.0 - 915.0 MHz) E-GSM 900 (880.0 - 915.0 MHz) R-GSM 900 (876.0 - 915.0 MHz) DCS 1800 (1710.0 - 1785.0 MHz) PCS 1900 (1850.0 - 1910.0 MHz) ER-GSM 900 (873.0 - 915.0 MHz) Validation band (0.0 - 6000.0 MHz)
Detailed Specification:	Active Slot: TN0 Data: PN9 continuous Frame: composed out of 8 Slots Multiframe: 26th (IDLE) Frame set blank Slottype & -timing: Normal burst for GMSK
Bandwidth:	0.2 MHz
Integration Time:	120.0 ms

[1] PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
[2] Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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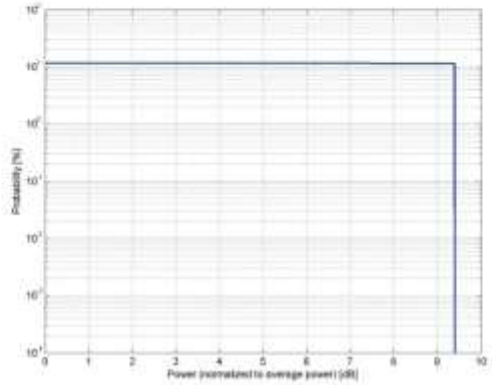
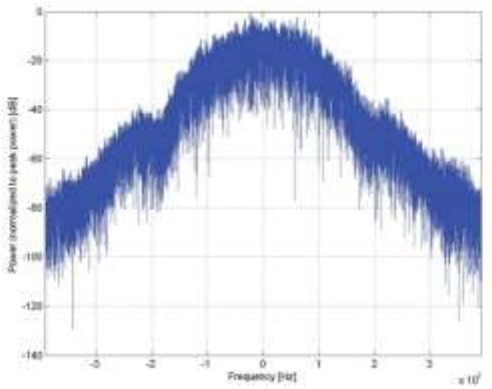
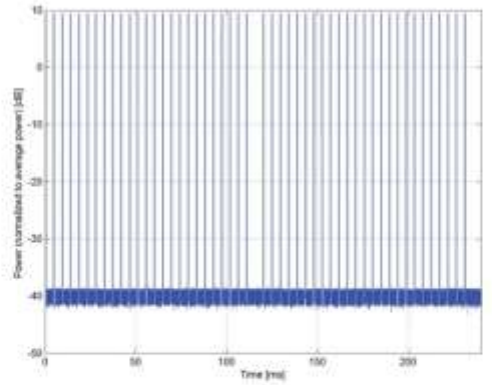


Complementary Cumulative Distribution Function (CCDF)



Frequency Domain



Time Domain

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Name:	**EDGE-FDD (TDMA, 8PSK, TN 0)**
Group:	GSM
UID:	10025-DAC
PAR: [1]	**12.62 dB**
MIF: [2]	**3.75 dB**
Standard Reference:	ETSI TS 100 909 V8.9.0 (2005-01) FCC OET KDB 941225, D03 and D04
Category:	Periodic pulsed modulation
Modulation:	8PSK
Frequency Band:	GSM 450 (450.4 - 457.6 MHz) GSM 480 (478.8 - 486.0 MHz) GSM 710 (698.0 - 716.0 MHz) GSM 750 (747.0 - 763.0 MHz) GSM 850 (824.0 - 849.0 MHz) P-GSM 900 (890.0 - 915.0 MHz) E-GSM 900 (880.0 - 915.0 MHz) R-GSM 900 (876.0 - 915.0 MHz) DCS 1800 (1710.0 - 1785.0 MHz) PCS 1900 (1850.0 - 1910.0 MHz) ER-GSM 900 (873.0 - 915.0 MHz) Validation band (0.0 - 6000.0 MHz)
Detailed Specification:	Active Slot: TN0 Data: PN9 continuous Frame: composed out of 8 Slots Multiframe: 13th (PTCCH) and 26th (IDLE) Frame set blank Slottype & -timing: Normal burst for 8PSK
Bandwidth:	0.2 MHz
Integration Time:	60.0 ms

[1] PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
[2] Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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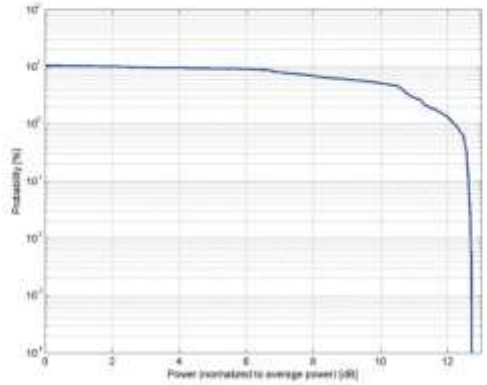
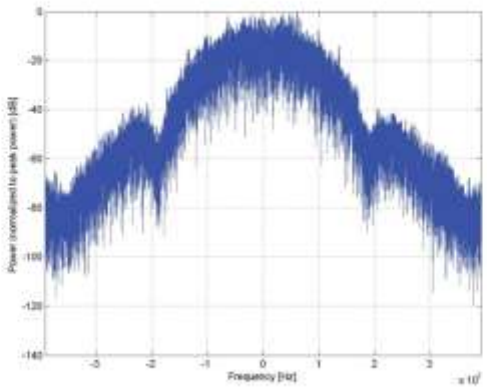
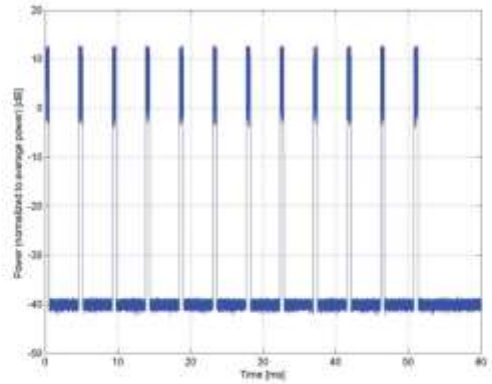


