

FCC Part 15B Compliance Test Report

Test Report no.:	1136 v2	Date of Report:	27-Jun-2019
Number of pages:	19	Customer's Contact person:	Jari Veikkolainen
Testing laboratory:	Eleforss Oy Visiokatu 6 33720 TAMPERE Tel. +358 29 0802 990 Fax. +358 29 0800 999	Customer:	Hublet Oy Itälahdenkatu 22 B 00210 HELSINKI Finland
FCC designation no.:	FI0007		
IC recognition no.:	-		
Tested devices/ accessories:	Hublet		
FCC ID:	-	IC:	-
Supplement reports:	-		
Testing has been carried out in accordance with:	47 CFR, Part 15B, ANSI C63.4 (2014), RSS-GEN (Issue 5). Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit".		
Documentation:	The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory. The documentation of the testing performed on the tested devices is archived for 15 years at Eleforss		
Test Results:	The EUT complies with the requirements in respect of all parameters subject to the test. The test results contained in this report relate only to the Item(s) tested. Any electrical or mechanical modification made to the test item subsequent to the test date shall invalidate the data presented in this report.		

Date and signature for the contents:



05-Jul-2019

Jari Jantunen, Test Engineer, EMC

1. Summary for FCC Part 15B Compliance Test Report

Date of receipt	11-Jun-2019
Testing completed	19-Jun-2019
The customer's contact person	Jari Veikkolainen
Test Plan referred to	Test plan by customer
Notes	-
Document name and version	EMC Test Report 1136: Initial version EMC Test Report 1136 v2: corrections

1.1. DUT and Accessory Information

Devices under test

Product	Type	SN	HW	SW	DUT ID
Docking station	Hublet 6	2191900002	-*	-*	1

*See ANNEX A

Accessory devices

Product	Type	SN	HW	SW	DUT ID
Tablet x 6	Samsung Galaxy TAB A 10.1" SM- T580NZKENE	-	-	-	2

DUT wasn't modified during the tests

1.2. Description of DUT

DUT is an intelligent docking station

RF General Information	
Operating Mode	Hublet is in operating mode, connected to router, tablets powered on, standby, NFC reader active
Power setting	NA
Power supply type	115/230 VAC 50/60 Hz
Software	See ANNEX A



Picture of DUT

1.3. Summary of Test Results

Section in CFR 47	Section in RSS-GEN	Name of the test	Result
15.107, a	8.8	AC powerline conducted emissions	PASSED
15.109, a	7	Radiated emissions	PASSED

PASSED

The EUT complies with the essential requirements in the standard.

FAILED

The EUT does not comply with the essential requirements in the standard.

NP

The test was not performed by the Eleforss Laboratory.

1.4. List of applied standards

47 CFR FCC Part 15B

ANSI C63.14-2014

1.5. Measurement uncertainty

The measurement uncertainties given below are based on a 95% confidence level
(Coverage factor k=2)

Test	Uncertainty
Radiated emissions	± 6.35 dB
AC powerline conducted emissions	± 3.42 dB

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2. AC powerline conducted emissions (FCC §15.107, a, RSS-GEN, section 8.8)

EUT with DUT number	Hublet 6 DUT1
Accessories with DUT numbers	6 x Samsung Galaxy TAB DUT2
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	Test setup pictures see ANNEX B
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20 / 42-45 / 101.3
Date of measurements	19-Jun-2019
Measured by	Jari Jantunen

2.1. Test Setup

Receiver

LISN

EUT

2.2. Test method and limit

The measurement is made according to ANSI C63.4-2014.

Conducted emissions limit

Frequency range [MHz]	Quasi peak limit [dBμV]	Average limit [dBμV]
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50

*Decreases with the logarithm of the frequency

2.2.1 Test procedure

The EUT is placed directly on the reference ground plane.

The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port. LISN has an internal impulse limiter.

During the conducted emission test, the EMI test receiver and Spectrum Analyzer were set with the following configurations:

Frequency range	RBW	Video B/W	Detector
0.15 MHz – 30 MHz	9 kHz	30 kHz	QP, Average

