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RTTE AND AUTOMOTIVE COMPONENTS LABORATORY

TEST REPORT
No. ARSP00067/1

performed in accordance with

FCC Rules: Code of Federal Regulations (CFR) no. 47
Part 15 Subpart B Section 15.107 and 15.109

PRODUCT	Activity tracker for swimmers
MODEL(s) TESTED	XMETRICS
FCC ID	2AE4YXM01-FIT-PRO
TRADE MARK(s)	XMETRICS®

APPLICANT	MR&D S.p.A. – Viale dell'Unione Europea, 8 I – 21013 – Gallarate (Va)

Tested by	Giordano Carcano	Giordano Carcano cosign
Approved by	Giovanni Di Turi *[Laboratory deputy]*	Giovanni Di Turi CoSign

Revision Sheet

Release No.	Date	Revision Description
Rev. 0	2015-06-22	First edition Digital signed - ARSP00067-1_TR_M&RD_XMetrics_FCC Part15B
Rev. 1	2015-07-23	Second edition – repetition of conducted emissions and radiated emissions, testing EUT as a computer peripheral; new photo documentation and description of the two models (PRO and FIT) Digital signed - ARSP00067-1_rev1_TR_M&RD_XMetrics_FCC Part15B
Rev. 2	2015-07-30	Third edition – repetition of conducted emissions and radiated emissions on FIT model Digital signed - ARSP00067-1_rev2_TR_M&RD_XMetrics_FCC Part15B

1. GENERAL DATA

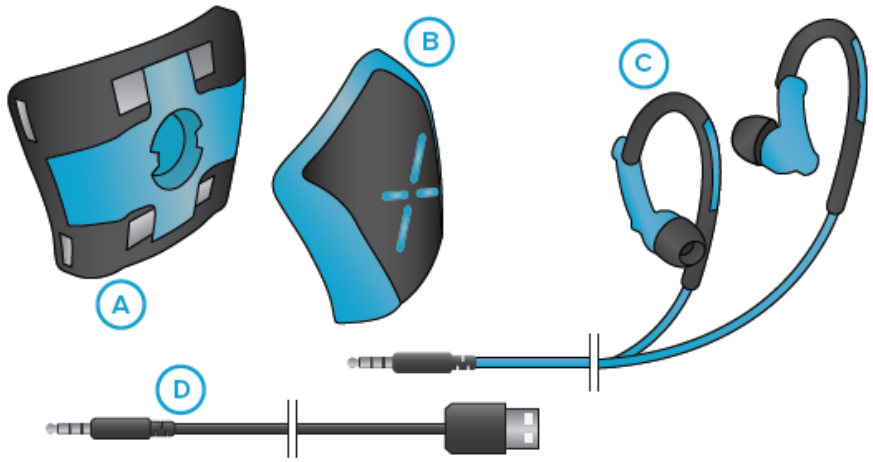
SAMPLE		
Samples received on	**2015-05-18** **2015-05-20** **2015-07-27**	**(item sent and sampling by applicant)**
IMQ reference samples	**BEM**	**77530** **77557** **78397**
Samples tested No.	2	
Object under analysis recognition	**Not carried out** Except where stated, characteristics of products were taken from client description and were not verified by the laboratory	
TEST LOCATION		
Testing dates	2015-06-05 2015-07-21 2015-07-28	
Testing laboratory.	IMQ S.p.A. – Via Quintiliano, 43 – I – 20138 Milano	
Testing site	Via Quintiliano, 43 – I – 20138 Milano	
ENVIRONMENTAL CONDITIONING		
Parameter	***Measured***	
Ambient Temperature	25 ÷ 35 °C	
Relative Humidity	50 ÷ 60 %	
Atmospheric Pressure	900 ÷ 1000 mbar	

2. REFERENCE DOCUMENT

DOCUMENT		DATE	TITLE
☒	47 CFR Part 15	2008	Radio Frequency Device
☒	ANSI C63.4	2009	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
☒	ANSI C63.10	2009	American National Standard for Testing Unlicensed Wireless Devices

3. EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL DATA

MODEL (basic)	Description
XMETRICS PRO	The product is used as a workout tool by swimmers. The device provides information, through earphones, to the swimmer in respect of his training (pool, rhythm, etc...). The device acquires data on training of swimmers, that can later be transferred via USB connection or Bluetooth connection to an external device.  A. Silicone band B. Device C. Earphones D. USB cable
VARIANTS (derived)	**Description**
XMETRICS FIT	Same electronics of the model PRO, with less features (without Bluetooth module) and different external plastic 

Tests performed on both models

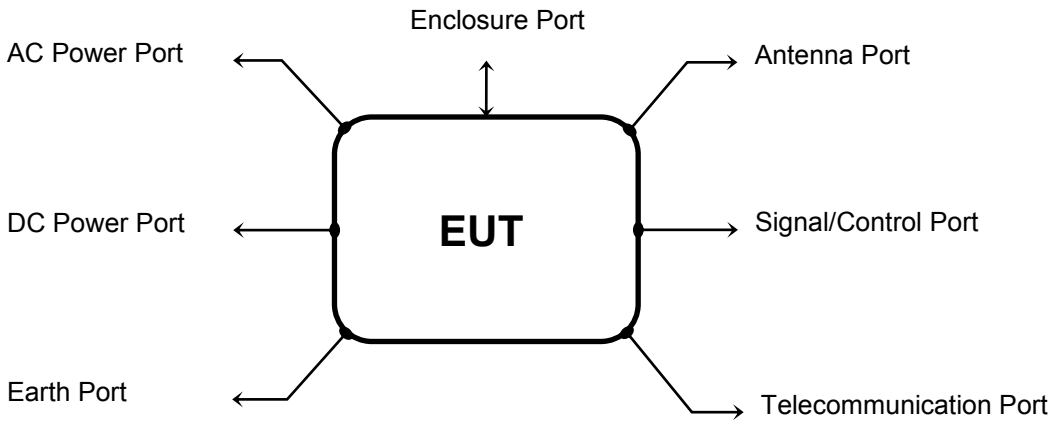
Contains module with FCC ID	EUT (XMETRICS PRO) contains FCC ID: SQGBT830

Manufacturer	Xmetrics S.r.l. – Via Caravaggio 3 – I – 20060 Bussero (MI)

Type of equipment	Information Technology Equipment
Operating frequency:	2402 ÷ 2480 - Bluetooth
Antenna:	Integrated
Ratings:	DC5V ⎓ 1A

4. TEST CONFGURATION OF EQUIPMENT UNDER TEST

EUT PORTS



Port	Description	Max length
Enclosure	Plastic enclosure	/
AC power	Not present	/
DC power	Internal battery or jack connector	USB cable < 1m
Earth	Not present	/
Telecommunication	Not present	/
Signal	Jack connector for earphones or USB cable	USB cable < 1m
Control	Jack connector for earphones or USB cable	USB cable < 1m
Antenna	Integrated	/

