FCC HAC (RF Emission) Test Report

Report No.	:	**HC190621C15**
Applicant	:	**Google LLC**
Address	:	**1600 Amphitheatre Parkway, Mountain View, CA 94043, USA**
Product	:	**Phone**
FCC ID	:	**A4RG020J**
Model Name	:	**G020J**
Standards	:	**FCC 47 CFR Part 20.19, ANSI C63.19-2011** **KDB 285076 D01 v05, KDB 285076 D02 v03**
Sample Received Date	:	**May. 28, 2019**
Date of Testing	:	**Jun. 21, 2019 ~ Jun. 28, 2019**
Summary M-Rating	:	**M3**
Lab Address	:	**No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan, R.O.C.**
Test Location	:	**No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil, Kwei Shan Dist., Taoyuan City 33383, Taiwan (R.O.C)**

CERTIFICATION: The above equipment have been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch – Lin Kou Laboratories**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's HAC characteristics under the conditions specified in this report. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product certification, approval, or endorsement by TAF or any government agencies.

Prepared By : Rona Chen
Rona Chen / Specialist

Approved By :
Roy Wu / Senior Manager

Testing Laboratory
2021

FCC Accredited No.: TW0003

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Release Control Record

Report No.	Reason for Change	Date Issued
HC190621C15	Initial release	Jul. 01, 2019

1. Summary of M-Rating

Mode	Band	Maximum Audio Interference Level (dBV/m)	M-Rating
GSM	GSM850	37.33	M4
	GSM1900	34.18	M3
WCDMA	Band II	N/A	M4
	Band IV	N/A	M4
	Band V	N/A	M4
CDMA	BC0	36.16	M4
	BC1	27.42	M4
	BC10	32.87	M4
FDD-LTE	Band 2	N/A	M4
	Band 4	N/A	M4
	Band 5	N/A	M4
	Band 7	N/A	M4
	Band 12	N/A	M4
	Band 13	N/A	M4
	Band 14	N/A	M4
	Band 17	N/A	M4
	Band 25	N/A	M4
	Band 26	N/A	M4
	Band 30	N/A	M4
	Band 66	N/A	M4
	Band 71	N/A	M4
TDD-LTE	Band 38	26.42	M4
	Band 41	25.87	M4
	Band 48	23.56	M4
WLAN	2.4G	34.93	M3
	5.2G	24.73	M4
	5.3G	25.82	M4
	5.6G	29.29	M4
	5.8G	31.86	M3
Summary		M3	

Note:

1. The HAC RF emission limit **(M-rating Category M3)** is specified in FCC 47 CFR part 20.19 and ANSI C63.19.
2. The device RF emission rating is determined by the minimum rating.

2. Description of Equipment Under Test

EUT Type	Phone
FCC ID	A4RG020J
Model Name	G020J
Tx Frequency Bands (Unit: MHz)	**GSM** GSM850 : 824.2 ~ 848.8 GSM1900 : 1850.2 ~ 1909.8 **WCDMA** Band II : 1852.4 ~ 1907.6 Band IV : 1712.4 ~ 1752.6 Band V : 826.4 ~ 846.6 **CDMA** BC0 : 824.7 ~ 848.31 BC1 : 1851.25 ~ 1908.75 BC10 : 817.9 ~ 823.1 **FDD-LTE** Band 2 : 1850.7 ~ 1909.3 (BW: 1.4M, 3M, 5M, 10M, 15M, 20M) Band 4 : 1710.7 ~ 1754.3 (BW: 1.4M, 3M, 5M, 10M, 15M, 20M) Band 5 : 824.7 ~ 848.3 (BW: 1.4M, 3M, 5M, 10M) Band 7 : 2502.5 ~ 2567.5 (BW: 5M, 10M, 15M, 20M) Band 12 : 699.7 ~ 715.3 (BW: 1.4M, 3M, 5M, 10M) Band 13 : 779.5 ~ 784.5 (BW: 5M, 10M) Band 14 : 790.5 ~ 795.5 (BW: 5M, 10M) Band 17 : 706.5 ~ 713.5 (BW: 5M, 10M) Band 25 : 1850.7 ~ 1914.3 (BW: 1.4M, 3M, 5M, 10M, 15M, 20M) Band 26 : 814.7 ~ 848.3 (BW: 1.4M, 3M, 5M, 10M, 15M) Band 30 : 2307.5 ~ 2312.5 (BW: 5M, 10M) Band 66 : 1710.7 ~ 1779.3 (BW: 1.4M, 3M, 5M, 10M, 15M, 20M) Band 71 : 665.5 ~ 695.5 (BW: 5M, 10M, 15M, 20M) **TDD-LTE** LTE Band 38 : 2572.5 ~ 2617.5 (BW: 5M, 10M, 15M, 20M) LTE Band 41 : 2498.5 ~ 2687.5 (BW: 5M, 10M, 15M, 20M) LTE Band 48 : 3552.5 ~ 3697.5 (BW: 5M, 10M, 15M, 20M) **WLAN** 2412 ~ 2472, 5180 ~ 5240, 5260 ~ 5320, 5500 ~ 5720, 5745 ~ 5825 **Bluetooth** 2402 ~ 2480
Modulations Supported in Uplink	GSM & GPRS : GMSK EDGE : 8PSK WCDMA : QPSK CDMA : QPSK LTE : QPSK, 16QAM, 64QAM 802.11b : DSSS 802.11a/g/n/ac : OFDM Bluetooth : GFSK, π/4-DQPSK, 8-DPSK
Antenna Type	PIFA Antenna
EUT Stage	Identical Prototype

Note:

1. Antenna supported band information.

WWAN Antenna	Support Band																					
	GSM		WCDMA			CDMA			LTE													
	850	1900	II	IV	V	BC0	BC1	BC10	2	4	5	7	12	13	14	17	25	26	30	38	41	48	66	71
ANT 0_B	-	V	V	V	-	-	V	-	V	V	-	V	-	-	-	-	V	-	V	V	V	-	V	-
ANT 0_C	V	V	V	V	V	V	V	V	V	V	V	-	V	V	V	V	V	V	V	V	V	-	V	V
ANT 1	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
ANT 6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V	-	-

BT/WLAN Antenna	Support Band		
	BT	WLAN 2.4G	WLAN 5G
ANT 2	V	V	-
ANT 4_B	-	V	V
ANT 5_A	-	-	V

2. The above EUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

Air Interface and Operational Mode:

Air Interface	Bands	Transport Type	HAC Tested	Simultaneous But Not Tested	Name of Voice Service	Power Reduction
GSM	850	VO	YES	WLAN, BT	CMRS Voice	No
	1900					No
	EGPRS	VD	YES	WLAN, BT	Google Duo	No
WCDMA	II	VO	No(1)	WLAN, BT	CMRS Voice	No
	IV					No
	V					No
	HSPA	VD	No(1)	WLAN, BT	Google Duo	No
CDMA	BC0	VO	YES	WLAN, BT	CMRS Voice	No
	BC1					No
	BC10					No
	EVDO	VD	No(1)	WLAN, BT	Google Duo	No
FDD-LTE	2	VD	No(1)	WLAN, BT	VoLTE Google Duo	No
	4					No
	5					No
	7					No
	12					No
	13					No
	14					No
	17					No
	25					No
	26					No
	30					No
	66					No
	71					No
TDD-LTE	38	VD	YES	WLAN, BT	VoLTE Google Duo	No
	41					No
	48					No
WLAN	2.4G	VD	YES	WWAN, BT	VoWiFi Google Duo	No
	5.2G		No(1)			No
	5.3G					No
	5.6G					No
	5.8G		YES			No
Bluetooth	2.4G	DT	No	WWAN, WLAN	N/A	No

Transport Type
VO = Legacy Cellular Voice Service
DT = Digital Transport Only (No Voice)
VD = IP Voice Service over Digital Transport

Note
1. It applies the low power exemption per ANSI C63.19-2011.

3. HAC RF Emission Measurement System

3.1 SPEAG DASY System

The SPEAG DASY52 system consists of high precision robot, probe alignment sensor, phantom, robot controller, controlled measurement server and near-field probe. The robot includes six axes that can move to the precision position of the DASY52 software defined. The DASY52 software can define the area that is detected by the probe. The robot is connected to controlled box. Controlled measurement server is connected to the controlled robot box. The DAE includes amplifier, signal multiplexing, AD converter, offset measurement and surface detection. It is connected to the Electro-optical coupler (ECO). The ECO performs the conversion form the optical into digital electric signal of the DAE and transfers data to the PC.

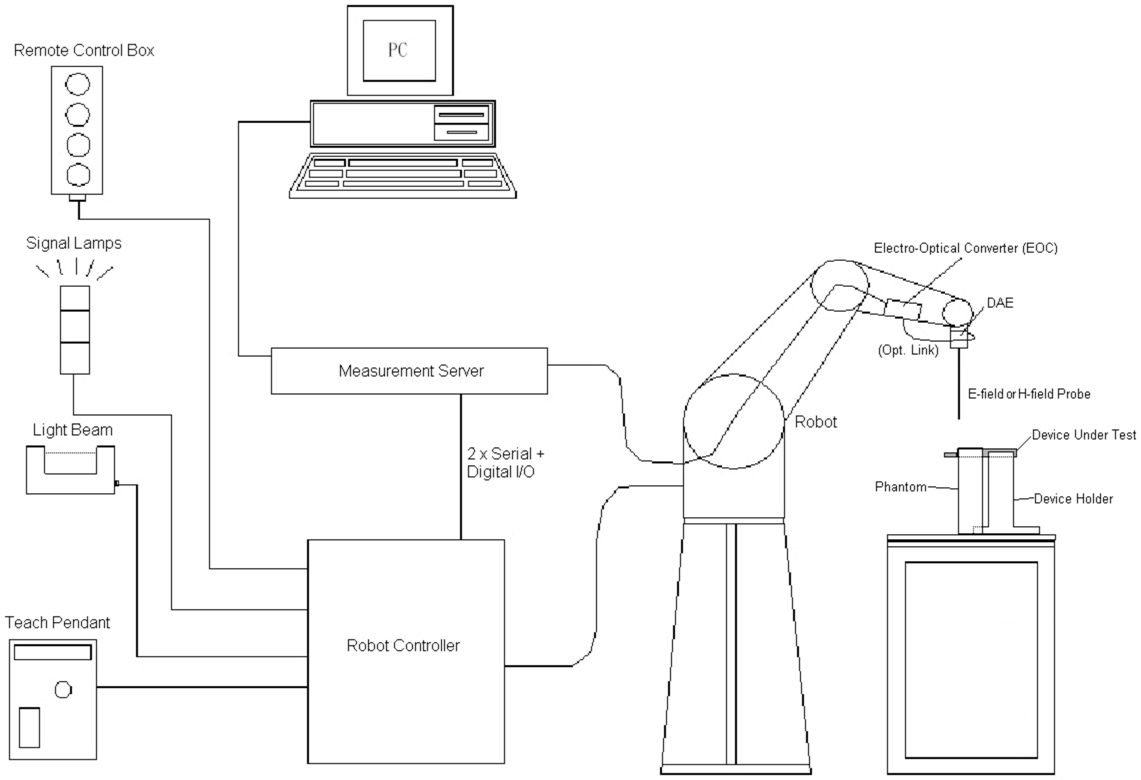

Fig-3.1 DASY52 System Setup

3.1.1 Robot

The DASY52 system uses the high precision robots from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY52: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability ±0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

Fig-3.2 DASY52 Measurement System

3.1.2 Probes

Model	ER3DV6	
Construction	One dipole parallel, two dipoles normal to probe axis Built-in shielding against static charges	
Frequency	40 MHz to 3 GHz Linearity: ± 0.2 dB	
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: 337 mm (Tip: 16 mm) Tip diameter: 8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.5 mm	

Model	EF3DV3	
Construction	One dipole parallel, two dipoles normal to probe axis Built-in shielding against static charges	
Frequency	40 MHz to 6 GHz Linearity: ± 0.2 dB	
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: 337 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 1.5 mm	

3.1.3 Data Acquisition Electronics (DAE)

Model	DAE3, DAE4
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.
Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4mV, 400mV)
Input Offset Voltage	< 5µV (with auto zero)
Input Bias Current	< 50 fA
Dimensions	60 x 60 x 68 mm

3.1.4 Phantoms

Model	Test Arch
Construction	Enables easy and well defined positioning of the phone and validation dipoles as well as simple teaching of the robot.
Dimensions	Length : 370 mm Width : 370 mm Height : 370 mm

3.1.5 Device Holder

Model	Mounting Device
Construction	The Mounting Device enables the rotation of the mounted transmitter device in spherical coordinates. Rotation point is the ear opening point. Transmitter devices can be easily and accurately positioned according to ANSI C63.19.
Material	POM

3.1.6 RF Emission Calibration Dipoles

Model	CD-Serial
Construction	Free space antenna Hearing Aid susceptibility measurements according to ANSI C63.19. Validation of Hearing Aid RF setup for wireless device emission measurements according to ANSI C63.19
Frequency	CD700V3 : 698 ~ 806 MHz CD835V3 : 800 ~ 960 MHz CD1880V3 : 1710 ~ 2000 MHz CD2450V3 : 2250 ~ 2650 MHz CD2600V3 : 2450 ~ 2750 MHz CD3500V3 : 3300 ~ 3950 MHz CD5500V3 : 5000 ~ 5900 MHz
Return Loss	CD700V3 : > 15 dB (750 MHz > 20 dB) CD835V3 : > 15 dB (835 MHz > 25 dB) CD1880V3 : > 18 dB (1880 MHz > 20 dB) CD2450V3 : > 18 dB (2450 MHz > 25 dB) CD2600V3 : > 18 dB (2600 MHz > 20 dB) CD3500V3 : > 16 dB (3500 MHz > 20 dB) CD5500V3 : > 18 dB (5500 MHz > 20 dB)
Power Capability	> 40 W continuous

3.2 DASY System Verification

The system check verifies that the system operates within its specifications. It is performed before every E-field measurement. The system check uses normal measurements in the center section of the arch phantom with a matched dipole at a specified distance. The system verification setup is shown as below.

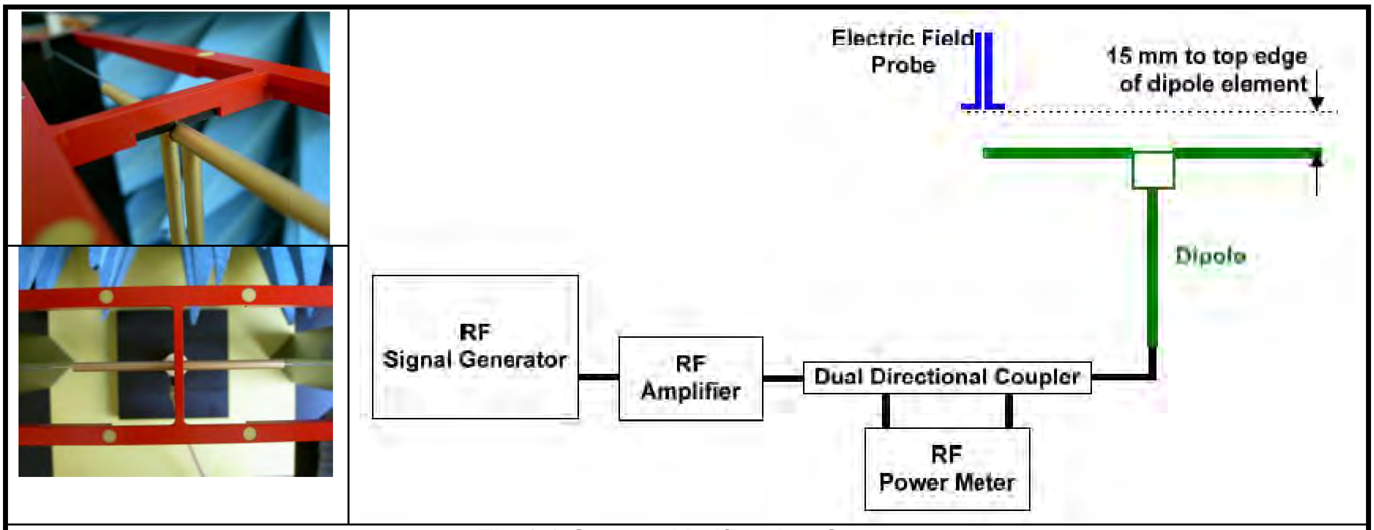

Fig-3.3 System Verification Setup

The validation dipole is placed beneath the center of arch phantom. The power meter measures the forward power at the location of the system check dipole connector. The signal generator is adjusted for the desired forward power, 100 mW (20 dBm) at the dipole connector and the RF power meter is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at RF power meter.

After system check testing, the E-field result will be compared with the reference value derived from validation dipole certificate report. The deviation of system check should be within 25 %.

The result of system verification is shown in section 4.3 of this report.

3.3 EUT Measurements Reference and Plane

The EUT is mounted in the device holder. The acoustic output of the EUT will coincide with the center point of the area formed by the dielectric wire and the middle bar of the arch's top frame. Then EUT will be moved vertically upwards until it touches the frame.

Fig-3.4 and Fig-3.5 illustrate the references and reference plane that is used in the RF emissions measurement.

(a) The grid is 50 mm by 50 mm area that is divided into nine evenly sized blocks or sub-grids.

(b) The grid is centered on the audio frequency output transducer of the EUT.

(c) The grid is in a reference plane, which is defined as the planar area that contains the highest point in the area of the phone that normally rests against the user's ear. It is parallel to the centerline of the receiver area of the phone and is defined by the points of the receiver-end of the EUT handset, which in normal handset use rest against the ear.

(d) The measurement plane is parallel to and 15 mm in front of the reference plane.

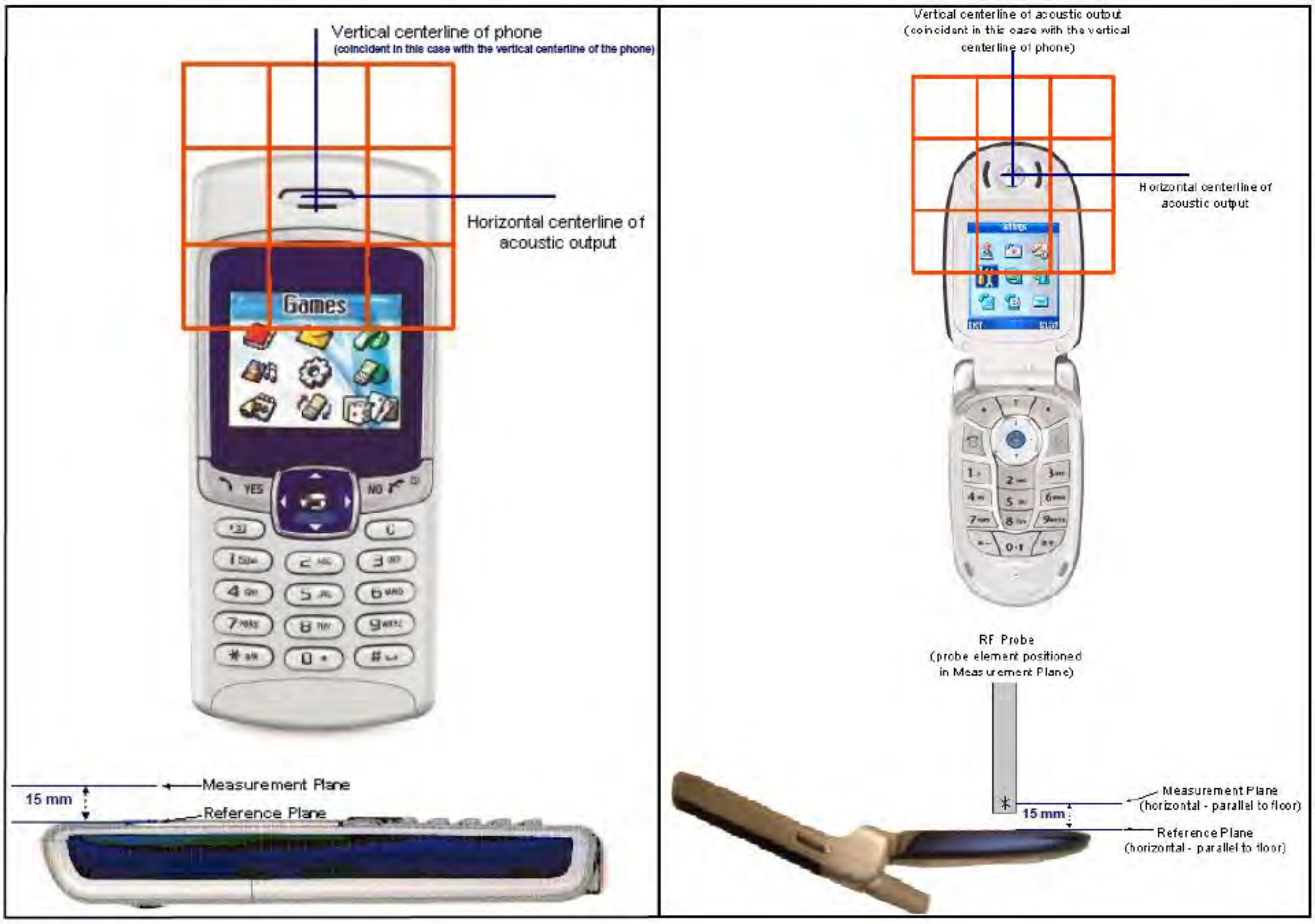

Fig-3.4 EUT Reference and Plane

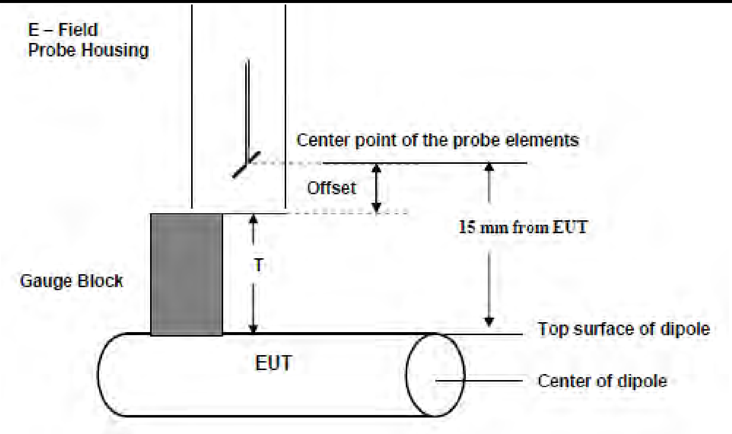

Fig-3.5 Gauge Block for Setting Measurement Distance to Probe

3.4 HAC RF Emission Measurement Procedure

The RF emissions test procedure for wireless communications device is as below.

1. Confirm the 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.
3. Set the WD to transmit a fixed and repeatable combination of signal power and modulation characteristic that is representative of the worst case (highest interference potential) encountered in normal use. Transiently occurring start-up, changeover, or termination conditions, or other operations likely to occur less than 1% of the time during normal operation, may be excluded from consideration.
4. The center sub-grid shall be centered on the T-Coil mode perpendicular measurement point or the acoustic output, as appropriate. Locate the field probe at the initial test position in the 50 mm by 50 mm grid, which is contained in the measurement plane, illustrated in Fig-3.4. If the field alignment method is used, align the probe for maximum field reception.
5. Record the reading at the output of the measurement system.
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 reading within the non-excluded sub-grids identified in step 7.
9. Indirect Measurement Method: The RF audio interference level in dB(V/m) is obtained by adding the MIF (in dB) to the maximum steady-state rms field-strength reading, in dB(V/m), from step 8. Use this result to determine the category rating.

10. Compare this RF audio interference level with the categories in section 4.1 and record the resulting WD category rating.

11 For the T-Coil mode M-rating assessment, determine whether the chosen perpendicular measurement point is contained in an included sub-grid of the first can. If so, then a second scan is not necessary. The first scan and resultant category rating may be used for the T-Coil mode M-rating. Otherwise, repeat step 1 through step 9, with the grid shifted so that it is centered on the perpendicular measurement point. Record the WD category rating.

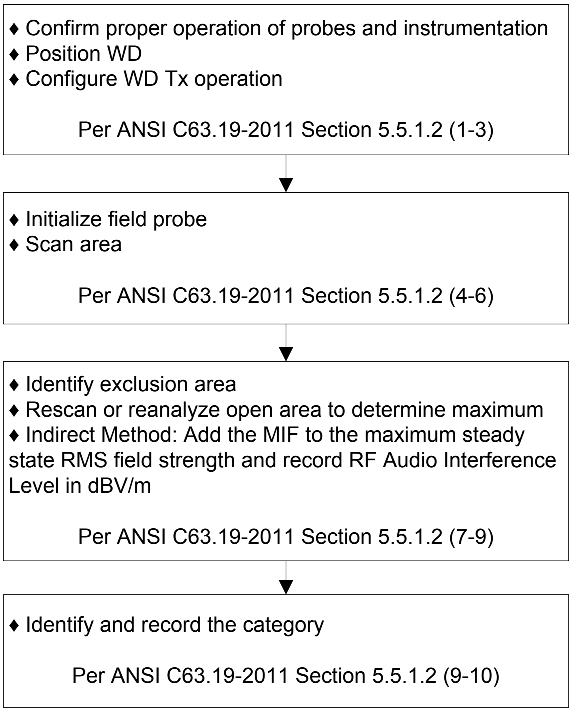

Fig-3.6 WD Near-Field Emission Test Flowchart

3.5 Modulation Interference Factor

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

The Modulation Interference Factor (MIF, in dB) is added to the measured average E-field (in dBV/m) and converts it to the RF audio interference potential (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 slots and repetition rates of few 100 Hz have high MIF values and give similar classification as ANSI C63.19-2007.

ER3D E-field probe 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. This near field probe read the averaged E-field. 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 evaluation method for 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 scaled to a 1 kHz 80% AM signal as reference. It may alternatively be determined through analysis and simulation, because it is constant and characteristic for a communication signal. DASY52 uses well-defined signals for PMR calibration. The MIF of these signals has been determined numerically. It allows a precise scaling and is therefore automatically applied.

The following table lists the MIF values evaluated by DASY52 manufacturer (SPEAG), and the test result will be calculated with the MIF parameter automatically. The detailed parameters for E-field probe can be found in the probe calibration report in appendix C.

UID	Reversion	Communication System Name	MIF (dB)
10021	DAC	GSM-FDD (TDMA, GMSK)	3.63
10025	DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	3.75
10460	AAA	UMTS-FDD (WCDMA, AMR)	-25.43
10225	CAB	UMTS-FDD (HSPA+)	-20.39
10081	CAB	CDMA2000 (1xRTT, RC3)	-19.71
10295	AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	3.26
10403	AAB	CDMA2000 (1xEV-DO, Rev. 0)	-17.67
10170	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	-9.76
10172	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	-1.62
10173	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	-1.44
10174	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	-1.54
10061	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	-2.02
10077	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	0.12
10427	AAB	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	-13.44
10069	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	-3.15
10616	AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle)	-5.57

The MIF measurement uncertainty listed in following table is estimated by SPEAG.

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

4. HAC Measurement Evaluation

4.1 M-Rating Category

The HAC Standard ANSI C63.19-2011 represents performance requirements for acceptable interoperability of hearing aids with wireless communications devices. When these parameters are met, a hearing aid operates acceptably in close proximity to a wireless communications device.

Emission Categories	E-Field Emissions < 960 MHz (dB V/m)	E-Field Emissions > 960 MHz (dB V/m)
Category M1	50 - 55	40 - 45
Category M2	45 - 50	35 - 40
Category M3	40 - 45	30 - 35
Category M4	< 40	< 30

4.2 EUT Configuration and Setting

For HAC RF emission testing, the EUT was linked and controlled by base station emulator. Communication between the EUT and the emulator was established by air link. The distance between the EUT and the communicating antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of EUT. The EUT was set from the emulator to radiate maximum output power during HAC testing.

4.3 System Verification

The measuring results for system check are shown as below.

Frequency (MHz)	Input Power (dBm)	Target Value (V/m)	E-Field 1 (V/m)	E-Field 2 (V/m)	Average E-Field (V/m)	Deviation (%)	Test Date
835	20.0	107.6	101.4	99.98	100.69	-6.42	Jun. 21, 2019
835	20.0	107.6	104	102.4	103.2	-4.09	Jun. 27, 2019
1880	20.0	91.0	84.05	85.03	84.54	-7.10	Jun. 21, 2019
1880	20.0	91.0	83.95	84.92	84.435	-7.21	Jun. 27, 2019
2450	20.0	88.3	83.16	81.46	82.31	-6.78	Jun. 21, 2019
2450	20.0	88.3	84.47	82.28	83.375	-5.58	Jun. 25, 2019
2450	20.0	88.3	87.87	85.99	86.93	-1.55	Jun. 28, 2019
2600	20.0	85.8	81.39	83.96	82.675	-3.64	Jun. 21, 2019
2600	20.0	85.8	84.5	87.05	85.775	-0.03	Jun. 27, 2019
2600	20.0	85.8	84.39	86.92	85.655	-0.17	Jun. 28, 2019
3500	20.0	82.3	87.87	89.34	88.605	7.66	Jun. 21, 2019
3500	20.0	82.3	87.79	89.27	88.53	7.57	Jun. 28, 2019
5500	20.0	103.5	104.7	109.2	106.95	3.33	Jun. 25, 2019
5500	20.0	103.5	108.3	112.2	110.25	6.52	Jun. 28, 2019

Note:

1. Comparing to the reference target value provided by SPEAG, the validation data should be within its specification of 25 %. The result indicates the system check can meet the variation criterion and the plots can be referred to Appendix A of this report.
2. For E-Field, the deviation is **[(E-Field 1 + E-Field 2) / 2 – Target Value] / Target Value x 100%**

4.4 Maximum Target Conducted Power

The maximum conducted average power (Unit: dBm) including tune-up tolerance is shown as below.

Air Interface		Max. Tune-up Power			
		WWAN Antenna			
		ANT 0_B	ANT 0_C	ANT 1	ANT 6
GSM	GSM850	N/A	33.5	33.5	N/A
	EDGE850	N/A	27.5	27.5	N/A
	GSM1900	27.5	27.5	27.5	N/A
	EDGE1900	24.5	24.5	24.5	N/A
WCDMA	Band II	19.0	19.0	19.0	N/A
	Band IV	19.8	19.8	19.8	N/A
	Band V	N/A	22.0	22.0	N/A
CDMA	BC0	N/A	23.4	23.4	N/A
	BC1	19.4	19.4	19.4	N/A
	BC10	N/A	25.0	25.0	N/A
FDD-LTE	Band 2	20.0	20.0	20.0	N/A
	Band 4	21.8	21.8	21.8	N/A
	Band 5	N/A	22.0	22.0	N/A
	Band 7	18.9	N/A	18.9	N/A
	Band 12	N/A	23.5	23.5	N/A
	Band 13	N/A	23.3	23.3	N/A
	Band 14	N/A	23.8	23.8	N/A
	Band 17	N/A	23.3	23.3	N/A
	Band 25	20.0	20.0	20.0	N/A
	Band 26	N/A	22.0	22.0	N/A
	Band 30	18.9	18.9	18.9	N/A
	Band 66	21.8	21.8	21.8	N/A
	Band 71	N/A	25.0	25.0	N/A

Air Interface			Max. Tune-up Power			
			WWAN Antenna			
			ANT 0_B	ANT 0_C	ANT 1	ANT 6
TDD-LTE	Band 38	QPSK	20.5	20.5	20.5	N/A
		16QAM	20.5	20.5	20.5	N/A
		64QAM	20.5	20.5	20.5	N/A
	Band 41 (PC2)	QPSK	22.9	22.9	22.9	N/A
		16QAM	22.9	22.9	22.9	N/A
		64QAM	22.9	22.9	22.9	N/A
	Band 41 (PC3)	QPSK	20.9	20.9	20.9	N/A
		16QAM	20.9	20.9	20.9	N/A
		64QAM	20.9	20.9	20.9	N/A
	Band 48	QPSK	N/A	N/A	21.9	21.9
		16QAM	N/A	N/A	21.9	21.9
		64QAM	N/A	N/A	21.9	21.9

Air Interface		Max. Tune-up Power		
		WLAN Antenna		
		ANT 2	ANT 4_B	ANT 2 + ANT 4_B
WLAN 2.4G	802.11b	23.0	23.0	26.0
	802.11g	21.5	21.5	24.5
	802.11n HT20	21.5	21.0	24.5
	802.11ac VHT20	21.0	21.0	24.5

Air Interface		Max. Tune-up Power		
		WLAN Antenna		
		ANT 4_B	ANT 5_A	ANT 4_B + ANT 5_A
WLAN 5.2G	802.11a	19.0	19.0	22.0
	802.11n HT20	19.0	19.0	22.0
	802.11n HT40	20.0	20.0	23.0
	802.11ac VHT20	19.0	19.0	22.0
	802.11ac VHT40	20.0	20.0	23.0
	802.11ac VHT80	14.5	14.5	17.5
WLAN 5.3G	802.11a	19.0	19.0	22.0
	802.11n HT20	19.0	19.0	22.0
	802.11n HT40	21.0	21.0	24.0
	802.11ac VHT20	19.0	19.0	22.0
	802.11ac VHT40	21.0	21.0	24.0
	802.11ac VHT80	17.0	17.0	20.0
WLAN 5.6G	802.11a	19.0	19.0	22.0
	802.11n HT20	19.0	19.0	22.0
	802.11n HT40	21.0	21.0	24.0
	802.11ac VHT20	19.0	19.0	22.0
	802.11ac VHT40	21.0	21.0	24.0
	802.11ac VHT80	21.0	21.0	24.0
WLAN 5.8G	802.11a	21.0	21.0	24.0
	802.11n HT20	21.0	21.0	24.0
	802.11n HT40	21.0	21.0	24.0
	802.11ac VHT20	21.0	21.0	24.0
	802.11ac VHT40	21.0	21.0	24.0
	802.11ac VHT80	21.0	21.0	24.0

4.5 Low Power Exemption Evaluation

According to ANSI C63.19-2011 section 4, RF air interface technologies that have low power have been found to produce sufficiently low RF interference potential, so it is possible to exempt them from the product testing. An RF air interface technology of a device is exempt from testing when its average antenna input power plus its worst-case MIF is ≤ 17 dBm for any of its operating modes. If a device supports multiple RF air interfaces, each RF air interface shall be evaluated individually. An RF air interface technology that is exempted from testing by above method could be rated as M4.