The measurement results are obtained as described below:

$$U [dB\mu V] = U_{RX} + A_{TOT}$$

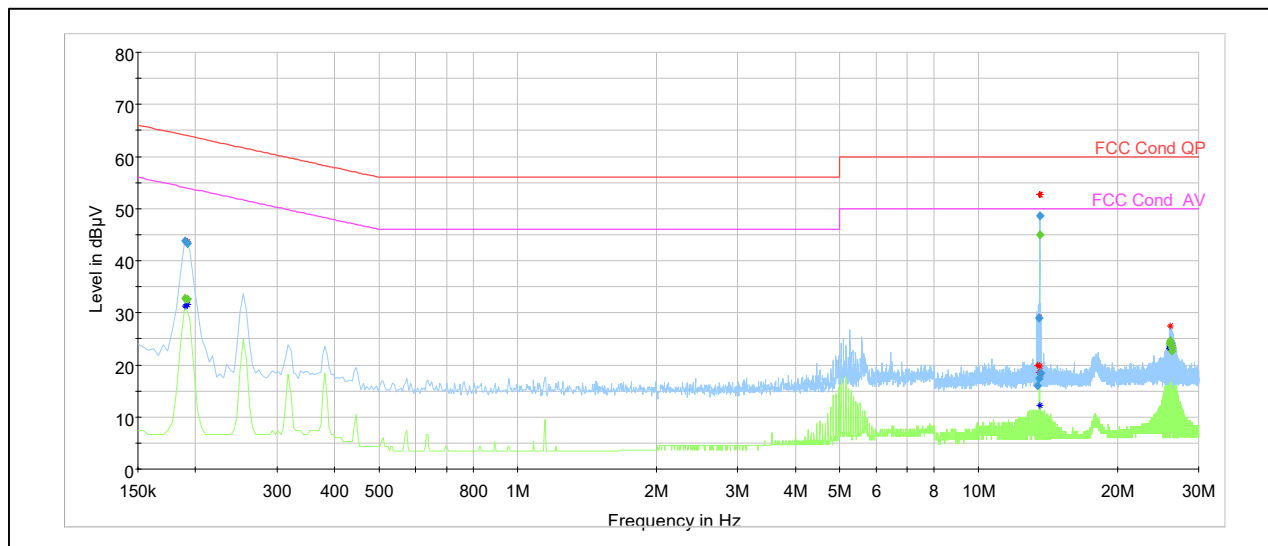
Where U_{RX} is receiver reading and A_{TOT} is total correction factor including cable attenuation.

$$U [dB\mu V] = U_{RX} + A_{TOT}$$

Where U_{RX} is receiver reading and A_{TOT} is total correction factor including cable and pulse limiter attenuations.

2.3. Test results

DUT Mode: Hublet is in operating mode, connected to router, tablets powered on, standby



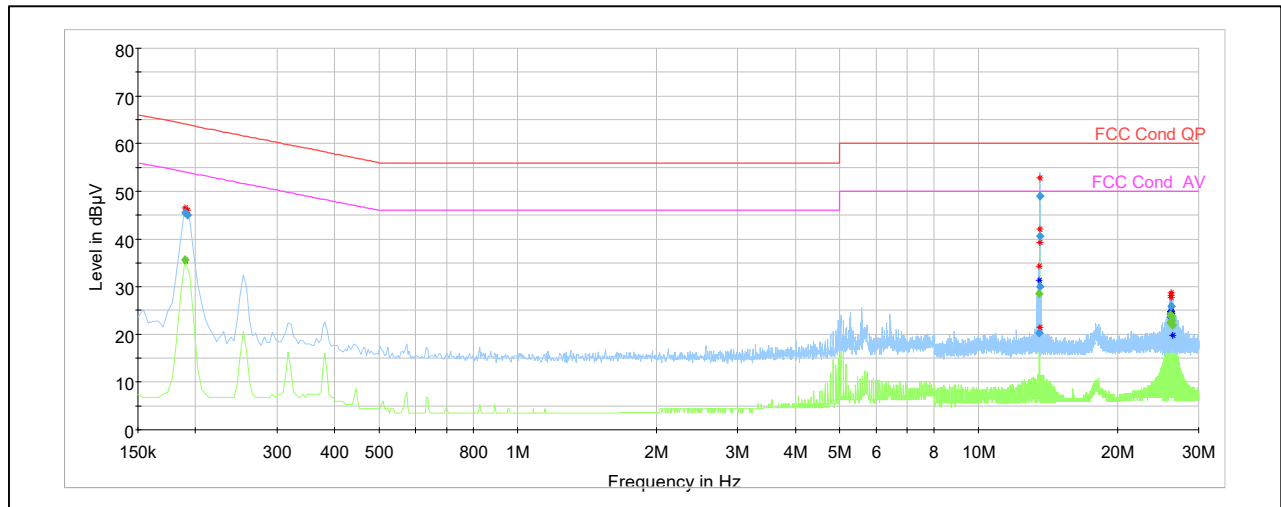
AC conducted emissions, Line

QuasiPeak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Limit	Margin	Line	Result
0,190000	43,71	64,04	20,33	L	PASSED
0,192000	43,36	63,95	20,59	L	PASSED
13,430000	16,06	60,00	43,94	L	PASSED
13,498000	17,40	60,00	42,60	L	PASSED
13,550000	28,91	60,00	31,09	L	PASSED
13,562000	48,59	60,00	11,41	L	PASSED
13,626000	18,38	60,00	41,62	L	PASSED
26,094000	24,60	60,00	35,40	L	PASSED