STATE OF THE EUT DURING TESTS

Ref.	Mode	Description
#1	Battery mode	EUT ON – green LED flashing – Bluetooth OFF
#2	Recharger mode	EUT ON – green/red LED flashing – Bluetooth OFF
#3	Computer peripheral mode	EUT ON and connected to a a desktop computer with monitor, keyboard, mouse – green/red LED flashing – Bluetooth OFF

SUPPORT EQUIPMENT

Defined as equipment needed for correct operation or loading of the EUT, but not considered as tested:

Equipment	Manufacturer	Model
Earphones	Xmetrics	/
USB cable	Xmetrics	/
AC/DC adapter for battery charging	Cellular line	ACHUSMCOMPACT – Mod.3A51-501A
Desktop computer	Thinkcenter	/
Monitor	BENQ	/
Mouse	Lenovo	/
Keyboard	Lenovo	/

ELECTROMAGNETICALLY RELEVANT COMPONENTS

Component	No.	Manufacturer	Model
Bluetooth module	1	Laird technologies	FCC ID: **SQGBT830**
X METRICS board	1	MR&D	XM01C_D0002_B

RFI SUPPRESSION DEVICES

Component	No.	Manufacturer	Model
/	/	/	/

EMI PROTECTION DEVICES

Component	No.	Manufacturer	Model
/	/	/	/

EUT TECHNICAL DOCUMENTATION

Document	Reference
Quick start manual	/
Product description	/
Grant of equipment authorization	06/04/2014
Bill of material	BOM XM01C_B0002_B

5. METHODS OF MEASUREMENT

All compliance measurements have been carried out using the procedures described in the standard ANSI C63.4-2009, ANSI C63.10-2009 and Section 15.31 of CFR47 Part 15 – Subpart A (General). Additional test requirements have been adopted according to the reference Section indicated in the § 6 of this test report.
FREQUENCY RANGE INVESTIGATED
Conducted emission tests : from 150 kHz to 30 MHz. Radiated emission tests: from 30 MHz to 1GHz

6. SUMMARY OF TEST RESULTS

POSSIBLE TEST CASE VERDICTS:	
Test object does meet the requirement	PASS
Test object does not meet the requirement	FAIL
Test case does not apply to the test object	N.A.
Test not performed	N.P.

CFR47 Part 15	TITLE	RESULT
§ 15.107	Conducted emission	PASS *
§ 15.109	Radiated disturbances	PASS

* EUT connected to the adapter for battery charging or to desktop computer mains, which is connected to the LISN.

7. TEST RESULTS

7.1 CONDUCTED EMISSION

TEST REQUIREMENT	
Test setup	ANSI C63.4
Frequency range	150 kHz ÷ 30 MHz
IF bandwidth	9 kHz
EMC class	B
Limits	section 15.107
EUT operating condition	#2-3
Remark	None

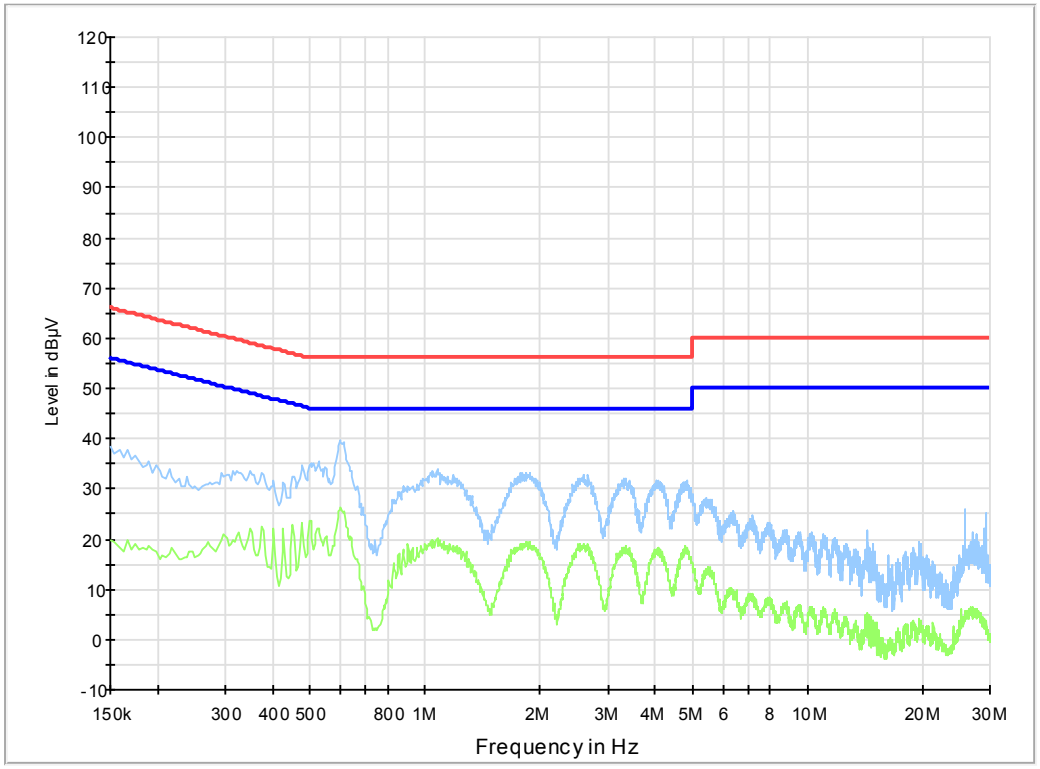
TEST RESULT
The EUTs meet the requirements of sections 15.107.

TEST PROCEDURE

1) The EUT was placed on a wooden table of size, 80 cm by 80 cm, raised 80 cm in which is located 40 cm away from the vertical wall the shielded room.
2) Each EUT power cord input cord was individually connected through a 50Ω/50µH LISN to the input power source.
3) Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4) The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
5) The measurements were made with the detector set to PEAK and AVERAGE amplitude within a bandwidth of 10 kHz during the measurements.
6) The measurements with Quasi-Peak detector are performed only for frequencies for which the Peak values are ≥ (Q.P. limit - 6 dB).