Complementary Cumulative Distribution Function (CCDF)



Frequency Domain



Time Domain

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Name:	**UMTS-FDD (WCDMA)**
Group:	WCDMA
UID:	10011-CAB
PAR: [1]	**2.91 dB**
MIF: [2]	**-27.23 dB**
Standard Reference:	3GPP TS 25.141 Annex A FCC OET KDB 941225 D01 SAR test for 3G devices v02
Category:	Random amplitude modulation
Modulation:	QPSK
Frequency Band:	Band 1, UTRA/FDD (1920.0-1980.0 MHz, 20000) Band 2, UTRA/FDD (1850.0-1910.0 MHz, 20001) Band 3, UTRA/FDD (1710.0-1785.0 MHz, 20002) Band 4, UTRA/FDD (1710.0-1755.0 MHz, 20003) Band 5, UTRA/FDD (824.0-849.0 MHz, 20004) Band 6, UTRA/FDD (830.0-840.0 MHz, 20005) Band 7, UTRA/FDD (2500.0-2570.0 MHz, 20006) Band 8, UTRA/FDD (880.0-915.0 MHz, 20007) Band 9, UTRA/FDD (1749.9-1784.9 MHz, 20008) Band 10, UTRA/FDD (1710.0-1770.0 MHz, 20009) Band 11, UTRA/FDD (1427.9-1452.9 MHz, 20010) Band 12, UTRA/FDD (698.0-716.0 MHz, 20011) Band 13, UTRA/FDD (777.0-787.0 MHz, 20012) Band 14, UTRA/FDD (788.0-798.0 MHz, 20013) Band 19, UTRA/FDD (830.0-845.0 MHz, 20130) Band 20, UTRA/FDD (832.0-862.0 MHz, 20131) Band 21, UTRA/FDD (1447.9-1462.9 MHz, 20132) Band 22, UTRA/FDD (3410.0-3490.0 MHz, 20217) Band 25, UTRA/FDD (1850.0-1915.0 MHz, 20218) Band 26, UTRA/FDD (814.0-849.0 MHz, 20219)
Detailed Specification:	Dedicated Channel Type: RMC Bitrate: 12.2 kbps DPDCH: 60 kbps DPCCH: 15 kbps DPCCH/DPDCH power ratio: -5.46 dB
Bandwidth:	5.0 MHz
Integration Time:	100.0 ms

[1] PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
[2] Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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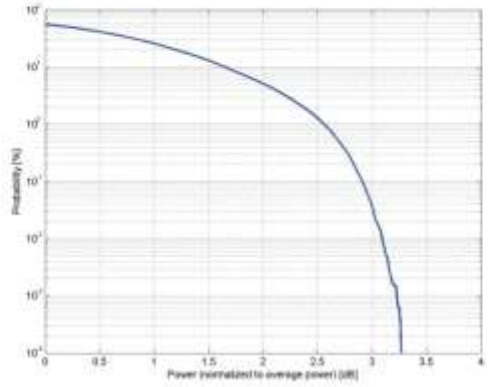
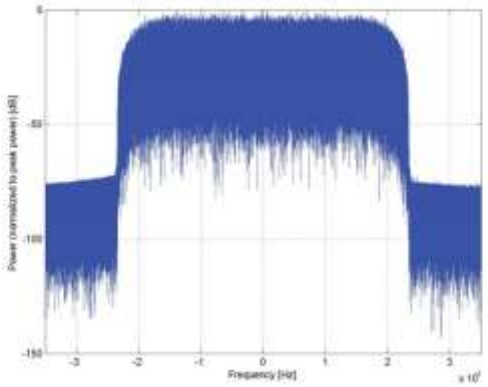
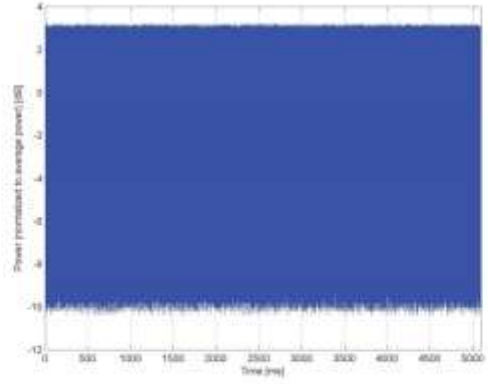


Complementary Cumulative Distribution Function (CCDF)