CAverage (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Limit	Margin	Line	Result
0,190000	32,80	54,04	21,24	L	PASSED
0,192000	32,63	53,95	21,32	L	PASSED
13,558000	45,06	50,00	4,94	L	PASSED
25,970000	24,12	50,00	25,88	L	PASSED
26,034000	24,12	50,00	25,88	L	PASSED
26,098000	24,60	50,00	25,40	L	PASSED
26,158000	23,72	50,00	26,28	L	PASSED
26,222000	23,30	50,00	26,70	L	PASSED



AC conducted emissions, Neutral

QuasiPeak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Limit	Margin	Line	Result
0,190000	45,57	64,04	18,46	N	PASSED
0,192000	45,08	63,95	18,87	N	PASSED
13,506000	20,35	60,00	39,65	N	PASSED
13,562000	49,02	60,00	10,98	N	PASSED
13,566000	40,66	60,00	19,34	N	PASSED
13,570000	29,99	60,00	30,01	N	PASSED
26,154000	25,90	60,00	34,10	N	PASSED

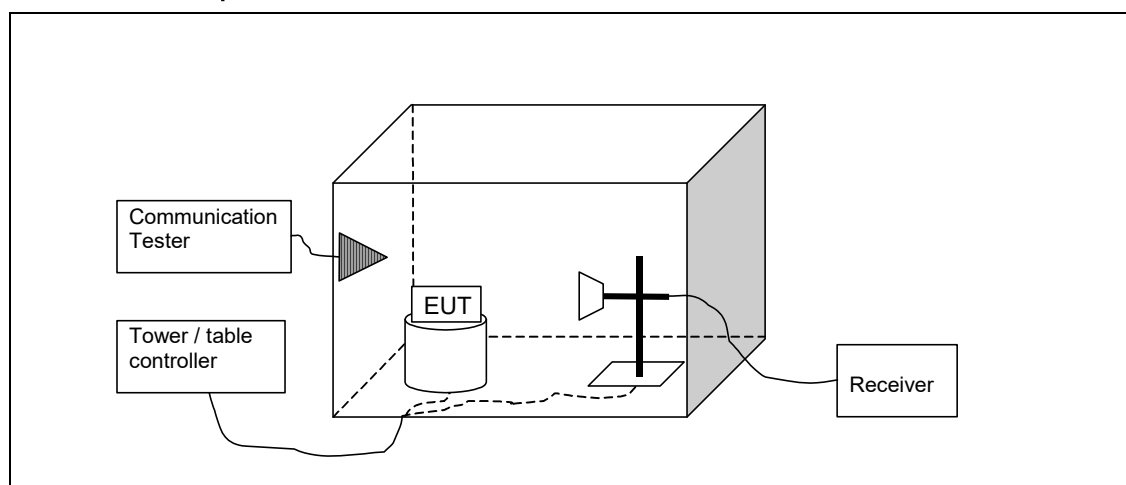
CAverage (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Limit	Margin	Line	Result
0,190000	35,61	54,04	18,43	N	PASSED
13,550000	28,57	50,00	21,43	N	PASSED
26,026000	22,38	50,00	27,62	N	PASSED
26,090000	24,12	50,00	25,88	N	PASSED
26,154000	23,72	50,00	26,28	N	PASSED
26,218000	23,82	50,00	26,18	N	PASSED
26,282000	22,96	50,00	27,04	N	PASSED
26,342000	22,01	50,00	27,99	N	PASSED

3. Radiated emissions (FCC §15.109, a, RSS-GEN, section 7)

EUT with DUT number	Hublet 6 DUT1
Accessories with DUT numbers	6 x Samsung Galaxy TAB DUT2
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	Test setup pictures see ANNEX B
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21-22 / 42-47 / 101.3-101.4
Date of measurements	18-19-Jun-2019
Measured by	Jari Jantunen

3.1.1 Test setup



3.2. Test method and limit

The measurement is made according to ANSI C63.4.

