

Test Report

HELEM2304000153-3 v1.1



INTENTIONAL RADIATOR TESTS ACCORDING TO FCC PART 15 C

Equipment Under Test: Docking Station with wireless charging

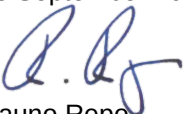
Model: Docking Station

Customer / Manufacturer: Planmeca Oy
Asentajankatu 6
FI-00880 Helsinki
Finland

FCC Rule Part: 15.207, 15.209, 15.215

Date: 13 September 2024

Issued by:


Rauno Repo
Senior EMC Specialist

Date: 13 September 2024

Checked by:


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RELEASE HISTORY

Version	Changes	Issued
1.0	Initial release	29 May 2023
1.1	Information regarding EUT load level during testing added to section “EUT Test Conditions during Testing”. AC Power-Line Conducted Emissions test results and equipment added. Measurement loop antenna orientation corrected in Radiated Emissions test results.	13 September 2024

PRODUCT DESCRIPTION

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Equipment Under Test

Equipment Under Test: Docking Station
Model: Docking Station
Type: -
Trademark: Planmed XFI
Serial no: -
FCC ID: -
IC: -
Radio module or chip: Renesas P9241-G

General Description

The EUT is a charging station for a remote controller.

Classification

Fixed device ☐
Mobile Device (Human body distance > 20cm) ☒
Portable Device (Human body distance < 20cm) ☐

Modifications Incorporated in the EUT

No modifications.

Ratings and declarations

Operating Frequency Range (OFR): 120 - 148 kHz
Antenna: Integral

Power Supply

Operating voltage: 24 VDC
Maximum Current: 200 mA

Cables

Cable:	Length:	Type:
Power Supply Cable	1 m	L/N

Peripherals

Peripheral	Description / Use
Remote Controller	Used to activate the charging function
Power Supply	Lenovo ADLX65NCT3A, powering the EUT during AC Power-Line Conducted Emissions test. Provided by the laboratory.

SUMMARY OF TESTING

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Test Specification	Description of Test	Result
§15.203	Antenna Requirement	PASS
§15.207(a)	AC Power-Line Conducted Emissions	PASS
§15.209(a)	Radiated Emissions 9 kHz to 1 GHz	PASS
§15.215(c)	20 dB bandwidth	PASS

The decision rule applied for the tests results stated in this test report is according to the requirements of section 1.3 of ANSI C63.10-2013.

EUT Test Conditions during Testing

Configuration of the EUT was made to correspond to the actual assembling conditions as far as possible. In emissions tests the remote controller was placed into the charging dock to activate the charging process. In bandwidth tests the charging was repeatedly started and stopped in order to activate the whole operating frequency range.

During AC Power-Line Conducted Emissions test the EUT was powered with the peripheral AC/DC power supply. The input voltage to the power supply was 120 V/60 Hz.

The EUT was tested with load levels < 1 %, 50 %, and > 99 %. The worst-case results are reported.

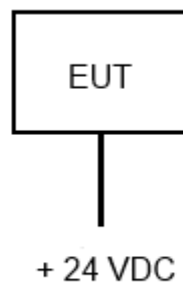


Figure 1: Test setup block diagram

SUMMARY OF TESTING

Test Facility

Testing Laboratory / address: FCC designation number: FI0002 ISED CAB identifier: T004	SGS Fimko Ltd Takomotie 8 FI-00380, HELSINKI FINLAND
Test Site:	☐ K10LAB, ISED Canada registration number: 8708A-1 ☒ K5LAB, ISED Canada registration number: 8708A-2 ☐ T10LAB

TEST RESULTS

Antenna Requirement

Standard: FCC Rule §15.203
Tested by: HAM
Date: 13 April 2023

FCC Rule: 15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Specification	Requirement (at least one of the following shall be applied)	Conclusion
§15.203	1. Permanently attached antenna 2. Unique coupling to the intentional radiator 3. Professionally installed radio. The installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.	PASS
Note	Option 1 is used	