Frequency Domain



Time Domain

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Name:	**UMTS-FDD (HSPA+)**
Group:	WCDMA
UID:	10225-CAB
PAR: [1]	**5.97 dB**
MIF: [2]	**-20.39 dB**
Standard Reference:	3GPP Rel 7 TS 34.121 FCC OET KDB 941225 D01 SAR test for 3G devices v02 FCC OET KDB 941225 D02 Guidance for 3GPP R6 and R7 HSPA v02v01
Category:	Random amplitude modulation
Modulation:	16QAM
Frequency Band:	Band 1, UTRA/FDD (1920.0-1980.0 MHz, 20000) Band 2, UTRA/FDD (1850.0-1910.0 MHz, 20001) Band 3, UTRA/FDD (1710.0-1785.0 MHz, 20002) Band 4, UTRA/FDD (1710.0-1755.0 MHz, 20003) Band 5, UTRA/FDD (824.0-849.0 MHz, 20004) Band 6, UTRA/FDD (830.0-840.0 MHz, 20005) Band 7, UTRA/FDD (2500.0-2570.0 MHz, 20006) Band 8, UTRA/FDD (880.0-915.0 MHz, 20007) Band 9, UTRA/FDD (1749.9-1784.9 MHz, 20008) Band 10, UTRA/FDD (1710.0-1770.0 MHz, 20009) Band 11, UTRA/FDD (1427.9-1452.9 MHz, 20010) Band 12, UTRA/FDD (698.0-716.0 MHz, 20011) Band 13, UTRA/FDD (777.0-787.0 MHz, 20012) Band 14, UTRA/FDD (788.0-798.0 MHz, 20013) Band 19, UTRA/FDD (830.0-845.0 MHz, 20130) Band 20, UTRA/FDD (832.0-862.0 MHz, 20131) Band 21, UTRA/FDD (1447.9-1462.9 MHz, 20132) Band 22, UTRA/FDD (3410.0-3490.0 MHz, 20217) Band 25, UTRA/FDD (1850.0-1915.0 MHz, 20218) Band 26, UTRA/FDD (814.0-849.0 MHz, 20219)
Detailed Specification:	12.2 kbps RMC, FRC H-Set 2 CQI value: 2 Sub-test 2 Conditions: DPCCH gain factor (Beta_c) = 6/15 DPDCH gain factor (Beta_d): 15/15 E-DPDCH Settings: Symbol Rate: 2x1960 Mbps Modulation 4PAM Data Type: PN9
Bandwidth:	5.0 MHz
Integration Time:	100.0 ms

[1] PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
[2] Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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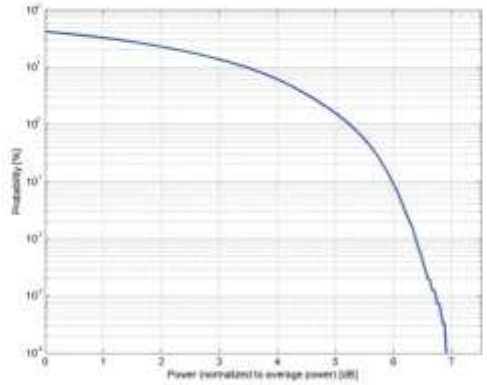
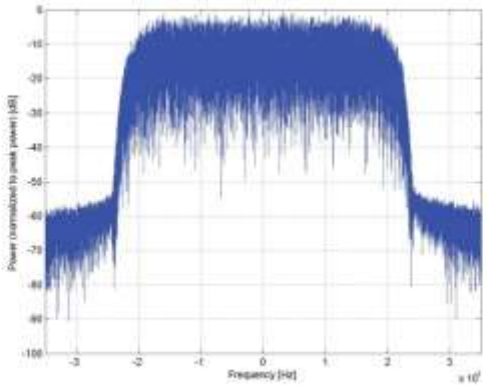
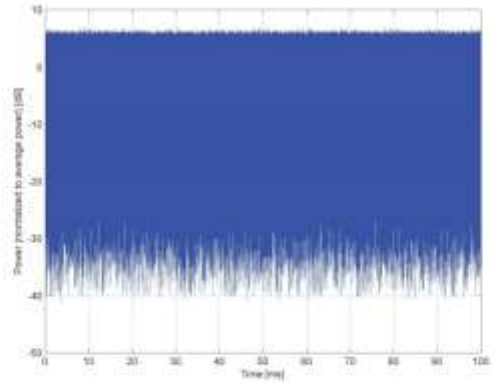


Complementary Cumulative Distribution Function (CCDF)



Frequency Domain



Time Domain

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Name:	**CDMA2000, RC1, SO3, 1/8th Rate 25 fr.**
Group:	CDMA2000
UID:	10295-AAB
PAR: [1]	**12.49 dB**
MIF: [2]	**3.26 dB**
Standard Reference:	3GPP2 C.S0002-C-1, Chapter 2.1.3.9.2.3 FCC OET KDB 941225 D01 SAR test for 3G devices (v02)
Category:	Random amplitude modulation
Modulation:	64-ary orthogonal
Frequency Band:	Band Class 0 (815.0-849.0 MHz, 20220) Band Class 1 (1850.0-1910.0 MHz, 20040) Band Class 2 (872.0-915.0 MHz, 20041) Band Class 3 (887.0-925.0 MHz, 20042) Band Class 4 (1750.0-1780.0 MHz, 20043) Band Class 5 (411.7-483.5 MHz, 20044) Band Class 6 (1920.0-1980.0 MHz, 20045) Band Class 7 (776.0-794.0 MHz, 20046) Band Class 8 (1710.0-1785.0 MHz, 20047) Band Class 9 (880.0-915.0 MHz, 20048) Band Class 10 (806.0-901.0 MHz, 20049) Band Class 11 (410.0-462.5 MHz, 20050) Band Class 12 (870.0-876.0 MHz, 20051) Band Class 13 (2500.0-2570.0 MHz, 20179) Band Class 14 (1850.0-1915.0 MHz, 20180) Band Class 15 (1710.0-1755.0 MHz, 20181) Band Class 16 (2502.0-2568.0 MHz, 20182) Band Class 18 (787.0-799.0 MHz, 20184) Band Class 19 (698.0-716.0 MHz, 20185) Band Class 20 (1626.5-1660.5 MHz, 20186) Band Class 21 (2000.0-2020.0 MHz, 20187)
Detailed Specification:	Radio Configuration 1 (RC1) Service Option 3 (SO3) Speech codec: 8k EVRC (Enhanced Voice Rate Codec) 1/8th frame rate
Bandwidth:	1.2 MHz
Integration Time:	500.0 ms