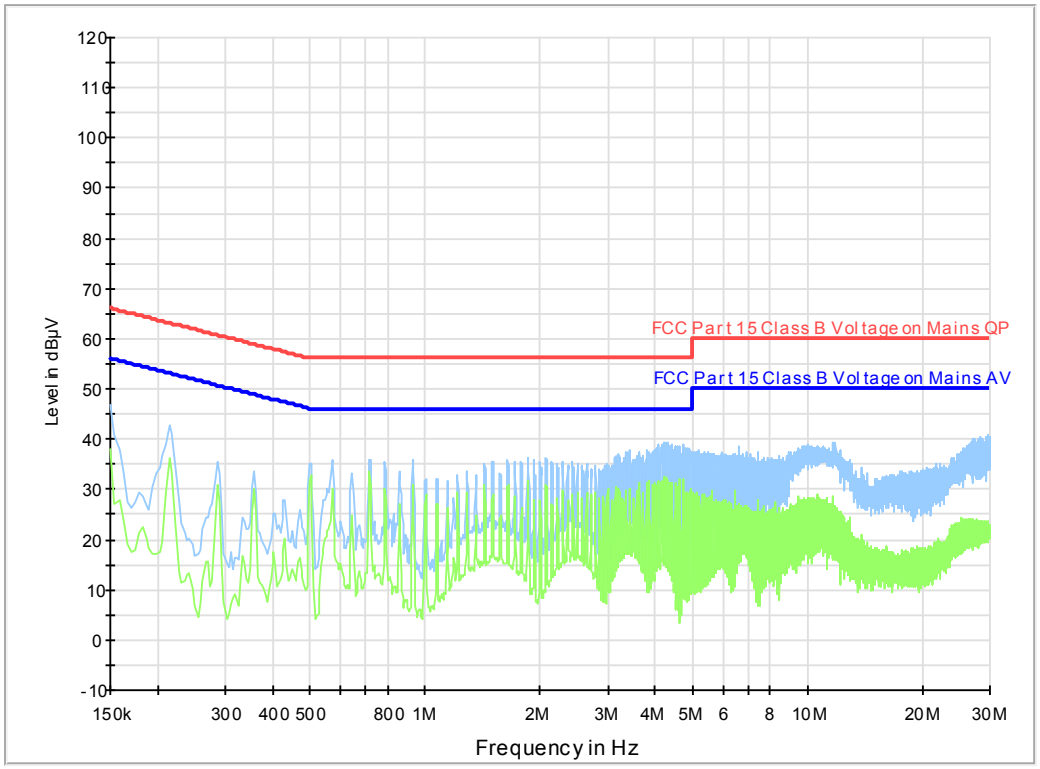
MEASUREMENTS RESULTS	
Port: AC Mains of adapter for battery charging	☐ Quasi-Peak detector – final meas. (◆ marked points) ☐ Average detector – final meas. (◆ marked points) ☒ Peak detector (blue trace) ☒ Average detector (green trace)

PRO MODEL
#2



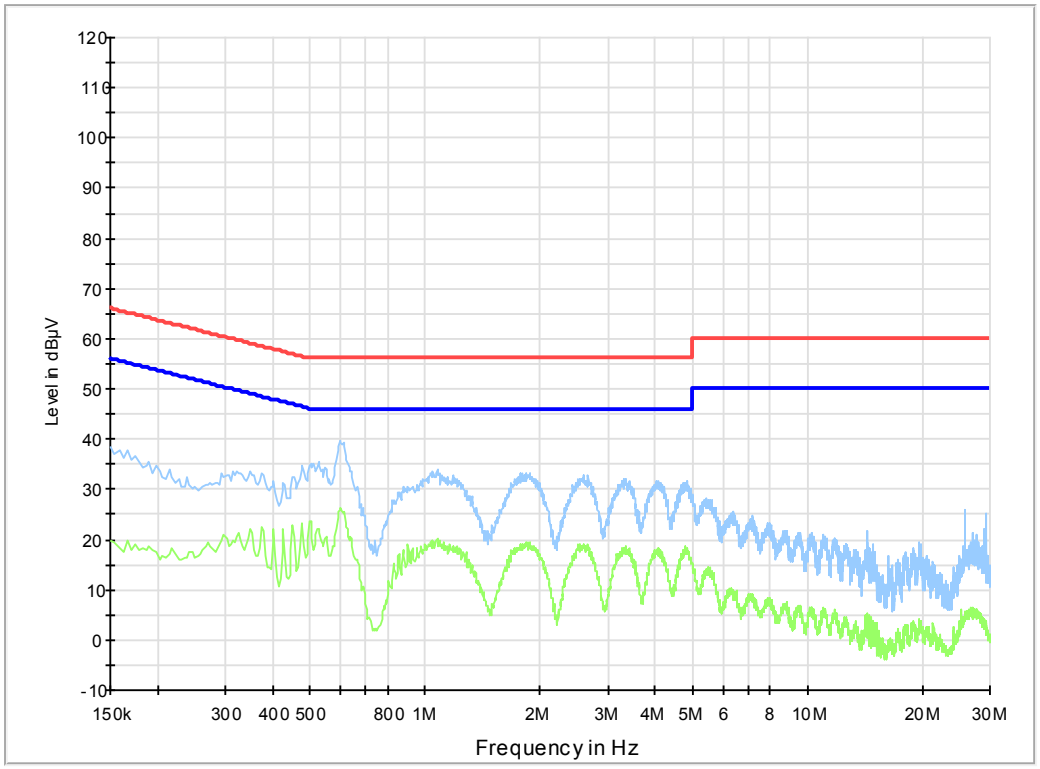
Port: AC Mains of desktop computer	☐ Quasi-Peak detector – final meas. (◆ marked points) ☐ Average detector – final meas. (◆ marked points) ☒ Peak detector (blue trace) ☒ Average detector (green trace)

PRO MODEL
#3



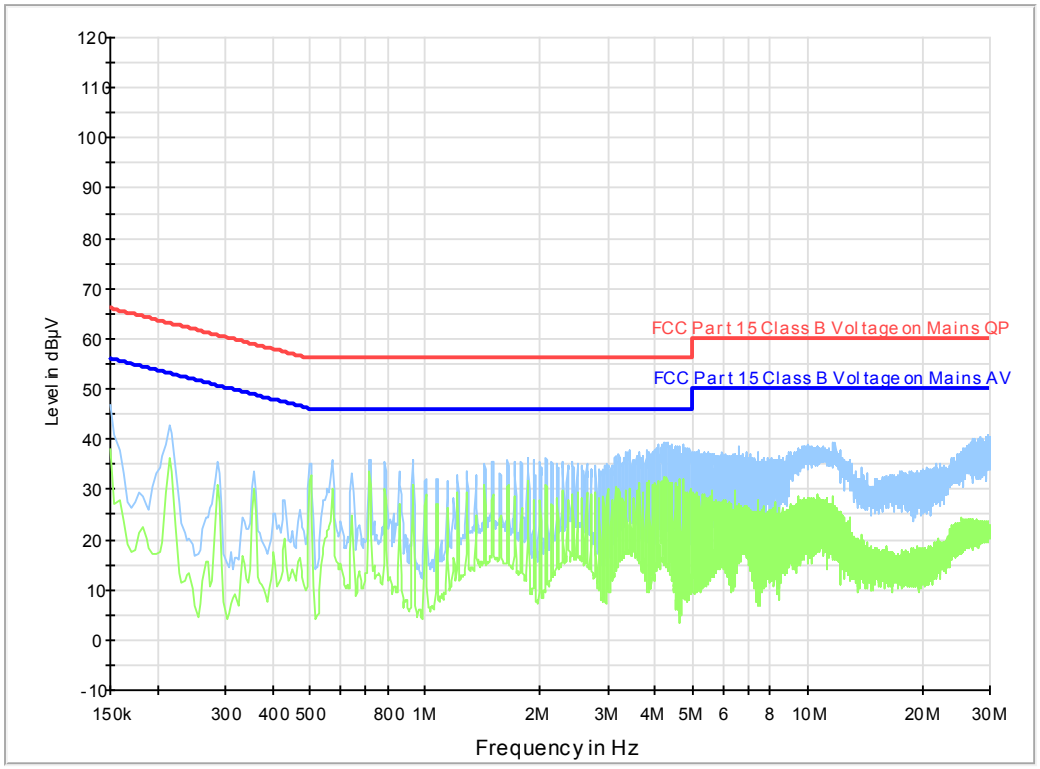
Port: AC Mains of adapter for battery charging	☐ Quasi-Peak detector – final meas. (◆ marked points) ☐ Average detector – final meas. (◆ marked points) ☒ Peak detector (blue trace) ☒ Average detector (green trace)