AC Power-Line Conducted Emissions

Standard: ANSI C63.10-2013
Tested by: HEM
Date: 13 September 2024
Temperature: 20 °C
Humidity: 66 %RH
Measurement uncertainty: ± 2.9 dB

Level of confidence 95 % ($k = 2$)

FCC Rule: 15.207(a)
RSS-GEN 8.8

Conducted disturbance voltage was measured with an artificial main network from 150 kHz to 30 MHz with 4.5 kHz steps and a resolution bandwidth of 9 kHz. Measurements were carried out with peak and average detectors.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

AC Power-Line Conducted Emissions

Test results

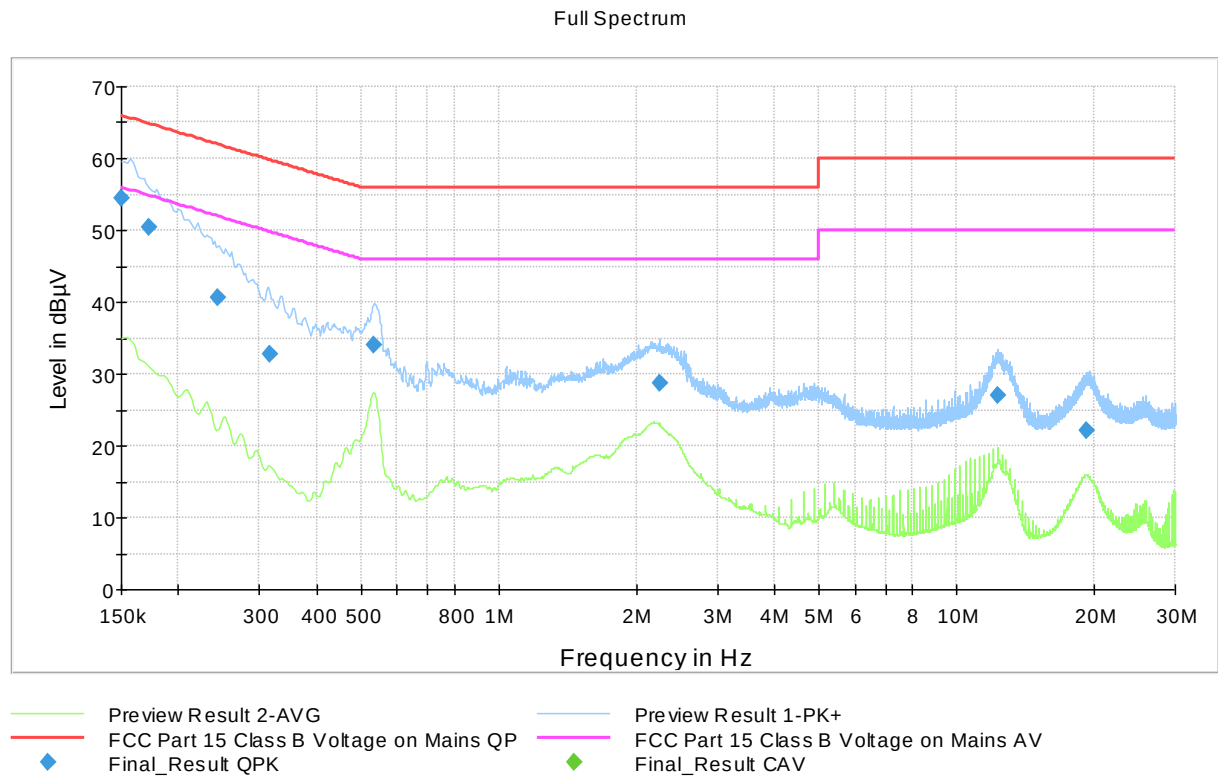


Figure 2: AC Power-Line Conducted Emissions

Table 1: Test results for AC Power-Line Conducted Emissions

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	54.51	---	66.00	11.49	15 x 1000.0	9.000	N	9.7
0.172500	50.36	---	64.84	14.48	15 x 1000.0	9.000	N	9.7
0.244000	40.55	---	61.96	21.41	15 x 1000.0	9.000	L1	9.7
0.315500	32.77	---	59.82	27.05	15 x 1000.0	9.000	N	9.7
0.534250	34.08	---	56.00	21.92	15 x 1000.0	9.000	L1	9.7
2.239750	28.70	---	56.00	27.30	15 x 1000.0	9.000	L1	9.9
12.309750	26.92	---	60.00	33.08	15 x 1000.0	9.000	N	10.3
19.270250	22.17	---	60.00	37.83	15 x 1000.0	9.000	L1	10.5

The correction factor in the final result table contains the sum of the transducers (LISN + cables).

The reported QuasiPeak and CAverage values include the correction factor.

Radiated Emissions 9 kHz to 1 GHz