[1] PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
[2] Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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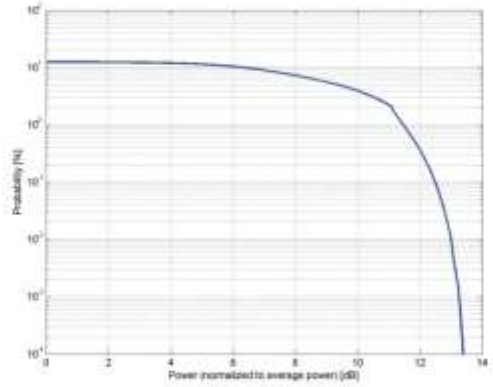
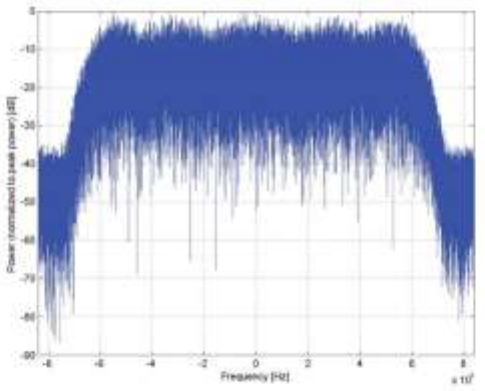
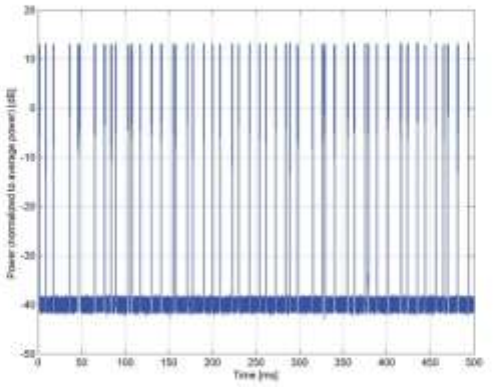


Complementary Cumulative Distribution Function (CCDF)



Frequency Domain



Time Domain

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Name:	**CDMA2000 (1xEV-DO, Rev. 0)**
Group:	CDMA2000
UID:	10403-AAB
PAR: [1]	**3.76 dB**
MIF: [2]	**-17.67 dB**
Standard Reference:	941225 D01 SAR test for 3G devices v02
Category:	Random amplitude modulation
Modulation:	BPSK
Frequency Band:	Band Class 0 (815.0-849.0 MHz, 20220) Band Class 1 (1850.0-1910.0 MHz, 20040) Band Class 2 (872.0-915.0 MHz, 20041) Band Class 3 (887.0-925.0 MHz, 20042) Band Class 4 (1750.0-1780.0 MHz, 20043) Band Class 5 (411.7-483.5 MHz, 20044) Band Class 6 (1920.0-1980.0 MHz, 20045) Band Class 7 (776.0-794.0 MHz, 20046) Band Class 8 (1710.0-1785.0 MHz, 20047) Band Class 9 (880.0-915.0 MHz, 20048) Band Class 10 (806.0-901.0 MHz, 20049) Band Class 11 (410.0-462.5 MHz, 20050) Band Class 12 (870.0-876.0 MHz, 20051) Band Class 13 (2500.0-2570.0 MHz, 20179) Band Class 14 (1850.0-1915.0 MHz, 20180) Band Class 15 (1710.0-1755.0 MHz, 20181) Band Class 16 (2502.0-2568.0 MHz, 20182) Band Class 18 (787.0-799.0 MHz, 20184) Band Class 19 (698.0-716.0 MHz, 20185) Band Class 20 (1626.5-1660.5 MHz, 20186) Band Class 21 (2000.0-2020.0 MHz, 20187)
Detailed Specification:	Physical Layer Configuration: Subtype 0 Reverse Data Channel: 153.6kbps Forward Traffic Channel: 2-slot version of 307.2kbps, ACK channel transmitting in all slots Access Terminal Power Control: "All bits up"
Bandwidth:	1.2 MHz
Integration Time:	100.0 ms