FCC Part 15 Class B limits (3 m measurement distance)

Frequency range [MHz]	Quasi peak limit [dBμV/m]	Average limit [dBμV/m]	Peak limit [dBμV/m]
30 - 230	40	-	-
230 - 1000	47	-	-
1000 - 3000	-	50	70
Above 3000	-	54	74

3.2.1 Test procedure

The EUT is placed on a nonconductive plate at 80 cm height.

The measurement distance is 3 m.

The measurement is performed in the Semi-Anechoic Chamber with conducting metal floor at frequency range 30-3000 MHz and in the Full-Anechoic Chamber at frequency range 3000-8000 MHz.

For each suspected frequency below 3 GHz, the turntable is rotated 360 degrees and antenna is scanned from 1 to 4 m. This is repeated for both horizontal and vertical receive antenna polarizations. Frequencies above 3 GHz, the turntable is rotated 360 degrees to maximize the emissions.

The emissions less than 20 dB below the permissible value are reported.

During the radiated emission test, the EMI test receiver and Spectrum Analyzer were set with the following configurations:

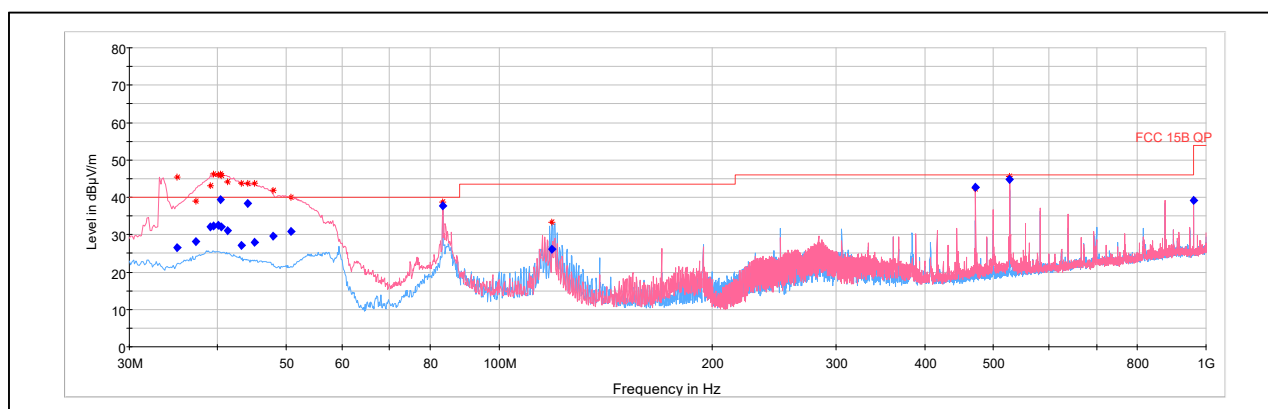
Frequency range	RBW	Video B/W	Detector
30MHz – 1000 MHz	100 kHz	300 kHz	QP
>1000 MHz	1 MHz	3 MHz	Peak, Average

The measurement results are obtained as described below:

$$E [dB\mu V/m] = U_{RX} + A_{TOT}$$

Where U_{RX} is receiver reading and A_{TOT} is total correction factor including cable loss, antenna factor and preamplifier gain ($A_{TOT} = L_{CABLES} + A_F - G_{PREAMP}$).