Radiated Emissions 9 kHz to 1 GHz

Standard:	ANSI C63.10-2013	
Tested by:	HAM, PKA	HAM, PKA
Date:	13 April 2023	14 April 2023
Temperature:	23 °C	23 °C
Humidity:	34 % RH	33 % RH
Measurement uncertainty:	± 4.51 dB	Level of confidence 95 % (k = 2)

FCC Rule: 15.209

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency [MHz]	Field strength [μV/m]	Measurement distance [m]
0.009 – 0.490	2400 / F[kHz]	300
0.490 – 1.705	24000 / F[kHz]	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

According to ANSI C63.10 clause 5.3.2 the measurements below 30 MHz can be performed at a closer distance than the EUT limit distance, the results shall be extrapolated to limit distance by using the square of an inverse linear distance extrapolation factor (40 dB/ decade). This method was used when performing measurements at a distance of 3 m instead of limit distances 300 m or 30 m.

According to §15.209(c) any unwanted emission shall not exceed the level of the fundamental emission. As the measurement has been made from 3 m distance and the result has been extrapolated by -40 dB to the 30 meter distance and by -80 dB to the 300 meter distance, the correct levels of fundamental emission for comparison to unwanted emissions in the 30 – 1000 MHz frequency range is 88.09 dBμV/m, [Result 30m + 40log(300m/3m)].

The results for load level with the worst-case emissions are reported (load level > 99 %).