The low power exemption for this device is analyzed in below.

Air Interface			Max. Tune-up Power (dBm)	Worst Case MIF (dB)	Power + MIF (dB)	C63.19 Testing Required
GSM	GSM850		33.5	3.63	37.13	**YES**
	EDGE850		27.5	3.75	31.25	YES[1]
	GSM1900		27.5	3.63	31.13	**YES**
	EDGE1900		24.5	3.75	28.25	YES[1]
WCDMA	AMR		22.0	-25.43	-3.43	No
	HSPA		21.0	-20.39	0.61	No
CDMA	Full Frame Rate		25.0	-19.71	5.29	No
	1/8th Frame Rate		25.0	3.26	28.26	**YES**
	EVDO		25.0	-17.67	7.33	No
FDD-LTE			25.0	-9.76	15.24	No
TDD-LTE	QPSK		22.9	-1.62	21.28	YES[2]
	16QAM		22.9	-1.44	21.46	**YES**
	64QAM		22.9	-1.54	21.36	YES[2]
WLAN 2.4G	802.11b	ANT 2	23.0	-2.02	20.98	YES[3]
		ANT 4_B	23.0	-2.02	20.98	YES[3]
		ANT 2 + ANT 4_B	26.0	-2.02	23.98	YES[3]
	802.11g	ANT 2	21.5	0.12	21.62	**YES**
		ANT 4_B	21.5	0.12	21.62	**YES**
		ANT 2 + ANT 4_B	24.5	0.12	24.62	**YES**
	802.11n HT20	ANT 2	21.5	-13.44	8.06	No
		ANT 4_B	21.0	-13.44	7.56	No
		ANT 2 + ANT 4_B	24.5	-13.44	11.06	No
	802.11ac VHT20	ANT 2	21.0	-5.57	15.43	No
		ANT 4_B	21.0	-5.57	15.43	No
		ANT 2 + ANT 4_B	24.5	-5.57	18.93	**YES**

Note:

1. The EDGE data modes were considered but not tested because GSM voice mode was worst case for the GSM air interface.
2. The TDD-LTE 16QAM/64QAM data modes were considered but not tested because QPSK mode was worst case for the TDD-LTE air interface.
3. The 802.11b modes were considered but not tested because 802.11g mode was worst case for the WLAN 2.4G air interface.

Air Interface			Max. Tune-up Power (dBm)	Worst Case MIF (dB)	Power + MIF (dB)	C63.19 Testing Required
WLAN 5.2G	802.11a	ANT 4_B	19.0	-3.15	15.85	No
		ANT 5_A	19.0	-3.15	15.85	No
		ANT 4_B + ANT 5_A	22.0	-3.15	18.85	**YES**
	802.11n HT20	ANT 4_B	19.0	-13.44	5.56	No
		ANT 5_A	19.0	-13.44	5.56	No
		ANT 4_B + ANT 5_A	22.0	-13.44	8.56	No
	802.11n HT40	ANT 4_B	20.0	-13.44	6.56	No
		ANT 5_A	20.0	-13.44	6.56	No
		ANT 4_B + ANT 5_A	23.0	-13.44	9.56	No
	802.11ac VHT20	ANT 4_B	19.0	-5.57	13.43	No
		ANT 5_A	19.0	-5.57	13.43	No
		ANT 4_B + ANT 5_A	22.0	-5.57	16.43	No
	802.11ac VHT40	ANT 4_B	20.0	-5.57	14.43	No
		ANT 5_A	20.0	-5.57	14.43	No
		ANT 4_B + ANT 5_A	23.0	-5.57	17.43	**YES**
	802.11ac VHT80	ANT 4_B	14.5	-5.57	8.93	No
		ANT 5_A	14.5	-5.57	8.93	No
		ANT 4_B + ANT 5_A	17.5	-5.57	11.93	No
WLAN 5.3G	802.11a	ANT 4_B	19.0	-3.15	15.85	No
		ANT 5_A	19.0	-3.15	15.85	No
		ANT 4_B + ANT 5_A	22.0	-3.15	18.85	**YES**
	802.11n HT20	ANT 4_B	19.0	-13.44	5.56	No
		ANT 5_A	19.0	-13.44	5.56	No
		ANT 4_B + ANT 5_A	22.0	-13.44	8.56	No
	802.11n HT40	ANT 4_B	21.0	-13.44	7.56	No
		ANT 5_A	21.0	-13.44	7.56	No
		ANT 4_B + ANT 5_A	24.0	-13.44	10.56	No
	802.11ac VHT20	ANT 4_B	19.0	-5.57	13.43	No
		ANT 5_A	19.0	-5.57	13.43	No
		ANT 4_B + ANT 5_A	22.0	-5.57	16.43	No
	802.11ac VHT40	ANT 4_B	21.0	-5.57	15.43	No
		ANT 5_A	21.0	-5.57	15.43	No
		ANT 4_B + ANT 5_A	24.0	-5.57	18.43	**YES**
	802.11ac VHT80	ANT 4_B	17.0	-5.57	11.43	No
		ANT 5_A	17.0	-5.57	11.43	No
		ANT 4_B + ANT 5_A	20.0	-5.57	14.43	No

Air Interface			Max. Tune-up Power (dBm)	Worst Case MIF (dB)	Power + MIF (dB)	C63.19 Testing Required
WLAN 5.6G	802.11a	ANT 4_B	19.0	-3.15	15.85	No
		ANT 5_A	19.0	-3.15	15.85	No
		ANT 4_B + ANT 5_A	22.0	-3.15	18.85	**YES**
	802.11n HT20	ANT 4_B	19.0	-13.44	5.56	No
		ANT 5_A	19.0	-13.44	5.56	No
		ANT 4_B + ANT 5_A	22.0	-13.44	8.56	No
	802.11n HT40	ANT 4_B	21.0	-13.44	7.56	No
		ANT 5_A	21.0	-13.44	7.56	No
		ANT 4_B + ANT 5_A	24.0	-13.44	10.56	No
	802.11ac VHT20	ANT 4_B	19.0	-5.57	13.43	No
		ANT 5_A	19.0	-5.57	13.43	No
		ANT 4_B + ANT 5_A	22.0	-5.57	16.43	No
	802.11ac VHT40	ANT 4_B	21.0	-5.57	15.43	No
		ANT 5_A	21.0	-5.57	15.43	No
		ANT 4_B + ANT 5_A	24.0	-5.57	18.43	**YES**
	802.11ac VHT80	ANT 4_B	21.0	-5.57	15.43	No
		ANT 5_A	21.0	-5.57	15.43	No
		ANT 4_B + ANT 5_A	24.0	-5.57	18.43	**YES**
WLAN 5.8G	802.11a	ANT 4_B	21.0	-3.15	17.85	**YES**
		ANT 5_A	21.0	-3.15	17.85	**YES**
		ANT 4_B + ANT 5_A	24.0	-3.15	20.85	**YES**
	802.11n HT20	ANT 4_B	21.0	-13.44	7.56	No
		ANT 5_A	21.0	-13.44	7.56	No
		ANT 4_B + ANT 5_A	24.0	-13.44	10.56	No
	802.11n HT40	ANT 4_B	21.0	-13.44	7.56	No
		ANT 5_A	21.0	-13.44	7.56	No
		ANT 4_B + ANT 5_A	24.0	-13.44	10.56	No
	802.11ac VHT20	ANT 4_B	21.0	-5.57	15.43	No
		ANT 5_A	21.0	-5.57	15.43	No
		ANT 4_B + ANT 5_A	24.0	-5.57	18.43	**YES**
	802.11ac VHT40	ANT 4_B	21.0	-5.57	15.43	No
		ANT 5_A	21.0	-5.57	15.43	No
		ANT 4_B + ANT 5_A	24.0	-5.57	18.43	**YES**
	802.11ac VHT80	ANT 4_B	21.0	-5.57	15.43	No
		ANT 5_A	21.0	-5.57	15.43	No
		ANT 4_B + ANT 5_A	24.0	-5.57	18.43	**YES**

4.6 Measured Conducted Power Results

The measuring conducted average power (Unit: dBm) are shown as below.

Band	GSM850		
Channel	128	189	251
Frequency (MHz)	824.2	836.4	848.8
GSM (GMSK, 1 Tx Slot) (ANT 0_A & ANT 1)	32.80	32.59	32.61

Band	GSM1900		
Channel	512	661	810
Frequency (MHz)	1850.2	1880.0	1909.8
GSM (GMSK, 1 Tx Slot) (ANT 0_B & ANT 0_C & ANT 1)	26.14	26.19	26.08

Band	CDMA BC0			CDMA BC10		
Channel	1013	384	777	476	580	684
Frequency (MHz)	824.70	836.52	848.31	817.9	820.5	823.1
RC1+SO3, 1/8th Rate (ANT 0_A & ANT 1)	21.48	21.47	21.42	23.70	23.65	23.57

Band	CDMA BC1		
Channel	25	600	1175
Frequency (MHz)	1851.25	1880.00	1908.75
RC1+SO3, 1/8th Rate (ANT 0_B & ANT 1)	17.40	17.43	17.44

Band	LTE Band 38 (ANT 0_B & ANT 0_C & ANT 1)					
BW	Modulation	RB Size	RB Offset	Low	Mid	High
		Channel		37850	38000	38150
		Frequency (MHz)		2580	2595	2610
20M	16QAM	1	0	18.66	18.54	18.53
		1	50	18.64	18.50	18.53
		1	99	18.60	18.56	18.86
		50	0	18.85	18.77	18.66
		50	25	18.69	18.81	18.85
		50	50	18.71	18.74	18.96
		100	0	18.84	18.84	18.85

Band	LTE Band 41 PC3 (ANT 0_B & ANT 0_C & ANT 1)						
BW	Modulation	RB Size	RB Offset	Low	Low-Mid	Mid	High-Mid	High
		Channel		39750	40185	40620	41055	41490
		Frequency (MHz)		2506	2549.5	2593	2636.5	2680
20M	16QAM	1	0	18.85	18.79	18.70	18.60	18.62
		1	50	18.82	18.78	18.69	18.62	18.61
		1	99	18.79	18.90	18.61	18.62	18.76
		50	0	18.92	18.80	18.81	18.86	18.68
		50	25	18.92	18.73	18.79	18.90	18.91
		50	50	18.94	18.92	18.78	18.81	18.86
		100	0	18.91	18.88	18.76	18.88	18.89

Band	LTE Band 41 PC2 (ANT 0_B & ANT 0_C & ANT 1)							
BW	Modulation	RB Size	RB Offset	Low	Low-Mid	Mid	High-Mid	High
		Channel		39750	40185	40620	41055	41490
		Frequency (MHz)		2506	2549.5	2593	2636.5	2680
20M	16QAM	1	0	21.12	21.19	20.91	20.92	20.93
		1	50	21.06	21.15	21.05	20.93	21.00
		1	99	21.13	21.28	20.90	20.93	20.99
		50	0	21.12	21.18	21.19	21.20	21.08
		50	25	21.27	21.09	20.99	21.30	21.15
		50	50	21.19	21.19	21.11	21.11	21.14
		100	0	21.22	21.16	21.14	21.18	21.29

Band	LTE Band 48 (ANT 1 & ANT 6)						
BW	Modulation	RB Size	RB Offset	Low	Mid	Mid	High
		Channel		55340	55830	56150	56640
		Frequency (MHz)		3560	3609	3641	3690
20M	16QAM	1	0	19.91	20.09	20.10	20.03
		1	50	20.11	19.93	20.01	19.93
		1	99	20.10	20.08	20.18	20.16
		50	0	19.90	20.21	20.20	20.10
		50	25	20.03	19.96	19.90	19.90
		50	50	20.04	20.06	20.32	20.20
		100	0	19.93	20.17	20.14	20.13

Band	WLAN 2.4G					
Mode	Data Rate	Channel	Frequency (MHz)	Power ANT 2	Power ANT 4_B	Power ANT 2 + ANT 4_B
802.11g	6Mbps	1	2412	19.80	19.70	22.97
		6	2437	21.40	21.30	24.47
		11	2462	18.80	18.70	21.87
		12	2467	14.70	14.60	17.77
		13	2472	3.20	3.00	6.26
802.11ac VHT20	MCS0	1	2412	-	-	22.71
		6	2437	-	-	24.12
		11	2462	-	-	18.97
		12	2467	-	-	15.67
		13	2472	-	-	7.11

Band	WLAN 5.2G					
Mode	Data Rate	Channel	Frequency (MHz)	Power ANT 4_B	Power ANT 5_A	Power ANT 4_B + ANT 5_A
802.11a	6Mbps	36	5180	-	-	21.57
		40	5200	-	-	21.52
		44	5220	-	-	21.67
		48	5240	-	-	21.56
802.11ac VHT40	MCS0	38	5190	-	-	18.36
		46	5230	-	-	22.36

Band	WLAN 5.3G					
Mode	Data Rate	Channel	Frequency (MHz)	Power ANT 4_B	Power ANT 5_A	Power ANT 4_B + ANT 5_A
802.11a	6M	52	5260	-	-	21.61
		56	5280	-	-	21.66
		60	5300	-	-	21.51
		64	5320	-	-	21.56
802.11ac VHT40	MCS0	54	5270	-	-	23.56
		62	5310	-	-	19.81

Band	WLAN 5.6G					
Mode	Data Rate	Channel	Frequency (MHz)	Power ANT 4_B	Power ANT 5_A	Power ANT 4_B + ANT 5_A
802.11a	6M	100	5500	-	-	21.51
		116	5580	-	-	21.26
		124	5620	-	-	21.76
		132	5660	-	-	21.86
		140	5700	-	-	21.66
		144	5720	-	-	21.56
802.11ac VHT40	MCS0	102	5510	-	-	22.86
		110	5550	-	-	23.76
		126	5630	-	-	23.86
		134	5670	-	-	23.76
		142	5710	-	-	23.71
802.11ac VHT80	MCS0	106	5530	-	-	19.81
		122	5610	-	-	23.81
		138	5690	-	-	23.71

Band	WLAN 5.8G					
Mode	Data Rate	Channel	Frequency (MHz)	Power ANT 4_B	Power ANT 5_A	Power ANT 4_B + ANT 5_A
802.11a	6M	149	5745	20.50	20.60	23.66
		157	5785	20.40	20.40	23.71
		165	5825	20.50	20.50	23.81
802.11ac VHT20	MCS0	149	5745	-	-	23.56
		157	5785	-	-	23.56
		165	5825	-	-	23.66
802.11ac VHT40	MCS0	151	5755	-	-	23.61
		159	5795	-	-	23.66
802.11ac VHT80	MCS0	155	5775	-	-	23.67

4.7 HAC RF Emission Testing Results

Plot No.	Band	Mode	Channel	Transmit Antenna	Audio Interference Level (dB V/m)	FCC Limit (dB V/m)	FCC Margin (dB)	M-Rating
	GSM850	GSM Voice	128	ANT 0_C	36.21	45	-8.79	M4
	GSM850	GSM Voice	189	ANT 0_C	35.24	45	-9.76	M4
	GSM850	GSM Voice	251	ANT 0_C	36.03	45	-8.97	M4
	GSM850	GSM Voice	128	ANT 1	36.27	45	-8.73	M4
	GSM850	GSM Voice	189	ANT 1	35.83	45	-9.17	M4
01	GSM850	GSM Voice	251	ANT 1	37.33	45	-7.67	M4
	GSM1900	GSM Voice	512	ANT 0_C	26.27	35	-8.73	M4
	GSM1900	GSM Voice	661	ANT 0_C	28.65	35	-6.35	M4
	GSM1900	GSM Voice	810	ANT 0_C	26.59	35	-8.41	M4
	GSM1900	GSM Voice	512	ANT 1	27.05	35	-7.95	M4
02	GSM1900	GSM Voice	661	ANT 1	34.18	35	-0.82	M3
	GSM1900	GSM Voice	810	ANT 1	29.14	35	-5.86	M4
	GSM1900	GSM Voice	512	ANT 0_B	26.35	35	-8.65	M4
	GSM1900	GSM Voice	661	ANT 0_B	28.75	35	-6.25	M4
	GSM1900	GSM Voice	810	ANT 0_B	26.91	35	-8.09	M4
	CDMA BC0	RC1+SO3, 1/8th Rate	1013	ANT 0_C	27.78	45	-17.22	M4
	CDMA BC0	RC1+SO3, 1/8th Rate	384	ANT 0_C	33.63	45	-11.37	M4
	CDMA BC0	RC1+SO3, 1/8th Rate	777	ANT 0_C	29.48	45	-15.52	M4
	CDMA BC0	RC1+SO3, 1/8th Rate	1013	ANT 1	27.95	45	-17.05	M4
03	CDMA BC0	RC1+SO3, 1/8th Rate	384	ANT 1	36.16	45	-8.84	M4
	CDMA BC0	RC1+SO3, 1/8th Rate	777	ANT 1	28.12	45	-16.88	M4
	CDMA BC1	RC1+SO3, 1/8th Rate	25	ANT 0_C	22.14	35	-12.86	M4
	CDMA BC1	RC1+SO3, 1/8th Rate	600	ANT 0_C	22.63	35	-12.37	M4
	CDMA BC1	RC1+SO3, 1/8th Rate	1175	ANT 0_C	26.15	35	-8.85	M4
	CDMA BC1	RC1+SO3, 1/8th Rate	25	ANT 1	21.97	35	-13.03	M4
	CDMA BC1	RC1+SO3, 1/8th Rate	600	ANT 1	22.81	35	-12.19	M4
	CDMA BC1	RC1+SO3, 1/8th Rate	1175	ANT 1	23.58	35	-11.42	M4
	CDMA BC1	RC1+SO3, 1/8th Rate	25	ANT 0_B	21.91	35	-13.09	M4
	CDMA BC1	RC1+SO3, 1/8th Rate	600	ANT 0_B	22.62	35	-12.38	M4
04	CDMA BC1	RC1+SO3, 1/8th Rate	1175	ANT 0_B	27.42	35	-7.58	M4
	CDMA BC10	RC1+SO3, 1/8th Rate	476	ANT 0_C	31.73	45	-13.27	M4
	CDMA BC10	RC1+SO3, 1/8th Rate	580	ANT 0_C	27.87	45	-17.13	M4
05	CDMA BC10	RC1+SO3, 1/8th Rate	684	ANT 0_C	32.87	45	-12.13	M4
	CDMA BC10	RC1+SO3, 1/8th Rate	476	ANT 1	28.11	45	-16.89	M4
	CDMA BC10	RC1+SO3, 1/8th Rate	580	ANT 1	28.24	45	-16.76	M4
	CDMA BC10	RC1+SO3, 1/8th Rate	684	ANT 1	28.08	45	-16.92	M4
	LTE B38	20M, 16QAM, 1RB, OS0	37850	ANT 0_C	24.42	35	-10.58	M4
	LTE B38	20M, 16QAM, 1RB, OS0	38000	ANT 0_C	26.01	35	-8.99	M4
	LTE B38	20M, 16QAM, 1RB, OS0	38150	ANT 0_C	25.2	35	-9.8	M4
	LTE B38	20M, 16QAM, 1RB, OS0	37850	ANT 1	24.4	35	-10.6	M4
06	LTE B38	20M, 16QAM, 1RB, OS0	38000	ANT 1	26.62	35	-8.58	M4
	LTE B38	20M, 16QAM, 1RB, OS0	38150	ANT 1	24.77	35	-10.23	M4
	LTE B38	20M, 16QAM, 1RB, OS0	37850	ANT 0_B	24.47	35	-10.53	M4
	LTE B38	20M, 16QAM, 1RB, OS0	38000	ANT 0_B	25.94	35	-9.06	M4
	LTE B38	20M, 16QAM, 1RB, OS0	38150	ANT 0_B	25.18	35	-9.82	M4

Plot No.	Band	Mode	Channel	Transmit Antenna	Audio Interference Level (dB V/m)	FCC Limit (dB V/m)	FCC Margin (dB)	M-Rating
	LTE B41 PC3	20M, 16QAM, 1RB, OS0	39750	ANT 0_C	24.25	35	-10.75	M4
	LTE B41 PC3	20M, 16QAM, 1RB, OS0	40185	ANT 0_C	23.05	35	-11.95	M4
07	LTE B41 PC3	20M, 16QAM, 1RB, OS0	40620	ANT 0_C	25.87	35	-9.32	M4
	LTE B41 PC3	20M, 16QAM, 1RB, OS0	41055	ANT 0_C	24.28	35	-10.72	M4
	LTE B41 PC3	20M, 16QAM, 1RB, OS0	41490	ANT 0_C	24.35	35	-10.65	M4
	LTE B41 PC3	20M, 16QAM, 1RB, OS0	39750	ANT 1	24.76	35	-10.24	M4
	LTE B41 PC3	20M, 16QAM, 1RB, OS0	40185	ANT 1	22.83	35	-12.17	M4
	LTE B41 PC3	20M, 16QAM, 1RB, OS0	40620	ANT 1	24.23	35	-10.77	M4
	LTE B41 PC3	20M, 16QAM, 1RB, OS0	41055	ANT 1	24.8	35	-10.2	M4
	LTE B41 PC3	20M, 16QAM, 1RB, OS0	41490	ANT 1	24.72	35	-10.28	M4
	LTE B41 PC3	20M, 16QAM, 1RB, OS0	39750	ANT 0_B	24.34	35	-10.66	M4
	LTE B41 PC3	20M, 16QAM, 1RB, OS0	40185	ANT 0_B	22.87	35	-12.13	M4
	LTE B41 PC3	20M, 16QAM, 1RB, OS0	40620	ANT 0_B	25.46	35	-9.54	M4
	LTE B41 PC3	20M, 16QAM, 1RB, OS0	41055	ANT 0_B	24.61	35	-10.39	M4
	LTE B41 PC3	20M, 16QAM, 1RB, OS0	41490	ANT 0_B	24.33	35	-10.67	M4
	LTE B41 PC2	20M, 16QAM, 1RB, OS0	40620	ANT 0_C	23.83	35	-11.17	M4
	LTE B48	20M, 16QAM, 1RB, OS0	55340	ANT 6	21.35	35	-13.65	M4
	LTE B48	20M, 16QAM, 1RB, OS0	55830	ANT 6	21.93	35	-13.07	M4
	LTE B48	20M, 16QAM, 1RB, OS0	56150	ANT 6	22.72	35	-12.28	M4
08	LTE B48	20M, 16QAM, 1RB, OS0	55640	ANT 6	23.56	35	-11.63	M4
	LTE B48	20M, 16QAM, 1RB, OS0	55340	ANT 1	21.31	35	-13.69	M4
	LTE B48	20M, 16QAM, 1RB, OS0	55830	ANT 1	21.98	35	-13.02	M4
	LTE B48	20M, 16QAM, 1RB, OS0	56150	ANT 1	22.65	35	-12.35	M4
	LTE B48	20M, 16QAM, 1RB, OS0	55640	ANT 1	23.1	35	-11.9	M4
	WLAN 2.4G	802.11g	1	ANT 2	27.19	35	-7.81	M4
	WLAN 2.4G	802.11g	6	ANT 2	28.46	35	-6.54	M4
	WLAN 2.4G	802.11g	11	ANT 2	26.12	35	-8.88	M4
	WLAN 2.4G	802.11g	12	ANT 2	22.07	35	-12.93	M4
	WLAN 2.4G	802.11g	13	ANT 2	13.7	35	-21.3	M4
	WLAN 2.4G	802.11g	1	ANT 4_B	34.86	35	-0.14	M3
	WLAN 2.4G	802.11g	6	ANT 4_B	34.51	35	-0.49	M3
	WLAN 2.4G	802.11g	11	ANT 4_B	32.84	35	-2.16	M3
	WLAN 2.4G	802.11g	12	ANT 4_B	28.49	35	-6.51	M4
	WLAN 2.4G	802.11g	13	ANT 4_B	17.43	35	-17.57	M4
09	WLAN 2.4G	802.11g	1	ANT 2 + ANT 4_B	34.93	35	-0.07	M3
	WLAN 2.4G	802.11g	6	ANT 2 + ANT 4_B	34.43	35	-0.57	M3
	WLAN 2.4G	802.11g	11	ANT 2 + ANT 4_B	33.18	35	-1.82	M3
	WLAN 2.4G	802.11g	12	ANT 2 + ANT 4_B	28.83	35	-6.17	M4
	WLAN 2.4G	802.11g	13	ANT 2 + ANT 4_B	18.83	35	-16.17	M4
	WLAN 2.4G	802.11ac VHT20	1	ANT 2 + ANT 4_B	29.11	35	-5.89	M4
	WLAN 2.4G	802.11ac VHT20	6	ANT 2 + ANT 4_B	30.38	35	-4.62	M3
	WLAN 2.4G	802.11ac VHT20	11	ANT 2 + ANT 4_B	24.67	35	-10.33	M4
	WLAN 2.4G	802.11ac VHT20	12	ANT 2 + ANT 4_B	21.09	35	-13.91	M4
	WLAN 2.4G	802.11ac VHT20	13	ANT 2 + ANT 4_B	13.17	35	-21.83	M4

Plot No.	Band	Mode	Channel	Transmit Antenna	Audio Interference Level (dB V/m)	FCC Limit (dB V/m)	FCC Margin (dB)	M-Rating
	WLAN 5.2G	802.11a	36	ANT 4_B + ANT 5_A	23.84	35	-11.16	M4
	WLAN 5.2G	802.11a	40	ANT 4_B + ANT 5_A	23.75	35	-11.25	M4
	WLAN 5.2G	802.11a	44	ANT 4_B + ANT 5_A	24.02	35	-10.98	M4
10	WLAN 5.2G	802.11a	48	ANT 4_B + ANT 5_A	24.73	35	-10.27	M4
	WLAN 5.2G	802.11ac VHT40	38	ANT 4_B + ANT 5_A	18.28	35	-16.72	M4
	WLAN 5.2G	802.11ac VHT40	46	ANT 4_B + ANT 5_A	23.41	35	-11.59	M4
	WLAN 5.3G	802.11a	52	ANT 4_B + ANT 5_A	25.16	35	-9.84	M4
	WLAN 5.3G	802.11a	56	ANT 4_B + ANT 5_A	25.14	35	-9.86	M4
	WLAN 5.3G	802.11a	60	ANT 4_B + ANT 5_A	25.42	35	-9.58	M4
11	WLAN 5.3G	802.11a	64	ANT 4_B + ANT 5_A	25.82	35	-9.18	M4
	WLAN 5.3G	802.11ac VHT40	54	ANT 4_B + ANT 5_A	24.64	35	-10.36	M4
	WLAN 5.3G	802.11ac VHT40	62	ANT 4_B + ANT 5_A	21.97	35	-13.03	M4
	WLAN 5.6G	802.11a	100	ANT 4_B + ANT 5_A	27.38	35	-7.62	M4
	WLAN 5.6G	802.11a	116	ANT 4_B + ANT 5_A	27.75	35	-7.25	M4
	WLAN 5.6G	802.11a	124	ANT 4_B + ANT 5_A	28.63	35	-6.37	M4
	WLAN 5.6G	802.11a	132	ANT 4_B + ANT 5_A	28.92	35	-6.08	M4
12	WLAN 5.6G	802.11a	140	ANT 4_B + ANT 5_A	29.29	35	-5.71	M4
	WLAN 5.6G	802.11a	144	ANT 4_B + ANT 5_A	29.17	35	-5.83	M4
	WLAN 5.6G	802.11ac VHT40	102	ANT 4_B + ANT 5_A	27.08	35	-7.92	M4
	WLAN 5.6G	802.11ac VHT40	110	ANT 4_B + ANT 5_A	27.6	35	-7.4	M4
	WLAN 5.6G	802.11ac VHT40	126	ANT 4_B + ANT 5_A	28.39	35	-6.61	M4
	WLAN 5.6G	802.11ac VHT40	134	ANT 4_B + ANT 5_A	28.71	35	-6.29	M4
	WLAN 5.6G	802.11ac VHT40	142	ANT 4_B + ANT 5_A	28.85	35	-6.15	M4
	WLAN 5.6G	802.11ac VHT80	106	ANT 4_B + ANT 5_A	24.09	35	-10.91	M4
	WLAN 5.6G	802.11ac VHT80	122	ANT 4_B + ANT 5_A	27.93	35	-7.07	M4
	WLAN 5.6G	802.11ac VHT80	138	ANT 4_B + ANT 5_A	28.73	35	-6.27	M4
	WLAN 5.8G	802.11a	149	ANT 4_B	31.72	35	-3.28	M3
	WLAN 5.8G	802.11a	157	ANT 4_B	31.29	35	-3.71	M3
	WLAN 5.8G	802.11a	165	ANT 4_B	31.57	35	-3.43	M3
	WLAN 5.8G	802.11a	149	ANT 5_A	22.93	35	-12.07	M4
	WLAN 5.8G	802.11a	157	ANT 5_A	23.07	35	-11.93	M4
	WLAN 5.8G	802.11a	165	ANT 5_A	22.87	35	-12.13	M4
13	WLAN 5.8G	802.11a	149	ANT 4_B + ANT 5_A	31.86	35	-3.14	M3
	WLAN 5.8G	802.11a	157	ANT 4_B + ANT 5_A	31.69	35	-3.31	M3
	WLAN 5.8G	802.11a	165	ANT 4_B + ANT 5_A	31.83	35	-3.17	M3
	WLAN 5.8G	802.11ac VHT20	149	ANT 4_B + ANT 5_A	29.67	35	-5.33	M4
	WLAN 5.8G	802.11ac VHT20	157	ANT 4_B + ANT 5_A	29.48	35	-5.52	M4
	WLAN 5.8G	802.11ac VHT20	165	ANT 4_B + ANT 5_A	29.98	35	-5.02	M4
	WLAN 5.8G	802.11ac VHT40	151	ANT 4_B + ANT 5_A	29.6	35	-5.4	M4
	WLAN 5.8G	802.11ac VHT40	159	ANT 4_B + ANT 5_A	29.48	35	-5.52	M4
	WLAN 5.8G	802.11ac VHT80	155	ANT 4_B + ANT 5_A	29.64	35	-5.36	M4

Test Engineer： Willy Chang, and Eric Wu

5. Calibration of Test Equipment

Equipment	Manufacturer	Model	SN	Cal. Date	Cal. Interval
835MHz Calibration Dipole	SPEAG	CD835V3	1041	Mar. 20, 2017	3 Years
1880MHz Calibration Dipole	SPEAG	CD1880V3	1032	Apr. 25, 2017	3 Years
2450MHz Calibration Dipole	SPEAG	CD2450V3	1033	Apr. 25, 2017	3 Years
2600MHz Calibration Dipole	SPEAG	CD2600V3	1005	Mar. 14, 2018	3 Years
3500MHz Calibration Dipole	SPEAG	CD3500V3	1004	Dec. 04, 2017	3 Years
5500MHz Calibration Dipole	SPEAG	CD5500V3	1003	Mar. 14, 2018	3 Years
Isotropic E-Field Probe	SPEAG	EF3DV3	4049	Jan. 11, 2019	1 Year
Data Acquisition Electronics	SPEAG	DAE3	579	Aug. 27, 2018	1 Year
Data Acquisition Electronics	SPEAG	DAE4	861	May. 08, 2019	1 Year
Universal Radio Communication Tester	R&S	CMW500	152443	Aug. 20, 2018	1 Year
MXG Analog Signal Generator	Agilent	N5181A	MY50143868	Jul. 03, 2018	1 Year
Power Meter	Anritsu	ML2495A	1218009	Jul. 03, 2018	1 Year
Power Sensor	Anritsu	MA2411B	1207252	Jul. 03, 2018	1 Year
Test Arch Phantom	SPEAG	Arch	N/A	N/A	N/A

6. Measurement Uncertainty

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (E)	Standard Uncertainty (E)
Measurement System					
Probe Calibration	5.05	Normal	1	1	± 5.1 %
Axial Isotropy	4.7	Rectangular	√3	1	± 2.7 %
Sensor Displacement	16.5	Rectangular	√3	1	± 9.5 %
Boundary Effects	2.4	Rectangular	√3	1	± 1.4 %
Phantom Boundary Effect	7.2	Rectangular	√3	1	± 4.2 %
Linearity	4.7	Rectangular	√3	1	± 2.7 %
Scaling with PMR Calibration	10.0	Rectangular	√3	1	± 5.8 %
System Detection Limit	0.25	Rectangular	√3	1	± 0.1 %
Readout Electronics	0.3	Normal	1	1	± 0.3 %
Response Time	0.0	Rectangular	√3	1	± 0.0 %
Integration Time	2.6	Rectangular	√3	1	± 1.5 %
RF Ambient Conditions	3.0	Rectangular	√3	1	± 1.7 %
RF Reflections	12.0	Rectangular	√3	1	± 6.9 %
Probe Positioner	1.2	Rectangular	√3	1	± 0.7 %
Probe Positioning	4.7	Rectangular	√3	1	± 2.7 %
Extrap. and Interpolation	2.0	Rectangular	√3	1	± 1.2 %
Test Sample Related					
Device Positioning Vertical	4.7	Rectangular	√3	1	± 2.7 %
Device Positioning Lateral	1.0	Rectangular	√3	1	± 0.6 %
Device Holder and Phantom	2.4	Rectangular	√3	1	± 1.4 %
Power Drift	5.0	Rectangular	√3	1	± 2.9 %
Phantom and Setup Related					
Phantom Thickness	2.4	Rectangular	√3	1	± 1.4 %
Combined Standard Uncertainty					± 16.3 %
Coverage Factor for 95 %					K = 2
Expanded Uncertainty					**± 32.6 %**

Uncertainty budget for HAC RF Emission

7. Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Taiwan HwaYa EMC/RF/Safety Lab:
Add: No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan, R.O.C.
Tel: 886-3-318-3232
Fax: 886-3-327-0892

Taiwan LinKo EMC/RF Lab:
Add: No. 47-2, 14th Ling, Chia Pau Vil., Linkou Dist., New Taipei City 244, Taiwan, R.O.C.
Tel: 886-2-2605-2180
Fax: 886-2-2605-1924

Taiwan HsinChu EMC/RF/Telecom Lab:
Add: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 30078, Taiwan, R.O.C.
Tel: 886-3-666-8565
Fax: 886-3-666-8323

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

The road map of all our labs can be found in our web site also.