3.3. Test results 30-1000 MHz SAC

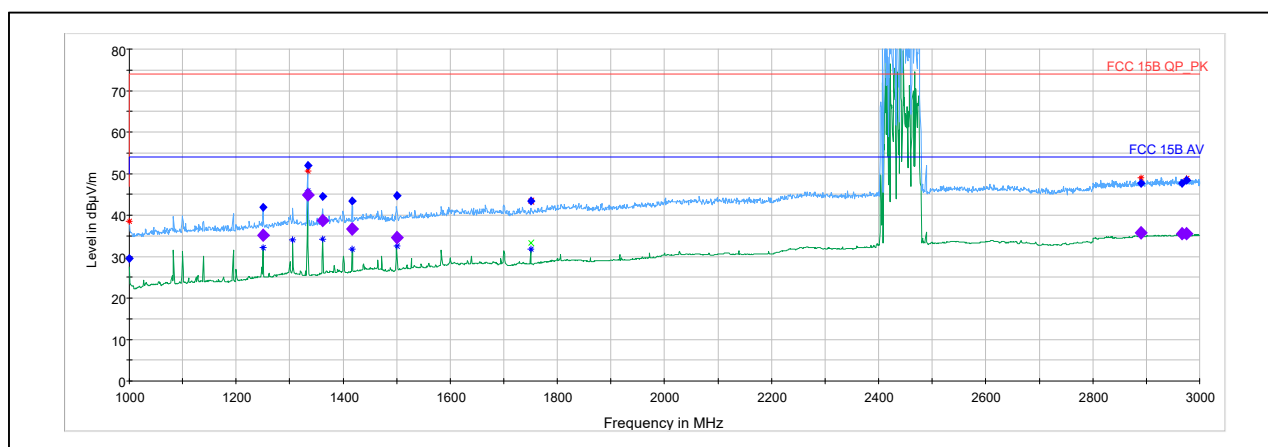


Test result, Radiated emissions 30-1000 MHz, SAC. Blue curve Horizontal, Red curve Vertical antenna polarization

Quasi peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	E [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Antenna height [cm]	Polarity []	Turntable [deg]	Results
35,086172	26,51	40,00	13,49	112,0	V	25,0	PASSED
37,291503	28,17	40,00	11,83	113,0	V	114,0	PASSED
39,135431	32,12	40,00	7,88	98,0	V	82,0	PASSED
39,481042	32,39	40,00	7,61	110,0	V	249,0	PASSED
40,039639	32,56	40,00	7,44	118,0	V	202,0	PASSED
40,350200	39,33	40,00	0,67	184,0	V	202,0	PASSED
40,471884	32,06	40,00	7,94	115,0	V	216,0	PASSED
41,276373	31,18	40,00	8,82	110,0	V	-7,0	PASSED
43,240301	27,23	40,00	12,77	98,0	V	24,0	PASSED
44,138617	38,42	40,00	1,58	98,0	V	7,0	PASSED
45,137495	27,91	40,00	12,09	112,0	V	22,0	PASSED
47,894509	29,68	40,00	10,32	98,0	V	12,0	PASSED
50,820962	30,92	40,00	9,08	110,0	V	8,0	PASSED
83,346613	37,66	40,00	2,34	129,0	V	9,0	PASSED
118,907675	26,11	43,52	17,41	335,0	H	2,0	PASSED
472,234689	42,70	46,02	3,32	115,0	V	180,0	PASSED
527,785311	44,73	46,02	1,29	111,0	V	-20,0	PASSED
960,019840	39,07	53,98	14,91	282,0	V	181,0	PASSED

3.4. Test results 1000-3000 MHz SAC



Test result, Radiated emissions 1000-3000 MHz, SAC. The emissions at 2400-2483.5 MHz come from WLAN transmitter and can be ignored

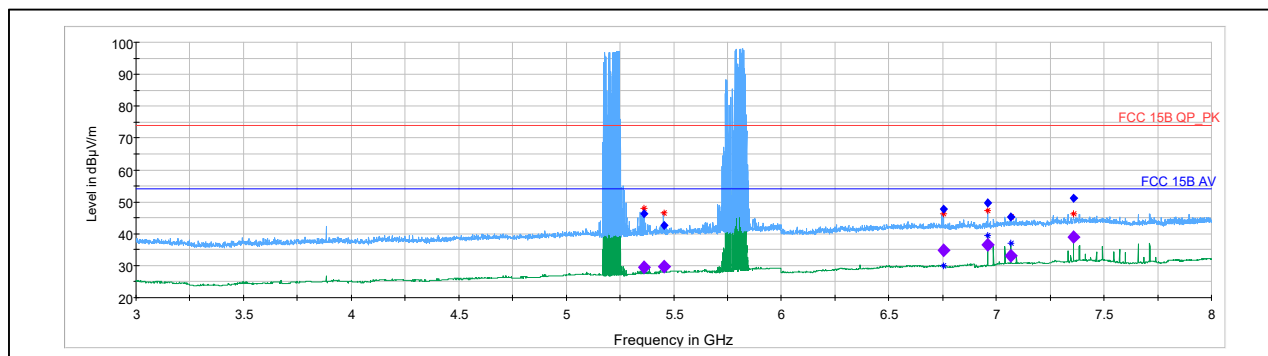
Peak (RBW: 1 MHz, VBW: 3 MHz)

Frequency [MHz]	E [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Antenna height [cm]	Polarity []	Turntable [deg]	Results
2975,351904	48,39	74,00	25,61	182,0	H	112,0	PASSED
2966,430261	47,68	74,00	26,32	262,0	H	85,0	PASSED
1333,367335	52,04	74,00	21,96	151,0	V	52,0	PASSED
1500,399198	44,60	74,00	29,40	187,0	V	43,0	PASSED
1250,099599	41,94	74,00	32,06	98,0	V	176,0	PASSED
1416,635070	43,45	74,00	30,55	157,0	V	184,0	PASSED
1361,123247	44,44	74,00	29,56	122,0	V	177,0	PASSED
2890,077154	47,64	74,00	26,36	151,0	V	202,0	PASSED
1750,200601	43,29	74,00	30,71	123,0	V	317,0	PASSED