Radiated Emissions 9 kHz to 1 GHz

Test results

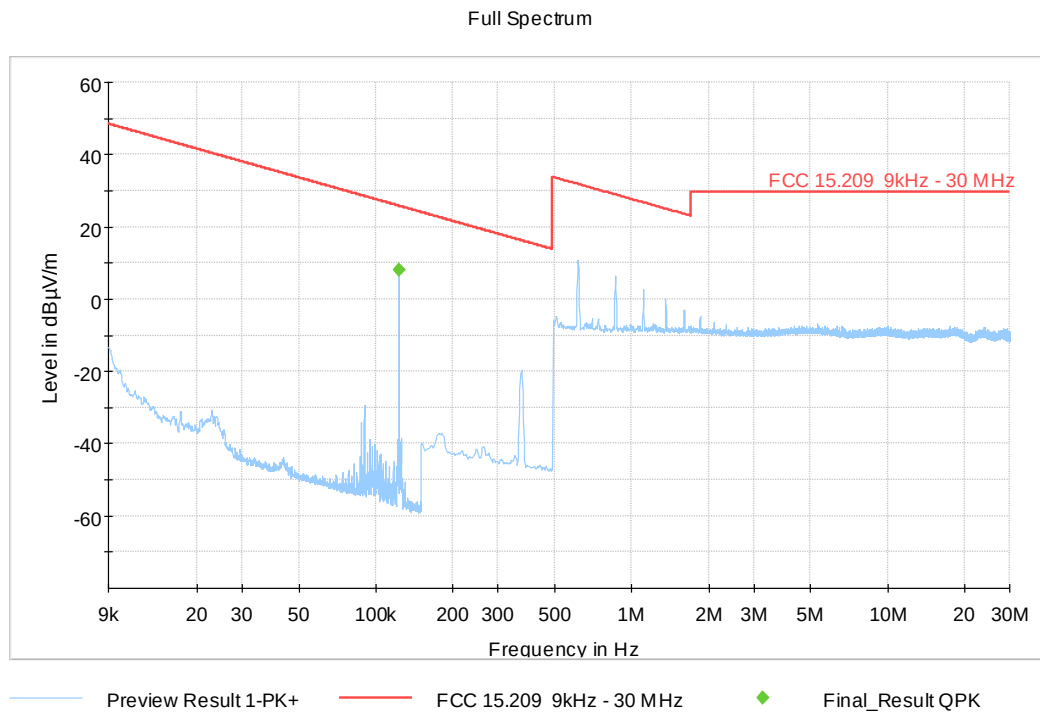


Figure 3: Radiated emission 9 kHz to 30MHz.