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Appendix A. Plots of System Verification

The plots for system verification with largest deviation for each system combination are shown as follows.

System Check_E-Field_835_190621

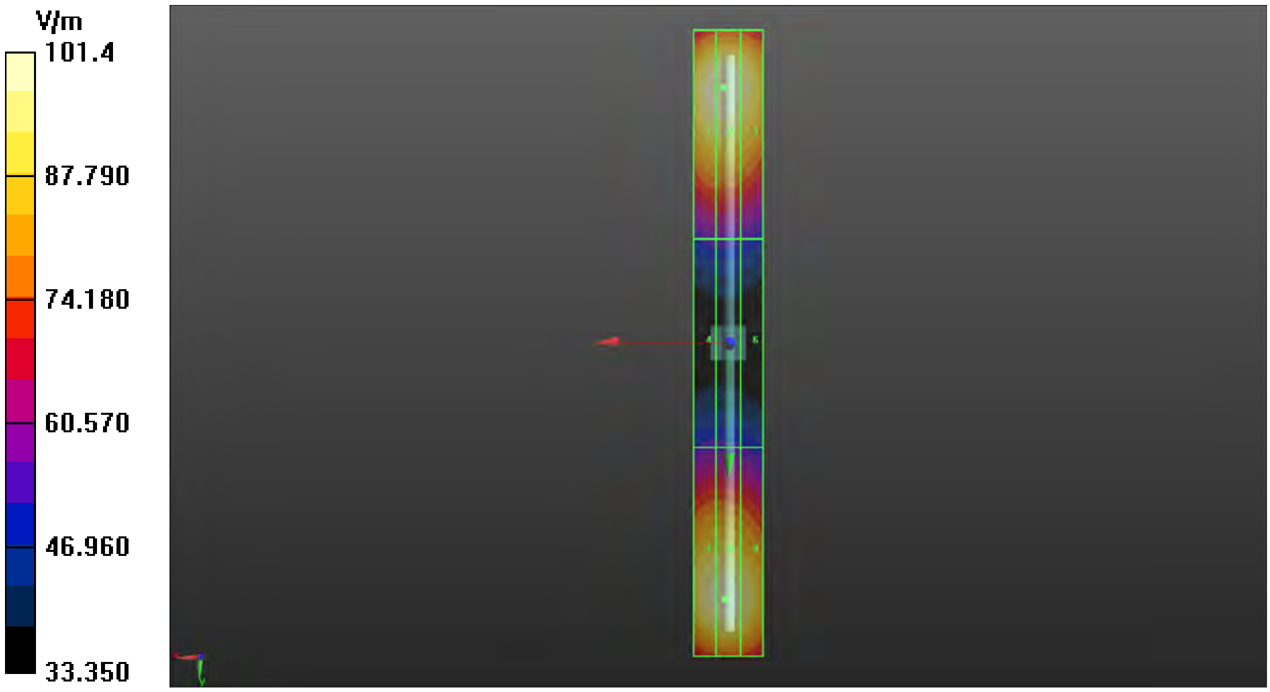
DUT: HAC Dipole 835 MHz; Type: CD835V3; SN: 1041

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.8 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1277; Calibrated: 2019/01/24
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (41x361x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 104.7 V/m; Power Drift = 0.01 dB
E-field emissions = 101.4 V/m

Grid 1 **M4** **101.0 V/m**	Grid 2 **M4** **101.4 V/m**	Grid 3 **M4** **97.84 V/m**
Grid 4 **M4** **54.92 V/m**	Grid 5 **M4** **55.12 V/m**	Grid 6 **M4** **53.39 V/m**
Grid 7 **M4** **99.23 V/m**	Grid 8 **M4** **99.98 V/m**	Grid 9 **M4** **96.94 V/m**



System Check_E-Field_1880_190627

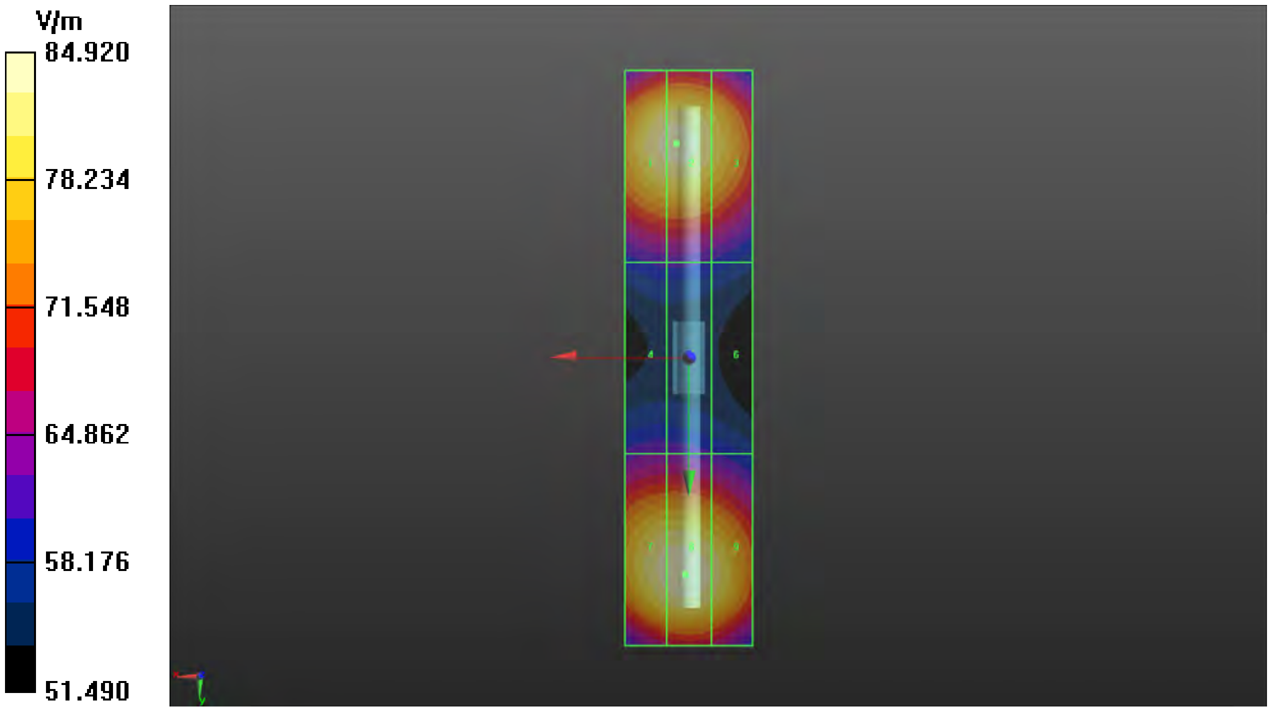
DUT: HAC Dipole 1880 MHz; Type: CD1880V3; SN: 1032

Communication System: CW; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.8 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn579; Calibrated: 2018/08/27
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (41x181x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 138.1 V/m; Power Drift = -0.01 dB
E-field emissions = 84.92 V/m

Grid 1 **M3** **83.75 V/m**	Grid 2 **M3** **83.95 V/m**	Grid 3 **M3** **80.96 V/m**
Grid 4 **M4** **62.86 V/m**	Grid 5 **M4** **62.84 V/m**	Grid 6 **M4** **61.04 V/m**
Grid 7 **M3** **84.08 V/m**	Grid 8 **M3** **84.92 V/m**	Grid 9 **M3** **82.64 V/m**



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2019/06/21

System Check_E-Field_2450_190621

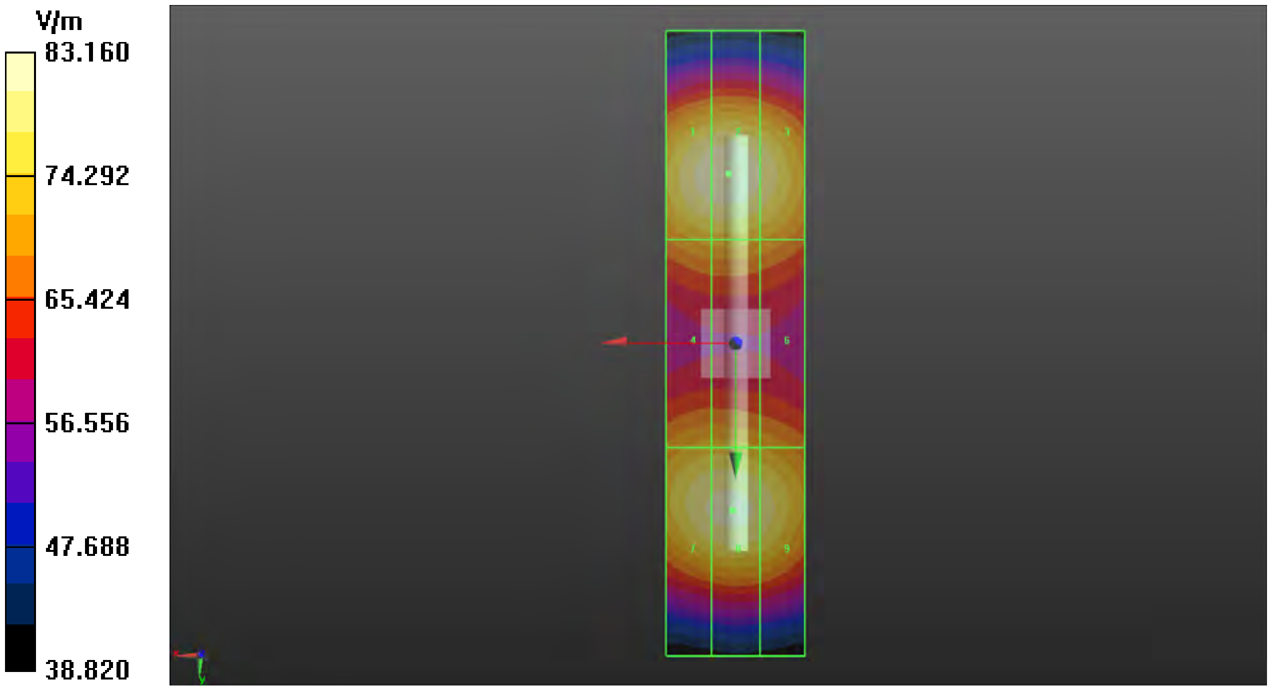
DUT: HAC Dipole 2450 MHz; Type: CD2450V3; SN: 1033

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.8 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1277; Calibrated: 2019/01/24
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (41x181x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 70.91 V/m; Power Drift = 0.09 dB
E-field emissions = 83.16 V/m

Grid 1 **M3** **82.53 V/m**	Grid 2 **M3** **83.16 V/m**	Grid 3 **M3** **80.49 V/m**
Grid 4 **M3** **73.04 V/m**	Grid 5 **M3** **73.13 V/m**	Grid 6 **M3** **71.64 V/m**
Grid 7 **M3** **80.70 V/m**	Grid 8 **M3** **81.46 V/m**	Grid 9 **M3** **79.47 V/m**



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2019/06/21

System Check_E-Field_2600_190621

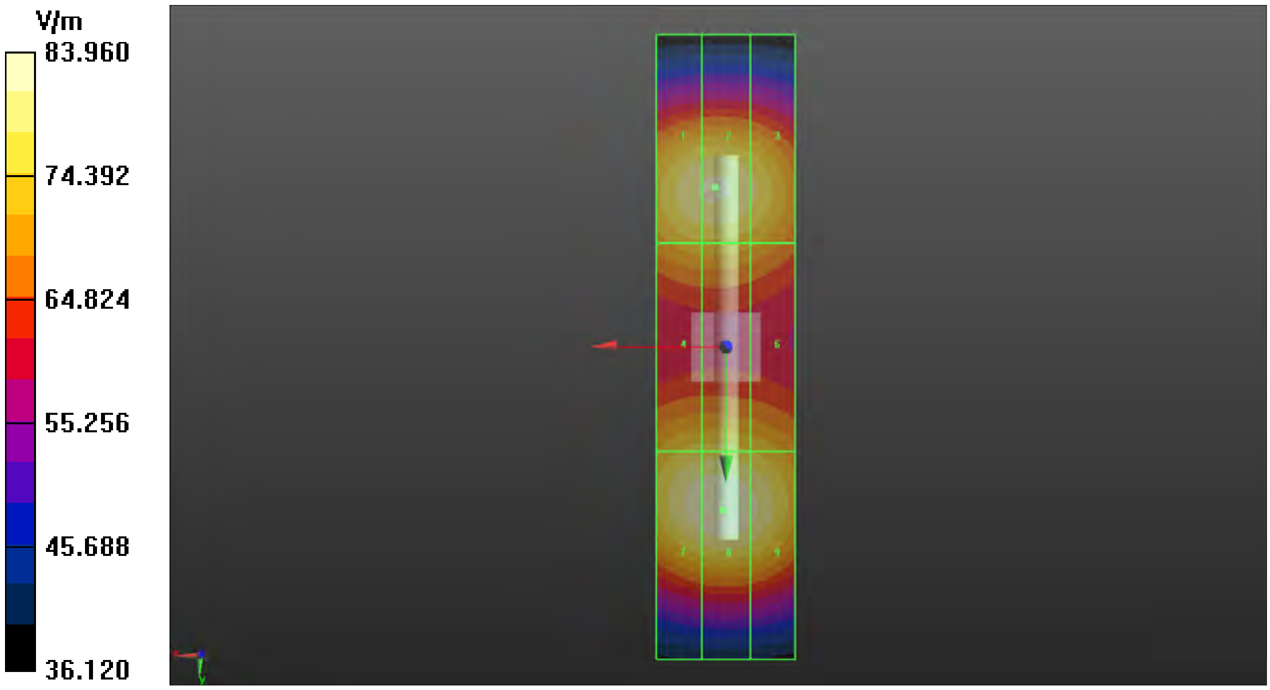
DUT: HAC Dipole 2600 MHz; Type: CD2600V3; SN: 1005

Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.8 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1277; Calibrated: 2019/01/24
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (41x181x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 65.84 V/m; Power Drift = 0.01 dB
E-field emissions = 83.96 V/m

Grid 1 **M3** **81.02 V/m**	Grid 2 **M3** **81.39 V/m**	Grid 3 **M3** **78.70 V/m**
Grid 4 **M3** **76.06 V/m**	Grid 5 **M3** **76.13 V/m**	Grid 6 **M3** **74.64 V/m**
Grid 7 **M3** **83.08 V/m**	Grid 8 **M3** **83.96 V/m**	Grid 9 **M3** **81.89 V/m**



System Check_E-Field_3500_190621

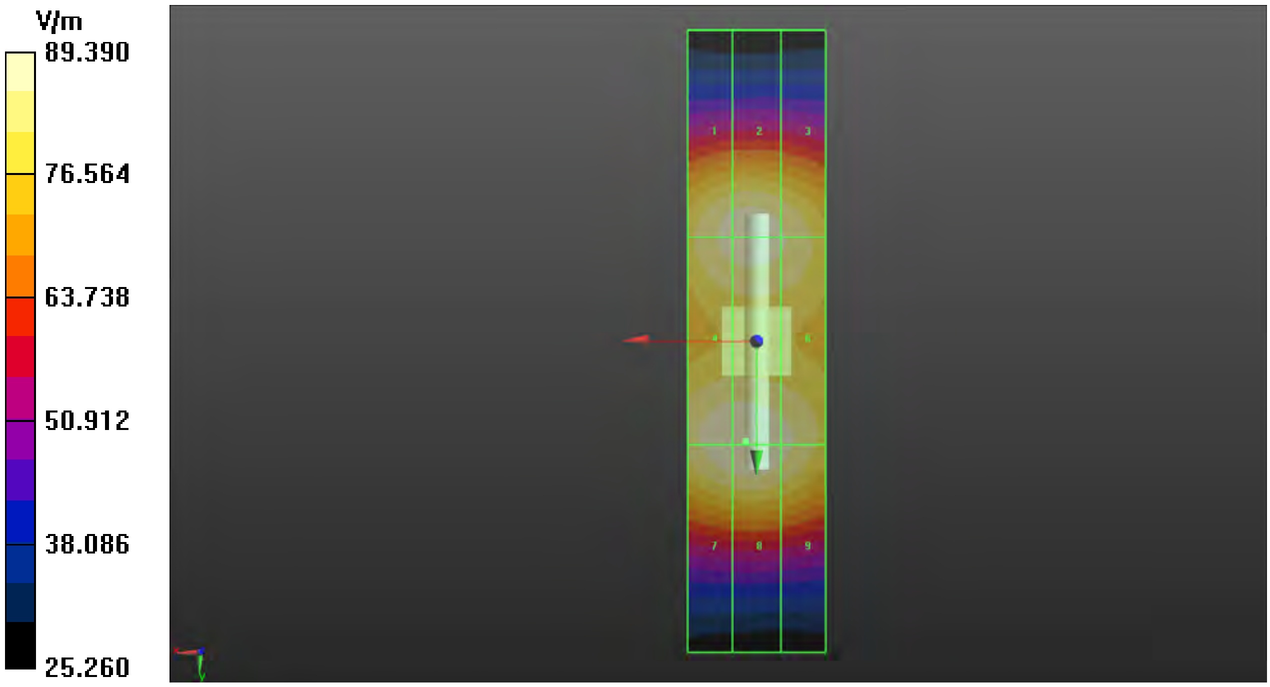
DUT: HAC Dipole 3500 MHz; Type: CD3500V3; SN: 1004

Communication System: CW; Frequency: 3500 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.8 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1277; Calibrated: 2019/01/24
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (41x181x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 35.94 V/m; Power Drift = 0.02 dB
E-field emissions = 89.39 V/m

Grid 1 **M3** **86.98 V/m**	Grid 2 **M3** **87.87 V/m**	Grid 3 **M3** **85.78 V/m**
Grid 4 **M3** **89.09 V/m**	Grid 5 **M3** **89.39 V/m**	Grid 6 **M3** **86.96 V/m**
Grid 7 **M3** **88.99 V/m**	Grid 8 **M3** **89.34 V/m**	Grid 9 **M3** **86.88 V/m**



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2019/06/28

System Check_E-Field_5500_190628

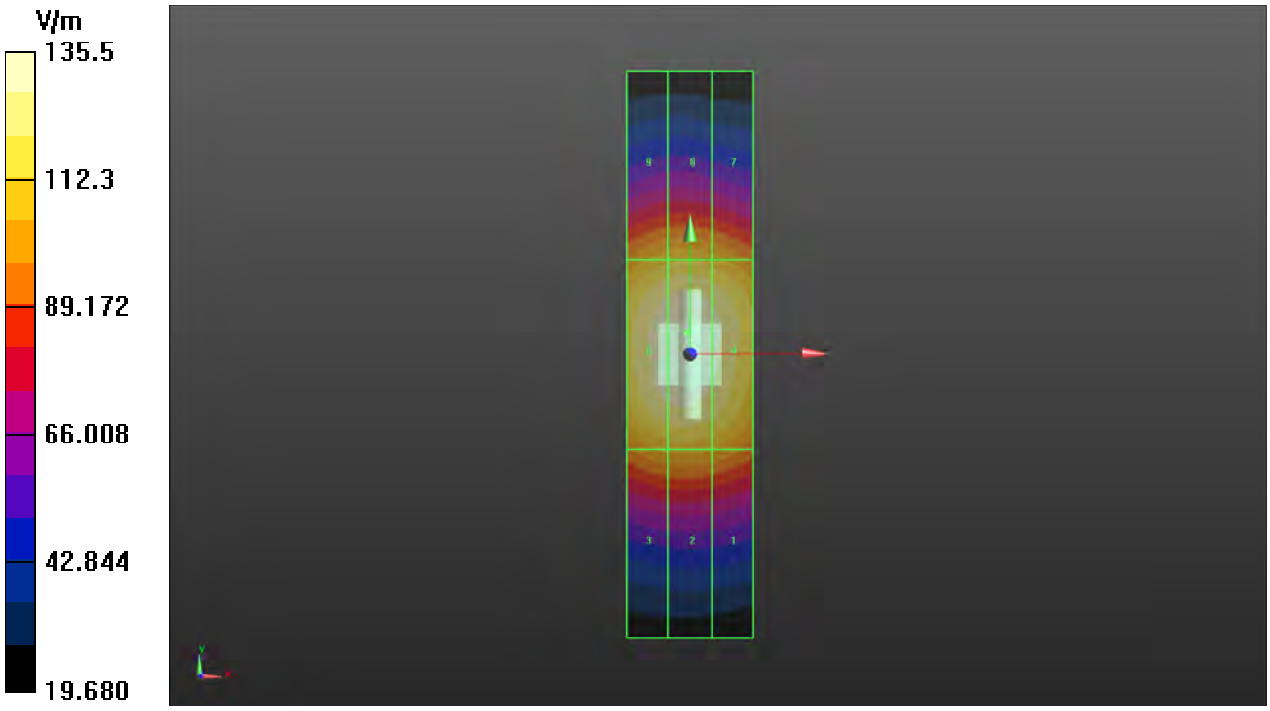
DUT: HAC Dipole 5500 MHz; Type: CD5500V3; SN: 1003

Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Ambient Temperature：23.8 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn579; Calibrated: 2018/08/27
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (41x181x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 35.34 V/m; Power Drift = -0.13 dB
E-field emissions = 135.5 V/m

Grid 1 **M3** **105.7 V/m**	Grid 2 **M3** **108.3 V/m**	Grid 3 **M3** **107.3 V/m**
Grid 4 **M2** **131.0 V/m**	Grid 5 **M2** **135.5 V/m**	Grid 6 **M2** **133.7 V/m**
Grid 7 **M3** **109.0 V/m**	Grid 8 **M2** **112.2 V/m**	Grid 9 **M3** **110.6 V/m**



Appendix B. Plots of HAC RF Emission Measurement

The plots for highest measured result in each wireless mode and frequency band combination are shown as follows.

P01 RF_E-Field_GSM850_GSM_Ch251_Ant1

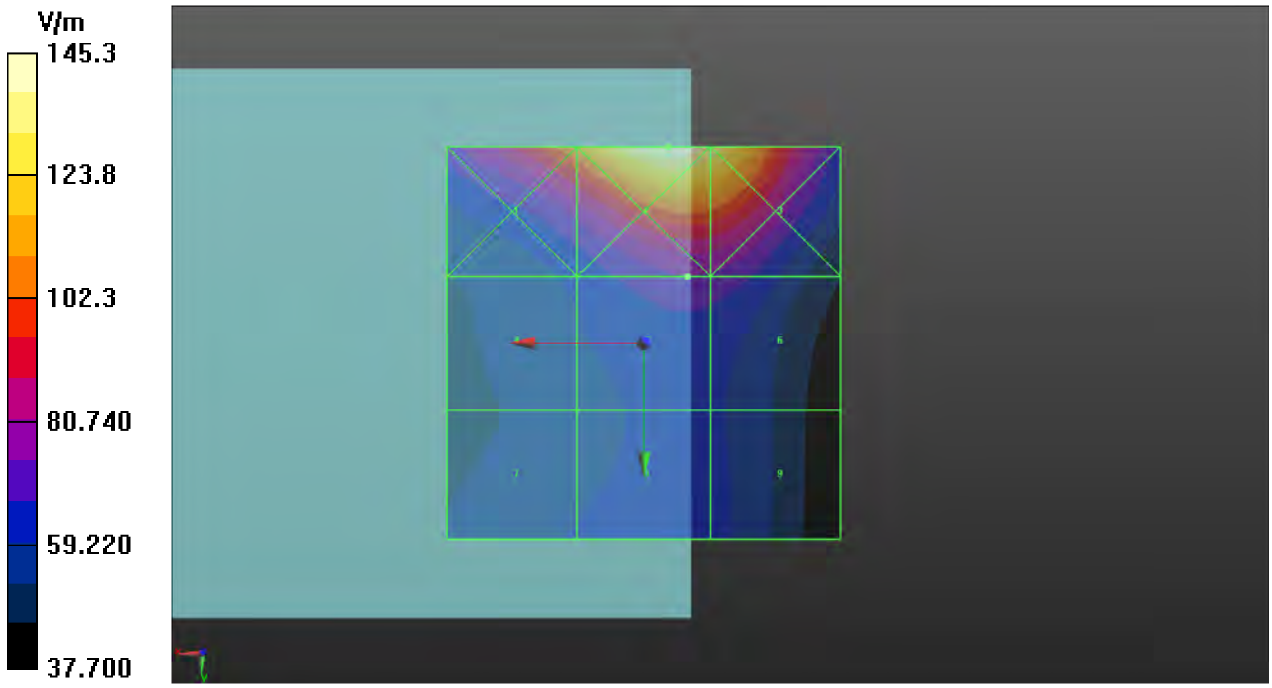
DUT: 181126C16

Communication System: GSM-FDD (TDMA, GMSK); Frequency: 848.8 MHz;Duty Cycle: 1:8.69
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.8 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn579; Calibrated: 2018/08/27
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 57.65 V/m; Power Drift = -0.02 dB
MIF = 3.63 dB
RF audio interference level = 37.33 dBV/m
Emission category: M4

Grid 1 **M3** **41 dBV/m**	Grid 2 **M3** **43.25 dBV/m**	Grid 3 **M3** **42.71 dBV/m**
Grid 4 **M4** **35.8 dBV/m**	Grid 5 **M4** **37.33 dBV/m**	Grid 6 **M4** **37.25 dBV/m**
Grid 7 **M4** **35.6 dBV/m**	Grid 8 **M4** **36.12 dBV/m**	Grid 9 **M4** **35.84 dBV/m**



P02 RF_E-Field_GSM1900_GSM_Ch661_Ant1

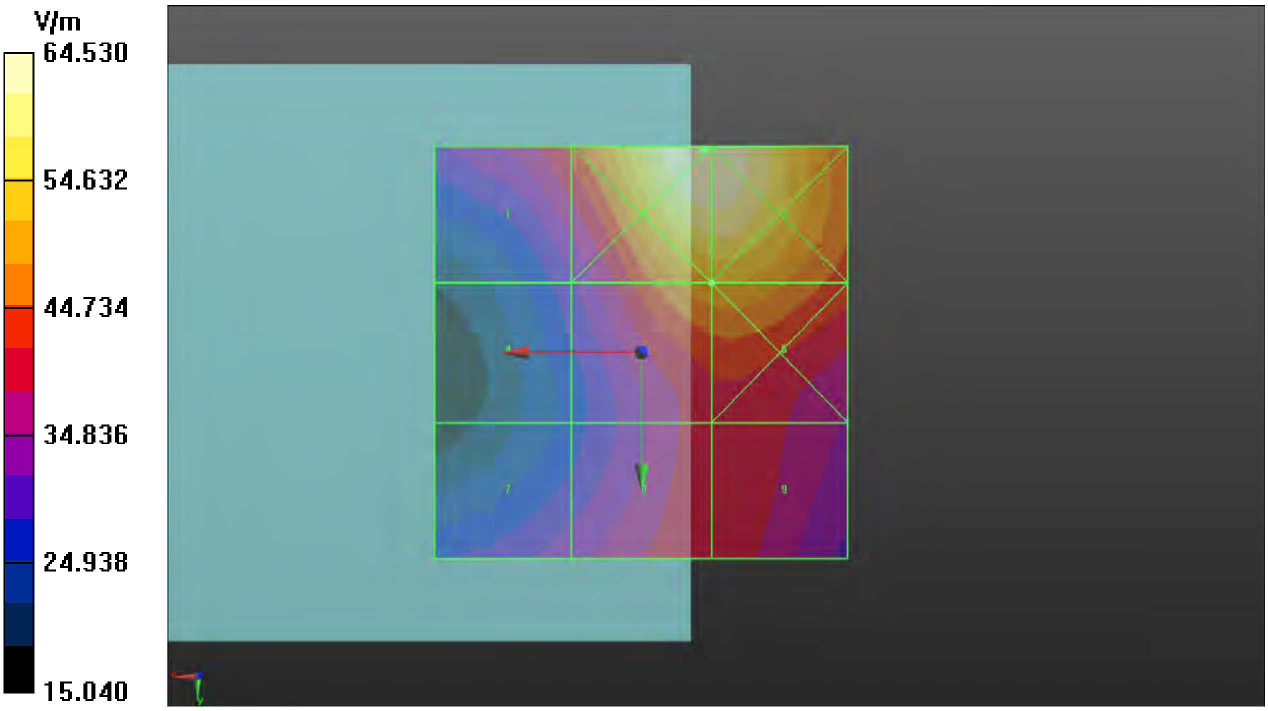
DUT: 181126C16

Communication System: GSM-FDD (TDMA, GMSK); Frequency: 1880 MHz;Duty Cycle: 1:8.69
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.8 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1277; Calibrated: 2019/01/24
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 33.25 V/m; Power Drift = 0.02 dB
MIF = 3.63 dB
RF audio interference level = 34.18 dBV/m
Emission category: M3

Grid 1 **M3** **32.66 dBV/m**	Grid 2 **M2** **36.19 dBV/m**	Grid 3 **M2** **36.18 dBV/m**
Grid 4 **M4** **29.93 dBV/m**	Grid 5 **M3** **34.18 dBV/m**	Grid 6 **M3** **34.25 dBV/m**
Grid 7 **M3** **30.65 dBV/m**	Grid 8 **M3** **32.14 dBV/m**	Grid 9 **M3** **32.14 dBV/m**



P03 RF_E-Field_CDMA BC0_RC1+SO3_Ch384_Ant1

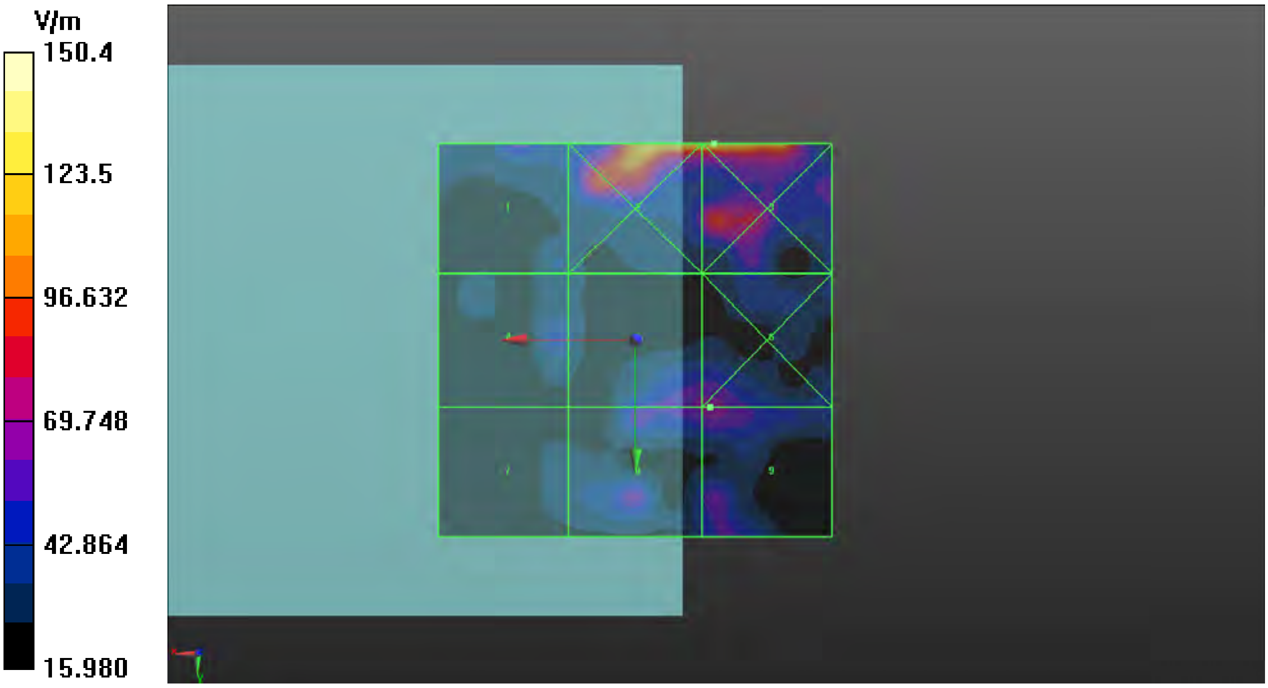
DUT: 181126C16

Communication System: CDMA2000, RC1, SO3, 1/8th Rate 25 fr.; Frequency: 836.52 MHz;Duty Cycle: 1:17.74
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.8 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1277; Calibrated: 2019/01/24
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 21.73 V/m; Power Drift = 0.09 dB
MIF = 3.26 dB
RF audio interference level = 36.16 dBV/m
Emission category: M4

Grid 1 **M4** **35.55 dBV/m**	Grid 2 **M3** **43.27 dBV/m**	Grid 3 **M3** **43.55 dBV/m**
Grid 4 **M4** **33.19 dBV/m**	Grid 5 **M4** **36.01 dBV/m**	Grid 6 **M4** **36.16 dBV/m**
Grid 7 **M4** **30.05 dBV/m**	Grid 8 **M4** **36.03 dBV/m**	Grid 9 **M4** **36.16 dBV/m**