FIT MODEL
#2



Port: AC Mains of desktop computer	☐ Quasi-Peak detector – final meas. (◆ marked points) ☐ Average detector – final meas. (◆ marked points) ☒ Peak detector (blue trace) ☒ Average detector (green trace)

FIT MODEL
#3



7.2 RADIATED DISTURBANCES

TEST REQUIREMENT	
Test setup	ANSI C63.4
Test facility	Semi-anechoic chamber
Test distance	3 meters
Frequency range	30 MHz to 1 GHz
IF bandwidth (below 1,000 MHz)	120 kHz
Deviation to test procedure	None
Limits	sections 15.109
EUT operating condition	#1-2-3
Remark	(*) In accordance with part 15.31 (f) (2), where the measurement distance was specified to be 30 or 300 meters, a correction factor was applied in order to permit measurement to be performed at a separation distance. The applied formula for limits at 3 meter is: Extrapolation (dB) = 40log (300meter / 3meter) = +80db Extrapolation (dB) = 40log (30meter / 3meter) = +40db

TEST RESULT
The EUTs meet the requirements of sections 15.109

LIMITS FOR SPURIOUS		
Band of operations	**Limit μV/m**	**Limit dBμV/m**
30÷88 MHz	100	40
88÷216 MHz	150	43.5
216÷960 MHz	200	46
Above 960MHz	500	54

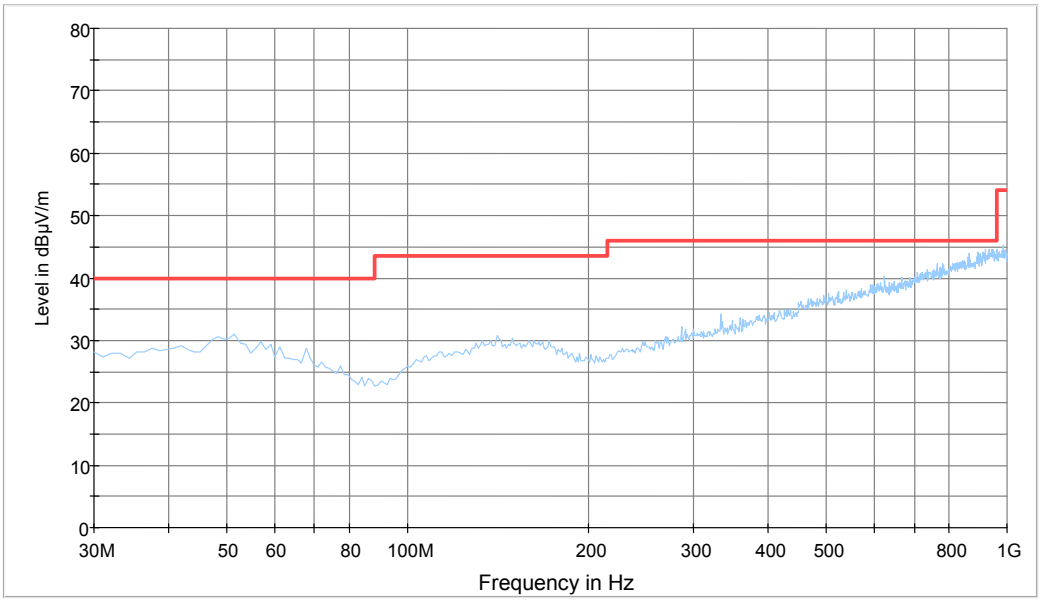
TEST PROCEDURE
1) The EUT was placed on turntable which is 0.8 m above the ground plane 2) The turntable shall rotate from 0° to 360° degrees to determine the position of maximum emission level. 3) The EUT is positioned 3 m away from the receiving antenna which varied from 1 to 4 m to find the highest emission. 4) The measurements were made with the detector set to PEAK and AVERAGE amplitude within a bandwidth of 100 kHz below 1000 MHz and 1 MHz above 1000 MHz. 5) The receiving antenna was positioned in both horizontal and vertical polarization. 6) The measurements with Quasi-Peak detector, below 1000 MHz are performed only for frequencies for which the Peak values are ≥ (Q.P. limit – 6 dB).

MEASUREMENTS RESULTS

Range: 30 ÷ 1000 MHz	☐ Quasi-Peak detector final meas. (◆ marked points) ☒ Peak detector (blue trace)

PRO MODEL

#1



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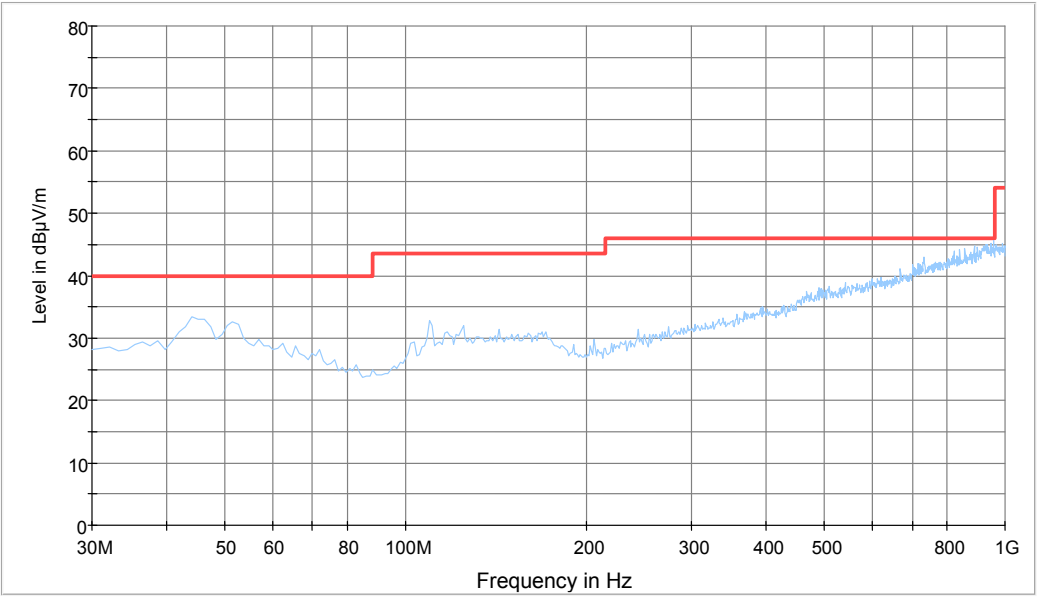