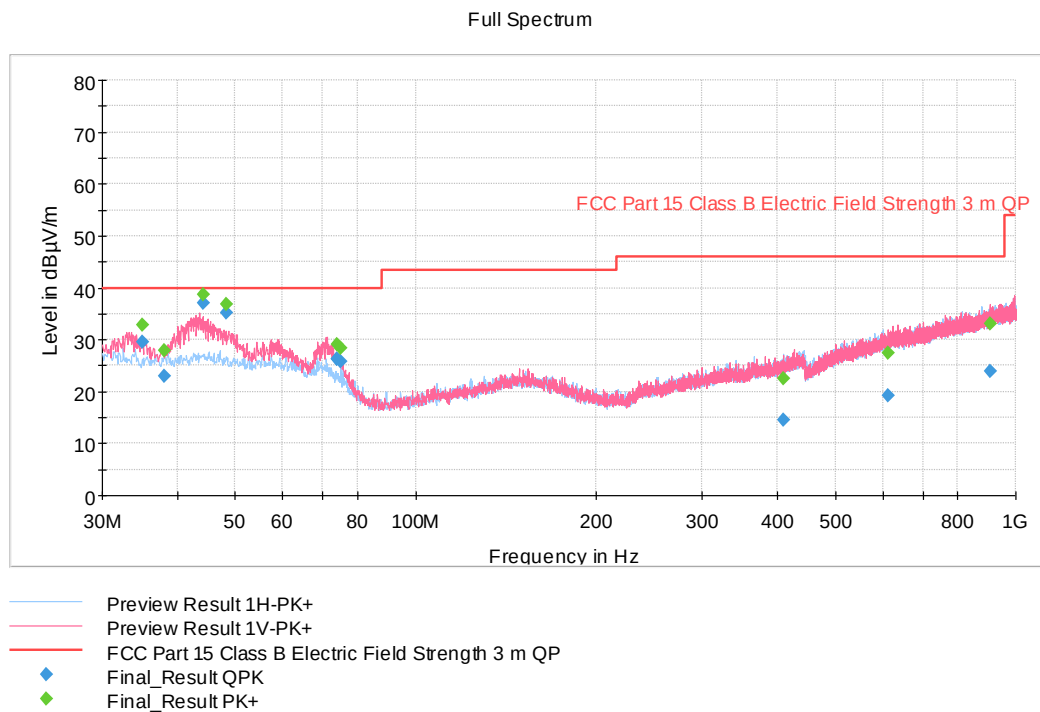


Figure 4: Radiated emission 30 – 1000 MHz

Radiated Emissions 9 kHz to 1 GHz

Table 2: The final results with Quasi-peak detector

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.123440	8.09	25.78	17.69	15 x 1000.0	0.200	Copl. *	V	193.0	-60.3
35.055000	29.48	40.00	10.52	15 x 1000.0	120.000	118.0	V	101.0	16.6
38.131000	22.97	40.00	17.03	15 x 1000.0	120.000	100.0	V	122.0	16.7
44.145000	37.14	40.00	2.86	15 x 1000.0	120.000	100.0	V	103.0	17.6
48.235000	35.09	40.00	4.91	15 x 1000.0	120.000	100.0	V	180.0	17.8
73.943000	26.28	40.00	13.72	15 x 1000.0	120.000	117.0	V	227.0	15.1
73.943000	26.28	40.00	13.72	15 x 1000.0	120.000	117.0	V	227.0	15.1
74.900000	25.72	40.00	11.52	15 x 1000.0	120.000	109.0	V	221.0	14.8
409.584000	14.54	46.00	23.57	15 x 1000.0	120.000	378.0	H	141.0	22.2
612.742000	19.26	46.00	18.66	15 x 1000.0	120.000	226.0	V	88.0	27.1
907.175000	23.91	46.00	22.09	15 x 1000.0	120.000	214.0	H	141.0	31.4

* Copl. = Measurement loop antenna in coplanar orientation.

The correction factor in the final result table contains the sum of the transducers (antenna + cables).

20 dB Emission Bandwidth

Standard: ANSI C63.10-2013
Tested by: HAM
Date: 15 May 2023
Temperature: 23 ± 3 °C
Humidity: 20 - 75 % RH

FCC Rule: 2.1049, 15.215(c)

Intentional radiators operating under the alternative provisions to the general emission limits must be designed to ensure that the 20 dB bandwidth of the emission is contained within the frequency band designated in the rule section under which the equipment is operated.

The results for load level with the worst-case emissions are reported (load level > 99 %).