P04 RF_E-Field_CDMA BC1_RC1+SO3_Ch1175_Ant0_B

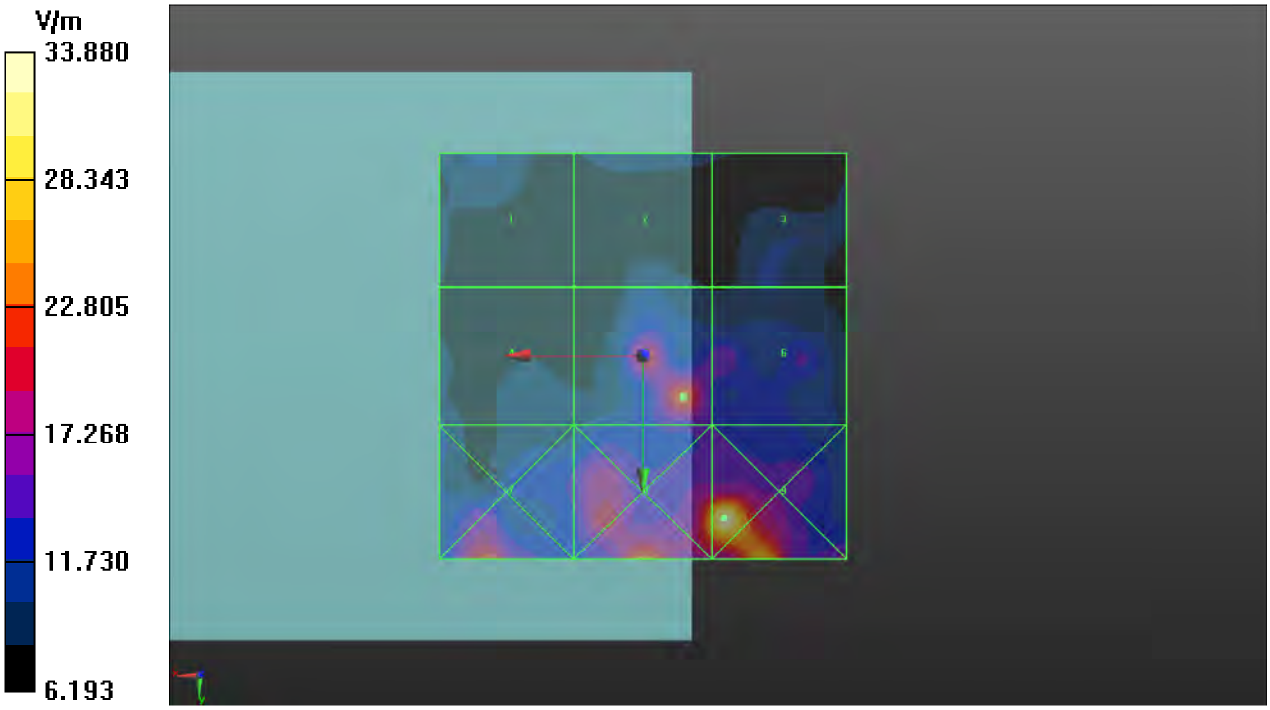
DUT: 181126C16

Communication System: CDMA2000, RC1, SO3, 1/8th Rate 25 fr.; Frequency: 1908.75 MHz;Duty Cycle: 1:17.74
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.8 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn579; Calibrated: 2018/08/27
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 10.44 V/m; Power Drift = -0.15 dB
MIF = 3.26 dB
RF audio interference level = 27.42 dBV/m
Emission category: M4

Grid 1 **M4** **20.46 dBV/m**	Grid 2 **M4** **20.03 dBV/m**	Grid 3 **M4** **20.4 dBV/m**
Grid 4 **M4** **20.72 dBV/m**	Grid 5 **M4** **27.42 dBV/m**	Grid 6 **M4** **23.7 dBV/m**
Grid 7 **M4** **26.94 dBV/m**	Grid 8 **M4** **28.85 dBV/m**	Grid 9 **M3** **30.6 dBV/m**



P05 RF_E-Field_CDMA BC10_RC1+SO3_Ch684_Ant0_C

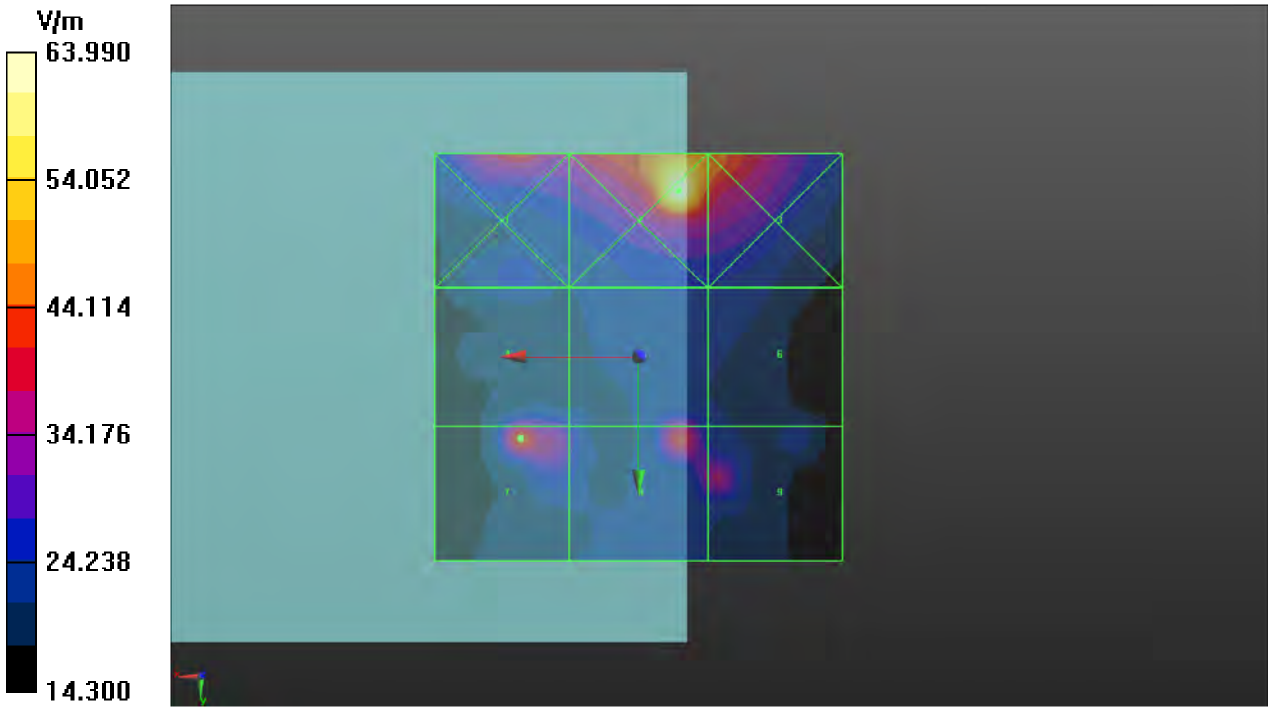
DUT: 181126C16

Communication System: CDMA2000, RC1, SO3, 1/8th Rate 25 fr.; Frequency: 823.1 MHz;Duty Cycle: 1:17.7419
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.8 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn579; Calibrated: 2018/08/27
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 18.96 V/m; Power Drift = 0.03 dB
MIF = 3.26 dB
RF audio interference level = 32.87 dBV/m
Emission category: M4

Grid 1 **M4** **32.74 dBV/m**	Grid 2 **M4** **36.12 dBV/m**	Grid 3 **M4** **33.65 dBV/m**
Grid 4 **M4** **30.9 dBV/m**	Grid 5 **M4** **30.89 dBV/m**	Grid 6 **M4** **27.72 dBV/m**
Grid 7 **M4** **32.87 dBV/m**	Grid 8 **M4** **32.43 dBV/m**	Grid 9 **M4** **30.92 dBV/m**



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2019/06/21

P06 RF_E-Field_LTE 38_16QAM20M_Ch38000_1RB_OS0_Ant1

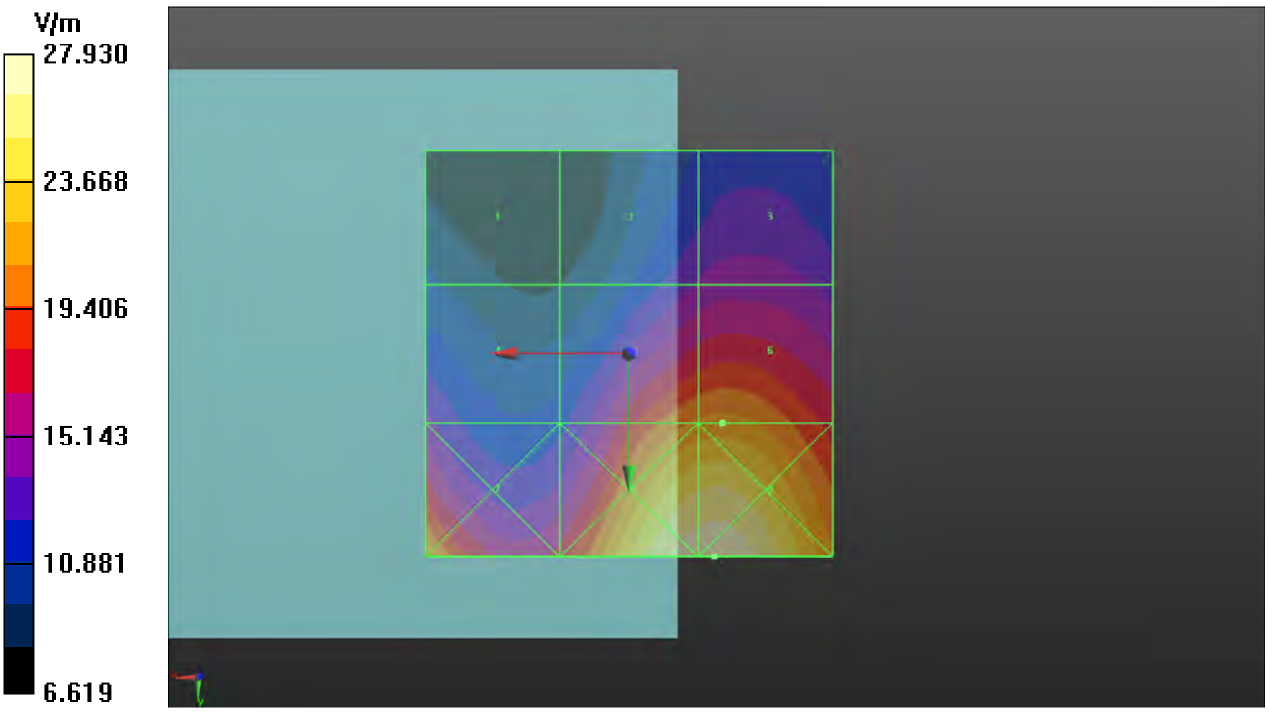
DUT: 181126C16

Communication System: LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM); Frequency: 2595 MHz;Duty Cycle: 1:8.87
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.7 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1277; Calibrated: 2019/01/24
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 17.11 V/m; Power Drift = -0.03 dB
MIF = -1.44 dB
RF audio interference level = 26.62 dBV/m
Emission category: M4

Grid 1 **M4** **19.96 dBV/m**	Grid 2 **M4** **22.94 dBV/m**	Grid 3 **M4** **23.38 dBV/m**
Grid 4 **M4** **23.14 dBV/m**	Grid 5 **M4** **26.49 dBV/m**	Grid 6 **M4** **26.62 dBV/m**
Grid 7 **M4** **26.87 dBV/m**	Grid 8 **M4** **28.88 dBV/m**	Grid 9 **M4** **28.92 dBV/m**



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2019/06/22

P07 RF_E-Field_LTE 41_16QAM20M_Ch40620_1RB_OS0_Ant0_C

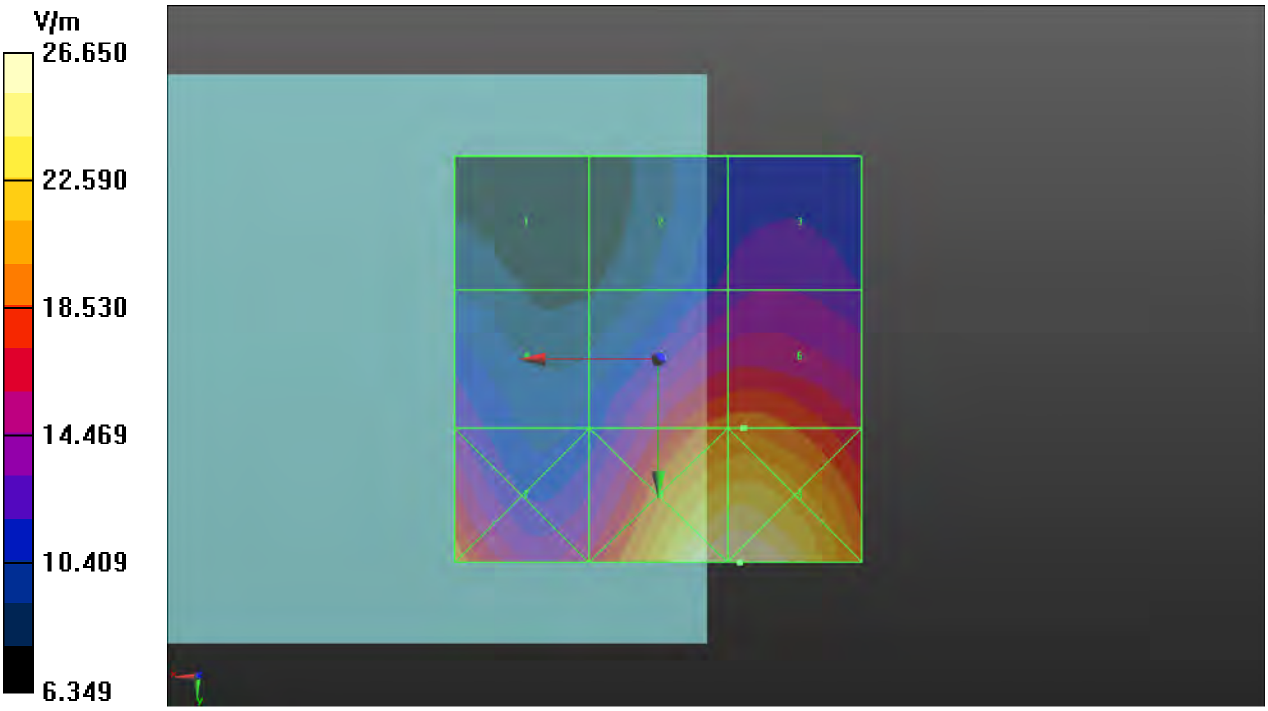
DUT: 181126C16

Communication System: LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM); Frequency: 2593 MHz;Duty Cycle: 1:8.87
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.7 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1277; Calibrated: 2019/01/24
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 15.20 V/m; Power Drift = -0.10 dB
MIF = -1.44 dB
RF audio interference level = 25.87 dBV/m
Emission category: M4

Grid 1 **M4** **19.25 dBV/m**	Grid 2 **M4** **21.92 dBV/m**	Grid 3 **M4** **22.43 dBV/m**
Grid 4 **M4** **22.52 dBV/m**	Grid 5 **M4** **25.79 dBV/m**	Grid 6 **M4** **25.87 dBV/m**
Grid 7 **M4** **26.1 dBV/m**	Grid 8 **M4** **28.51 dBV/m**	Grid 9 **M4** **28.51 dBV/m**



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2019/06/28

P08 RF_E-Field_LTE 48_16QAM20M_Ch56640_1RB_OS0_Ant6

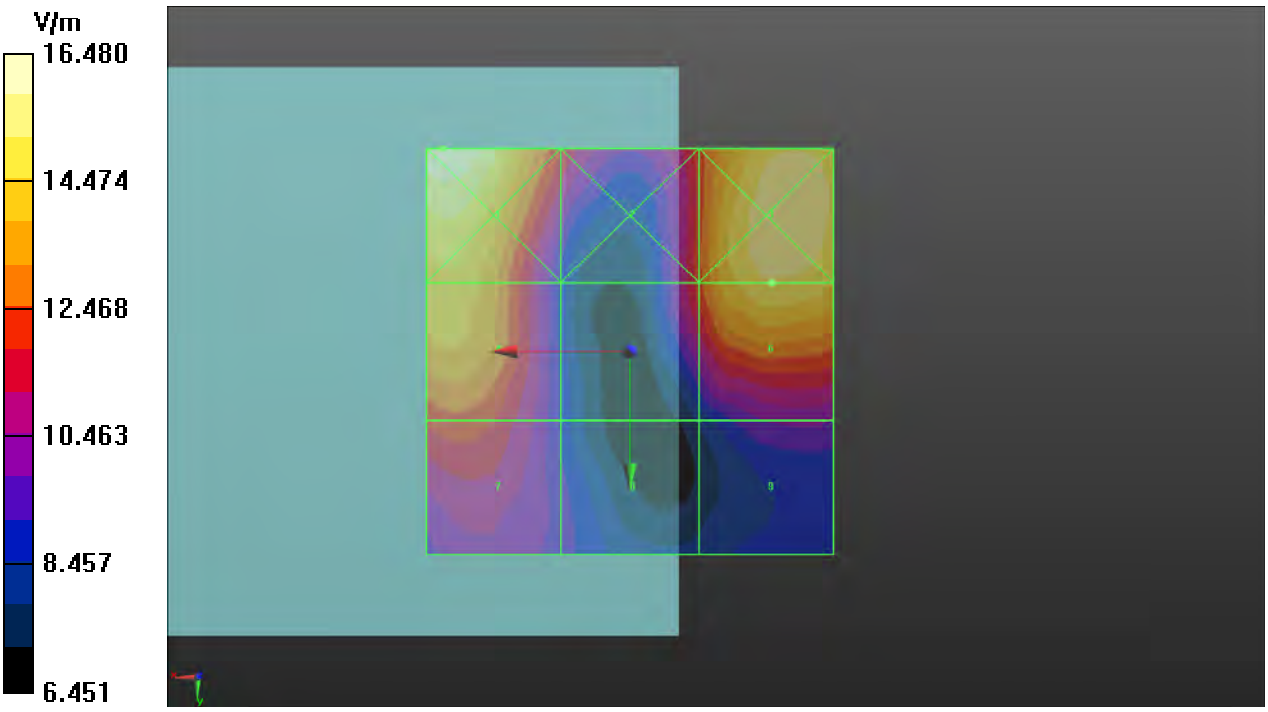
DUT: 181126C16

Communication System: LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM); Frequency: 3690 MHz;Duty Cycle: 1:8.87
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.7 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn579; Calibrated: 2018/08/27
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 7.961 V/m; Power Drift = -0.16 dB
MIF = -1.44 dB
RF audio interference level = 23.56 dBV/m
Emission category: M4

Grid 1 **M4** **24.34 dBV/m**	Grid 2 **M4** **21.81 dBV/m**	Grid 3 **M4** **23.93 dBV/m**
Grid 4 **M4** **23.15 dBV/m**	Grid 5 **M4** **21.73 dBV/m**	Grid 6 **M4** **23.56 dBV/m**
Grid 7 **M4** **21.78 dBV/m**	Grid 8 **M4** **19.57 dBV/m**	Grid 9 **M4** **20.01 dBV/m**



P09 RF_E-Field_WLAN2.4G_802.11g_Ch1_Ant2+Ant4_B

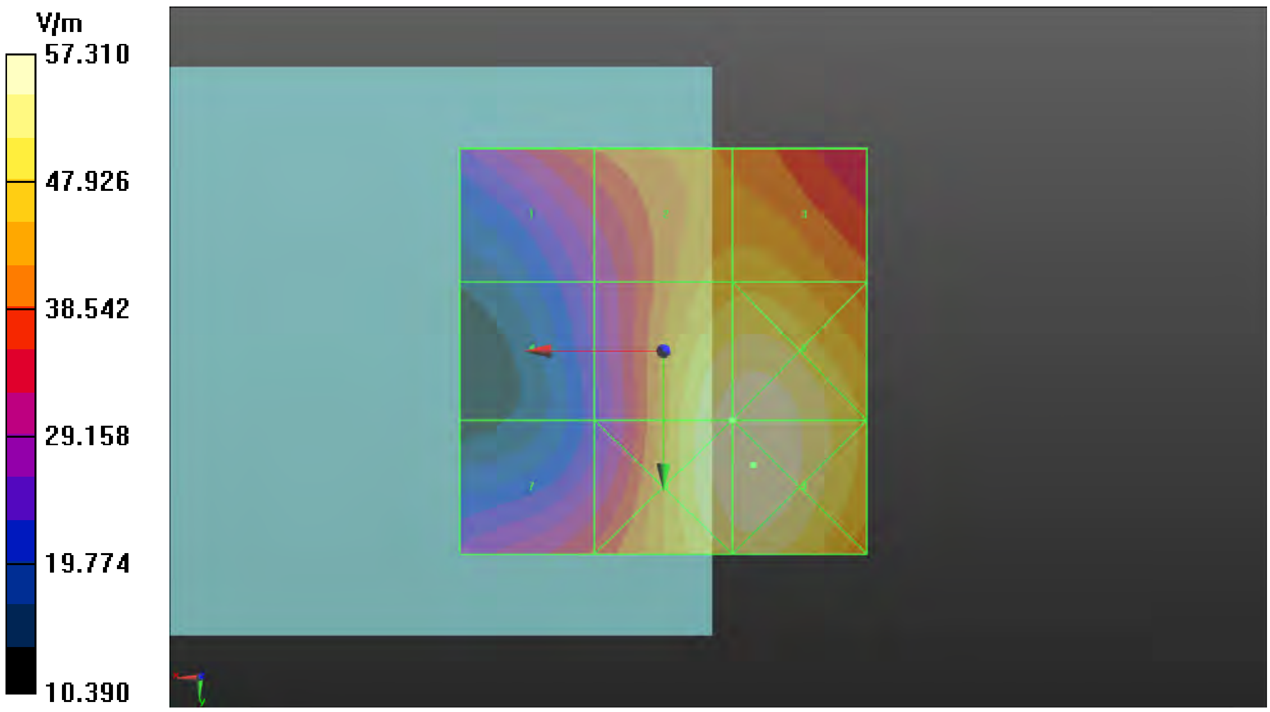
DUT: 190621C15

Communication System: IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps); Frequency: 2412 MHz;Duty Cycle: 1:12.59
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.8 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn579; Calibrated: 2018/08/27
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 62.58 V/m; Power Drift = -0.12 dB
MIF = 0.12 dB
RF audio interference level = 34.93 dBV/m
Emission category: M3

Grid 1 **M3** **31.75 dBV/m**	Grid 2 **M3** **33.43 dBV/m**	Grid 3 **M3** **33.49 dBV/m**
Grid 4 **M4** **29.16 dBV/m**	Grid 5 **M3** **34.93 dBV/m**	Grid 6 **M2** **35.06 dBV/m**
Grid 7 **M3** **31.23 dBV/m**	Grid 8 **M2** **35.03 dBV/m**	Grid 9 **M2** **35.16 dBV/m**



P10 RF_E-Field_WLAN5.2G_802.11a_Ch48_Ant4_B+Ant5_A

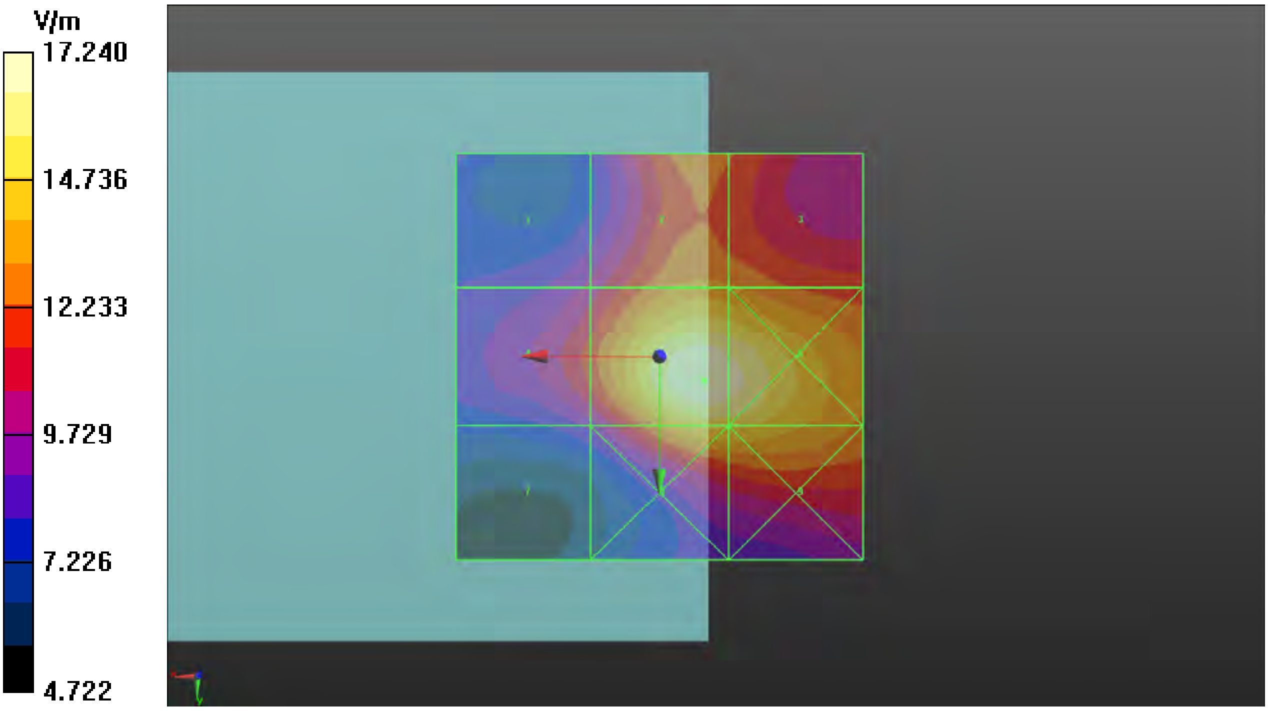
DUT: 190621C15

Communication System: IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps); Frequency: 5240 MHz;Duty Cycle: 1:11.38
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.8 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn579; Calibrated: 2018/08/27
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 35.01 V/m; Power Drift = 0.01 dB
MIF = -3.15 dB
RF audio interference level = 24.73 dBV/m
Emission category: M4

Grid 1 **M4** **20.08 dBV/m**	Grid 2 **M4** **22.54 dBV/m**	Grid 3 **M4** **22.41 dBV/m**
Grid 4 **M4** **21.46 dBV/m**	Grid 5 **M4** **24.73 dBV/m**	Grid 6 **M4** **24.52 dBV/m**
Grid 7 **M4** **19.35 dBV/m**	Grid 8 **M4** **23.57 dBV/m**	Grid 9 **M4** **23.52 dBV/m**



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2019/06/28

P11 RF_E-Field_WLAN5.3G_802.11a_Ch64_Ant4_B+Ant5_A

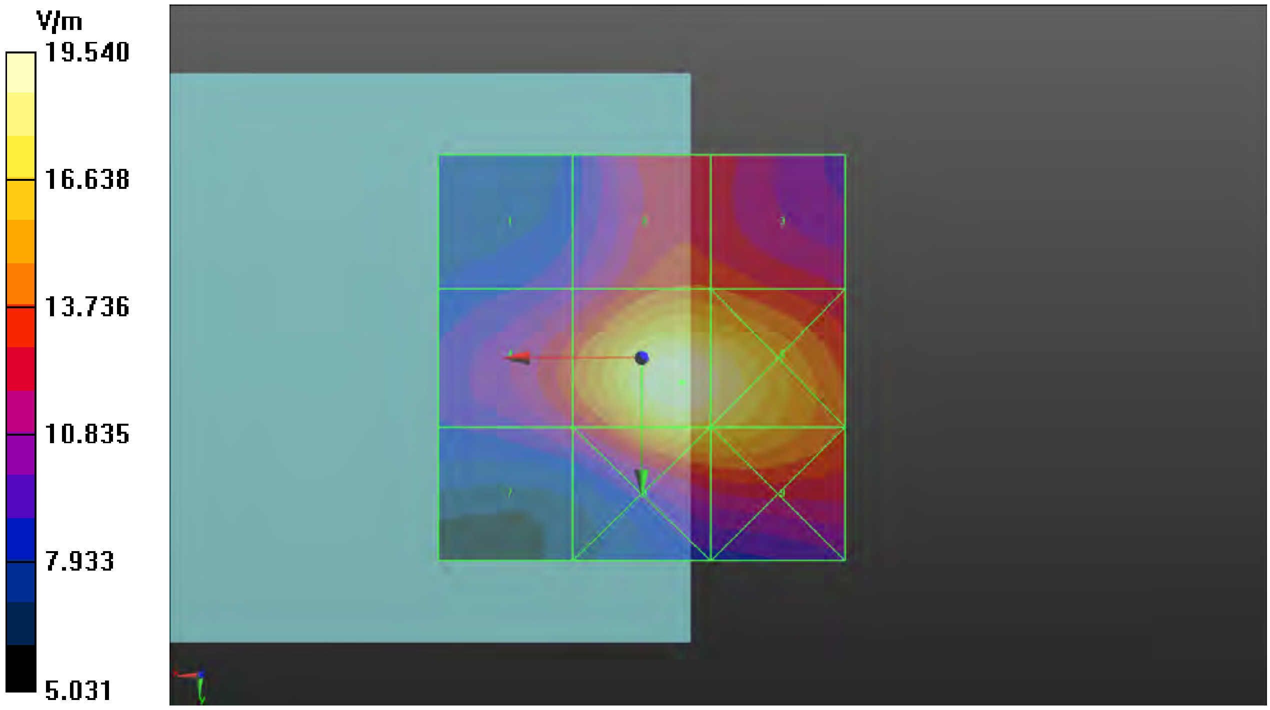
DUT: 190621C15

Communication System: IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps); Frequency: 5320 MHz;Duty Cycle: 1:11.38
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.8 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn579; Calibrated: 2018/08/27
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 40.08 V/m; Power Drift = -0.01 dB
MIF = -3.15 dB
RF audio interference level = 25.82 dBV/m
Emission category: M4

Grid 1 **M4** **20.28 dBV/m**	Grid 2 **M4** **22.9 dBV/m**	Grid 3 **M4** **22.83 dBV/m**
Grid 4 **M4** **22.72 dBV/m**	Grid 5 **M4** **25.82 dBV/m**	Grid 6 **M4** **25.53 dBV/m**
Grid 7 **M4** **21.25 dBV/m**	Grid 8 **M4** **24.74 dBV/m**	Grid 9 **M4** **24.64 dBV/m**



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2019/06/28

P12 RF_E-Field_WLAN5.6G_802.11a_Ch140_Ant4_B+Ant5_A

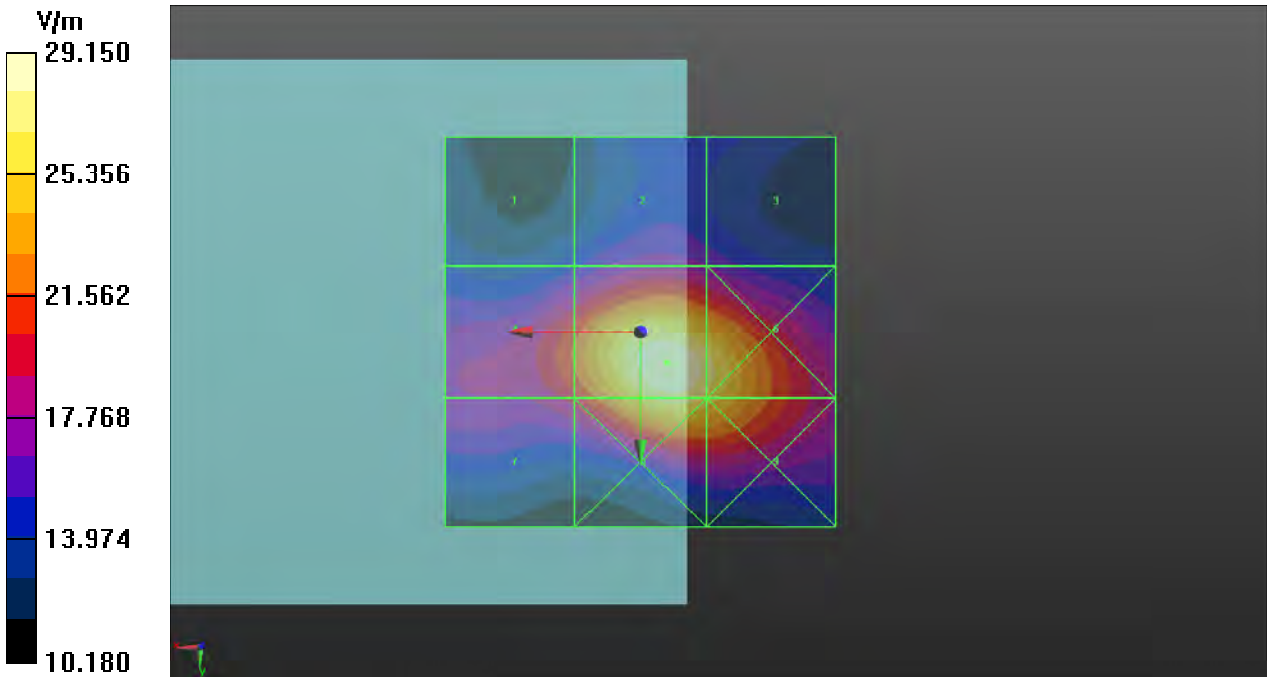
DUT: 190621C15

Communication System: IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps); Frequency: 5700 MHz;Duty Cycle: 1:11.38
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.8 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn579; Calibrated: 2018/08/27
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 61.88 V/m; Power Drift = 0.05 dB
MIF = -3.15 dB
RF audio interference level = 29.29 dBV/m
Emission category: M4

Grid 1 **M4** **23.52 dBV/m**	Grid 2 **M4** **24.93 dBV/m**	Grid 3 **M4** **24.38 dBV/m**
Grid 4 **M4** **26.78 dBV/m**	Grid 5 **M4** **29.29 dBV/m**	Grid 6 **M4** **28.72 dBV/m**
Grid 7 **M4** **25.93 dBV/m**	Grid 8 **M4** **28.74 dBV/m**	Grid 9 **M4** **28.35 dBV/m**



P13 RF_E-Field_WLAN5.8G_802.11a_Ch149_Ant4_B+Ant5_A

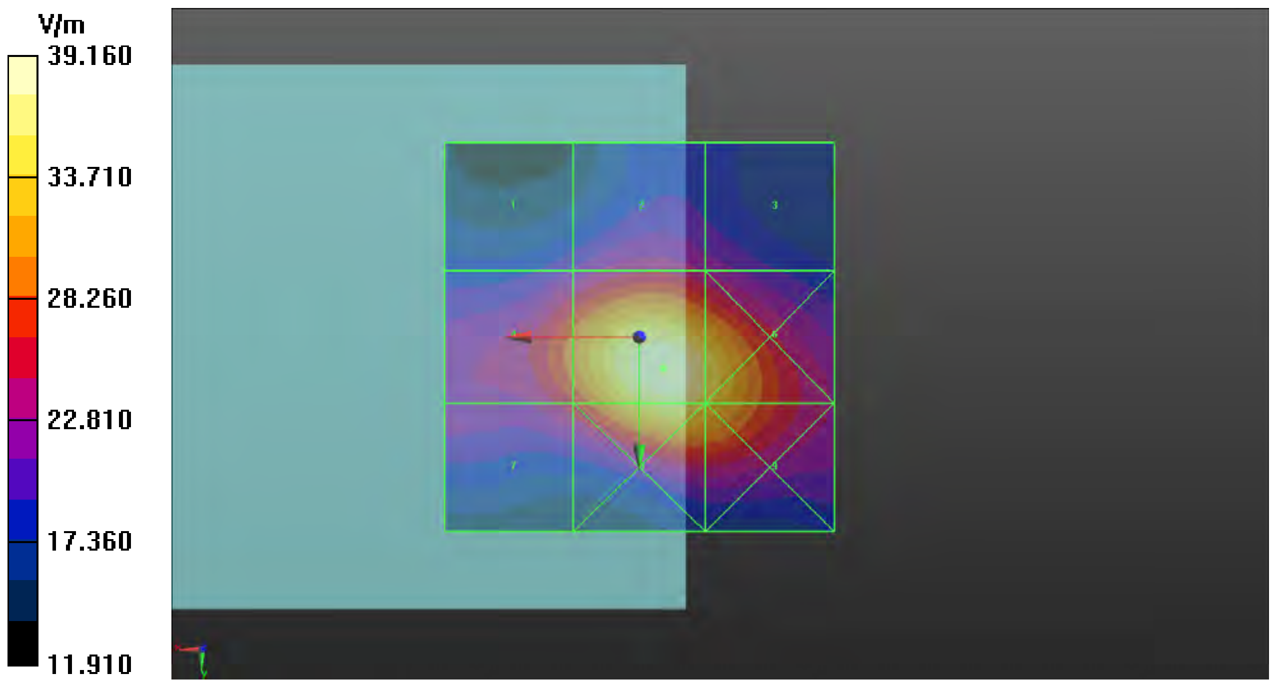
DUT: 190621C15

Communication System: IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps); Frequency: 5745 MHz;Duty Cycle: 1:11.38
Medium: Air Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.8 ℃

DASY5 Configuration:
- Probe: EF3DV3 - SN4049; ConvF(1, 1, 1); Calibrated: 2019/01/11
- Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn579; Calibrated: 2018/08/27
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Hearing Aid Compatibility (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 85.93 V/m; Power Drift = -0.17 dB
MIF = -3.15 dB
RF audio interference level = 31.86 dBV/m
Emission category: M3

Grid 1 **M4** **26.55 dBV/m**	Grid 2 **M4** **27.82 dBV/m**	Grid 3 **M4** **27.14 dBV/m**
Grid 4 **M4** **29.42 dBV/m**	Grid 5 **M3** **31.86 dBV/m**	Grid 6 **M3** **31.02 dBV/m**
Grid 7 **M4** **28.37 dBV/m**	Grid 8 **M3** **31.21 dBV/m**	Grid 9 **M3** **30.69 dBV/m**



Appendix C. Calibration Certificate for Probe and Dipole

The SPEAG calibration certificates are shown as follows.