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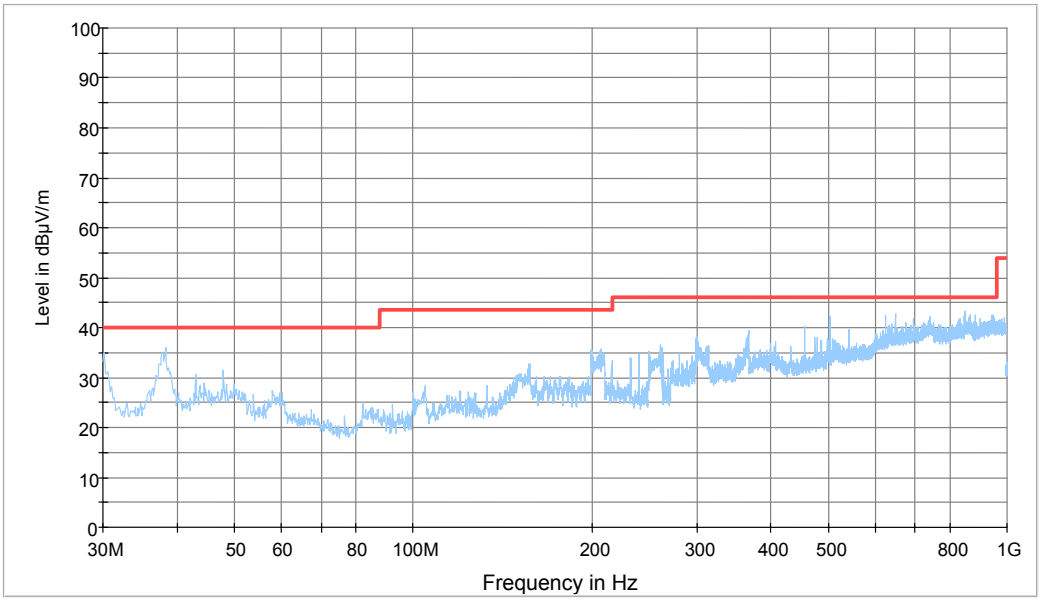
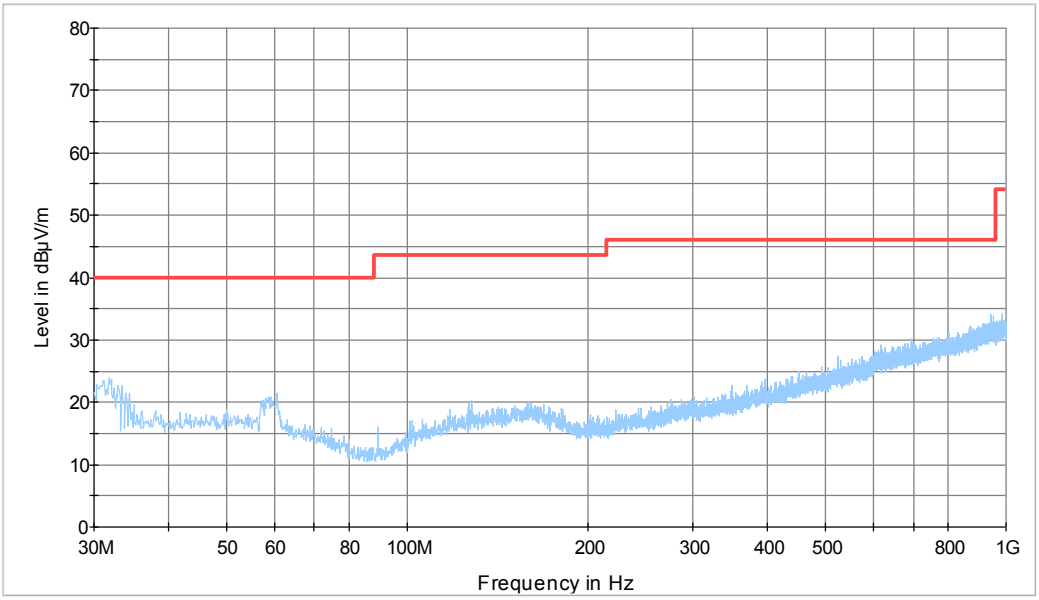

100
90
80
70
60
50
40
30
20
10
0
Level in dBµV/m
30M
50
60
80
100M
200
300
400
500
800
1G
Frequency in Hz

Range: 30 ÷ 1000 MHz	☐ Quasi-Peak detector final meas. (◆ marked points) ☒ Peak detector (blue trace)

FIT MODEL

#1



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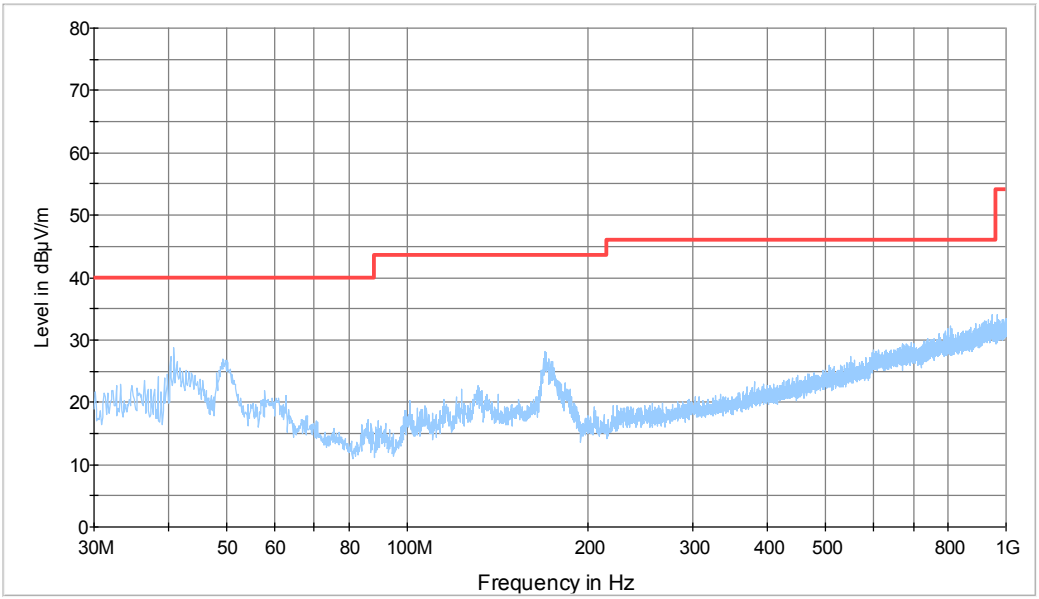