CAverage (RBW: 1 MHz, VBW: 3 MHz)

Frequency [MHz]	E [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Antenna height [cm]	Polarity []	Turntable [deg]	Results
2975,351904	35,61	54,00	18,39	182,0	H	112,0	PASSED
2966,430261	35,56	54,00	18,44	262,0	H	85,0	PASSED
1333,367335	44,94	54,00	9,06	151,0	V	52,0	PASSED
1500,399198	34,59	54,00	19,41	187,0	V	43,0	PASSED
1250,099599	35,23	54,00	18,77	98,0	V	176,0	PASSED
1416,635070	36,64	54,00	17,36	157,0	V	184,0	PASSED
1361,123247	38,73	54,00	15,27	122,0	V	177,0	PASSED
2890,077154	35,65	54,00	18,35	151,0	V	202,0	PASSED

3.5. Test results 3000-8000 MHz FAR



Test result, Radiated emissions 3000-8000 MHz, SAC. The emissions at 5100-5800 MHz come from WLAN transmitter and can be ignored

Peak (RBW: 1 MHz, VBW: 3 MHz)

Frequency [MHz]	E [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Antenna height [cm]	Polarity []	Turntable [deg]	Results
5362,623647	46,32	74,00	27,68	170,0	H	98,0	PASSED
5454,805812	42,59	74,00	31,41	170,0	H	85,0	PASSED
6752,907816	47,81	74,00	26,19	170,0	H	-18,0	PASSED
6958,519038	49,63	74,00	24,37	170,0	V	72,0	PASSED
7066,333667	45,30	74,00	28,70	170,0	H	-13,0	PASSED
7360,019840	51,07	74,00	22,93	170,0	V	26,0	PASSED

CAverage (RBW: 1 MHz, VBW: 3 MHz)

Frequency [MHz]	E [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Antenna height [cm]	Polarity []	Turntable [deg]	Results
5362,623647	29,55	54,00	24,45	170,0	H	98,0	PASSED
5454,805812	29,61	54,00	24,39	170,0	H	85,0	PASSED
6752,907816	34,88	54,00	19,12	170,0	H	-18,0	PASSED
6958,519038	36,41	54,00	17,59	170,0	V	72,0	PASSED
7066,333667	33,12	54,00	20,88	170,0	H	-13,0	PASSED
7360,019840	38,89	54,00	15,11	170,0	V	26,0	PASSED

4. Test Equipment

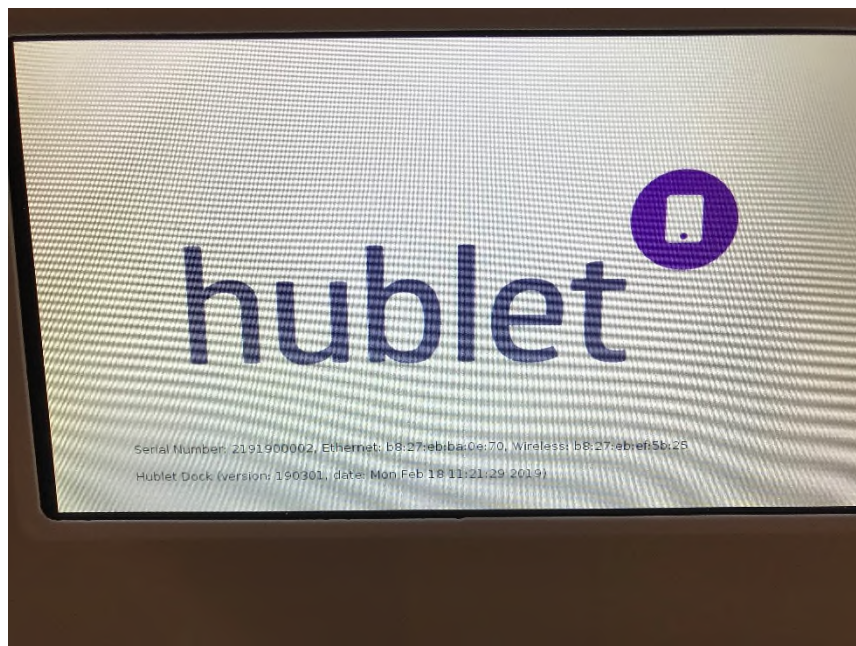
4.1. Conducted measurements

Equipment	Type	Serial number	Manufacturer	Calibration date	Cal due date
Receiver	ESIB40	833925/002 2493	R&S	21.2.2019	20.2.2020
LISN 50 µH	ENV216	100449	R&S	11.2.2019	10.2.2020
Test sw	EMC32	v.10.50.00	R&S	-	-