[1] PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
[2] Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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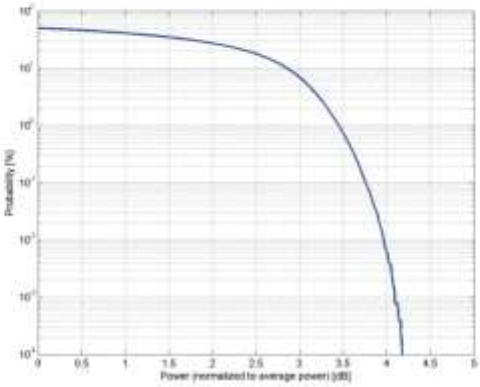
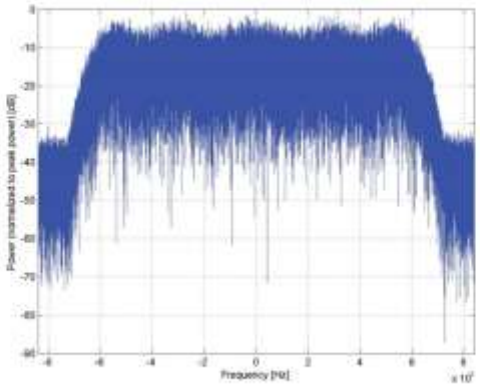
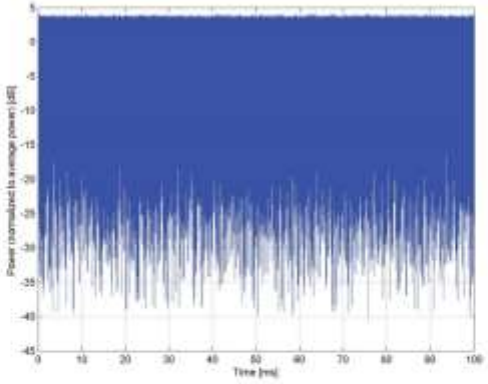


Complementary Cumulative Distribution Function (CCDF)



Frequency Domain



Time Domain

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Name:	**LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)**
Group:	LTE-FDD
UID:	10176-CAE
PAR: [1]	**6.52 dB**
MIF: [2]	**-9.76 dB**
Standard Reference:	3GPP / ETSI TS 136.101 V8.4.0 3GPP / ETSI TS 136.213 V8.4.0 FCC OET KDB 941225 D05 SAR for LTE Devices v01
Category:	Random amplitude modulation
Modulation:	16-QAM
Frequency Band:	Band 1, E-UTRA/FDD (1920.0 - 1980.0 MHz) Band 2, E-UTRA/FDD (1850.0 - 1910.0 MHz) Band 3, E-UTRA/FDD (1710.0 - 1785.0 MHz) Band 4, E-UTRA/FDD (1710.0 - 1755.0 MHz) Band 5, E-UTRA/FDD (824.0 - 849.0 MHz) Band 6, E-UTRA/FDD (830.0 - 840.0 MHz) Band 7, E-UTRA/FDD (2500.0 - 2570.0 MHz) Band 8, E-UTRA/FDD (880.0 - 915.0 MHz) Band 9, E-UTRA/FDD (1749.9 - 1784.9 MHz) Band 10, E-UTRA/FDD (1710.0 - 1770.0 MHz) Band 11, E-UTRA/FDD (1427.9 - 1447.9 MHz) Band 12, E-UTRA/FDD (699.0 - 716.0 MHz) Band 13, E-UTRA/FDD (777.0 - 787.0 MHz) Band 14, E-UTRA/FDD (788.0 - 798.0 MHz) Band 17, E-UTRA/FDD (704.0 - 716.0 MHz) Band 18, E-UTRA/FDD (815.0 - 830.0 MHz) Band 19, E-UTRA/FDD (830.0 - 845.0 MHz) Band 20, E-UTRA/FDD (832.0 - 862.0 MHz) Band 21, E-UTRA/FDD (1447.9 - 1462.9 MHz) Band 22, E-UTRA/FDD (3410.0 - 3490.0 MHz) Band 23, E-UTRA/FDD (2000.0 - 2020.0 MHz) Band 24, E-UTRA/FDD (1626.5 - 1660.5 MHz) Band 25, E-UTRA/FDD (1850.0 - 1915.0 MHz) Band 26 E-UTRA/FDD (814.0 - 849.0 MHz) Band 27 E-UTRA/FDD (807.0 - 824.0 MHz) Band 28 E-UTRA/FDD (703.0 - 748.0 MHz) Band 30, E-UTRA/FDD (2305.0 - 2315.0 MHz) Band 65, E-UTRA/FDD (1920.0 - 2010.0 MHz) Band 66, E-UTRA/FDD (1710.0 - 1780.0 MHz) Band 68, E-UTRA/FDD (698.0 - 728.0 MHz) Band 70, E-UTRA/FDD (1695.0 - 1710.0 MHz) Band 71, E-UTRA/FDD (663.0 - 698.0 MHz) Validation band (0.0 - 6000.0 MHz)
Detailed Specification:	Modulation Scheme: SC-FDMA Number of PUSCHs: 1 Settings for Subframe #0 to #9: Modulation Scheme: QPSK Data Type: UL-SCH Number RB: 1 Transport Block Size: 256 TBS Index: 14 MCS Index: 15 Data Type: PN9
Bandwidth:	10.0 MHz
Integration Time:	10.0 ms