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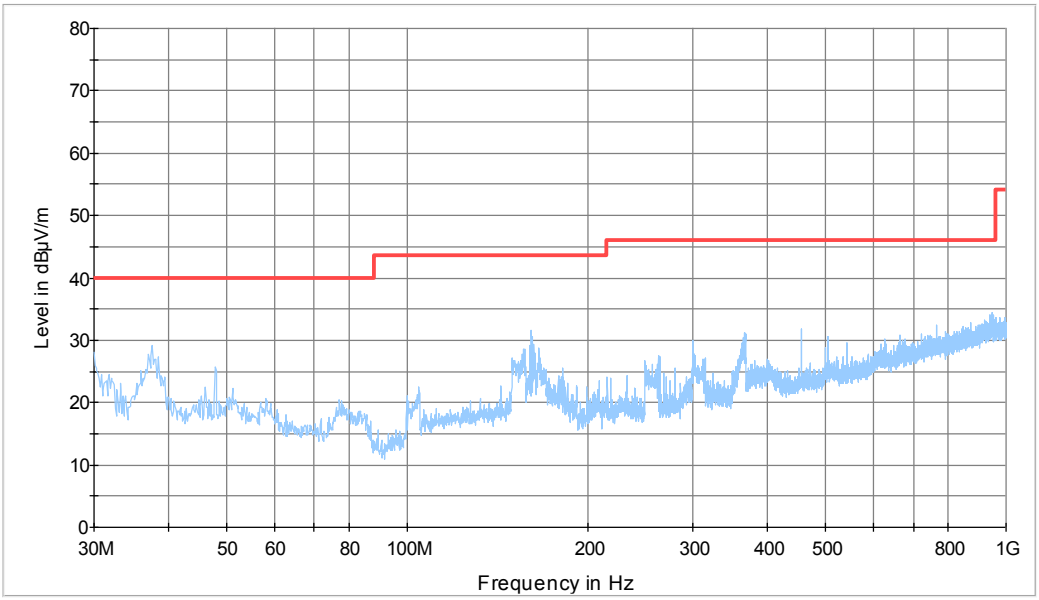

80
70
60
50
40
30
20
10
0
Level in dBµV/m
30M
50
60
80
100M
200
300
400
500
800
1G
Frequency in Hz

8. MEASUREMENTS AND TESTS UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the IMQ procedure No. IO-DT-U01 and requirement of NIST Technical Note 1297 and NIS 81: 1994 "The Treatment of Uncertainty in EMC Measurements"

Methods	Parameter	Expanded Uncertainty	Unit	Confidence level	Coverage Factor	Degree of freedom
Continuous disturbance	QP detector 150 k – 30 MHz	2.61	dB	95%	2.00	26
Radiated disturbance	QP detector (30 MHz - 100 MHz) H polarization	4.33	dB	95%	2.00	> 60
	QP detector (30 MHz - 100 MHz) V polarization	4.22	dB	95%	2.00	> 60
	QP detector (100 MHz - 200 MHz) H polarization	3.40	dB	95%	2.00	> 60
	QP detector (100 MHz - 200 MHz) V polarization	4.76	dB	95%	2.00	> 60
	QP detector (200 MHz - 1000 MHz) H polarization	3.91	dB	95%	2.00	> 60
	QP detector (200 MHz - 1000 MHz) V polarization	3.82	dB	95%	2.00	> 60

9. LIST OF MEASURING EQUIPMENT AND CALIBRATION INFORMATION

Measurement of conducted electromagnetic disturbance				
Instrument		**Manufacturer**	**Model**	**IMQ Ref.**
☒	Shielded chamber	/	/	P-00491
☒	EMI Receiver	ROHDE & SCHWARZ	ESCI	S-04355
☒	LISN 3 phases	ROHDE & SCHWARZ	ESH2-Z5	S-00554
☒	Pulse limiter	ROHDE & SCHWARZ	ESH3-Z2	S-03510
☒	EMI cable	/	/	S-05489
☒	Control / DAQ Software	ROHDE & SCHWARZ	EMC 32 Vers. 8.53	W-00083-E
☒	PC	/	/	H-00164

Measurement of radiated electromagnetic disturbance (semi-anecoic chamber)				
Instrument		**Manufacturer**	**Model**	**IMQ Ref.**
☒	Shielded anechoic chamber	SIDT	/	P-01709
☒	Turntable controller unit	FRANKONIA	FCTAM01	P-02486
☒	Mast antenna	FRANKONIA	FAM4	P-02488
☒	EMI Receiver	ROHDE & SCHWARZ	ESMI-RF	S-02350
☒	Bi-Log antenna	SCHWARZBECK	VULB9160	S-06463
☒	EMI cable	/	EMI1 RG 214/U	S-05040
☒	EMI cable	/	EMI2 RG 214/U	S-05041
☒	Control / DAQ Software	ROHDE & SCHWARZ	EMC 32 Vers. 8.53	W-00199/E
☒	PC	/	/	H-00165