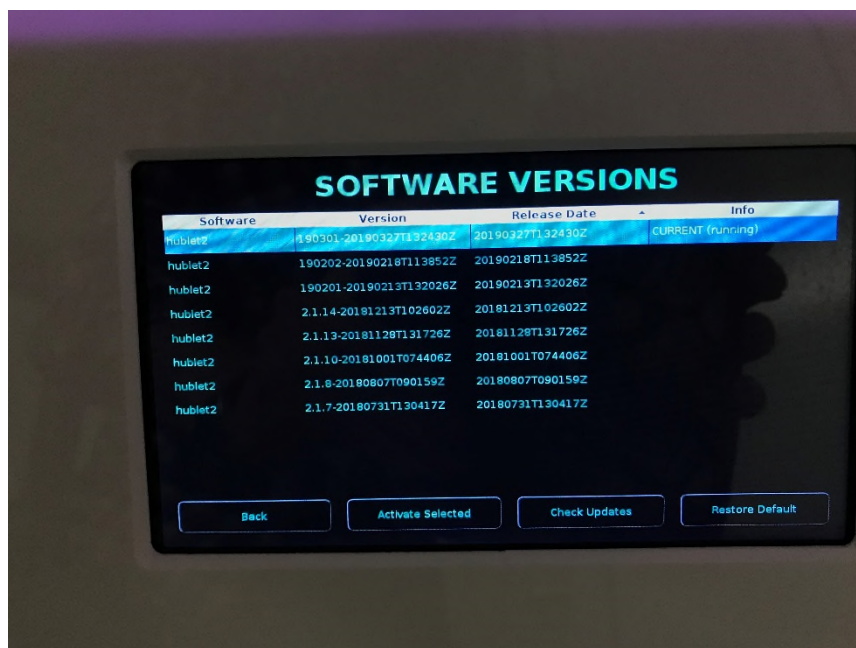
4.2. Radiated measurements

Equipment	Type	Serial number	Manufacturer	Calibration Date	Cal due Date
Receiver	ESIB40	833925/002 2493	R&S	21.2.2019	20.2.2020
Antenna	HL562	100154	R&S	28.9.2017	28.9.2020
Antenna	BBHA 9120 D	9120 D-1137	Schwarzbeck	23.6.2017	23.6.2020
Antenna	QSH18S20	10170	Q-Par	Cal not required	Cal not required
Antenna	QSH20S20	10173	Q-Par	Cal not required	Cal not required
Preamplifier	AMF-4D-10M- 3G-25-20P	989158	Miteq	24.8.2018	24.8.2019
Preamplifier	AMF-5D- 020180-26-10P	989142	Miteq	24.8.2018	24.8.2019
Signal Generator	SMF 100A	102365-aq	R&S	28.2.2019	27.2.2020
Semi anechoic chamber	RFD-F/A-100	1486	TDK	18.4.2019	17.4.2022
Test sw	EMC32	v.9.25.00	R&S	-	-