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

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

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

Accreditation No.: SCS 0108

Client **B.V. ADT (Auden)**

Certificate No: CD835V3-1041_Mar17

CALIBRATION CERTIFICATE

Object	CD835V3 - SN: 1041
Calibration procedure(s)	QA CAL-20.v6 Calibration procedure for dipoles in air
Calibration date:	March 20, 2017

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	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Probe ER3DV6	SN: 2336	30-Dec-16 (No. ER3-2336_Dec16)	Dec-17
Probe H3DV6	SN: 6065	30-Dec-16 (No. H3-6065_Dec16)	Dec-17
DAE4	SN: 781	02-Sep-16 (No. DAE4-781_Sep16)	Sep-17

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Sep-14)	In house check: Oct-17
Power sensor HP E4412A	SN: US38485102	05-Jan-10 (in house check Sep-14)	In house check: Oct-17
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Sep-14)	In house check: Oct-17
RF generator R&S SMT-06	SN: 832283/011	27-Aug-12 (in house check Oct-15)	In house check: Oct-17
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

	Name	Function	Signature
Calibrated by:	Johannes Kurikka	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: March 20, 2017

References

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

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

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 10 mm (15 mm for [2]) 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] and [2], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 10 mm (15 mm for [2]) (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.
- *H-field distribution:* H-field is measured with an isotropic H-field probe with 100mW forward power to the antenna feed point, in the x-y-plane. The scan area and sensor distance is equivalent to the E-field scan. The maximum of the field is available at the center (subgrid 5) above the feed point. The H-field value stated as calibration value represents the maximum of the interpolated H-field, 10mm above the dipole surface at the feed point.

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	V52.8.8
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	10, 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

H-field 10 mm above dipole surface	condition	**interpolated maximum**
Maximum measured	100 mW input power	**0.464 A/m ± 8.2 % (k=2)**

E-field 10 mm above dipole surface	condition	**Interpolated maximum**
Maximum measured above high end	100 mW input power	171.6 V/m = 44.69 dBV/m
Maximum measured above low end	100 mW input power	162.9 V/m = 44.24 dBV/m
Averaged maximum above arm	100 mW input power	**167.3 V/m ± 12.8 % (k=2)**

E-field 15 mm above dipole surface	condition	**Interpolated maximum**
Maximum measured above high end	100 mW input power	108.9 V/m = 40.74 dBV/m
Maximum measured above low end	100 mW input power	106.2 V/m = 40.52 dBV/m
Averaged maximum above arm	100 mW input power	**107.6 V/m ± 12.8 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters

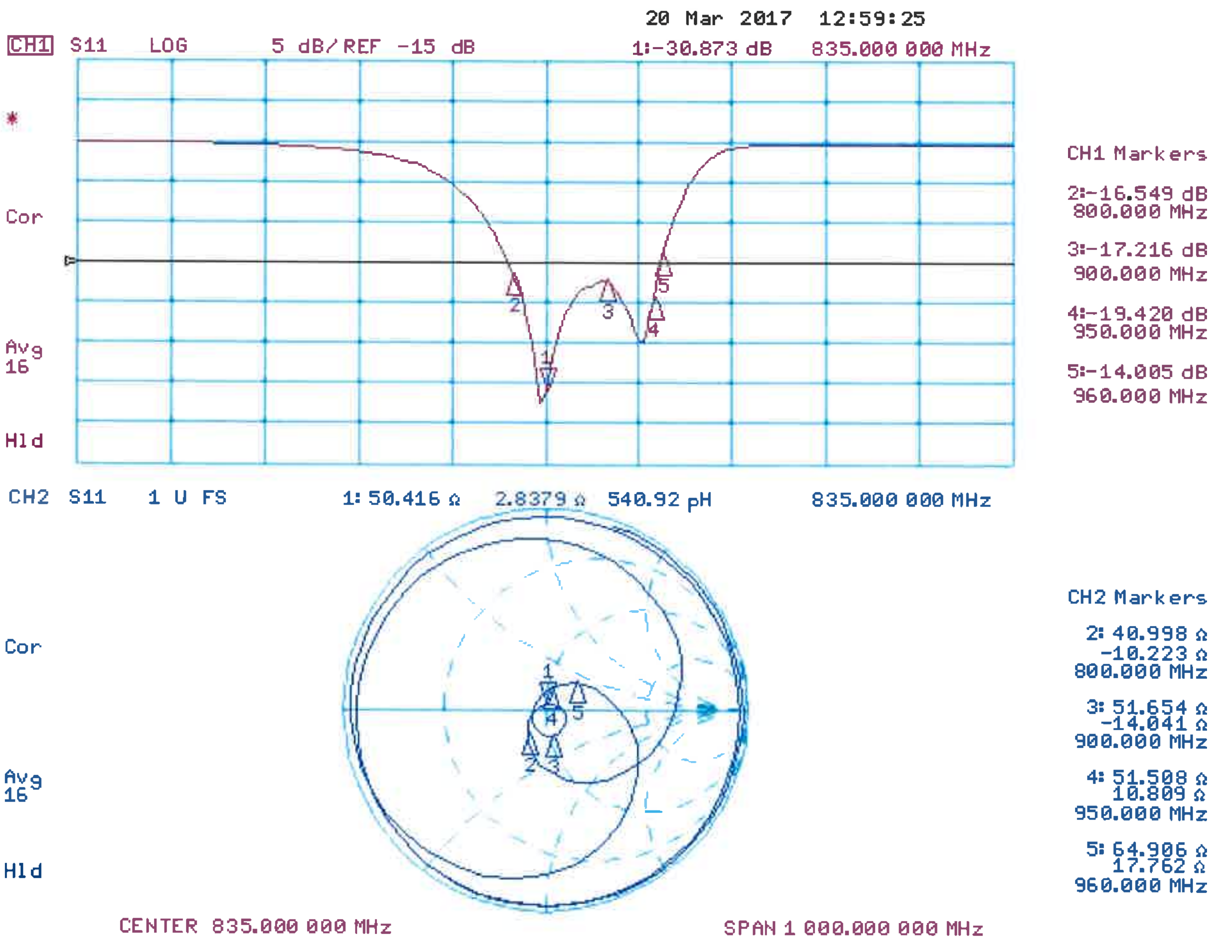
Frequency	Return Loss	Impedance
800 MHz	16.5 dB	41.0 Ω - 10.2 jΩ
835 MHz	30.9 dB	50.4 Ω + 2.8 jΩ
900 MHz	17.2 dB	51.7 Ω - 14.0 jΩ
950 MHz	19.4 dB	51.5 Ω + 10.8 jΩ
960 MHz	14.0 dB	64.9 Ω + 17.8 jΩ

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 H-field Result

Date: 20.03.2017

Test Laboratory: SPEAG Lab 2

DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN: 1041

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

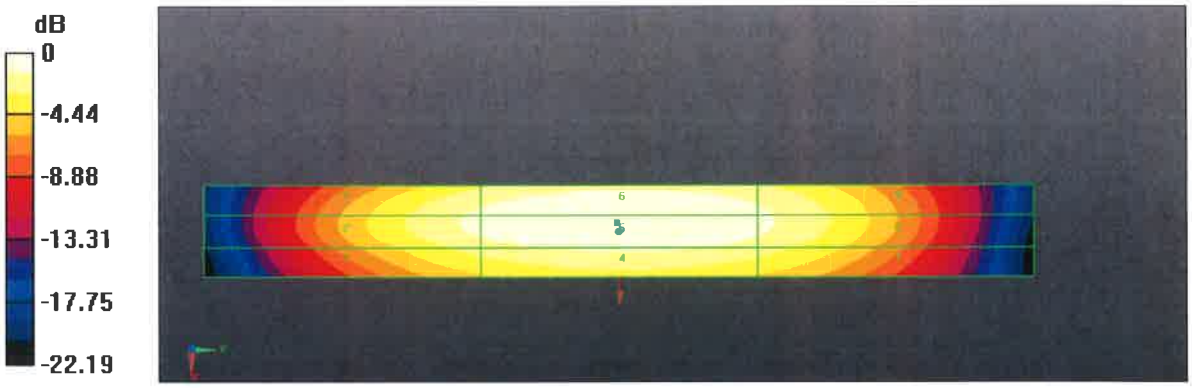
DASY52 Configuration:

- Probe: H3DV6 - SN6065; ; Calibrated: 30.12.2016
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.09.2016
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole H-Field measurement @ 835MHz/H-Scan - 835MHz d=10mm/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 = 0.4830 A/m; Power Drift = 0.01 dB
PMR not calibrated. PMF = 1.000 is applied.
H-field emissions = 0.4635 A/m
Near-field category: M4 (AWF 0 dB)

PMF scaled H-field

Grid 1 **M4** **0.358 A/m**	Grid 2 **M4** **0.410 A/m**	Grid 3 **M4** **0.405 A/m**
Grid 4 **M4** **0.406 A/m**	Grid 5 **M4** **0.464 A/m**	Grid 6 **M4** **0.460 A/m**
Grid 7 **M4** **0.361 A/m**	Grid 8 **M4** **0.408 A/m**	Grid 9 **M4** **0.406 A/m**



0 dB = 0.4635 A/m = -6.68 dBA/m

DASY5 E-field Result

Date: 17.03.2017

Test Laboratory: SPEAG Lab 2

DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN: 1041

Communication System: UID 0 - CW ; Frequency: 835 MHz
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)
DASY52 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 30.12.2016;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.09.2016
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole E-Field measurement @ 835MHz/E-Scan - 835MHz d=10mm/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 = 108.7 V/m; Power Drift = -0.04 dB
Applied MIF = 0.00 dB
RF audio interference level = 44.69 dBV/m
Emission category: M3

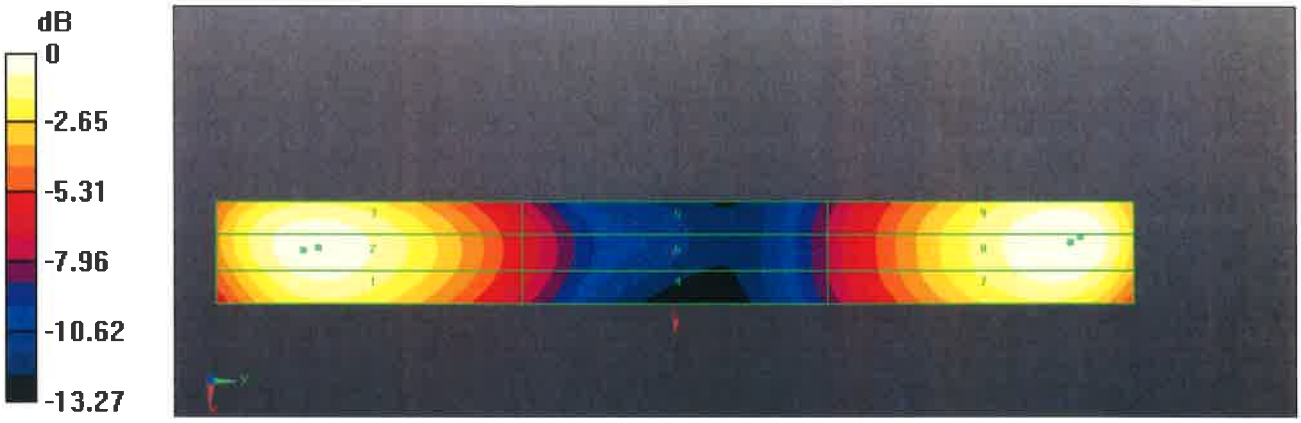
MIF scaled E-field

Grid 1 **M3** **43.88 dBV/m**	Grid 2 **M3** **44.24 dBV/m**	Grid 3 **M3** **44.09 dBV/m**
Grid 4 **M4** **38.56 dBV/m**	Grid 5 **M4** **38.94 dBV/m**	Grid 6 **M4** **38.81 dBV/m**
Grid 7 **M3** **43.89 dBV/m**	Grid 8 **M3** **44.69 dBV/m**	Grid 9 **M3** **44.68 dBV/m**

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 = 108.7 V/m; Power Drift = -0.03 dB
Applied MIF = 0.00 dB
RF audio interference level = 40.74 dBV/m
Emission category: M3

MIF scaled E-field

Grid 1 **M3** **40.31 dBV/m**	Grid 2 **M3** **40.52 dBV/m**	Grid 3 **M3** **40.45 dBV/m**
Grid 4 **M4** **35.84 dBV/m**	Grid 5 **M4** **36 dBV/m**	Grid 6 **M4** **35.92 dBV/m**
Grid 7 **M3** **40.41 dBV/m**	Grid 8 **M3** **40.74 dBV/m**	Grid 9 **M3** **40.71 dBV/m**



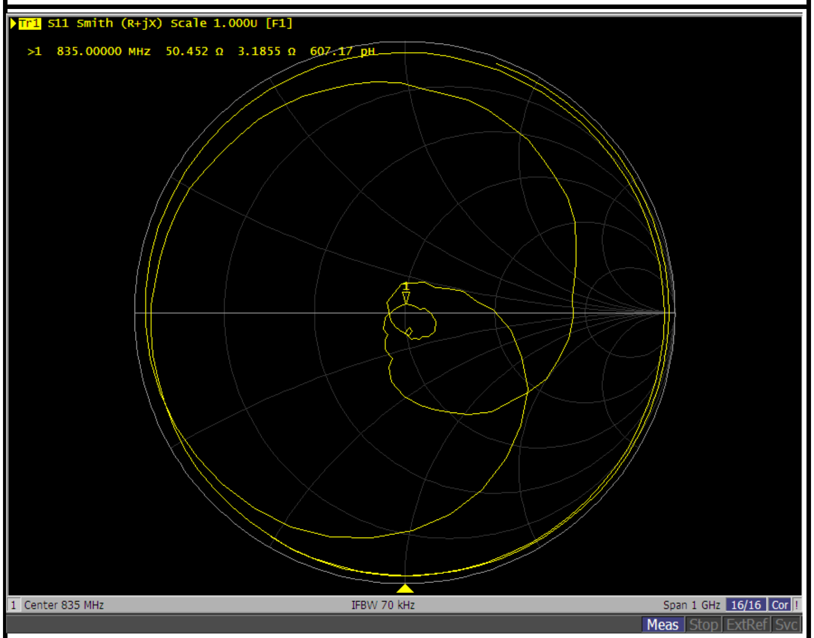
0 dB = 171.6 V/m = 44.69 dBV/m

Annual Confirmation of HAC Reference Dipole

Model： CD835V3   S/N： 1041   Measurement Date： 2018/3/19

Frequency (MHz)	Type	Item	Previous Measurement	Annual Check	Deviation	Accepted Tolerance	Result
835	Free Space	Return Loss	-30.873	-30.956	0.27%	±20%	PASS
		Real Impedance	50.416	50.452	0.04	±5Ω	PASS
		Imaginary Impedance	2.8379	3.1855	0.35	±5Ω	PASS

835 MHz，Free Space

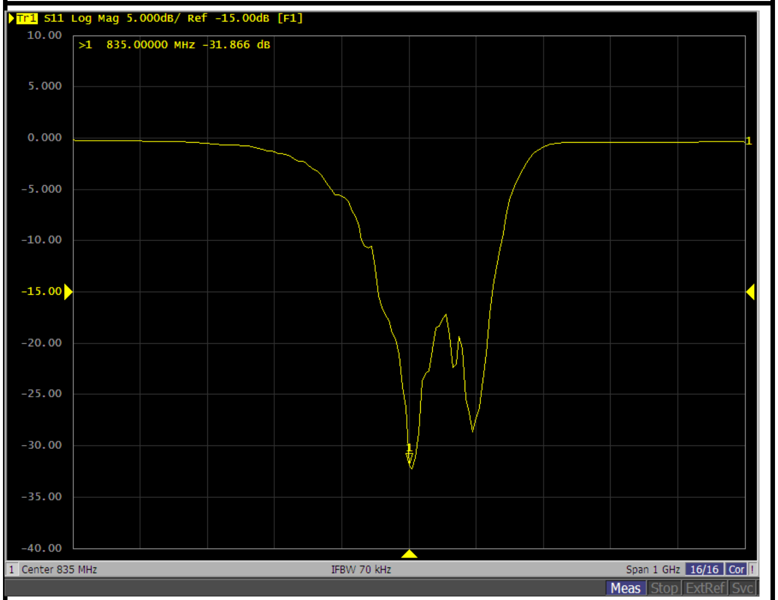


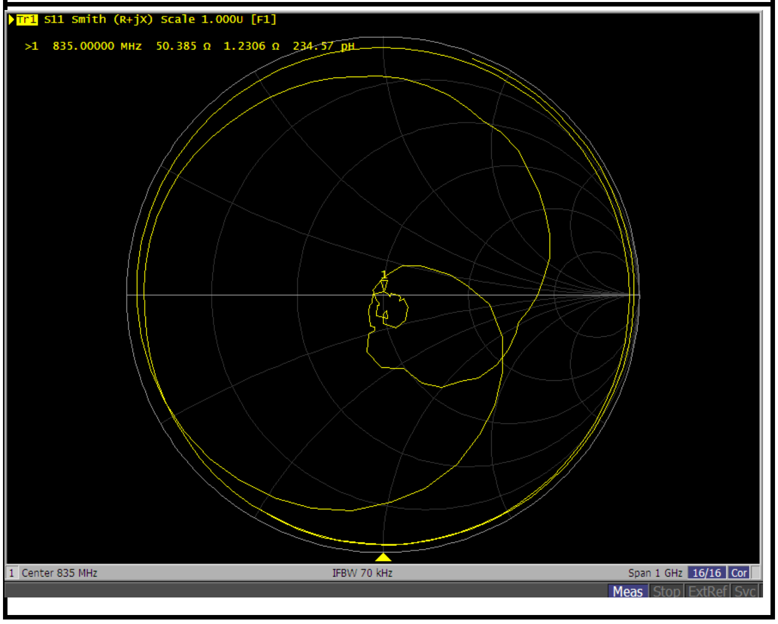
Annual Confirmation of HAC Reference Dipole

Model : CD835V3 S/N : 1041 Measurement Date : 2019/3/19

Frequency (MHz)	Type	Item	Previous Measurement	Annual Check	Deviation	Accepted Tolerance	Result
835	Free Space	Return Loss	-30.873	-31.866	3.22%	±20%	PASS
		Real Impedance	50.416	50.385	-0.03	±5Ω	PASS
		Imaginary Impedance	2.8379	1.2306	-1.61	±5Ω	PASS

835 MHz，Free Space





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

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

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

Accreditation No.: SCS 0108

Client **B.V. ADT (Auden)**

Certificate No: CD1880V3-1032_Apr17

CALIBRATION CERTIFICATE

Object	CD1880V3 - SN: 1032
Calibration procedure(s)	QA CAL-20.v6 Calibration procedure for dipoles in air
Calibration date:	April 25, 2017

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. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Probe ER3DV6	SN: 2336	30-Dec-16 (No. ER3-2336_Dec16)	Dec-17
Probe H3DV6	SN: 6065	30-Dec-16 (No. H3-6065_Dec16)	Dec-17
DAE4	SN: 781	02-Sep-16 (No. DAE4-781_Sep16)	Sep-17

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Sep-14)	In house check: Oct-17
Power sensor HP E4412A	SN: US38485102	05-Jan-10 (in house check Sep-14)	In house check: Oct-17
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Sep-14)	In house check: Oct-17
RF generator R&S SMT-06	SN: 832283/011	27-Aug-12 (in house check Oct-15)	In house check: Oct-17
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

	Name	Function	Signature
Calibrated by:	Johannes Kurikka	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 26, 2017

References

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

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

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 10 mm (15 mm for [2]) 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] and [2], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 10 mm (15 mm for [2]) (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.
- *H-field distribution:* H-field is measured with an isotropic H-field probe with 100mW forward power to the antenna feed point, in the x-y-plane. The scan area and sensor distance is equivalent to the E-field scan. The maximum of the field is available at the center (subgrid 5) above the feed point. The H-field value stated as calibration value represents the maximum of the interpolated H-field, 10mm above the dipole surface at the feed point.

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	V52.10.0
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	10, 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

H-field 10 mm above dipole surface	condition	**interpolated maximum**
Maximum measured	100 mW input power	**0.464 A/m ± 8.2 % (k=2)**

E-field 10 mm above dipole surface	condition	**Interpolated maximum**
Maximum measured above high end	100 mW input power	141.2 V/m = 43.00 dBV/m
Maximum measured above low end	100 mW input power	140.9 V/m = 42.98 dBV/m
Averaged maximum above arm	100 mW input power	**141.1 V/m ± 12.8 % (k=2)**

E-field 15 mm above dipole surface	condition	**Interpolated maximum**
Maximum measured above high end	100 mW input power	92.5 V/m = 39.32 dBV/m
Maximum measured above low end	100 mW input power	89.5 V/m = 39.04 dBV/m
Averaged maximum above arm	100 mW input power	**91.0 V/m ± 12.8 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters

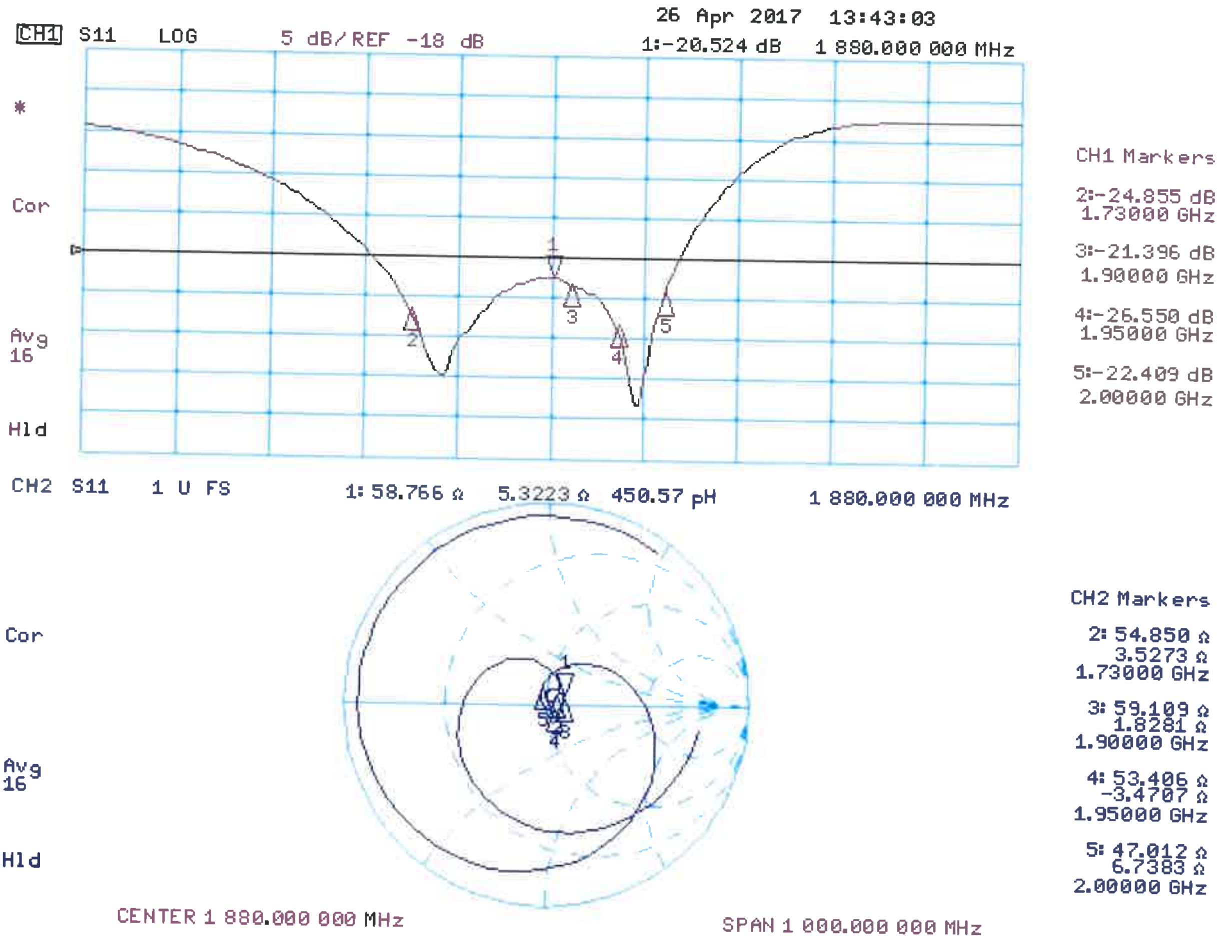
Frequency	Return Loss	Impedance
1730 MHz	24.9 dB	54.8 Ω + 3.5 jΩ
1880 MHz	20.5 dB	58.8 Ω + 5.3 jΩ
1900 MHz	21.4 dB	59.1 Ω + 1.8 jΩ
1950 MHz	26.6 dB	53.4 Ω - 3.5 jΩ
2000 MHz	22.4 dB	47.0 Ω + 6.7 jΩ

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 H-field Result

Date: 25.04.2017

Test Laboratory: SPEAG Lab2

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN: 1032

Communication System: UID 0 - CW ; Frequency: 1880 MHz
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

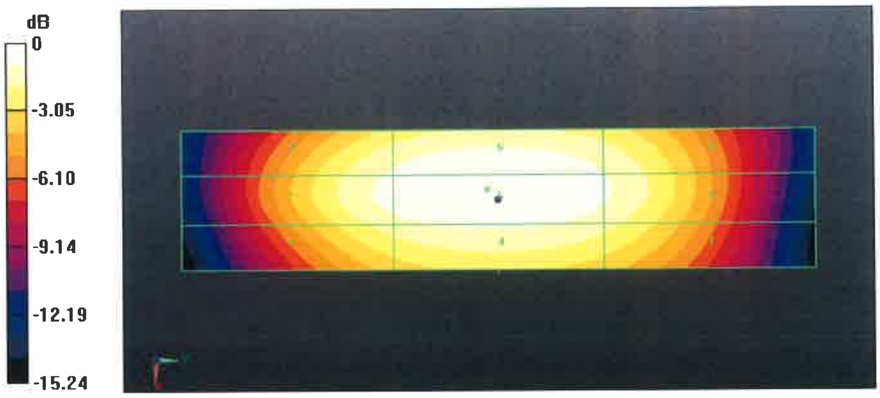
DASY52 Configuration:

- Probe: H3DV6 - SN6065; ; Calibrated: 30.12.2016
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.09.2016
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.10.0(1440); SEMCAD X 14.6.10(7413)

Dipole H-Field measurement @ 1880MHz/H-Scan - 1880MHz d=10mm/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 = 0.4870 A/m; Power Drift = -0.00 dB
PMR not calibrated. PMF = 1.000 is applied.
H-field emissions = 0.4640 A/m
Near-field category: M2 (AWF 0 dB)

PMF scaled H-field

Grid 1 **M2** **0.390 A/m**	Grid 2 **M2** **0.432 A/m**	Grid 3 **M2** **0.422 A/m**
Grid 4 **M2** **0.422 A/m**	Grid 5 **M2** **0.464 A/m**	Grid 6 **M2** **0.456 A/m**
Grid 7 **M2** **0.384 A/m**	Grid 8 **M2** **0.420 A/m**	Grid 9 **M2** **0.413 A/m**



0 dB = 0.4640 A/m = -6.67 dBA/m

DASY5 E-field Result

Date: 25.04.2017

Test Laboratory: SPEAG Lab2

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN: 1032

Communication System: UID 0 - CW ; Frequency: 1880 MHz
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 30.12.2016;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.09.2016
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.10.0(1440); SEMCAD X 14.6.10(7413)

Dipole E-Field measurement @ 1880MHz/E-Scan - 1880MHz d=10mm/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 = 158.3 V/m; Power Drift = 0.02 dB
Applied MIF = 0.00 dB
RF audio interference level = 43.00 dBV/m
Emission category: M1

MIF scaled E-field

Grid 1 **M1** **42.53 dBV/m**	Grid 2 **M1** **42.98 dBV/m**	Grid 3 **M1** **42.86 dBV/m**
Grid 4 **M2** **39.04 dBV/m**	Grid 5 **M2** **39.41 dBV/m**	Grid 6 **M2** **39.16 dBV/m**
Grid 7 **M1** **42.42 dBV/m**	Grid 8 **M1** **43 dBV/m**	Grid 9 **M1** **42.92 dBV/m**

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 = 158.6 V/m; Power Drift = -0.02 dB

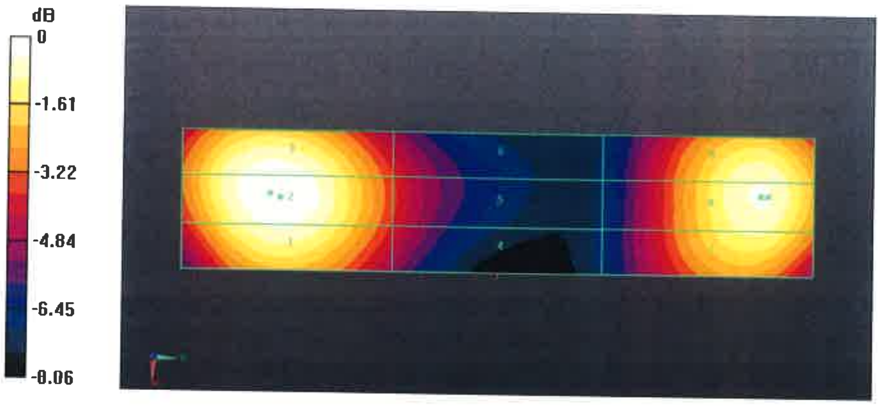
Applied MIF = 0.00 dB

RF audio interference level = 39.32 dBV/m

Emission category: M2

MIF scaled E-field

Grid 1 **M2** **39.06 dBV/m**	Grid 2 **M2** **39.32 dBV/m**	Grid 3 **M2** **39.25 dBV/m**
Grid 4 **M2** **36.95 dBV/m**	Grid 5 **M2** **37.13 dBV/m**	Grid 6 **M2** **37.05 dBV/m**
Grid 7 **M2** **38.76 dBV/m**	Grid 8 **M2** 39.04 dBV/m	Grid 9 **M2** **38.99 dBV/m**