10. PHOTOGRAPHIC DOCUMENTATION

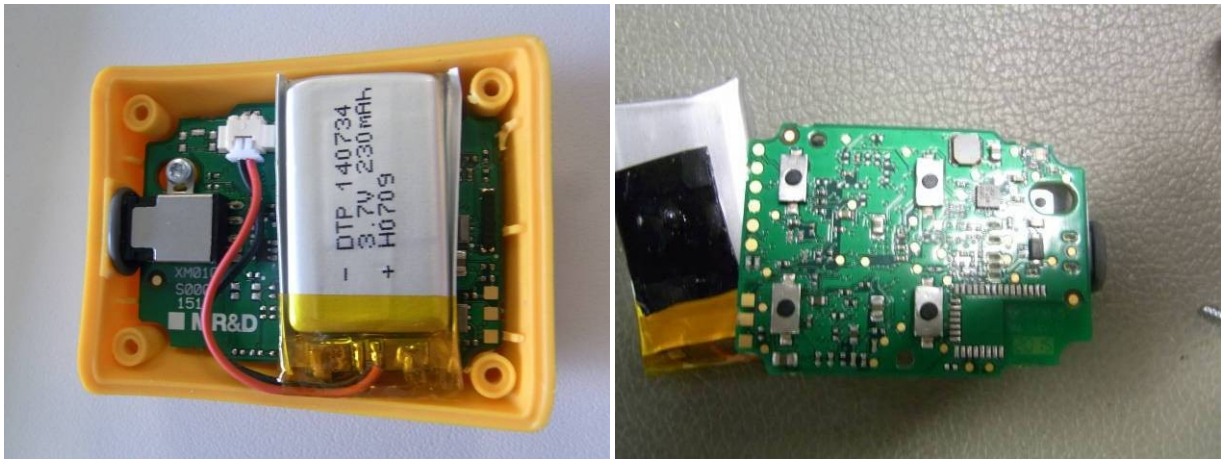
EUT IDENTIFICATION

PRO MODEL external view

PRO MODEL internal view/1

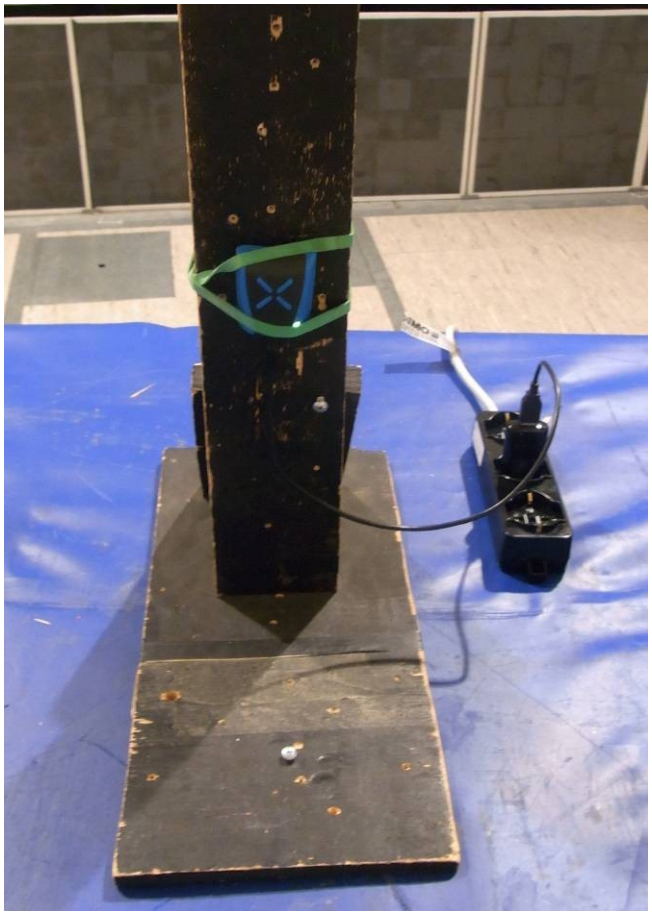
PRO MODEL internal view/2

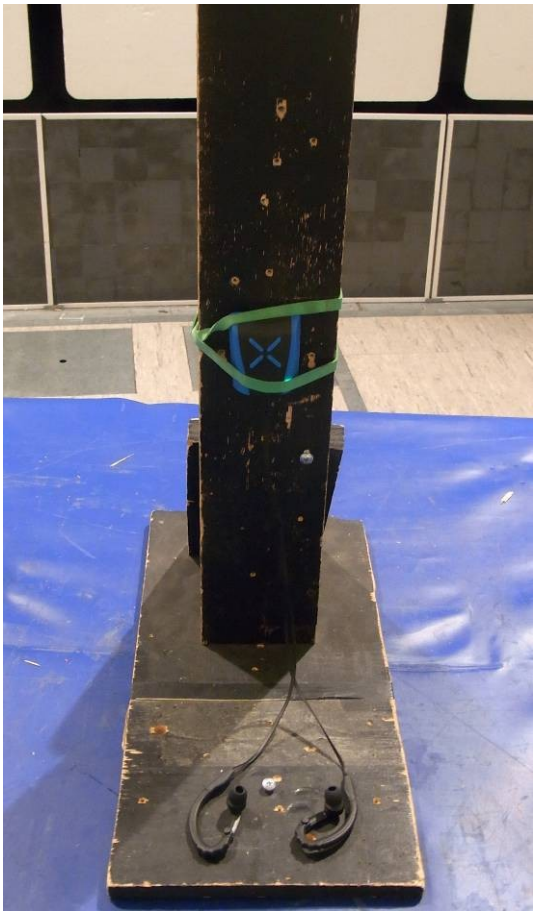
FIT MODEL external view