[1] PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
[2] Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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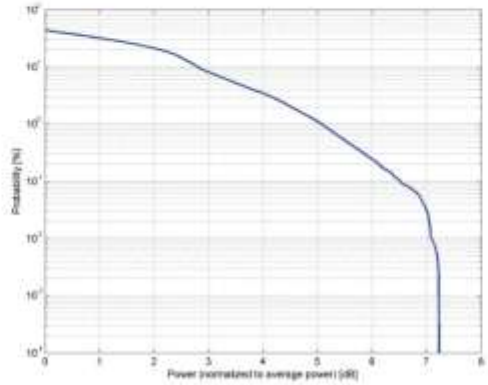
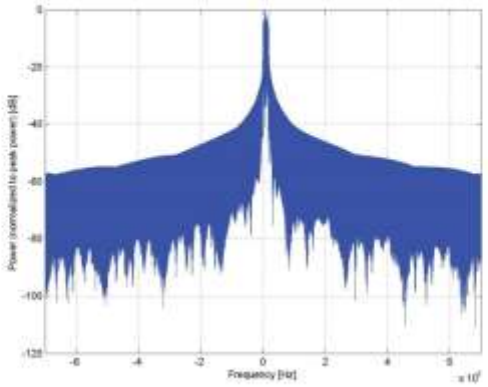
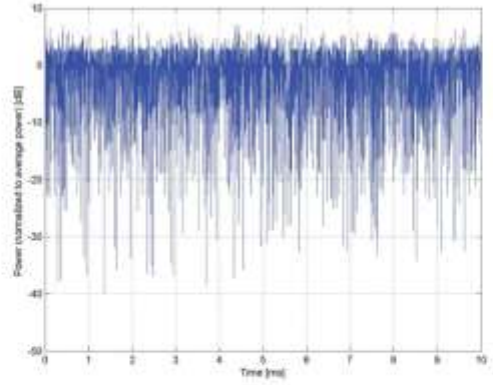


Complementary Cumulative Distribution Function (CCDF)



Frequency Domain



Time Domain

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Name:	**LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)**
Group:	LTE-FDD
UID:	10170-CAD
PAR: [1]	**6.52 dB**
MIF: [2]	**-9.76 dB**
Standard Reference:	3GPP / ETSI TS 136.101 V8.4.0 3GPP / ETSI TS 136.213 V8.4.0 FCC OET KDB 941225 D05 SAR for LTE Devices v01
Category:	Random amplitude modulation
Modulation:	16-QAM
Frequency Band:	Band 1, E-UTRA/FDD (1920.0 - 1980.0 MHz) Band 2, E-UTRA/FDD (1850.0 - 1910.0 MHz) Band 3, E-UTRA/FDD (1710.0 - 1785.0 MHz) Band 4, E-UTRA/FDD (1710.0 - 1755.0 MHz) Band 7, E-UTRA/FDD (2500.0 - 2570.0 MHz) Band 9, E-UTRA/FDD (1749.9 - 1784.9 MHz) Band 10, E-UTRA/FDD (1710.0 - 1770.0 MHz) Band 20, E-UTRA/FDD (832.0 - 862.0 MHz) Band 22, E-UTRA/FDD (3410.0 - 3490.0 MHz) Band 23, E-UTRA/FDD (2000.0 - 2020.0 MHz) Band 25, E-UTRA/FDD (1850.0 - 1915.0 MHz) Band 28 E-UTRA/FDD (703.0 - 748.0 MHz) Band 65, E-UTRA/FDD (1920.0 - 2010.0 MHz) Band 66, E-UTRA/FDD (1710.0 - 1780.0 MHz) Band 70, E-UTRA/FDD (1695.0 - 1710.0 MHz) Band 71, E-UTRA/FDD (663.0 - 698.0 MHz) Validation band (0.0 - 6000.0 MHz)
Detailed Specification:	Modulation Scheme: SC-FDMA Number of PUSCHs: 1 Settings for Subframe #0 to #9: Modulation Scheme: 16QAM Data Type: UL-SCH Number RB: 1 Transport Block Size: 256 TBS Index: 14 MCS Index: 15 Data Type: PN9
Bandwidth:	20.0 MHz
Integration Time:	10.0 ms

[1] PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
[2] Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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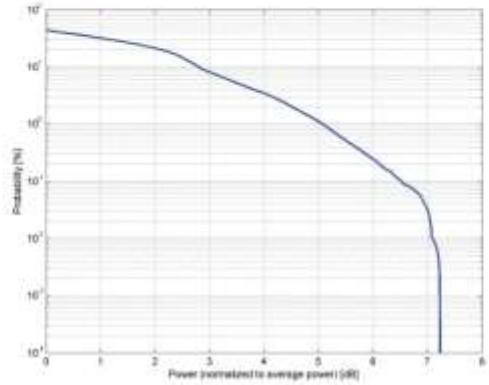
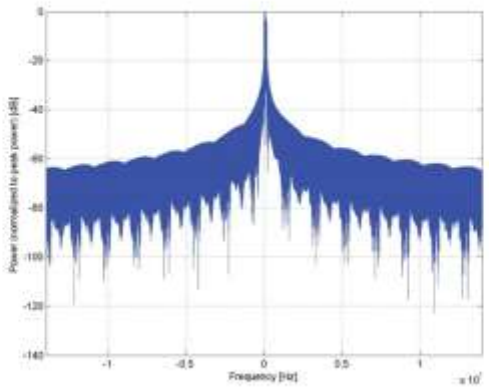
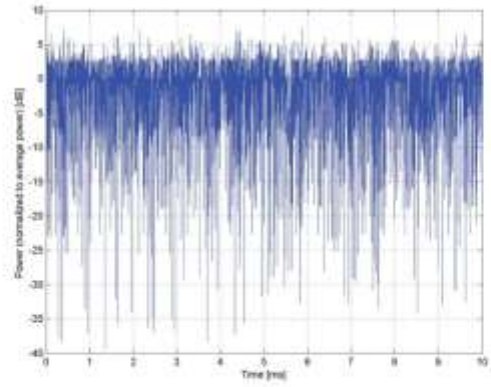