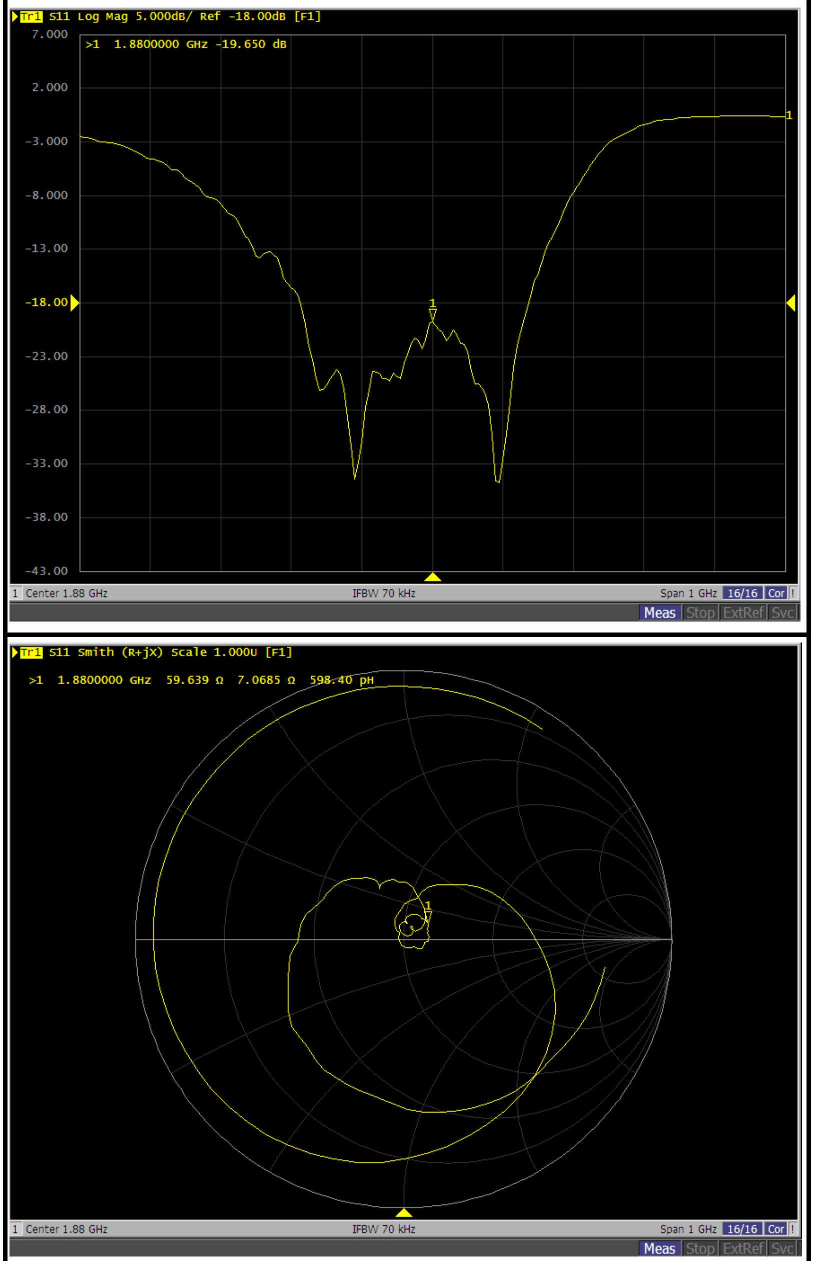
0 dB = 141.2 V/m = 43.00 dBV/m

Annual Confirmation of HAC Reference Dipole

Model： CD1880V3 S/N： 1032 Measurement Date： 2018/4/24

Frequency (MHz)	Type	Item	Previous Measurement	Annual Check	Deviation	Accepted Tolerance	Result
1880	Free Space	Return Loss	-20.524	-19.650	-4.26%	±20%	PASS
		Real Impedance	58.766	59.639	0.87	±5Ω	PASS
		Imaginary Impedance	5.3223	7.0685	1.75	±5Ω	PASS

1880 MHz，Free Space

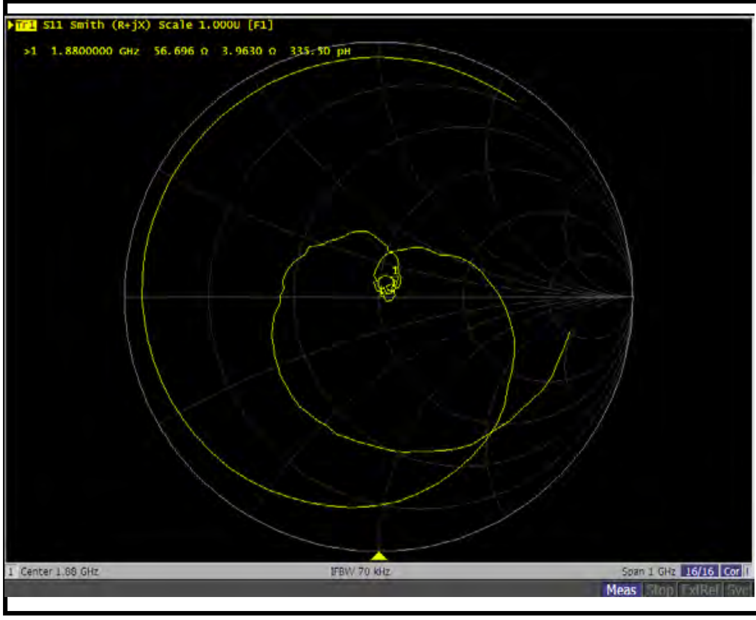


Annual Confirmation of HAC Reference Dipole

Model : CD1880V3 S/N : 1032 Measurement Date : 2019/4/24

Frequency (MHz)	Type	Item	Previous Measurement	Annual Check	Deviation	Accepted Tolerance	Result
1880	Free Space	Return Loss	-20.524	-21.991	7.15%	±20%	PASS
		Real Impedance	58.766	56.696	-2.07	±5Ω	PASS
		Imaginary Impedance	5.3223	3.9630	-1.36	±5Ω	PASS

1880 MHz，Free Space



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

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

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

Accreditation No.: SCS 0108

Client B.V. ADT (Auden)

Certificate No: CD2450V3-1033_Apr17

CALIBRATION CERTIFICATE

Object	CD2450V3 - SN: 1033
Calibration procedure(s)	QA CAL-20.v6 Calibration procedure for dipoles in air
Calibration date:	April 25, 2017

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. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Probe ER3DV6	SN: 2336	30-Dec-16 (No. ER3-2336_Dec16)	Dec-17
Probe H3DV6	SN: 6065	30-Dec-16 (No. H3-6065_Dec16)	Dec-17
DAE4	SN: 781	02-Sep-16 (No. DAE4-781_Sep16)	Sep-17

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Sep-14)	In house check: Oct-17
Power sensor HP E4412A	SN: US38485102	05-Jan-10 (in house check Sep-14)	In house check: Oct-17
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Sep-14)	In house check: Oct-17
RF generator R&S SMT-06	SN: 832283/011	27-Aug-12 (in house check Oct-15)	In house check: Oct-17
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

	Name	Function	Signature
Calibrated by:	Johannes Kurikka	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 27, 2017

References

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

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

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 10 mm (15 mm for [2]) 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] and [2], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 10 mm (15 mm for [2]) (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.
- *H-field distribution:* H-field is measured with an isotropic H-field probe with 100mW forward power to the antenna feed point, in the x-y-plane. The scan area and sensor distance is equivalent to the E-field scan. The maximum of the field is available at the center (subgrid 5) above the feed point. The H-field value stated as calibration value represents the maximum of the interpolated H-field, 10mm above the dipole surface at the feed point.

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	V52.10.0
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	10, 15 mm	
Scan resolution	dx, dy = 5 mm	
Frequency	2450 MHz ± 1 MHz	
Input power drift	< 0.05 dB	

Maximum Field values at 2450 MHz

H-field 10 mm above dipole surface	condition	**interpolated maximum**
Maximum measured	100 mW input power	**0.497 A/m ± 8.2 % (k=2)**

E-field 10 mm above dipole surface	condition	**Interpolated maximum**
Maximum measured above high end	100 mW input power	136.8 V/m = 42.72 dBV/m
Maximum measured above low end	100 mW input power	134.5 V/m = 42.57 dBV/m
Averaged maximum above arm	100 mW input power	**135.7 V/m ± 12.8 % (k=2)**

E-field 15 mm above dipole surface	condition	**Interpolated maximum**
Maximum measured above high end	100 mW input power	91.5 V/m = 39.23 dBV/m
Maximum measured above low end	100 mW input power	85.0 V/m = 38.59 dBV/m
Averaged maximum above arm	100 mW input power	**88.3 V/m ± 12.8 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters

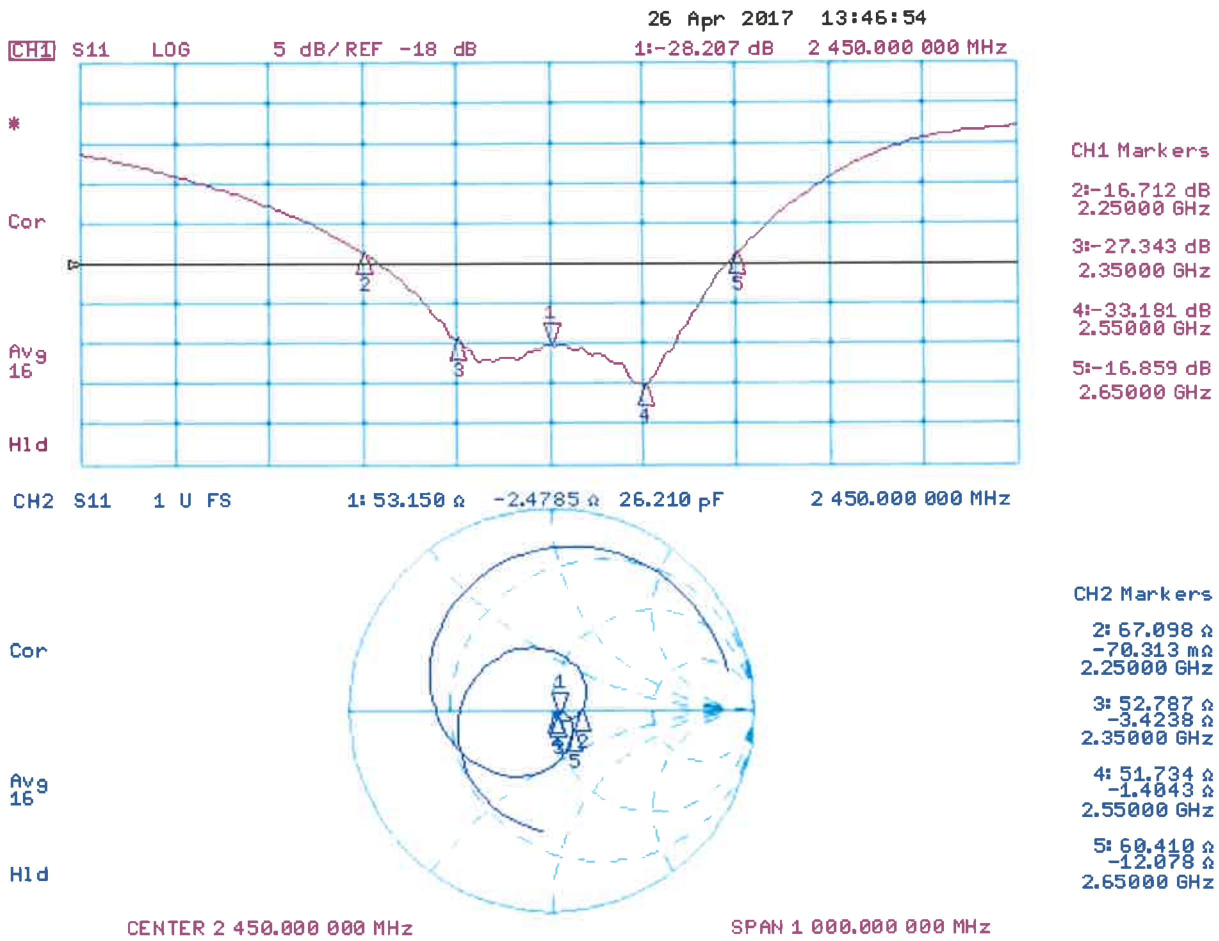
Frequency	Return Loss	Impedance
2250 MHz	16.7 dB	67.1 Ω - 0.1 jΩ
2350 MHz	27.3 dB	52.8 Ω - 3.4 jΩ
2450 MHz	28.2 dB	53.2 Ω - 2.5 jΩ
2550 MHz	33.2 dB	51.7 Ω - 1.4 jΩ
2650 MHz	16.9 dB	60.4 Ω - 12.1 jΩ

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 H-field Result

Date: 25.04.2017

Test Laboratory: SPEAG Lab2

DUT: HAC Dipole 2450 MHz; Type: CD2450V3; Serial: CD2450V3 - SN: 1033

Communication System: UID 0 - CW ; Frequency: 2450 MHz
Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

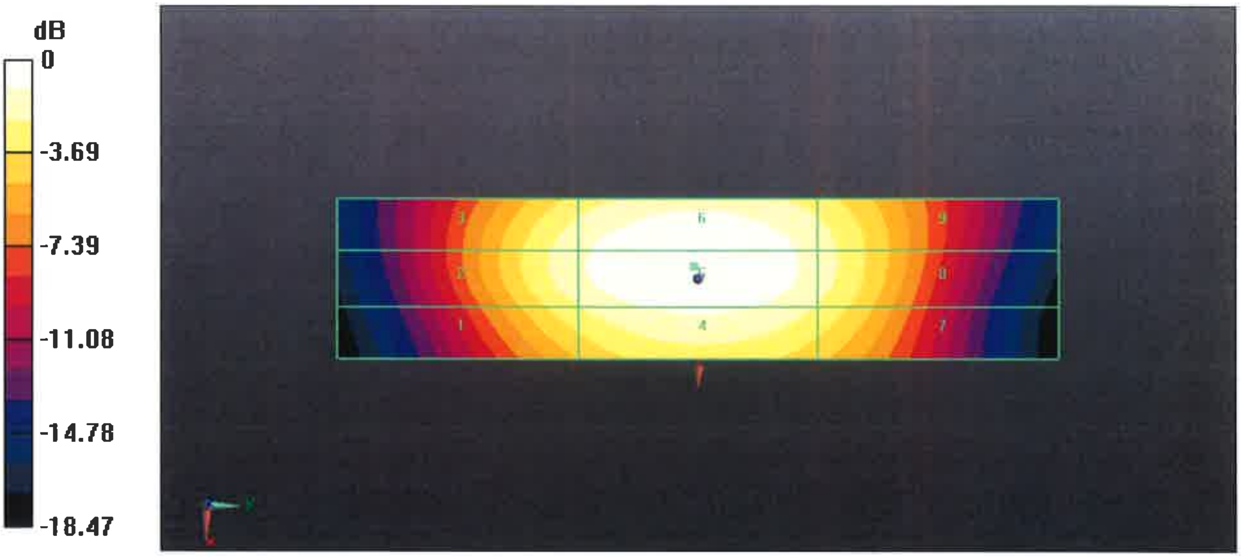
DASY52 Configuration:

- Probe: H3DV6 - SN6065; ; Calibrated: 30.12.2016
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.09.2016
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.10.0(1440); SEMCAD X 14.6.10(7413)

Dipole H-Field measurement @ 2450MHz/H-Scan - 2450MHz d=10mm/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 = 0.5200 A/m; Power Drift = 0.02 dB
PMR not calibrated. PMF = 1.000 is applied.
H-field emissions = 0.4968 A/m
Near-field category: M2 (AWF 0 dB)

PMF scaled H-field

Grid 1 **M2** **0.371 A/m**	Grid 2 **M2** **0.421 A/m**	Grid 3 **M2** **0.415 A/m**
Grid 4 **M2** **0.446 A/m**	Grid 5 **M2** **0.497 A/m**	Grid 6 **M2** **0.489 A/m**
Grid 7 **M2** **0.370 A/m**	Grid 8 **M2** **0.407 A/m**	Grid 9 **M2** **0.403 A/m**



0 dB = 0.4968 A/m = -6.08 dBA/m

DASY5 E-field Result

Date: 25.04.2017

Test Laboratory: SPEAG Lab2

DUT: HAC Dipole 2450 MHz; Type: CD2450V3; Serial: CD2450V3 - SN: 1033

Communication System: UID 0 - CW ; Frequency: 2450 MHz
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 30.12.2016;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.09.2016
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.10.0(1440); SEMCAD X 14.6.10(7413)

Dipole E-Field measurement @ 2450MHz/E-Scan - 2450MHz d=10mm/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 = 85.56 V/m; Power Drift = -0.03 dB
Applied MIF = 0.00 dB
RF audio interference level = 42.72 dBV/m
Emission category: M1

MIF scaled E-field

Grid 1 **M1** **42.13 dBV/m**	Grid 2 **M1** **42.72 dBV/m**	Grid 3 **M1** **42.63 dBV/m**
Grid 4 **M1** **41.03 dBV/m**	Grid 5 **M1** **41.52 dBV/m**	Grid 6 **M1** **41.32 dBV/m**
Grid 7 **M1** **41.85 dBV/m**	Grid 8 **M1** **42.57 dBV/m**	Grid 9 **M1** **42.55 dBV/m**

Dipole E-Field measurement @ 2450MHz/E-Scan - 2450MHz 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 = 85.08 V/m; Power Drift = 0.02 dB

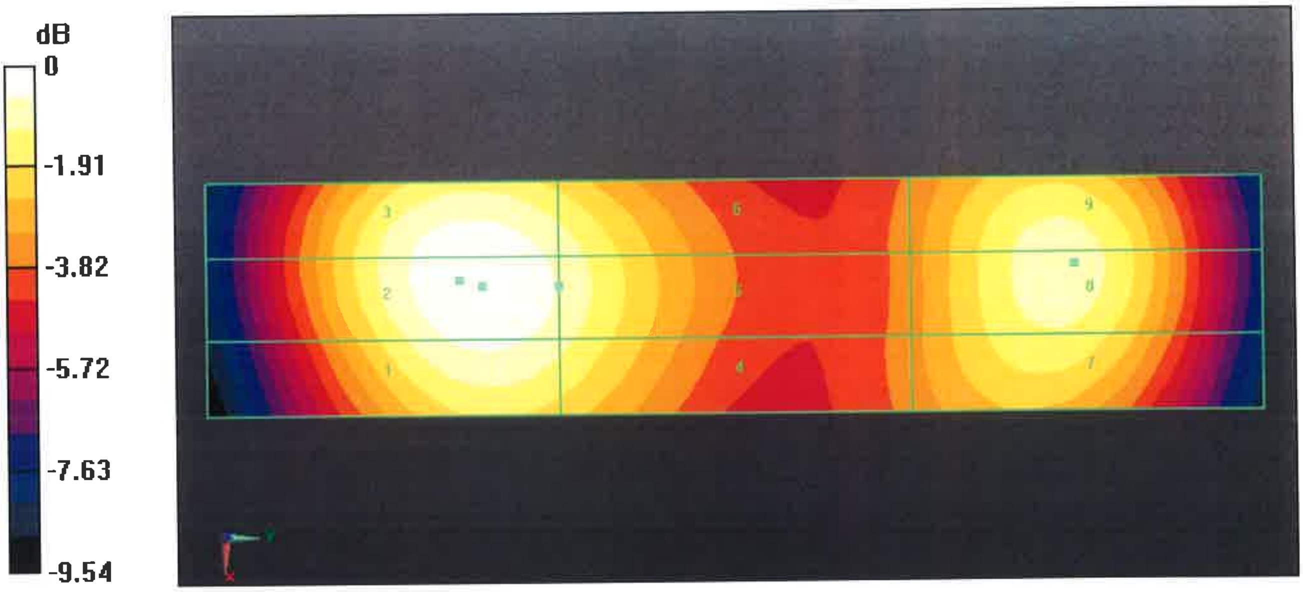
Applied MIF = 0.00 dB

RF audio interference level = 39.23 dBV/m

Emission category: M2

MIF scaled E-field

Grid 1 **M2** **38.9 dBV/m**	Grid 2 **M2** **39.23 dBV/m**	Grid 3 **M2** **39.15 dBV/m**
Grid 4 **M2** **38.48 dBV/m**	Grid 5 **M2** **38.73 dBV/m**	Grid 6 **M2** **38.63 dBV/m**
Grid 7 **M2** **38.26 dBV/m**	Grid 8 **M2** **38.59 dBV/m**	Grid 9 **M2** **38.57 dBV/m**



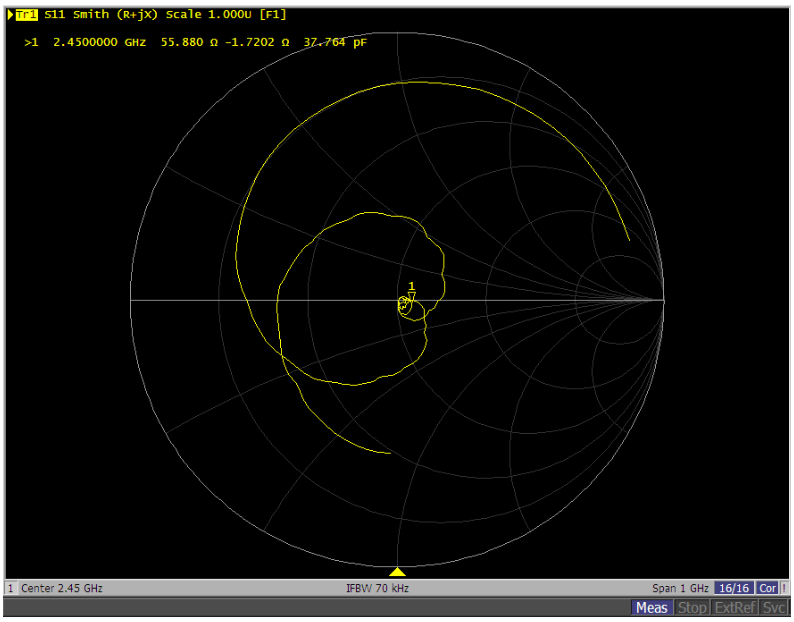
0 dB = 136.8 V/m = 42.72 dBV/m

Annual Confirmation of HAC Reference Dipole

Model : CD2450V3 S/N : 1033 Measurement Date : 2018/4/24

Frequency (MHz)	Type	Item	Previous Measurement	Annual Check	Deviation	Accepted Tolerance	Result
2450	Free Space	Return Loss	-28.207	-28.602	1.40%	±20%	PASS
		Real Impedance	53.150	55.880	2.73	±5Ω	PASS
		Imaginary Impedance	-2.4785	-1.7202	0.76	±5Ω	PASS

2450 MHz，Free Space

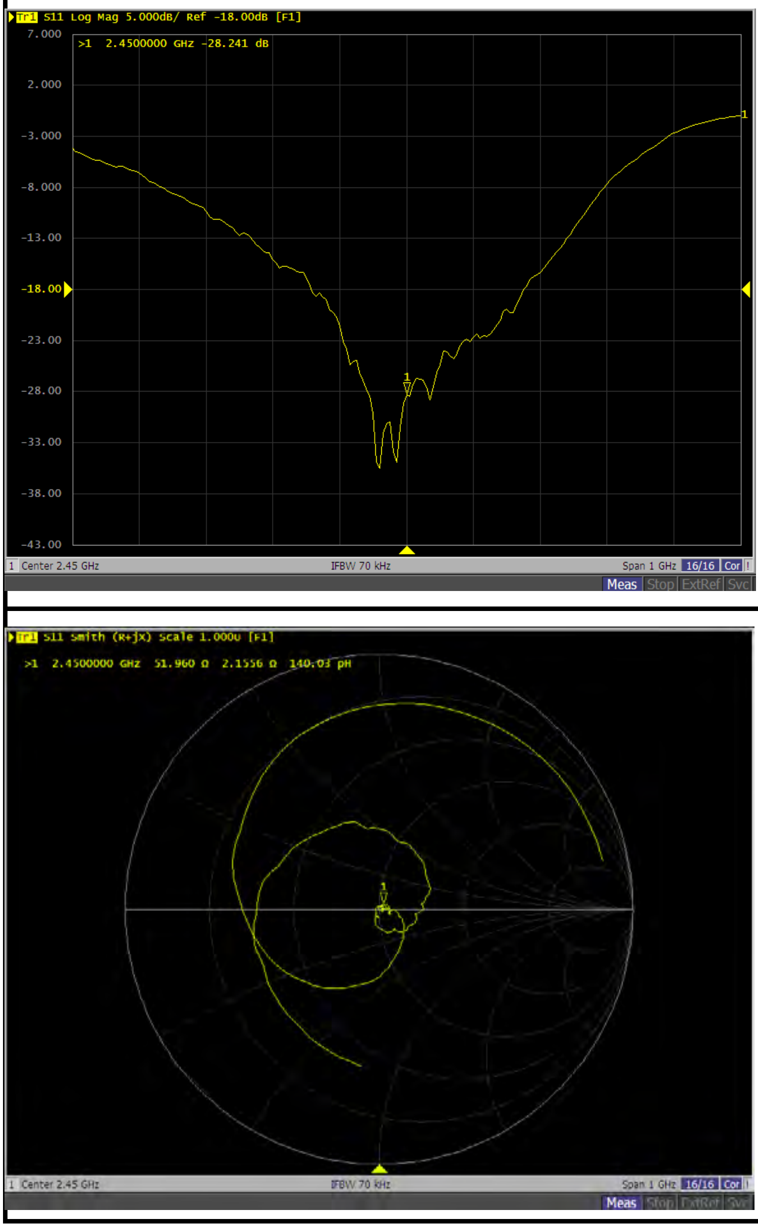


Annual Confirmation of HAC Reference Dipole

Model： CD2450V3 S/N： 1033 Measurement Date： 2019/4/24

Frequency (MHz)	Type	Item	Previous Measurement	Annual Check	Deviation	Accepted Tolerance	Result
2450	Free Space	Return Loss	-28.207	-28.241	0.12%	±20%	PASS
		Real Impedance	53.150	51.960	-1.19	±5Ω	PASS
		Imaginary Impedance	-2.4785	2.1556	4.63	±5Ω	PASS

2450 MHz，Free Space



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

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

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

Accreditation No.: SCS 0108

Client **B.V.ADT (Auden)**

Certificate No: CD2600V3-1005_Mar18

CALIBRATION CERTIFICATE

Object	CD2600V3 - SN: 1005
Calibration procedure(s)	QA CAL-20.v6 Calibration procedure for dipoles in air
Calibration date:	March 14, 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. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Probe EF3DV3	SN: 4013	05-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 HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

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

Issued: March 15, 2018

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	V52.10.0
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	86.5 V/m = 38.74 dBV/m
Maximum measured above low end	100 mW input power	85.1 V/m = 38.60 dBV/m
Averaged maximum above arm	100 mW input power	**85.8 V/m ± 12.8 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters

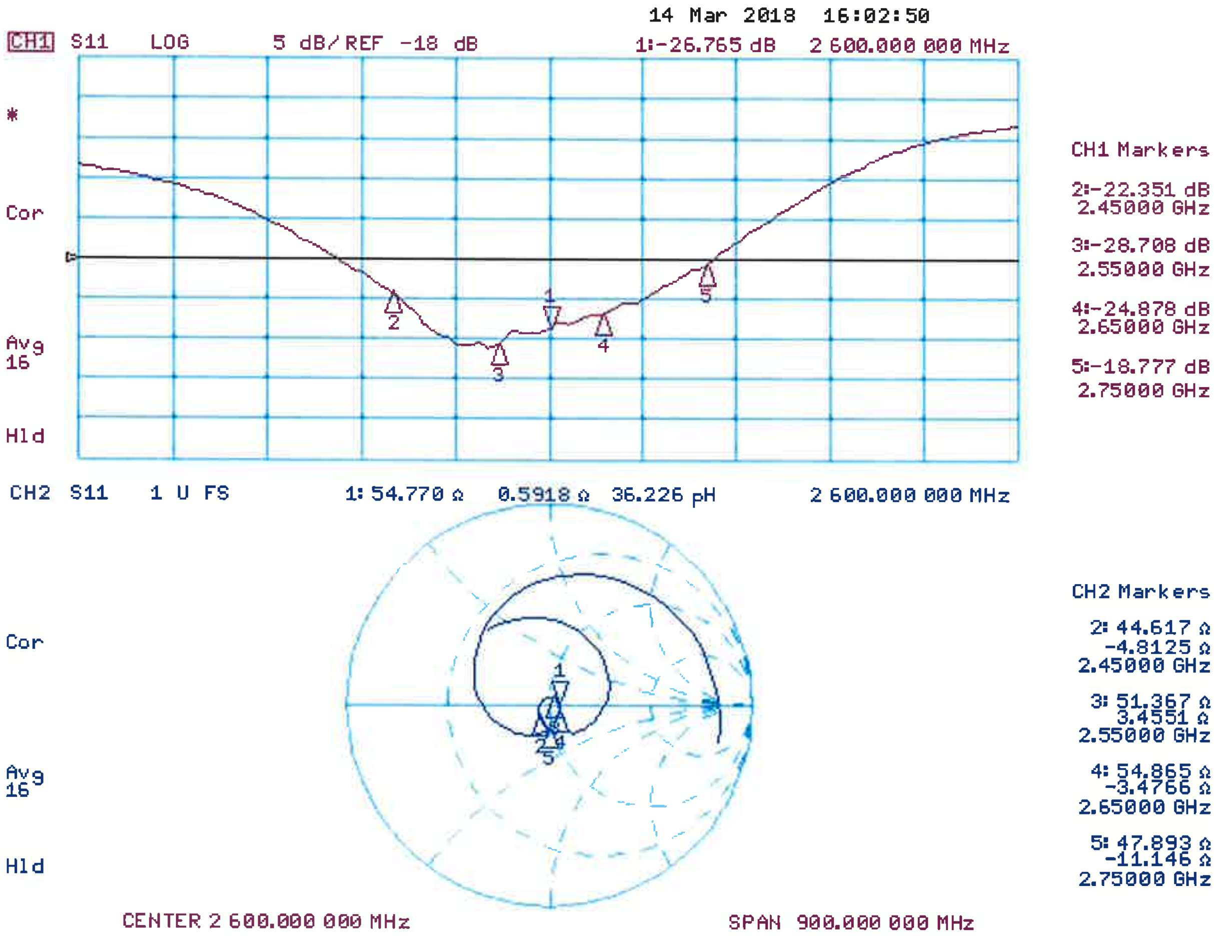
Frequency	Return Loss	Impedance
2450 MHz	22.4 dB	44.6 Ω - 4.8 jΩ
2550 MHz	28.7 dB	51.4 Ω + 3.5 jΩ
2600 MHz	26.8 dB	54.8 Ω + 0.6 jΩ
2650 MHz	24.9 dB	54.9 Ω - 3.5 jΩ
2750 MHz	18.8 dB	47.9 Ω - 11.1 jΩ

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: 14.03.2018

Test Laboratory: SPEAG Lab2

DUT: HAC Dipole 2600 MHz; Type: CD2600V3; Serial: CD2600V3 - SN: 1005

Communication System: UID 0 - CW ; Frequency: 2600 MHz
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

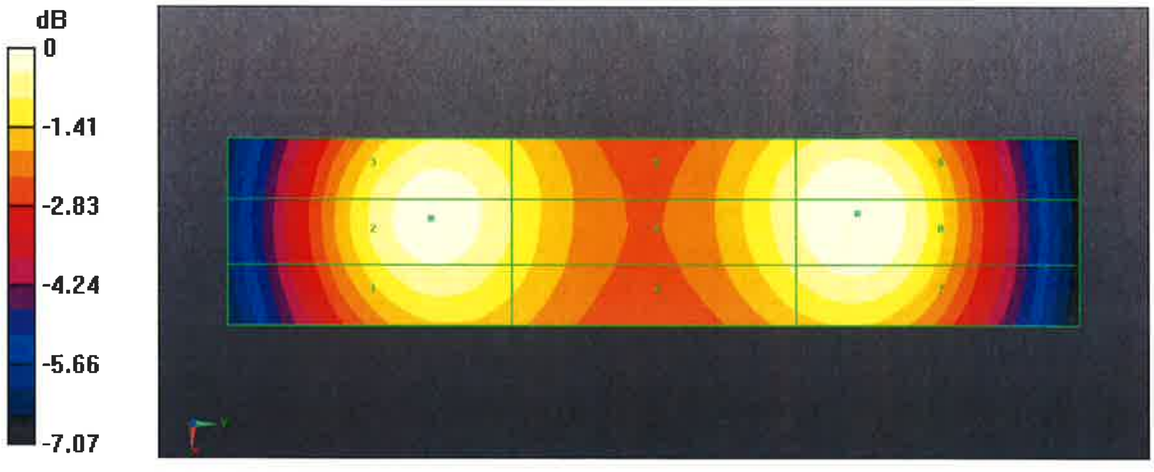
DASY52 Configuration:

- Probe: EF3DV3 - SN4013; ConvF(1, 1, 1); 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 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole E-Field measurement/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 = 63.21 V/m; Power Drift = -0.00 dB
Applied MIF = 0.00 dB
RF audio interference level = 38.74 dBV/m
Emission category: M2