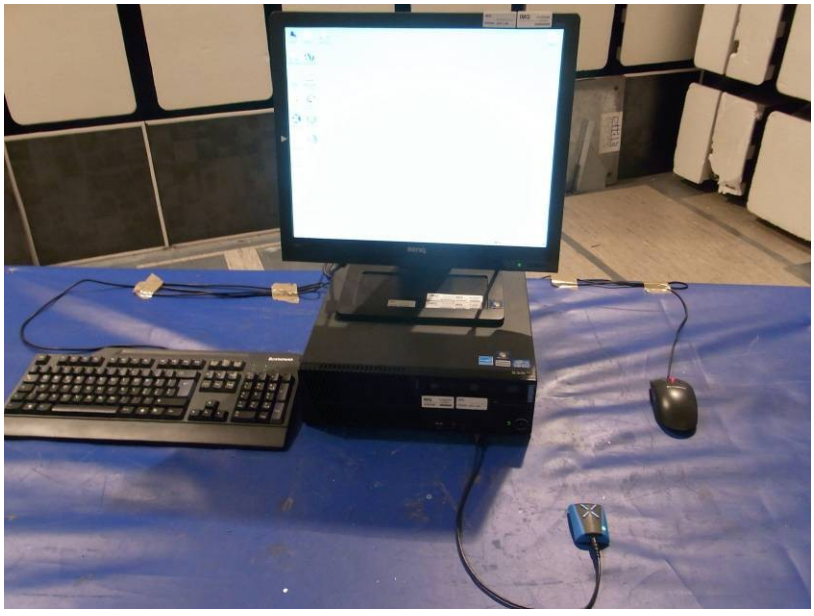


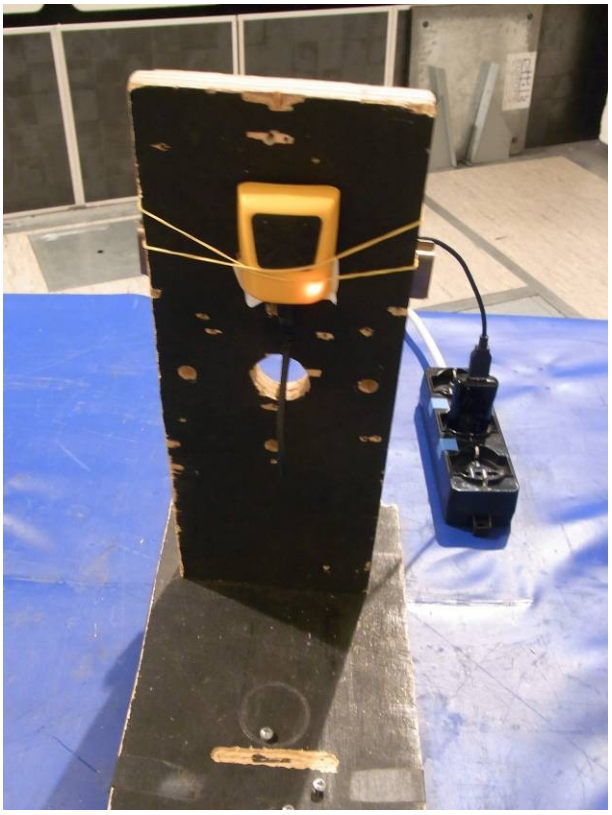
FIT MODEL internal view

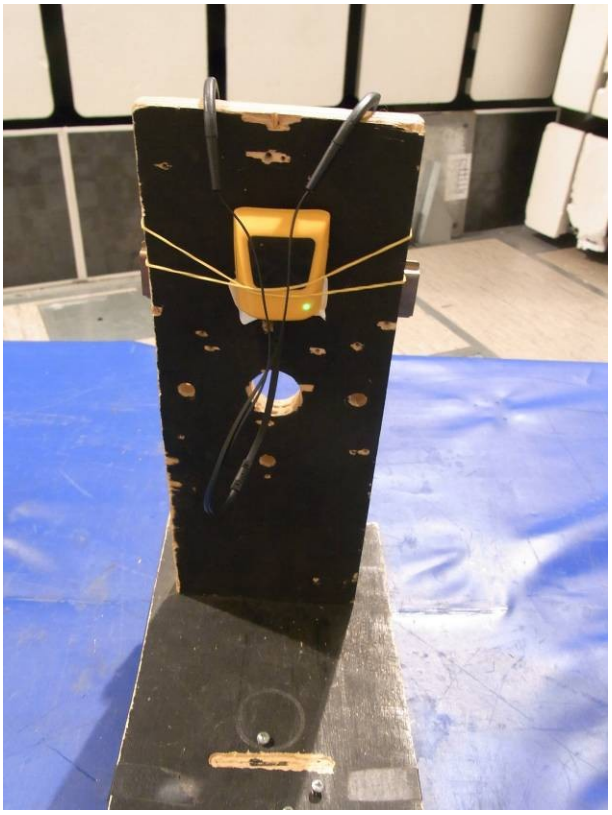
SET-UP

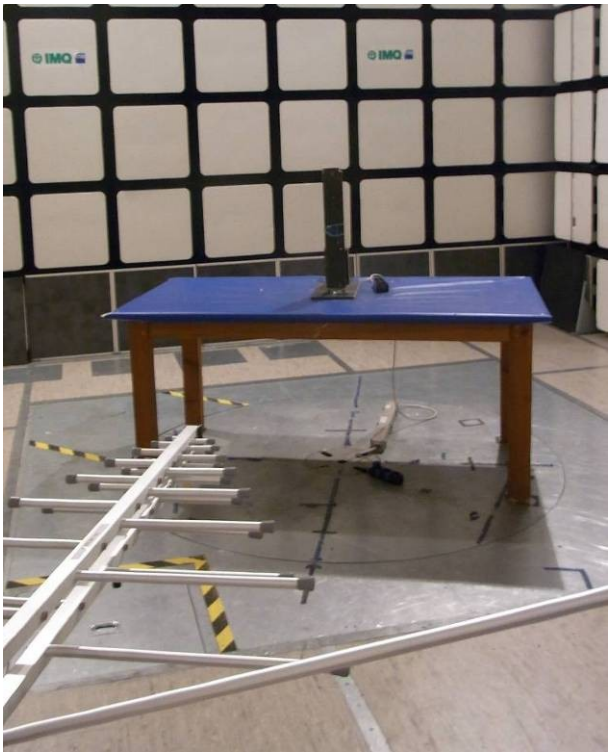
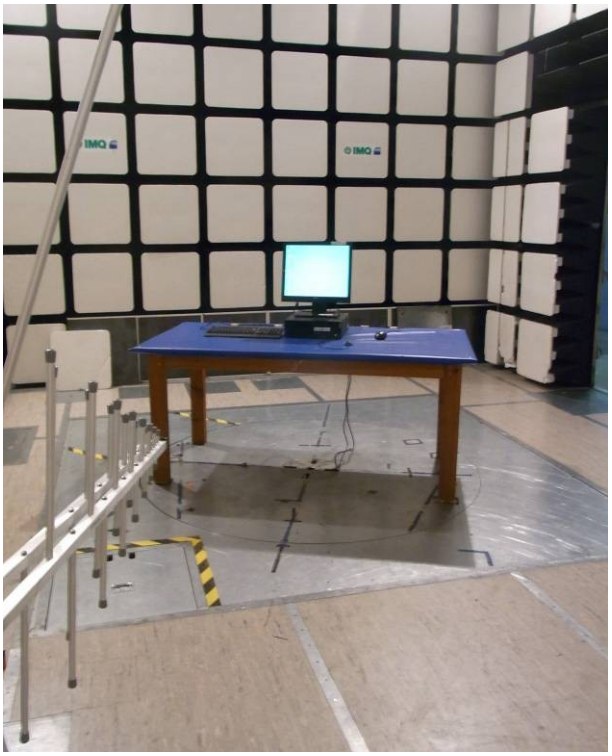


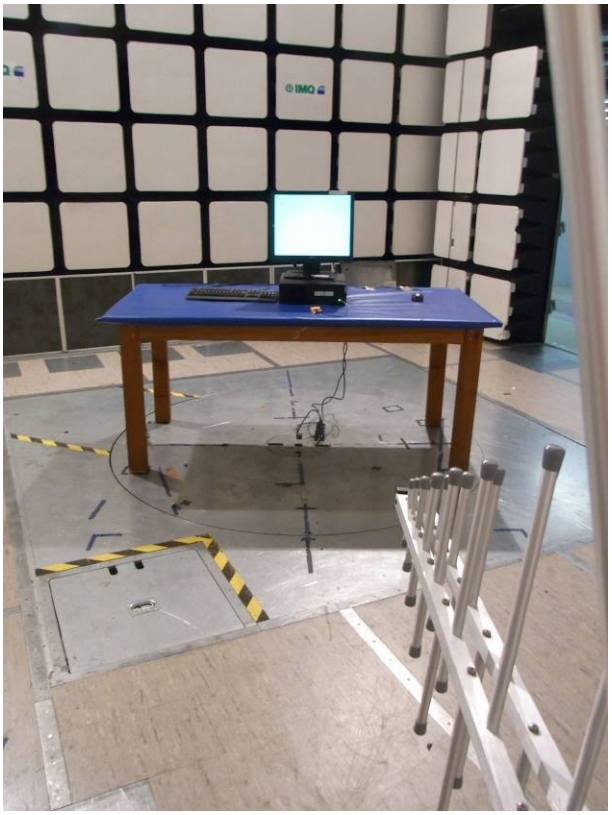










END OF REPORT