Complementary Cumulative Distribution Function (CCDF)



Frequency Domain



Time Domain

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Name:	**LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)**
Group:	LTE-TDD
UID:	10173-CAD
PAR: [1]	**9.48 dB**
MIF: [2]	**-1.44 dB**
Standard Reference:	3GPP / ETSI TS 136.101 V8.4.0 3GPP / ETSI TS 136.213 V8.4.0 FCC OET KDB 941225 D05 SAR for LTE Devices v02
Category:	Random amplitude modulation
Modulation:	16-QAM
Frequency Band:	Band 33, E-UTRA/TDD (1900.0 - 1920.0 MHz) Band 35, E-UTRA/TDD (1850.0 - 1910.0 MHz) Band 36, E-UTRA/TDD (1930.0 - 1990.0 MHz) Band 37, E-UTRA/TDD (1910.0 - 1930.0 MHz) Band 38, E-UTRA/TDD (2570.0 - 2620.0 MHz) Band 39, E-UTRA/TDD (1880.0 - 1920.0 MHz) Band 40, E-UTRA/TDD (2300.0 - 2400.0 MHz) Band 41, E-UTRA/TDD (2496.0 - 2690.0 MHz) Band 42, E-UTRA/TDD (3400.0 - 3600.0 MHz) Band 43, E-UTRA/TDD (3600.0 - 3800.0 MHz) Band 44, E-UTRA/TDD (703.0 - 803.0 MHz) Band 45, E-UTRA/FDD (1447.0 - 1467.0 MHz) Band 46, E-UTRA/FDD (5150.0 - 5925.0 MHz) Band 47, E-UTRA/TDD (5855.0 - 5925.0 MHz) Band 48, E-UTRA/TDD (3550.0 - 3700.0 MHz) Validation band (0.0 - 6000.0 MHz)
Detailed Specification:	Modulation Scheme: SC-FDMA Uplink-downlink configuration: 1 Special Subframe configuration: 4 Number of Frames: 1 Settings for UL Subframe 2,3,7,8: Number of PUSCHs: 1 Modulation Scheme: 16QAM Allocated RB: 1 Start Number of RB: 50 Data Type: PN9fix
Bandwidth:	20.0 MHz
Integration Time:	6.0 ms

[1] PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
[2] Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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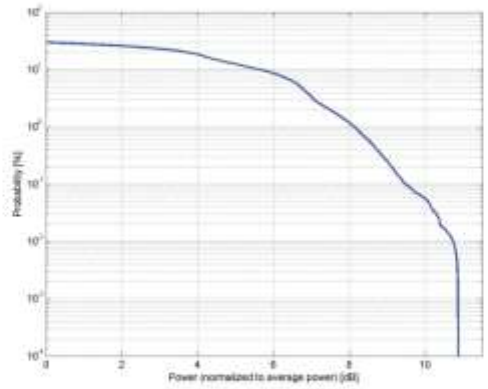
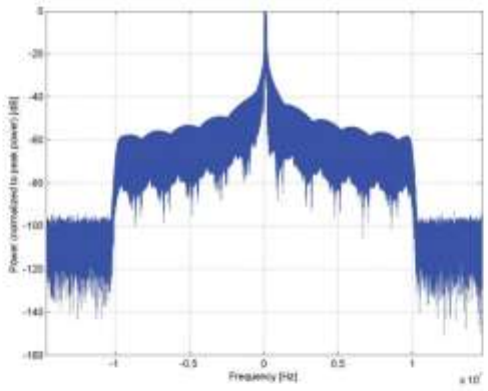
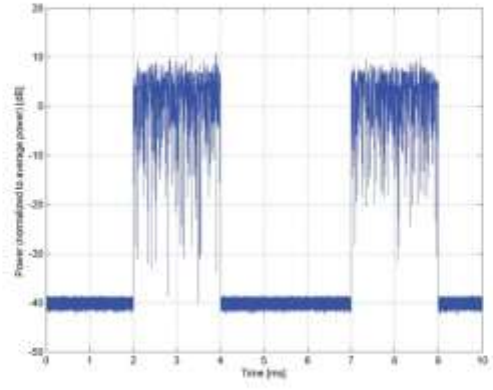


Complementary Cumulative Distribution Function (CCDF)



Frequency Domain



Time Domain

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Name:	**IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)**
Group:	WLAN
UID:	10061-CAB
PAR: [1]	**3.60 dB**
MIF: [2]	**-2.02 dB**
Standard Reference:	IEEE 802.11b-1999 , Part 11, FCC SAR meas for 802 11 a b g v01r02 (248227 D01)
Category:	Random amplitude modulation
Modulation:	DQPSK
Frequency Band:	WLAN 2.4GHz (2412.0-2484.0 MHz, 20230)
Detailed Specification:	Data Rate: 11 Mbps Spreading, Coding: CCK PPDU format: Long Preamble & Heading PSDU Length: 1024 PSDU Data: PN9
Bandwidth:	20.0 MHz
Integration Time:	1.5 ms