MIF scaled E-field

Grid 1 **M2** **38.27 dBV/m**	Grid 2 **M2** **38.6 dBV/m**	Grid 3 **M2** **38.56 dBV/m**
Grid 4 **M2** **37.94 dBV/m**	Grid 5 **M2** **38.24 dBV/m**	Grid 6 **M2** **38.22 dBV/m**
Grid 7 **M2** **38.41 dBV/m**	Grid 8 **M2** **38.74 dBV/m**	Grid 9 **M2** **38.71 dBV/m**



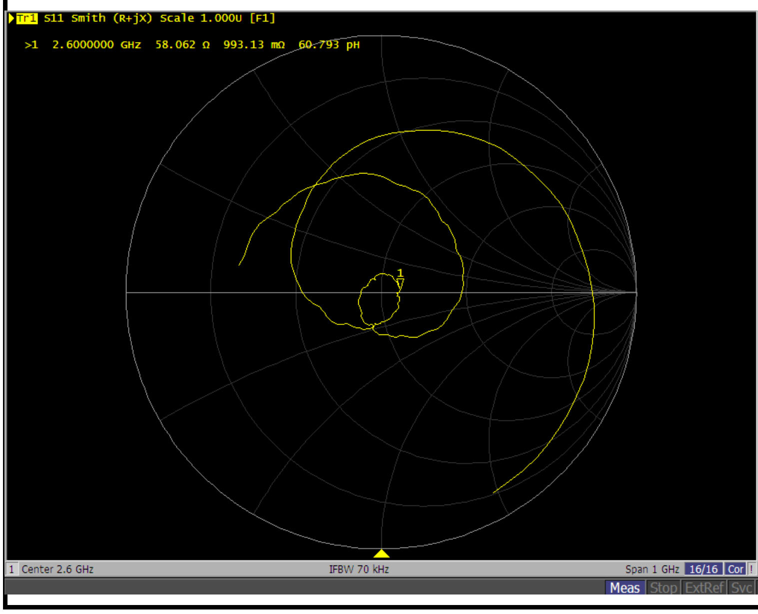
0 dB = 86.52 V/m = 38.74 dBV/m

Annual Confirmation of HAC Reference Dipole

Model : CD2600V3　　S/N : 1005　　Measurement Date : 2019/3/13

Frequency (MHz)	Type	Item	Previous Measurement	Annual Check	Deviation	Accepted Tolerance	Result
2600	Free Space	Return Loss	-26.765	-27.517	2.81%	±20%	PASS
		Real Impedance	54.770	58.062	3.29	±5Ω	PASS
		Imaginary Impedance	0.5918	0.99313	0.40	±5Ω	PASS

2600 MHz , Free Space



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

Client **BV ADT (Auden)** **Certificate No: CD3500V3-1004_Dec17**

CALIBRATION CERTIFICATE

Object	CD3500V3 - SN: 1004
Calibration procedure(s)	QA CAL-20.v6 Calibration procedure for dipoles in air
Calibration date:	December 04, 2017

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. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Probe EF3DV3	SN: 4013	14-Jun-17 (No. EF3-4013_Jun17)	Jun-18
DAE4	SN: 781	13-Jul-17 (No. DAE4-781_Jul17)	Jul-18

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 HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

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

Issued: December 5, 2017

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 EF3D-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	V52.10.0
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	15 mm	
Scan resolution	dx, dy = 5 mm	
Frequency	3500 MHz ± 1 MHz	
Input power drift	< 0.05 dB	

Maximum Field values at 3500 MHz

E-field 15 mm above dipole surface	condition	**Interpolated maximum**
Maximum measured above high end	100 mW input power	83.0 V/m = 38.38 dBV/m
Maximum measured above low end	100 mW input power	81.7 V/m = 38.24 dBV/m
Averaged maximum above arm	100 mW input power	**82.3 V/m ± 12.8 % (k=2)**

Appendix

Antenna Parameters

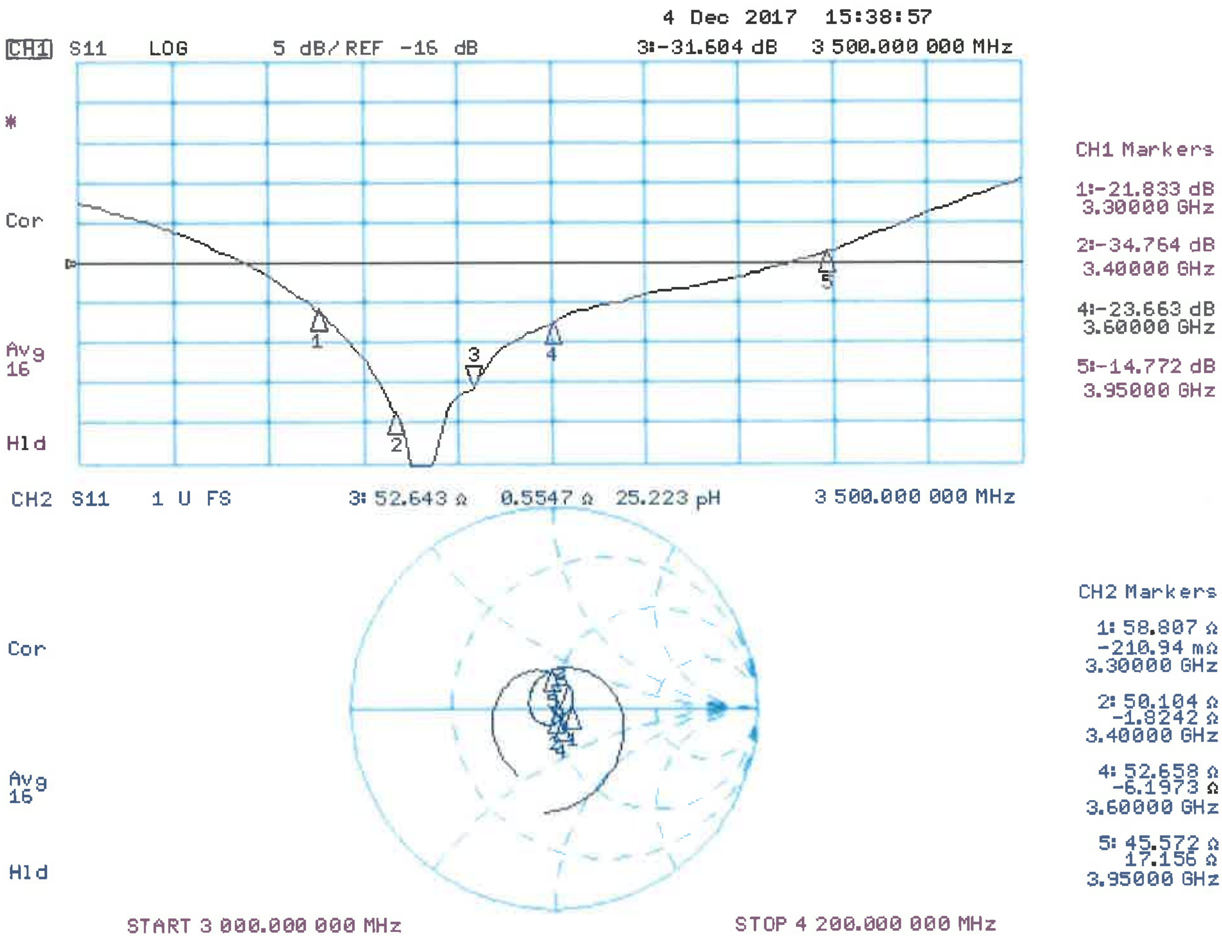
Frequency	**Return Loss**	**Impedance**
3300 MHz	21.8 dB	58.8 Ω - 0.2 jΩ
3400 MHz	34.8 dB	50.1 Ω - 1.8 jΩ
3500 MHz	31.6 dB	52.6 Ω + 0.6 jΩ
3600 MHz	23.7 dB	52.7 Ω - 6.2 jΩ
3950 MHz	14.8 dB	45.6 Ω + 17.2 jΩ

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: 04.12.2017

Test Laboratory: SPEAG Lab2

DUT: HAC Dipole 3500 MHz; Type: CD3500V3; Serial: CD3500V3 - SN: 1004

Communication System: UID 0 - CW ; Frequency: 3500 MHz
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

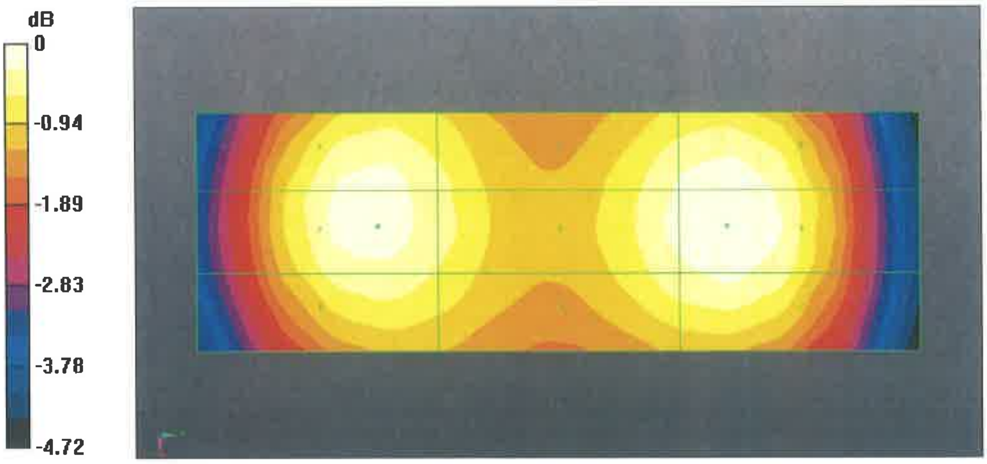
DASY52 Configuration:

- Probe: EF3DV3 - SN4013 (3-4 GHz); ConvF(1, 1, 1); Calibrated: 14.06.2017;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 13.07.2017
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole E-Field measurement @ 3500MHz/E-Scan - 3500MHz d=15mm/Hearing Aid Compatibility Test (41x121x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 32.63 V/m; Power Drift = 0.02 dB
Applied MIF = 0.00 dB
RF audio interference level = 38.38 dBV/m
Emission category: M2

MIF scaled E-field

Grid 1 **M2** **37.98 dBV/m**	Grid 2 **M2** **38.24 dBV/m**	Grid 3 **M2** **38.2 dBV/m**
Grid 4 **M2** **37.97 dBV/m**	Grid 5 **M2** **38.18 dBV/m**	Grid 6 **M2** **38.11 dBV/m**
Grid 7 **M2** **38.14 dBV/m**	Grid 8 **M2** **38.38 dBV/m**	Grid 9 **M2** **38.29 dBV/m**



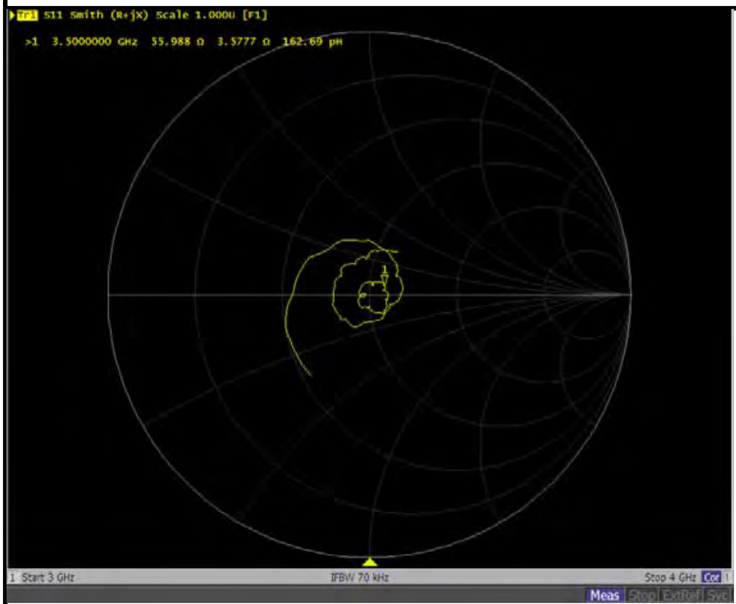
0 dB = 83.01 V/m = 38.38 dBV/m

Annual Confirmation of HAC Reference Dipole

Model： CD3500V3 S/N： 1004 Measurement Date： 2018/12/3

Frequency (MHz)	Type	Item	Previous Measurement	Annual Check	Deviation	Accepted Tolerance	Result
3500	Free Space	Return Loss	-31.604	-30.636	-3.06%	±20%	PASS
		Real Impedance	52.643	55.988	3.35	±5Ω	PASS
		Imaginary Impedance	0.5547	3.5777	3.02	±5Ω	PASS

3500 MHz，Free Space



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

Client **B.V.ADT (Auden)**

Certificate No: CD5500V3-1003_Mar18

CALIBRATION CERTIFICATE

Object	CD5500V3 - SN: 1003
Calibration procedure(s)	QA CAL-20.v6 Calibration procedure for dipoles in air
Calibration date:	March 14, 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. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Probe EF3DV3	SN: 4013	05-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 HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

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

Issued: March 15, 2018

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	V52.10.0
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	15 mm	
Scan resolution	dx, dy = 5 mm	
Frequency	5500 MHz ± 1 MHz	
Input power drift	< 0.05 dB	

Maximum Field values at 5500 MHz

E-field 15 mm above dipole surface	condition	**Interpolated maximum**
Maximum above arm	100 mW input power	**103.5 V/m ± 12.8 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters

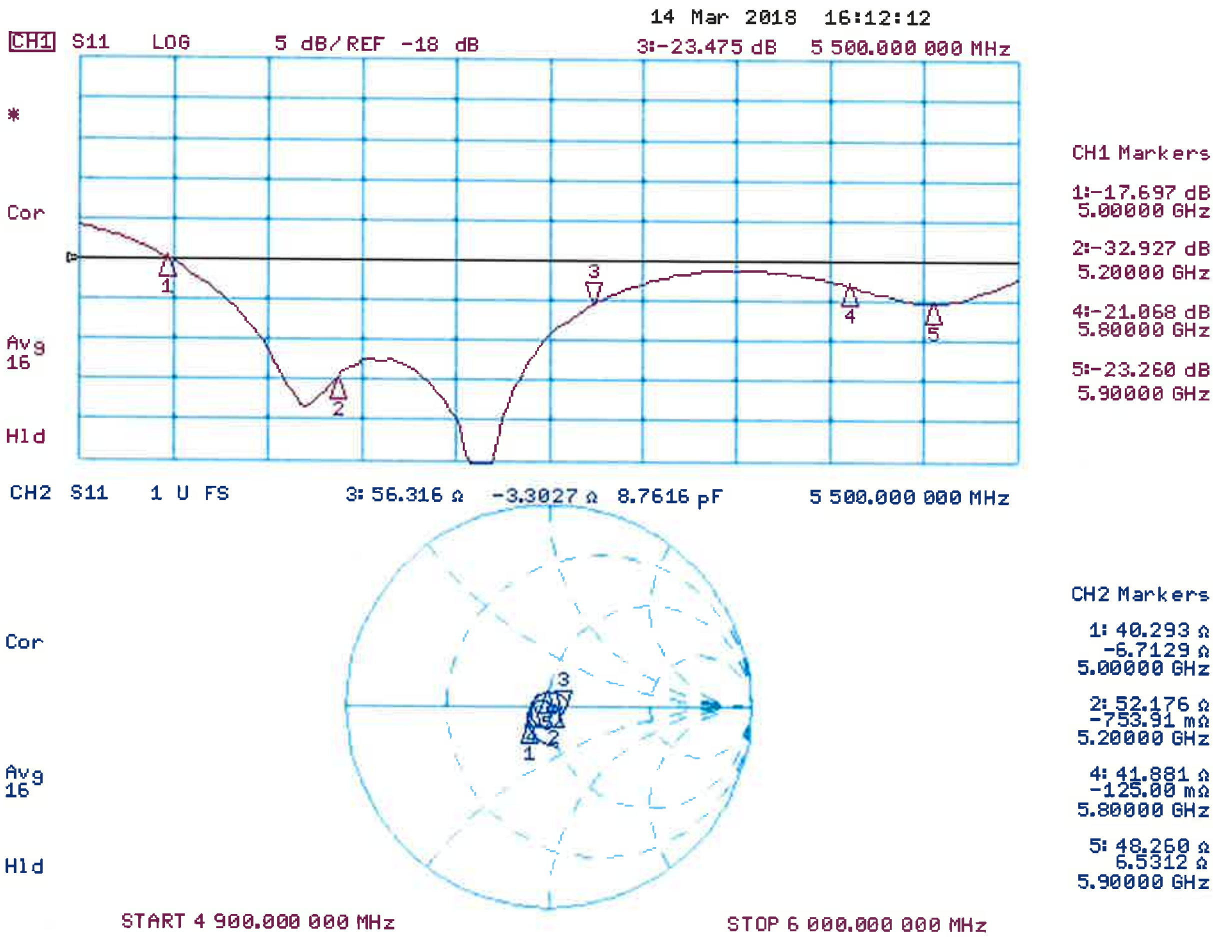
Frequency	**Return Loss**	**Impedance**
5000 MHz	17.7 dB	40.3 Ω - 6.7 jΩ
5200 MHz	32.9 dB	52.2 Ω - 0.8 jΩ
5500 MHz	23.5 dB	56.3 Ω - 3.3 jΩ
5800 MHz	21.1 dB	41.9 Ω - 0.1 jΩ
5900 MHz	23.3 dB	48.3 Ω + 6.5 jΩ

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: 14.03.2018

Test Laboratory: SPEAG Lab2

DUT: HAC Dipole 5500 MHz; Type: CD5500V3; Serial: CD5500V3 - SN: 1003

Communication System: UID 0 - CW ; Frequency: 5500 MHz
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

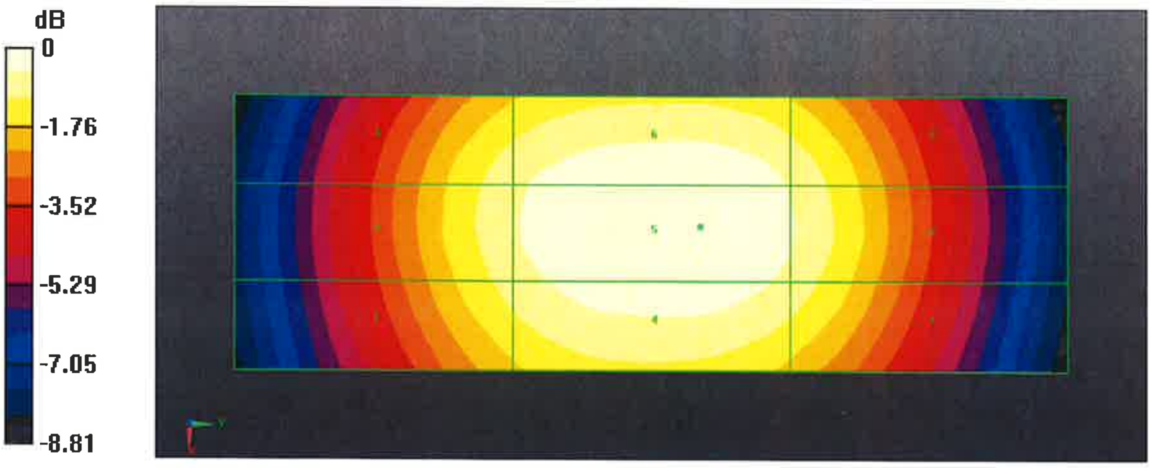
DASY52 Configuration:

- Probe: EF3DV3 - SN4013 (5-6 GHz); ConvF(1, 1, 1); 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 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole E-Field measurement @ 5500MHz/E-Scan - 5500MHz d=15mm/Hearing Aid Compatibility Test (41x121x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 134.4 V/m; Power Drift = 0.00 dB
Applied MIF = 0.00 dB
RF audio interference level = 40.30 dBV/m
Emission category: M1

MIF scaled E-field

Grid 1 **M2** **39.39 dBV/m**	Grid 2 **M2** **39.64 dBV/m**	Grid 3 **M2** **39.55 dBV/m**
Grid 4 **M1** **40.04 dBV/m**	Grid 5 **M1** **40.3 dBV/m**	Grid 6 **M1** **40.18 dBV/m**
Grid 7 **M2** **39.51 dBV/m**	Grid 8 **M2** **39.79 dBV/m**	Grid 9 **M2** **39.66 dBV/m**



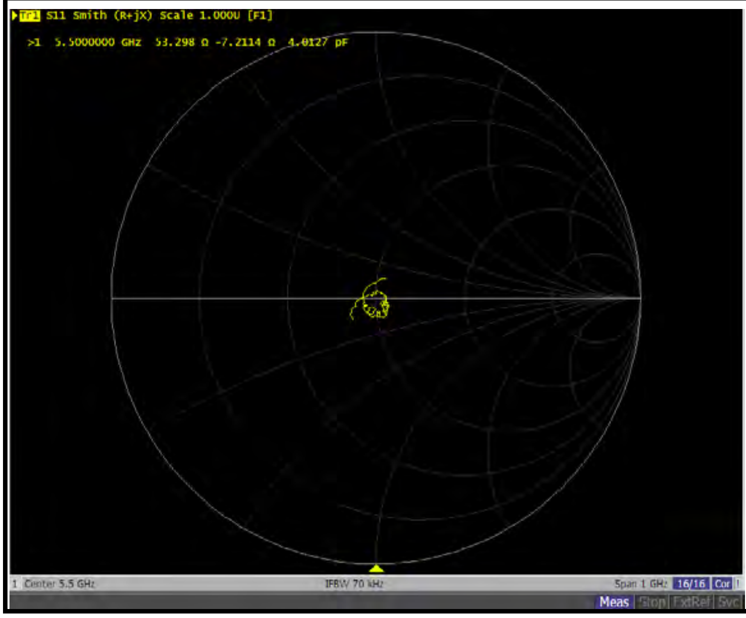
0 dB = 103.5 V/m = 40.30 dBV/m

Annual Confirmation of HAC Reference Dipole

Model : CD5500V3 S/N : 1003 Measurement Date : 2019/3/13

Frequency (MHz)	Type	Item	Previous Measurement	Annual Check	Deviation	Accepted Tolerance	Result
5500	Free Space	Return Loss	-23.475	-22.488	-4.20%	±20%	PASS
		Real Impedance	56.316	53.298	-3.02	±5Ω	PASS
		Imaginary Impedance	-3.3027	-7.2114	-3.91	±5Ω	PASS

5500 MHz，Free Space



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

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

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

Accreditation No.: SCS 0108

Client **BV ADT (Auden)**

Certificate No: EF3-4049_Jan19

CALIBRATION CERTIFICATE

Object	EF3DV3- SN:4049
Calibration procedure(s)	QA CAL-02.v9, QA CAL-25.v7 Calibration procedure for E-field probes optimized for close near field evaluations in air
Calibration date:	January 11, 2019

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: S5277 (20x)	04-Apr-18 (No. 217-02682)	Apr-19
DAE4	SN: 789	07-Aug-18 (No. DAE4-789_Aug18)	Aug-19
Reference Probe ER3DV6	SN: 2328	09-Oct-18 (No. ER3-2328_Oct18)	Oct-19
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: January 16, 2019

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

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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
En	incident E-field orientation normal to probe axis
Ep	incident E-field orientation parallel to probe axis
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1309-2005, “ IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz”, December 2005
b) CTIA Test Plan for Hearing Aid Compatibility, Rev 3.1.1, May 2017

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ for XY sensors and $\vartheta = 90$ for Z sensor ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide).
- *NORM(f)x,y,z = 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).

DASY/EASY - Parameters of Probe: EF3DV3 - SN:4049

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)	0.77	1.03	1.10	± 10.1 %
DCP (mV)[B]	96.4	95.0	97.5	

Calibration results for Frequency Response (30 MHz – 6 GHz)

Frequency MHz	Target E-Field V/m	Measured E-field (En) V/m	Deviation E-normal in %	Measured E-field (Ep) V/m	Deviation E-normal in %	Unc (k=2) %
30	77.2	77.4	0.4%	77.3	0.2%	± 5.1 %
100	77.4	78.2	1.1%	77.9	0.7%	± 5.1 %
450	77.1	77.9	1.0%	77.7	0.8%	± 5.1 %
600	77.3	77.6	0.5%	77.4	0.2%	± 5.1 %
750	77.2	77.3	0.2%	77.1	-0.1%	± 5.1 %
1800	140.4	136.3	-2.9%	136.3	-2.9%	± 5.1 %
2000	132.9	128.6	-3.2%	128.5	-3.3%	± 5.1 %
2200	124.1	120.2	-3.1%	121.4	-2.2%	± 5.1 %
2500	123.6	120.0	-2.9%	121.0	-2.1%	± 5.1 %
3000	78.9	74.6	-5.4%	75.5	-4.3%	± 5.1 %
3500	250.8	247.9	-1.2%	244.3	-2.6%	± 5.1 %
3700	244.0	238.8	-2.1%	237.3	-2.7%	± 5.1 %
5200	50.8	50.7	-0.2%	51.0	0.4%	± 5.1 %
5500	49.6	48.9	-1.5%	48.5	-2.2%	± 5.1 %
5800	48.9	49.2	0.5%	49.2	0.5%	± 5.1 %

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB$\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	167.6	+ 3.5 %	± 4.7 %
		Y	0.0	0.0	1.0		144.6		
		Y	0.0	0.0	1.0		162.0		

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

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

DASY/EASY - Parameters of Probe: EF3DV3 - SN:4049

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max dev.	Max Unc[E] (k=2)
0	CW	X	0.00	0.00	1.00	0.00	167.6	± 1.0 %	± 4.7 %
		Y	0.00	0.00	1.00		144.6		
		Z	0.00	0.00	1.00		162.0		
10352-AAA	Pulse Waveform (200Hz, 10%)	X	3.18	66.63	10.74	10.00	60.0	± 2.6 %	± 9.6 %
		Y	16.25	90.66	23.30		60.0		
		Z	7.45	77.73	16.08		60.0		
10353-AAA	Pulse Waveform (200Hz, 20%)	X	1.62	63.61	8.30	6.99	80.0	± 0.9 %	± 9.6 %
		Y	100.00	114.20	27.90		80.0		
		Z	36.20	95.09	19.93		80.0		
10354-AAA	Pulse Waveform (200Hz, 40%)	X	0.77	61.99	6.48	3.98	95.0	± 1.0 %	± 9.6 %
		Y	100.00	112.48	25.67		95.0		
		Z	100.00	103.58	20.37		95.0		
10355-AAA	Pulse Waveform (200Hz, 60%)	X	0.41	61.36	5.46	2.22	120.0	± 1.5 %	± 9.6 %
		Y	100.00	112.83	24.47		120.0		
		Z	100.00	104.39	19.62		120.0		
10387-AAA	QPSK Waveform, 1 MHz	X	0.78	63.76	9.74	0.00	150.0	± 2.1 %	± 9.6 %
		Y	1.41	69.10	14.73		150.0		
		Z	1.09	67.20	12.35		150.0		
10388-AAA	QPSK Waveform, 10 MHz	X	2.63	71.58	17.80	0.00	150.0	± 0.9 %	± 9.6 %
		Y	2.95	72.03	17.81		150.0		
		Z	2.79	72.30	18.14		150.0		
10396-AAA	64-QAM Waveform, 100 kHz	X	3.63	76.51	21.64	3.01	150.0	± 1.4 %	± 9.6 %
		Y	4.15	75.09	21.42		150.0		
		Z	2.64	69.51	18.67		150.0		
10399-AAA	64-QAM Waveform, 40 MHz	X	3.64	68.13	16.56	0.00	150.0	± 1.4 %	± 9.6 %
		Y	3.85	68.39	16.71		150.0		
		Z	3.70	68.29	16.70		150.0		
10414-AAA	WLAN CCDF, 64-QAM, 40MHz	X	4.89	66.15	16.01	0.00	150.0	± 3.3 %	± 9.6 %
		Y	5.06	65.52	15.78		150.0		
		Z	4.97	66.06	16.04		150.0		

Note: For details on UID parameters see Appendix

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

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

DASY/EASY - Parameters of Probe: EF3DV3 - SN:4049

Sensor Frequency Model Parameters

	Sensor X	Sensor Y	Sensor Z
Frequency Corr. (LF)	-0.04	-0.18	5.37
Frequency Corr. (HF)	2.82	2.82	2.82

Sensor Model Parameters

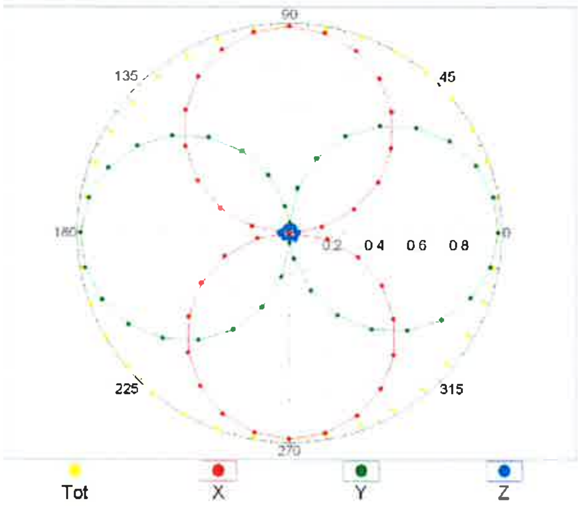
	C1 fF	C2 fF	α V^{-1}	T1 $ms.V^{-2}$	T2 $ms.V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
X	44.9	293.74	36.30	6.92	0.56	4.93	2.00	0.01	1.00
Y	78.3	536.51	39.31	25.35	1.61	5.10	0.00	0.72	1.01
Z	53.7	356.63	37.34	12.45	0.48	5.03	0.00	0.39	1.00

Other Probe Parameters

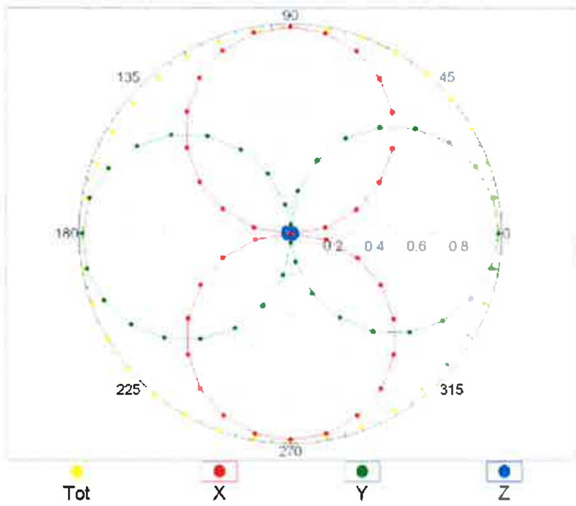
Sensor Arrangement	Rectangular
Connector Angle (°)	109.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	335 mm
Probe Body Diameter	12 mm
Tip Length	25 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	1.5 mm
Probe Tip to Sensor Y Calibration Point	1.5 mm
Probe Tip to Sensor Z Calibration Point	1.5 mm

Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM,0°

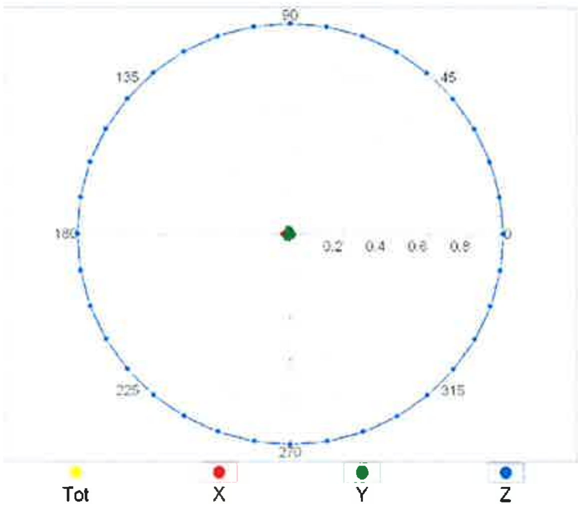


f=1800 MHz,R22,0°

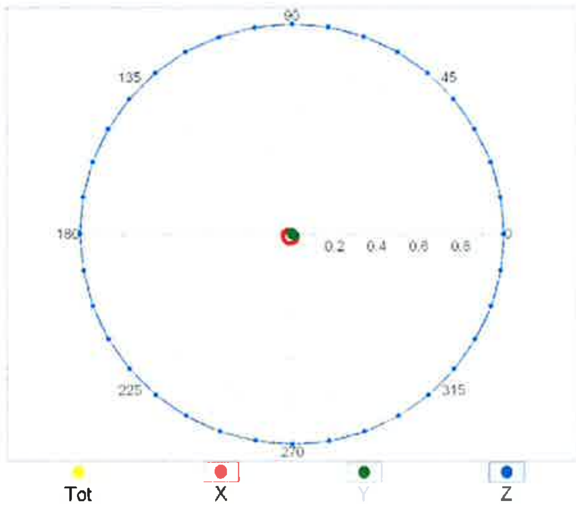


Receiving Pattern (ϕ), ϑ = 90°

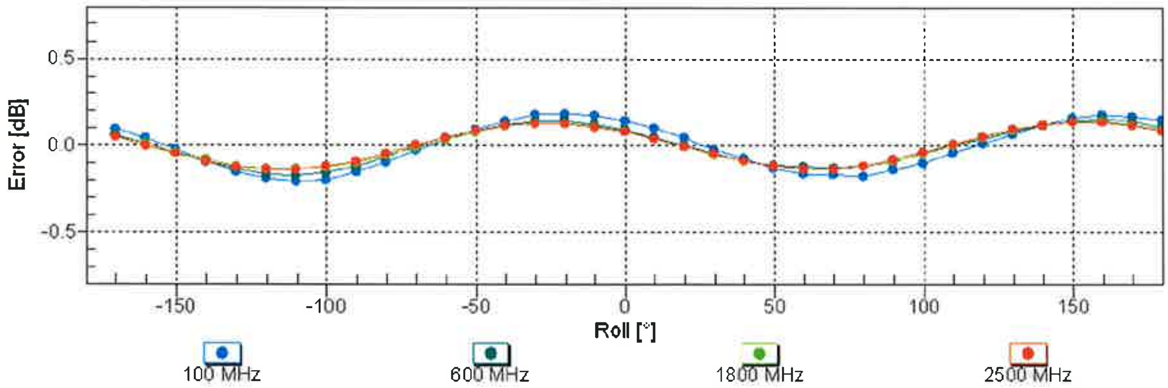
f=600 MHz,TEM,90°



f=1800 MHz,R22,90°

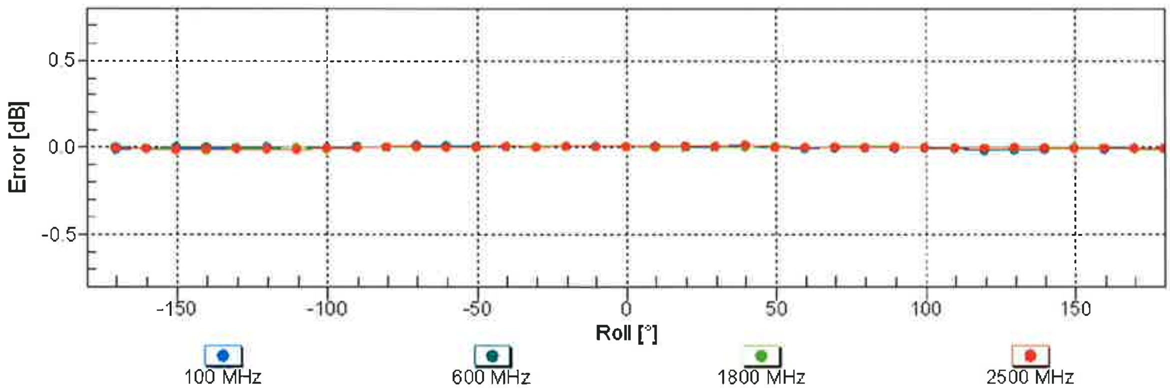


Receiving Pattern (ϕ), ϑ = 0°



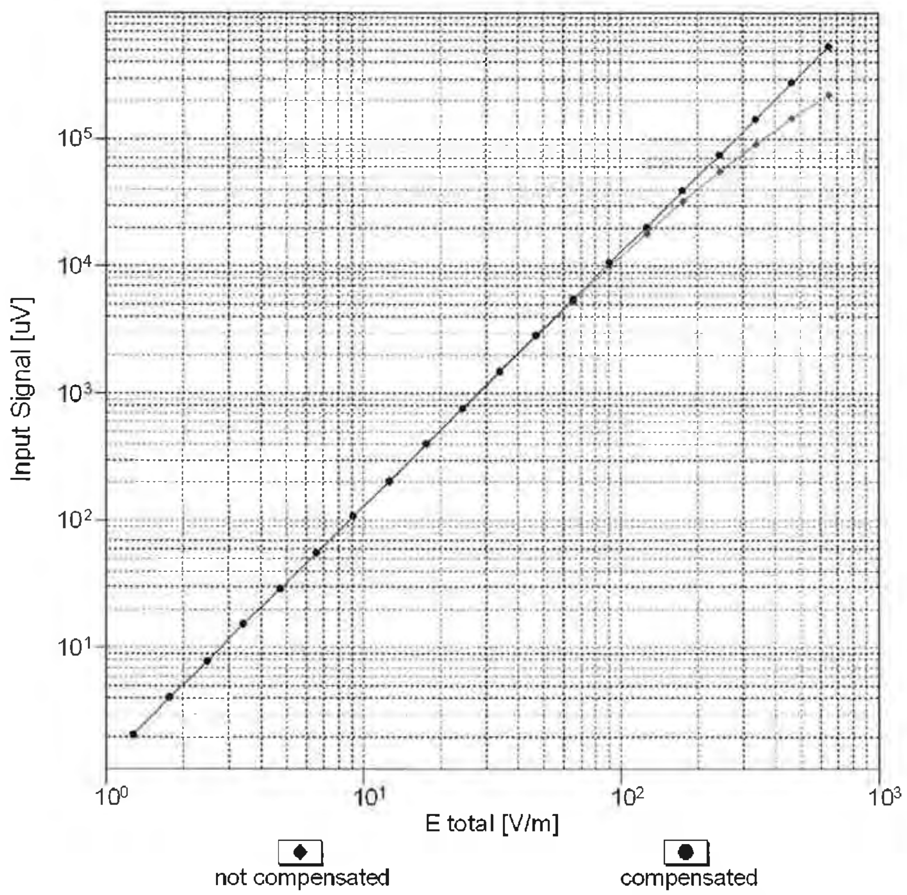
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

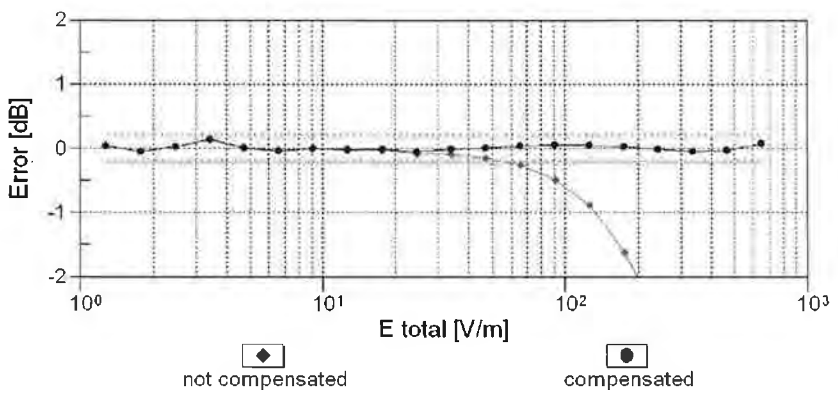
Receiving Pattern (ϕ), ϑ = 90°



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

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

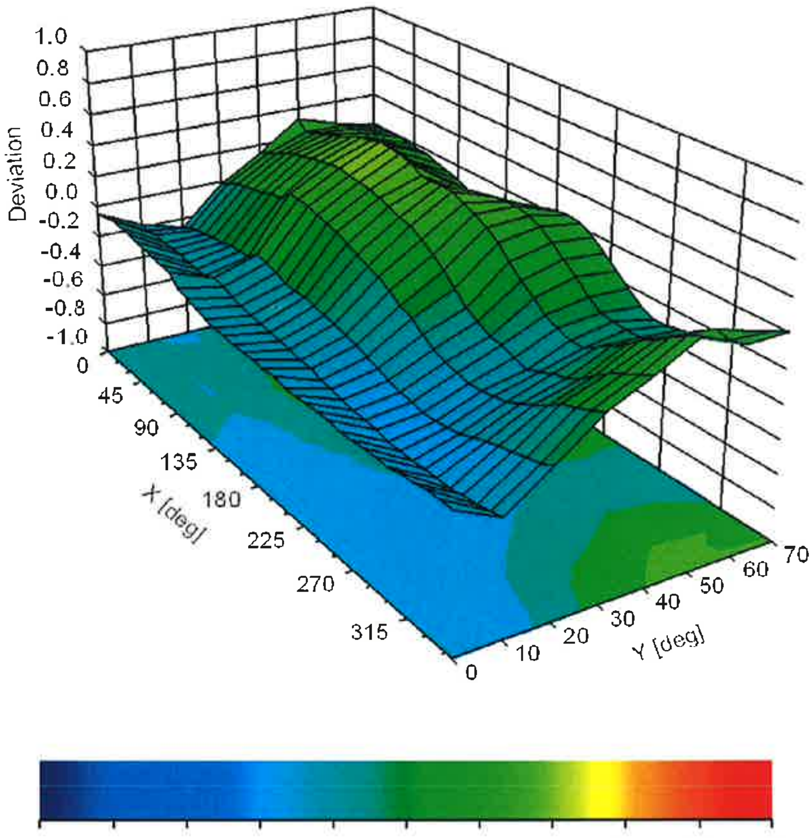




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Deviation from Isotropy in Air

Error (ϕ, ϑ), f = 900 MHz



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

Appendix: Modulation Calibration Parameters

UID	Rev	Communication System Name	Group	PAR (dB)	Unc[E] (k=2)
0		CW	CW	0.00	± 4.7 %
10010	CAA	SAR Validation (Square, 100ms, 10ms)	Test	10.00	± 9.6 %
10011	CAB	UMTS-FDD (WCDMA)	WCDMA	2.91	± 9.6 %
10012	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	WLAN	1.87	± 9.6 %
10013	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	WLAN	9.46	± 9.6 %
10021	DAC	GSM-FDD (TDMA, GMSK)	GSM	9.39	± 9.6 %
10023	DAC	GPRS-FDD (TDMA, GMSK, TN 0)	GSM	9.57	± 9.6 %
10024	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	GSM	6.56	± 9.6 %
10025	DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	GSM	12.62	± 9.6 %
10026	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	GSM	9.55	± 9.6 %
10027	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	GSM	4.80	± 9.6 %
10028	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	GSM	3.55	± 9.6 %
10029	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	GSM	7.78	± 9.6 %
10030	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	Bluetooth	5.30	± 9.6 %
10031	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	Bluetooth	1.87	± 9.6 %
10032	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	Bluetooth	1.16	± 9.6 %
10033	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	Bluetooth	7.74	± 9.6 %
10034	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	Bluetooth	4.53	± 9.6 %
10035	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	Bluetooth	3.83	± 9.6 %
10036	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	Bluetooth	8.01	± 9.6 %
10037	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	Bluetooth	4.77	± 9.6 %
10038	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	Bluetooth	4.10	± 9.6 %
10039	CAB	CDMA2000 (1xRTT, RC1)	CDMA2000	4.57	± 9.6 %
10042	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	AMPS	7.78	± 9.6 %
10044	CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	AMPS	0.00	± 9.6 %
10048	CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	DECT	13.80	± 9.6 %
10049	CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	DECT	10.79	± 9.6 %
10056	CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	TD-SCDMA	11.01	± 9.6 %
10058	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	GSM	6.52	± 9.6 %
10059	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	WLAN	2.12	± 9.6 %
10060	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	WLAN	2.83	± 9.6 %
10061	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	WLAN	3.60	± 9.6 %
10062	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	WLAN	8.68	± 9.6 %
10063	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	WLAN	8.63	± 9.6 %
10064	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	WLAN	9.09	± 9.6 %
10065	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	WLAN	9.00	± 9.6 %
10066	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	WLAN	9.38	± 9.6 %
10067	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	WLAN	10.12	± 9.6 %
10068	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	WLAN	10.24	± 9.6 %
10069	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	WLAN	10.56	± 9.6 %
10071	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	WLAN	9.83	± 9.6 %
10072	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	WLAN	9.62	± 9.6 %
10073	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	WLAN	9.94	± 9.6 %
10074	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	WLAN	10.30	± 9.6 %
10075	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	WLAN	10.77	± 9.6 %
10076	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	WLAN	10.94	± 9.6 %
10077	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	WLAN	11.00	± 9.6 %
10081	CAB	CDMA2000 (1xRTT, RC3)	CDMA2000	3.97	± 9.6 %
10082	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	AMPS	4.77	± 9.6 %
10090	DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	GSM	6.56	± 9.6 %
10097	CAB	UMTS-FDD (HSDPA)	WCDMA	3.98	± 9.6 %
10098	CAB	UMTS-FDD (HSUPA, Subtest 2)	WCDMA	3.98	± 9.6 %
10099	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	GSM	9.55	± 9.6 %
10100	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-FDD	5.67	± 9.6 %
10101	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10102	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10103	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10104	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-TDD	9.97	± 9.6 %
10105	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-TDD	10.01	± 9.6 %
10108	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-FDD	5.80	± 9.6 %

10109	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10110	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10111	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-FDD	6.44	± 9.6 %
10112	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-FDD	6.59	± 9.6 %
10113	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10114	CAC	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	WLAN	8.10	± 9.6 %
10115	CAC	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	WLAN	8.46	± 9.6 %
10116	CAC	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	WLAN	8.15	± 9.6 %
10117	CAC	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	WLAN	8.07	± 9.6 %
10118	CAC	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	WLAN	8.59	± 9.6 %
10119	CAC	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	WLAN	8.13	± 9.6 %
10140	CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10141	CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-FDD	6.53	± 9.6 %
10142	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10143	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-FDD	6.35	± 9.6 %
10144	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-FDD	6.65	± 9.6 %
10145	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-FDD	5.76	± 9.6 %
10146	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.41	± 9.6 %
10147	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.72	± 9.6 %
10149	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10150	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10151	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-TDD	9.28	± 9.6 %
10152	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10153	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-TDD	10.05	± 9.6 %
10154	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10155	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10156	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-FDD	5.79	± 9.6 %
10157	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10158	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10159	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-FDD	6.56	± 9.6 %
10160	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-FDD	5.82	± 9.6 %
10161	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10162	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-FDD	6.58	± 9.6 %
10166	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-FDD	5.46	± 9.6 %
10167	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.21	± 9.6 %
10168	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.79	± 9.6 %
10169	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10170	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10171	AAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-FDD	6.49	± 9.6 %
10172	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10173	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10174	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10175	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10176	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10177	CAI	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10178	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10179	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10180	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10181	CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10182	CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10183	AAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10184	CAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10185	CAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-FDD	6.51	± 9.6 %
10186	AAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10187	CAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10188	CAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10189	AAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10193	CAC	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	WLAN	8.09	± 9.6 %
10194	CAC	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	WLAN	8.12	± 9.6 %
10195	CAC	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	WLAN	8.21	± 9.6 %
10196	CAC	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	WLAN	8.10	± 9.6 %
10197	CAC	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	WLAN	8.13	± 9.6 %
10198	CAC	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	WLAN	8.27	± 9.6 %
10219	CAC	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	WLAN	8.03	± 9.6 %

10220	CAC	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	WLAN	8.13	± 9.6 %
10221	CAC	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	WLAN	8.27	± 9.6 %
10222	CAC	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	WLAN	8.06	± 9.6 %
10223	CAC	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	WLAN	8.48	± 9.6 %
10224	CAC	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	WLAN	8.08	± 9.6 %
10225	CAB	UMTS-FDD (HSPA+)	WCDMA	5.97	± 9.6 %
10226	CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.49	± 9.6 %
10227	CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.26	± 9.6 %
10228	CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-TDD	9.22	± 9.6 %
10229	CAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10230	CAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10231	CAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-TDD	9.19	± 9.6 %
10232	CAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10233	CAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10234	CAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10235	CAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10236	CAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10237	CAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10238	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10239	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10240	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10241	CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.82	± 9.6 %
10242	CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-TDD	9.86	± 9.6 %
10243	CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-TDD	9.46	± 9.6 %
10244	CAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10245	CAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-TDD	10.06	± 9.6 %
10246	CAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10247	CAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-TDD	9.91	± 9.6 %
10248	CAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-TDD	10.09	± 9.6 %
10249	CAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10250	CAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-TDD	9.81	± 9.6 %
10251	CAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-TDD	10.17	± 9.6 %
10252	CAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10253	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-TDD	9.90	± 9.6 %
10254	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-TDD	10.14	± 9.6 %
10255	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-TDD	9.20	± 9.6 %
10256	CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.96	± 9.6 %
10257	CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.08	± 9.6 %
10258	CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-TDD	9.34	± 9.6 %
10259	CAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-TDD	9.98	± 9.6 %
10260	CAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-TDD	9.97	± 9.6 %
10261	CAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10262	CAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-TDD	9.83	± 9.6 %
10263	CAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-TDD	10.16	± 9.6 %
10264	CAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-TDD	9.23	± 9.6 %
10265	CAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10266	CAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-TDD	10.07	± 9.6 %
10267	CAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10268	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10269	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-TDD	10.13	± 9.6 %
10270	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-TDD	9.58	± 9.6 %
10274	CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	WCDMA	4.87	± 9.6 %
10275	CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	WCDMA	3.96	± 9.6 %
10277	CAA	PHS (QPSK)	PHS	11.81	± 9.6 %
10278	CAA	PHS (QPSK, BW 884MHz, Rolloff 0.5)	PHS	11.81	± 9.6 %
10279	CAA	PHS (QPSK, BW 884MHz, Rolloff 0.38)	PHS	12.18	± 9.6 %
10290	AAB	CDMA2000, RC1, SO55, Full Rate	CDMA2000	3.91	± 9.6 %
10291	AAB	CDMA2000, RC3, SO55, Full Rate	CDMA2000	3.46	± 9.6 %
10292	AAB	CDMA2000, RC3, SO32, Full Rate	CDMA2000	3.39	± 9.6 %
10293	AAB	CDMA2000, RC3, SO3, Full Rate	CDMA2000	3.50	± 9.6 %
10295	AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	CDMA2000	12.49	± 9.6 %
10297	AAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-FDD	5.81	± 9.6 %
10298	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10299	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-FDD	6.39	± 9.6 %

10300	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10301	AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC)	WiMAX	12.03	± 9.6 %
10302	AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3 CTRL symbols)	WiMAX	12.57	± 9.6 %
10303	AAA	IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	WiMAX	12.52	± 9.6 %
10304	AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	WiMAX	11.86	± 9.6 %
10305	AAA	IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC, 15 symbols)	WiMAX	15.24	± 9.6 %
10306	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC, 18 symbols)	WiMAX	14.67	± 9.6 %
10307	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC, 18 symbols)	WiMAX	14.49	± 9.6 %
10308	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	WiMAX	14.46	± 9.6 %
10309	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, AMC 2x3, 18 symbols)	WiMAX	14.58	± 9.6 %
10310	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3, 18 symbols)	WiMAX	14.57	± 9.6 %
10311	AAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-FDD	6.06	± 9.6 %
10313	AAA	iDEN 1:3	iDEN	10.51	± 9.6 %
10314	AAA	iDEN 1:6	iDEN	13.48	± 9.6 %
10315	AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	WLAN	1.71	± 9.6 %
10316	AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	WLAN	8.36	± 9.6 %
10317	AAC	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	WLAN	8.36	± 9.6 %
10352	AAA	Pulse Waveform (200Hz, 10%)	Generic	10.00	± 9.6 %
10353	AAA	Pulse Waveform (200Hz, 20%)	Generic	6.99	± 9.6 %
10354	AAA	Pulse Waveform (200Hz, 40%)	Generic	3.98	± 9.6 %
10355	AAA	Pulse Waveform (200Hz, 60%)	Generic	2.22	± 9.6 %
10356	AAA	Pulse Waveform (200Hz, 80%)	Generic	0.97	± 9.6 %
10387	AAA	QPSK Waveform, 1 MHz	Generic	5.10	± 9.6 %
10388	AAA	QPSK Waveform, 10 MHz	Generic	5.22	± 9.6 %
10396	AAA	64-QAM Waveform, 100 kHz	Generic	6.27	± 9.6 %
10399	AAA	64-QAM Waveform, 40 MHz	Generic	6.27	± 9.6 %
10400	AAD	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)	WLAN	8.37	± 9.6 %
10401	AAD	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)	WLAN	8.60	± 9.6 %
10402	AAD	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle)	WLAN	8.53	± 9.6 %
10403	AAB	CDMA2000 (1xEV-DO, Rev. 0)	CDMA2000	3.76	± 9.6 %
10404	AAB	CDMA2000 (1xEV-DO, Rev. A)	CDMA2000	3.77	± 9.6 %
10406	AAB	CDMA2000, RC3, SO32, SCH0, Full Rate	CDMA2000	5.22	± 9.6 %
10410	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9, Subframe Conf=4)	LTE-TDD	7.82	± 9.6 %
10414	AAA	WLAN CCDF, 64-QAM, 40MHz	Generic	8.54	± 9.6 %
10415	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	WLAN	1.54	± 9.6 %
10416	AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	WLAN	8.23	± 9.6 %
10417	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	WLAN	8.23	± 9.6 %
10418	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preambule)	WLAN	8.14	± 9.6 %
10419	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preambule)	WLAN	8.19	± 9.6 %
10422	AAB	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	WLAN	8.32	± 9.6 %
10423	AAB	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	WLAN	8.47	± 9.6 %
10424	AAB	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	WLAN	8.40	± 9.6 %
10425	AAB	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	WLAN	8.41	± 9.6 %
10426	AAB	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	WLAN	8.45	± 9.6 %
10427	AAB	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	WLAN	8.41	± 9.6 %
10430	AAD	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	LTE-FDD	8.28	± 9.6 %
10431	AAD	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	LTE-FDD	8.38	± 9.6 %
10432	AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	LTE-FDD	8.34	± 9.6 %
10433	AAC	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	LTE-FDD	8.34	± 9.6 %
10434	AAA	W-CDMA (BS Test Model 1, 64 DPCH)	WCDMA	8.60	± 9.6 %
10435	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10447	AAD	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.56	± 9.6 %
10448	AAD	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clippin 44%)	LTE-FDD	7.53	± 9.6 %
10449	AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Cliping 44%)	LTE-FDD	7.51	± 9.6 %
10450	AAC	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.48	± 9.6 %

10451	AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	WCDMA	7.59	± 9.6 %
10456	AAB	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc duty cycle)	WLAN	8.63	± 9.6 %
10457	AAA	UMTS-FDD (DC-HSDPA)	WCDMA	6.62	± 9.6 %
10458	AAA	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	CDMA2000	6.55	± 9.6 %
10459	AAA	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	CDMA2000	8.25	± 9.6 %
10460	AAA	UMTS-FDD (WCDMA, AMR)	WCDMA	2.39	± 9.6 %
10461	AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10462	AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.30	± 9.6 %
10463	AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.56	± 9.6 %
10464	AAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10465	AAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	± 9.6 %
10466	AAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	± 9.6 %
10467	AAE	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10468	AAE	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	± 9.6 %
10469	AAE	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.56	± 9.6 %
10470	AAE	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10471	AAE	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	± 9.6 %
10472	AAE	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	± 9.6 %
10473	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10474	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	± 9.6 %
10475	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	± 9.6 %
10477	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	± 9.6 %
10478	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	± 9.6 %
10479	AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	± 9.6 %
10480	AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.18	± 9.6 %
10481	AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.45	± 9.6 %
10482	AAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.71	± 9.6 %
10483	AAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.39	± 9.6 %
10484	AAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.47	± 9.6 %
10485	AAE	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.59	± 9.6 %
10486	AAE	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.38	± 9.6 %
10487	AAE	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.60	± 9.6 %
10488	AAE	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.70	± 9.6 %
10489	AAE	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.31	± 9.6 %
10490	AAE	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	± 9.6 %
10491	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	± 9.6 %

10492	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.41	± 9.6 %
10493	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.55	± 9.6 %
10494	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	± 9.6 %
10495	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.37	± 9.6 %
10496	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	± 9.6 %
10497	AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.67	± 9.6 %
10498	AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.40	± 9.6 %
10499	AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.68	± 9.6 %
10500	AAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.67	± 9.6 %
10501	AAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.44	± 9.6 %
10502	AAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.52	± 9.6 %
10503	AAE	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.72	± 9.6 %
10504	AAE	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.31	± 9.6 %
10505	AAE	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	± 9.6 %
10506	AAE	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	± 9.6 %
10507	AAE	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.36	± 9.6 %
10508	AAE	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.55	± 9.6 %
10509	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.99	± 9.6 %
10510	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.49	± 9.6 %
10511	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.51	± 9.6 %
10512	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	± 9.6 %
10513	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.42	± 9.6 %
10514	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.45	± 9.6 %
10515	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc duty cycle)	WLAN	1.58	± 9.6 %
10516	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle)	WLAN	1.57	± 9.6 %
10517	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)	WLAN	1.58	± 9.6 %
10518	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle)	WLAN	8.23	± 9.6 %
10519	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle)	WLAN	8.39	± 9.6 %
10520	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle)	WLAN	8.12	± 9.6 %
10521	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc duty cycle)	WLAN	7.97	± 9.6 %
10522	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc duty cycle)	WLAN	8.45	± 9.6 %
10523	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc duty cycle)	WLAN	8.08	± 9.6 %
10524	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc duty cycle)	WLAN	8.27	± 9.6 %
10525	AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 99pc duty cycle)	WLAN	8.36	± 9.6 %
10526	AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 99pc duty cycle)	WLAN	8.42	± 9.6 %
10527	AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 99pc duty cycle)	WLAN	8.21	± 9.6 %
10528	AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 99pc duty cycle)	WLAN	8.36	± 9.6 %
10529	AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 99pc duty cycle)	WLAN	8.36	± 9.6 %
10531	AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 99pc duty cycle)	WLAN	8.43	± 9.6 %
10532	AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 99pc duty cycle)	WLAN	8.29	± 9.6 %
10533	AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 99pc duty cycle)	WLAN	8.38	± 9.6 %
10534	AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 99pc duty cycle)	WLAN	8.45	± 9.6 %

10535	AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 99pc duty cycle)	WLAN	8.45	± 9.6 %
10536	AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 99pc duty cycle)	WLAN	8.32	± 9.6 %
10537	AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 99pc duty cycle)	WLAN	8.44	± 9.6 %
10538	AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 99pc duty cycle)	WLAN	8.54	± 9.6 %
10540	AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 99pc duty cycle)	WLAN	8.39	± 9.6 %
10541	AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 99pc duty cycle)	WLAN	8.46	± 9.6 %
10542	AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 99pc duty cycle)	WLAN	8.65	± 9.6 %
10543	AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 99pc duty cycle)	WLAN	8.65	± 9.6 %
10544	AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 99pc duty cycle)	WLAN	8.47	± 9.6 %
10545	AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 99pc duty cycle)	WLAN	8.55	± 9.6 %
10546	AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 99pc duty cycle)	WLAN	8.35	± 9.6 %
10547	AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 99pc duty cycle)	WLAN	8.49	± 9.6 %
10548	AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 99pc duty cycle)	WLAN	8.37	± 9.6 %
10550	AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 99pc duty cycle)	WLAN	8.38	± 9.6 %
10551	AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 99pc duty cycle)	WLAN	8.50	± 9.6 %
10552	AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 99pc duty cycle)	WLAN	8.42	± 9.6 %
10553	AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 99pc duty cycle)	WLAN	8.45	± 9.6 %
10554	AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 99pc duty cycle)	WLAN	8.48	± 9.6 %
10555	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 99pc duty cycle)	WLAN	8.47	± 9.6 %
10556	AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 99pc duty cycle)	WLAN	8.50	± 9.6 %
10557	AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 99pc duty cycle)	WLAN	8.52	± 9.6 %
10558	AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 99pc duty cycle)	WLAN	8.61	± 9.6 %
10560	AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 99pc duty cycle)	WLAN	8.73	± 9.6 %
10561	AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 99pc duty cycle)	WLAN	8.56	± 9.6 %
10562	AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 99pc duty cycle)	WLAN	8.69	± 9.6 %
10563	AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 99pc duty cycle)	WLAN	8.77	± 9.6 %
10564	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc duty cycle)	WLAN	8.25	± 9.6 %
10565	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc duty cycle)	WLAN	8.45	± 9.6 %
10566	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc duty cycle)	WLAN	8.13	± 9.6 %
10567	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc duty cycle)	WLAN	8.00	± 9.6 %
10568	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc duty cycle)	WLAN	8.37	± 9.6 %
10569	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc duty cycle)	WLAN	8.10	± 9.6 %
10570	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc duty cycle)	WLAN	8.30	± 9.6 %
10571	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc duty cycle)	WLAN	1.99	± 9.6 %
10572	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc duty cycle)	WLAN	1.99	± 9.6 %
10573	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc duty cycle)	WLAN	1.98	± 9.6 %
10574	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)	WLAN	1.98	± 9.6 %
10575	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc duty cycle)	WLAN	8.59	± 9.6 %
10576	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc duty cycle)	WLAN	8.60	± 9.6 %
10577	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc duty cycle)	WLAN	8.70	± 9.6 %
10578	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc duty cycle)	WLAN	8.49	± 9.6 %
10579	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc duty cycle)	WLAN	8.36	± 9.6 %
10580	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc duty cycle)	WLAN	8.76	± 9.6 %
10581	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc duty cycle)	WLAN	8.35	± 9.6 %
10582	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc duty cycle)	WLAN	8.67	± 9.6 %
10583	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc duty cycle)	WLAN	8.59	± 9.6 %
10584	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc duty cycle)	WLAN	8.60	± 9.6 %
10585	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc duty cycle)	WLAN	8.70	± 9.6 %
10586	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc duty cycle)	WLAN	8.49	± 9.6 %
10587	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc duty cycle)	WLAN	8.36	± 9.6 %

10588	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc duty cycle)	WLAN	8.76	± 9.6 %
10589	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc duty cycle)	WLAN	8.35	± 9.6 %
10590	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc duty cycle)	WLAN	8.67	± 9.6 %
10591	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc duty cycle)	WLAN	8.63	± 9.6 %
10592	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc duty cycle)	WLAN	8.79	± 9.6 %
10593	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc duty cycle)	WLAN	8.64	± 9.6 %
10594	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc duty cycle)	WLAN	8.74	± 9.6 %
10595	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc duty cycle)	WLAN	8.74	± 9.6 %
10596	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc duty cycle)	WLAN	8.71	± 9.6 %
10597	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc duty cycle)	WLAN	8.72	± 9.6 %
10598	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS7, 90pc duty cycle)	WLAN	8.50	± 9.6 %
10599	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc duty cycle)	WLAN	8.79	± 9.6 %
10600	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc duty cycle)	WLAN	8.88	± 9.6 %
10601	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10602	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc duty cycle)	WLAN	8.94	± 9.6 %
10603	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc duty cycle)	WLAN	9.03	± 9.6 %
10604	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc duty cycle)	WLAN	8.76	± 9.6 %
10605	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS6, 90pc duty cycle)	WLAN	8.97	± 9.6 %
10606	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10607	AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 90pc duty cycle)	WLAN	8.64	± 9.6 %
10608	AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 90pc duty cycle)	WLAN	8.77	± 9.6 %
10609	AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 90pc duty cycle)	WLAN	8.57	± 9.6 %
10610	AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 90pc duty cycle)	WLAN	8.78	± 9.6 %
10611	AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 90pc duty cycle)	WLAN	8.70	± 9.6 %
10612	AAB	IEEE 802.11ac WiFi (20MHz, MCS5, 90pc duty cycle)	WLAN	8.77	± 9.6 %
10613	AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 90pc duty cycle)	WLAN	8.94	± 9.6 %
10614	AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 90pc duty cycle)	WLAN	8.59	± 9.6 %
10615	AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10616	AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10617	AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 90pc duty cycle)	WLAN	8.81	± 9.6 %
10618	AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 90pc duty cycle)	WLAN	8.58	± 9.6 %
10619	AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 90pc duty cycle)	WLAN	8.86	± 9.6 %
10620	AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 90pc duty cycle)	WLAN	8.87	± 9.6 %
10621	AAB	IEEE 802.11ac WiFi (40MHz, MCS5, 90pc duty cycle)	WLAN	8.77	± 9.6 %
10622	AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 90pc duty cycle)	WLAN	8.68	± 9.6 %
10623	AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10624	AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 90pc duty cycle)	WLAN	8.96	± 9.6 %
10625	AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 90pc duty cycle)	WLAN	8.96	± 9.6 %
10626	AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 90pc duty cycle)	WLAN	8.83	± 9.6 %
10627	AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 90pc duty cycle)	WLAN	8.88	± 9.6 %
10628	AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 90pc duty cycle)	WLAN	8.71	± 9.6 %
10629	AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 90pc duty cycle)	WLAN	8.85	± 9.6 %
10630	AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 90pc duty cycle)	WLAN	8.72	± 9.6 %
10631	AAB	IEEE 802.11ac WiFi (80MHz, MCS5, 90pc duty cycle)	WLAN	8.81	± 9.6 %
10632	AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 90pc duty cycle)	WLAN	8.74	± 9.6 %
10633	AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 90pc duty cycle)	WLAN	8.83	± 9.6 %
10634	AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 90pc duty cycle)	WLAN	8.80	± 9.6 %
10635	AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 90pc duty cycle)	WLAN	8.81	± 9.6 %
10636	AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 90pc duty cycle)	WLAN	8.83	± 9.6 %
10637	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 90pc duty cycle)	WLAN	8.79	± 9.6 %
10638	AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 90pc duty cycle)	WLAN	8.86	± 9.6 %
10639	AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 90pc duty cycle)	WLAN	8.85	± 9.6 %
10640	AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 90pc duty cycle)	WLAN	8.98	± 9.6 %
10641	AAC	IEEE 802.11ac WiFi (160MHz, MCS5, 90pc duty cycle)	WLAN	9.06	± 9.6 %
10642	AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 90pc duty cycle)	WLAN	9.06	± 9.6 %
10643	AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 90pc duty cycle)	WLAN	8.89	± 9.6 %
10644	AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 90pc duty cycle)	WLAN	9.05	± 9.6 %
10645	AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 90pc duty cycle)	WLAN	9.11	± 9.6 %
10646	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,7)	LTE-TDD	11.96	± 9.6 %
10647	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,7)	LTE-TDD	11.96	± 9.6 %
10648	AAA	CDMA2000 (1x Advanced)	CDMA2000	3.45	± 9.6 %
10652	AAD	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.91	± 9.6 %
10653	AAD	LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.42	± 9.6 %
10654	AAD	LTE-TDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.96	± 9.6 %

10655	AAE	LTE-TDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.21	± 9.6 %
10658	AAA	Pulse Waveform (200Hz, 10%)	Test	10.00	± 9.6 %
10659	AAA	Pulse Waveform (200Hz, 20%)	Test	6.99	± 9.6 %
10660	AAA	Pulse Waveform (200Hz, 40%)	Test	3.98	± 9.6 %
10661	AAA	Pulse Waveform (200Hz, 60%)	Test	2.22	± 9.6 %
10662	AAA	Pulse Waveform (200Hz, 80%)	Test	0.97	± 9.6 %
10670	AAA	Bluetooth Low Energy	Bluetooth	2.19	± 9.6 %

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

Appendix D. Photographs of EUT and Setup

The photographs are shown as follows.