Test results

Table 6: 20 dB bandwidth test results

f_c [kHz]	20 dB BW [kHz]	Limit	Result
133.460	29.437000	-	PASS

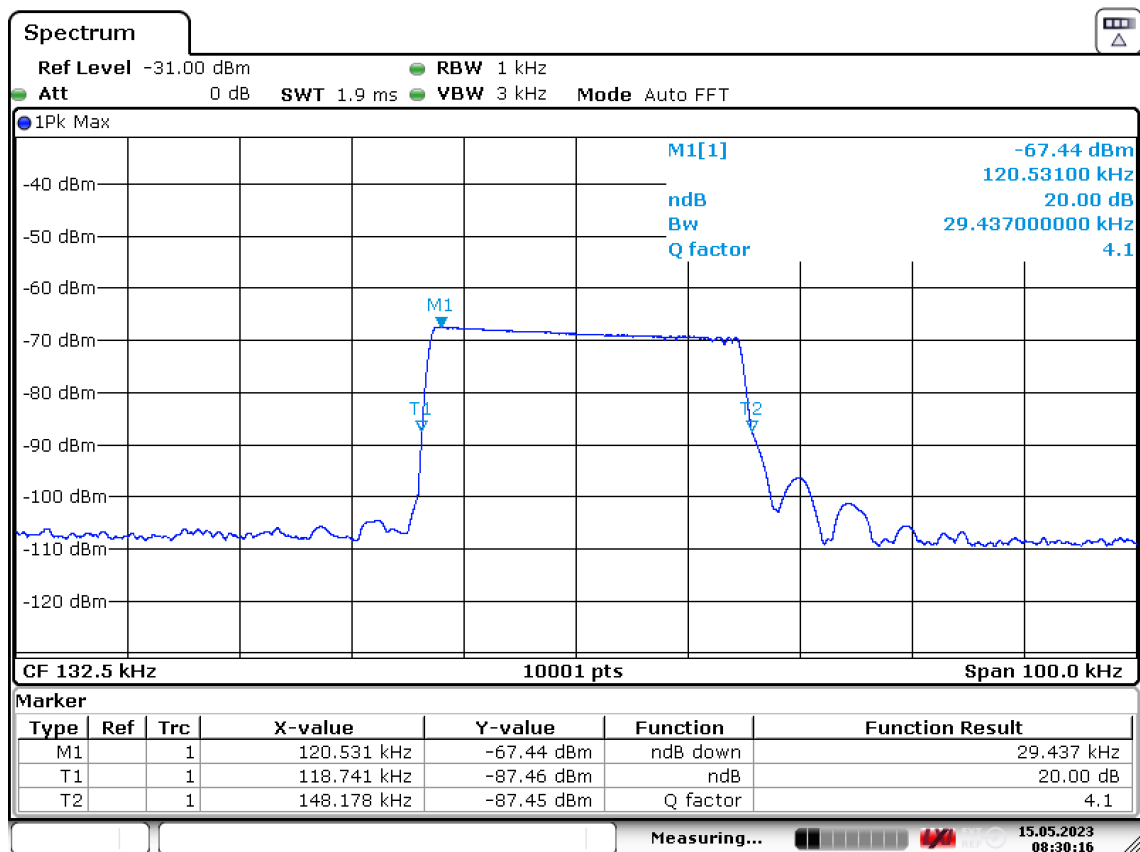


Figure 5: 20 dB emission bandwidth

TEST EQUIPMENT

AC Power-Line Conducted Emissions

Equipment	Manufacturer	Type	Inv or serial	Prev Calib	Next Calib
COAX CHAIN K5 EMI CE 9kHz-30MHz	-	C054+FP1SF+C153	-	2024-03-28	2025-03-28
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESW26	inv. 10679	2024-06-12	2025-06-11
LISN	ROHDE & SCHWARZ	ENV216	inv. 9611	2024-02-05	2025-02-05
POWER SUPPLY	CALIFORNIA INSTR.	5001 iX Series II	inv. 7826	NCR	NCR
TEMPERATURE/ HUMIDITY SENSOR	EDS	OW-ENV-TH, K5 SAC	inv. 10517	2023-10-30	2024-10-30
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	-	-

Radiated tests

Equipment	Manufacturer	Type	Inv or serial	Prev Calib	Next Calib
ANTENNA	SCHWARZBECK	VULB 9168	inv:8911	2022-11-29	2024-11-29
ANTENNA	ROHDE & SCHWARZ	HFH2-Z2 , 335.4711.52	inv:8013	2022-10-25	2024-10-25
ANTENNA MAST	MATURO	TAM 4.0E	inv:10181	NCR	NCR
ATTENUATOR	PASTERNAK	PE 7004-4 (4dB)	inv:10126	2023-03-13	2024-03-13
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESW26	inv:10679	2022-06-20	2023-06-20
MAST & TURNTABLE CONTROLLER	MATURO	NCD	inv:10183	NCR	NCR
MULTIMETER	FLUKE	289	sn:59090035	2022-11-29	2023-11-29
NEAR-FIELD PROBE SET	ROHDE & SCHWARZ	HZ-14	inv:7883	NCR	NCR
POWER SUPPLY	DELTA	SM 130-25D	inv:10406	NCR	NCR
SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSV40	inv:9093	2023-01-04	2024-01-04
TEMPERATURE/ HUMIDITY METER	VAISALA	HMT 333	inv:8638	2022-08-31	2023-08-31
TEMPERATURE/ HUMIDITY SENSOR	EDS	OW-ENV-TH, K5 EMC	inv:10516	2022-10-27	2023-10-27
TEMPERATURE/ HUMIDITY SENSOR	EDS	OW-ENV-TH, K5 SAC	inv:10517	2022-10-27	2023-10-27
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	NCR	NCR
TURNTABLE	MATURO	DS430 UPGRADED	inv:10182	NCR	NCR

NCR = No calibration required

END OF REPORT