ANNEX A HUBLET INFORMATION

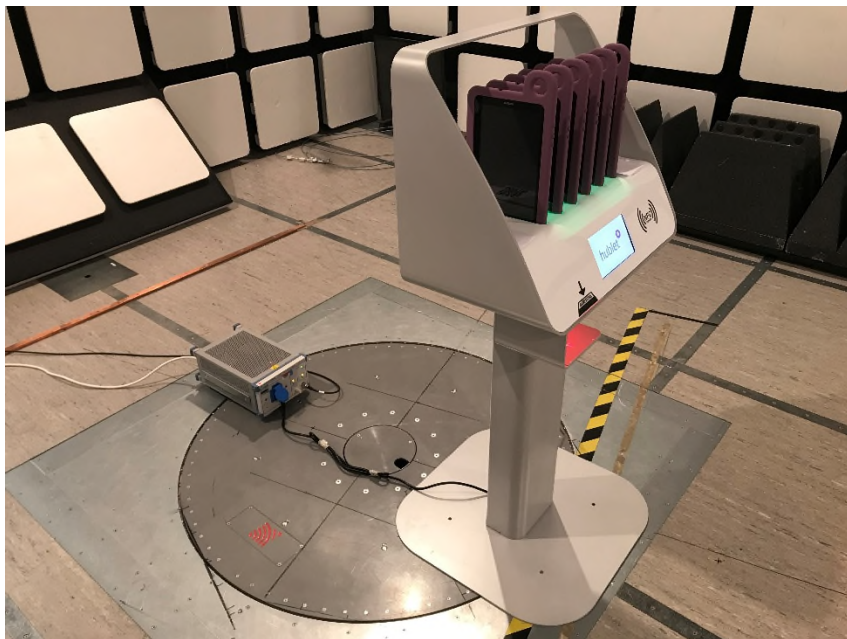


Hublet information

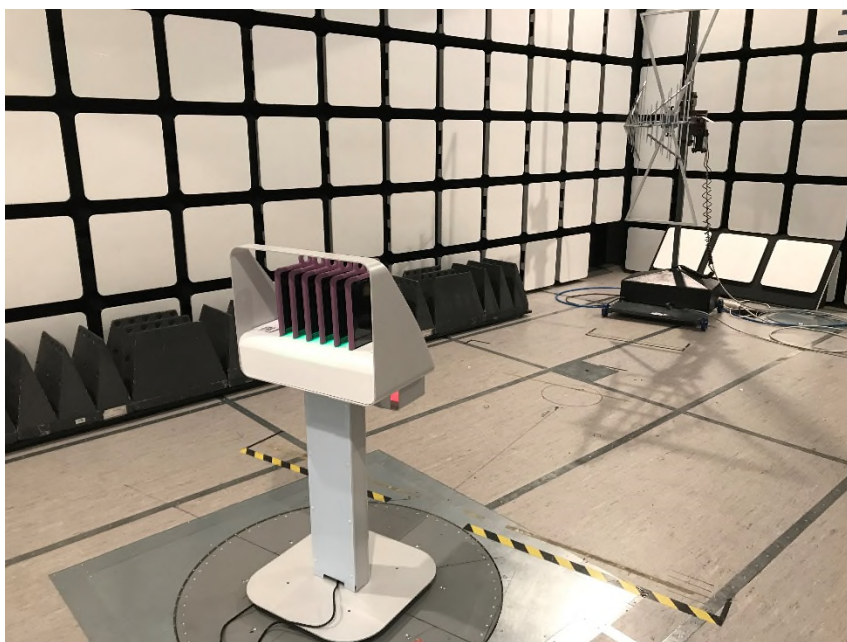


Hublet SW information

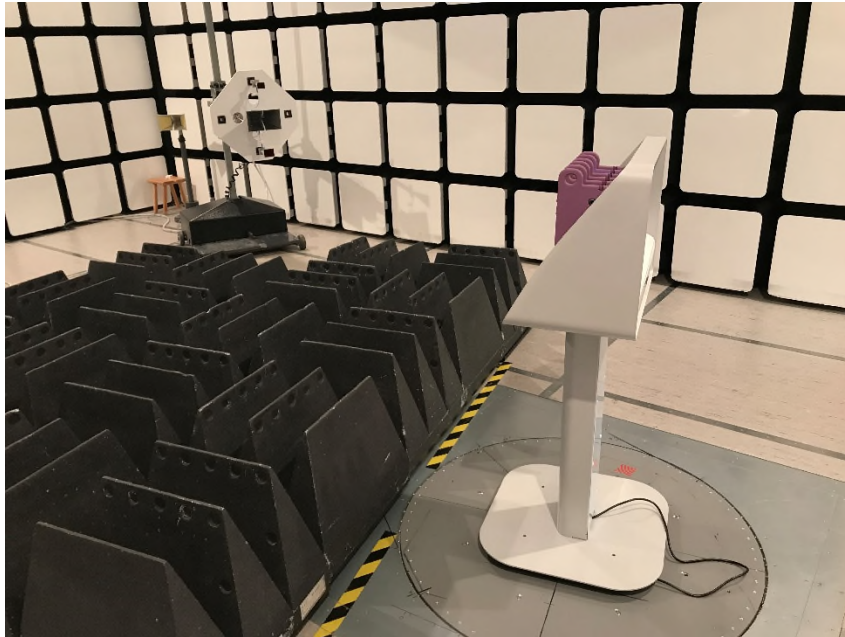
ANNEX B TEST SETUP PICTURES



Test setup picture, AC conducted emissions



Test setup picture, Radiated emissions 30-3000 MHz SAC



Test setup picture, Radiated emissions 3000-8000 MHz FAR

ANNEX C AE DEVICES



Tablet

END OF REPORT