[1] PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
[2] Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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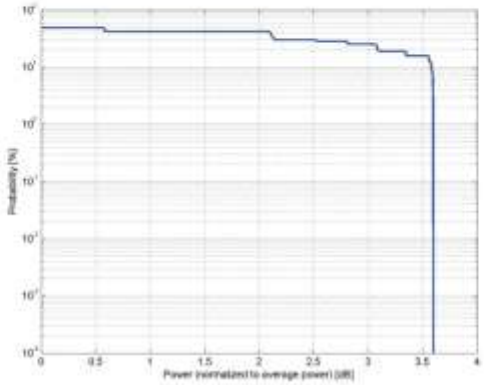
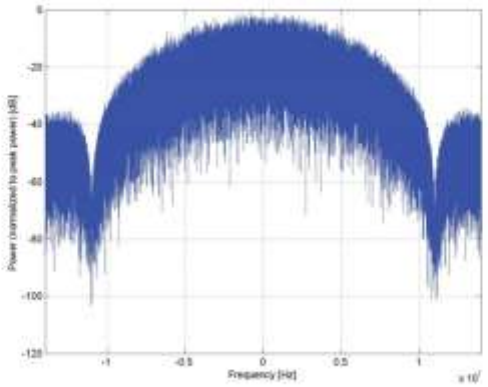
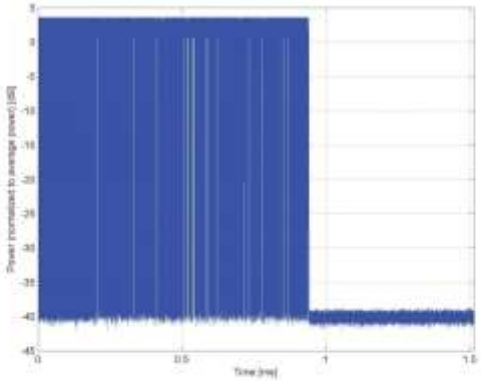


Complementary Cumulative Distribution Function (CCDF)



Frequency Domain



Time Domain

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Name:	**IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)**
Group:	WLAN
UID:	10069-CAC
PAR: [1]	**10.56 dB**
MIF: [2]	**-3.15 dB**
Standard Reference:	IEEE 802.11a-1999 (R2003) , Part 11 IEEE 802.11h-2003 , Part 11 FCC SAR meas for 802 11 a b g v01r02 (248227 D01)
Category:	Random amplitude modulation
Modulation:	64-QAM
Frequency Band:	WLAN 5GHz (4915.0 - 5825.0 MHz) U-NII-1, U-NII-2A (5170 - 5330 MHz) U-NII-2C Standalone (5490 - 5710 MHz) U-NII-2C <5.65 GHz (5490 - 5650 MHz) U-NII-3 Standalone (5735 - 5835 MHz) U-NII-2C, U-NII-3 (5650 - 5835 MHz) Validation band (0.0 - 6000.0 MHz)
Detailed Specification:	Data Rate: 54 Mbps Coding Rate: 3/4 Coded bits per subcarrier: 6 Coded bits per OFDM symbol: 288 Data bits per OFDM symbol: 216 PSDU Length: 1000 Bytes PSDU Data: PN9
Bandwidth:	20.0 MHz
Integration Time:	0.3 ms

[1] PAR (0.1%) in accordance with FCC KDB 971168, Section 6.0 "Measurement of the Peak-to-Average Power Ratio (PAPR)"
[2] Modulation Interference Factor (MIF) value valid only in conjunction with advanced probe response linearization calibration for the same communication system (same UID and version).

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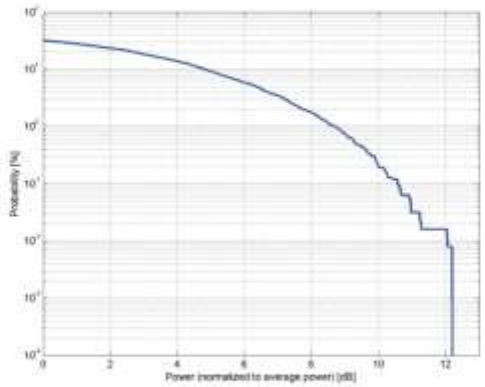
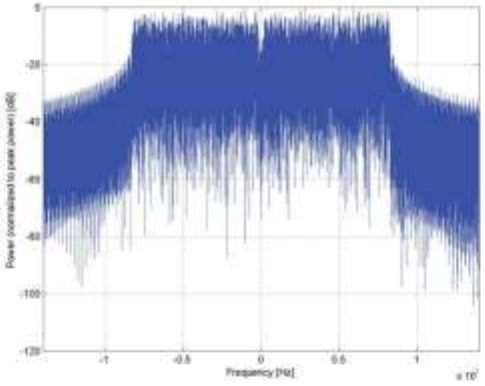
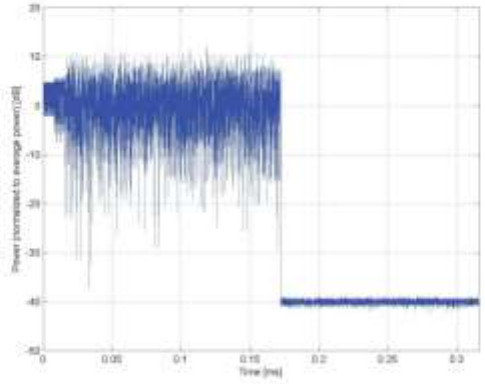


Complementary Cumulative Distribution Function (CCDF)



Frequency Domain



Time Domain