

Test report No:
NIE: 66096REM.002A2

Test report

FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)

(*) Identification of item tested	Optical hear rate sensor
(*) Trademark	Polar
(*) Model and /or type reference	Polar Verity Sense / 4J
Other identification of the product	HW version: 00784292 SW version: 0.1.1
(*) Features	Bluetooth LE & ANT+ (ANT+ simultaneously with BLE only) optical heart rate
Manufacturer	Polar Electro Oy Professorintie 5, 90440 Kempele. Finland.
Test method requested, standard	FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Rafael López EMC Consumer & RF Lab. Manager
Date of issue	2021-02-10
Report template No	FDT08_23 (*) "Data provided by the client"

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Acronyms

Acronym ID	Acronym Description
Avg	Radiated Average Level
Avg	Conducted Average Level
Az	Azimuth
CPL	Zones / Coupling Cables
Code	EMC Test Code
Freq	Frequency
Freq Rng	Frequency Range
H	Height
Line	Conducted Emissions - Tested Line
MP	Measurement Point
Max	Conducted Maximum Level
MaxPeak	Radiated Maximum Peak Level
OM	Operation Mode
Pol	Polarization
QuasiPeak	Conducted Quasi Peak Level
QuasiPeak	Radiated Quasi Peak Level
S/	Sample
V	Verdict
Volt Immunity Lvl	Voltage Immunity Severity Level
Volt Immunity Type	Voltage Immunity Type

Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification S.A.U.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification internal document PODT000.

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1000 MHz is $I = \pm 4,9$ dB for quasi-peak measurements, $I = \pm 4,6$ dB for peak measurements ($k=2$).

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 1000 MHz to 12.75 GHz is $I = \pm 2,6$ dB for peaks and average measurements ($k=2$).

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested")
2. The sample consists of an optical heart rate sensor with Bluetooth low-energy and USB connectivity.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial N°	Date of Reception	Application
S/01	66096_23	4J device	4J	M0454L0300060	2020-11-17	Element under test
S/01	66096_10	Strap	---	---	2020-10-30	Element under test
S/02	66096_23	4J device	4J	M0454L0300060	2020-11-17	Element under test
S/02	CTC-6644-Z	Laptop	E5430	5SL1GV1	N/A	Auxiliary element
S/02	66096_06	USB cable	---	---	2020-10-30	Auxiliary element

Notes referenced to samples during the project.

Id	Note
S/01	N/A
S/02	Sample according to ANSI 63.4 transferring data with a PC

Test sample description

Ports..... :	Port name and description	Cable				
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾	
	USB port	0.02	X			
Supplementary information to the ports..... :	N/A					
Rated power supply	Voltage and Frequency		Reference poles			
			L1	L2	L3	N
		AC:				
	X	DC: EUT: 3.9Vdc				
Rated Power	0.25W.					
Clock frequencies..... :	37MHz, 32,768kHz.					
Other parameters..... :	Not provided data					
Software version	0.1.1					
Hardware version	00784292					
Dimensions in cm (W x H x D)..... :	Ø 27 mm, tickness10 mm, weight 5 g					
Mounting position..... :	Table top equipment					
	Wall/Ceiling mounted equipment					
	Floor standing equipment					
	Hand-held equipment					
	X	Other: Upper arm with armband and holder.				
Modules/parts	Module/parts of test item		Type		Manufacturer	
	N/A					
Accessories (not part of the test item)	Description		Type		Manufacturer	
	N/A					
Documents as provided by the applicant. :	Description		File name		Issue date	
	N/A					

⁽³⁾ Only for Medical Equipment

Identification of the client

Polar Electro Oy
Professorintie 5, 90440 Kempele. Finland.

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2020-11-18
Date (finish)	2020-11-18

Document history

Report number	Date	Description
66096REM.002	2020-12-23	First release
66096REM.002A1	2021-02-08	First modification due to typos, update standard version and to include the operation mode according to ANSI 63.4. This modification test report cancels and replaces the test report 66096REM002.
66096REM.002A2	2021-02-10	Second modification due to typos. This modification test report cancels and replaces the test report 66096REM002A1.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Abel Gil.

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P

List of equipment used during the test

Control Number	Description	Model	Manufacturer	Next Calibration
6196	PRE-AMPLIFIER G>55dB 1-18GHz	AMF-7D-01001800-22-10P	NARDA	2020-12-17
6607	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2021-04-29
6666	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2022-02-05
6815	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2022-02-01
7615	SHIELDED ROOM	S101	ETS LINDGREN	---
7743	HORN ANTENNA 0,75-18GHz	3115	ETS LINDGREN	2023-08-24
6205	THREE-PHASE ARTIFICIAL NETWORK 32A	PMM L3-32	NARDA	2021-12-11

Summary

Test Specification.	Requirement – Test case	Verdict	Remark
FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) Secs. 15.109 & ICES-003 Issue 7 (October 2020). ANSI C63.4 (2014)	Radiated emission	Pass	---
FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) Secs. 15.107 & ICES-003 Issue 7 (October 2020). ANSI C63.4 (2014)	Conducted emission	Pass	---

Appendix A: Test results

Appendix A context

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Description of the operation modes

The operation modes described in this paragraph constitute a functionality of the sample under test for itself. Every operation mode takes a failure criteria for the immunity test that they were applying to it and a monitoring to guarantee performance of the same ones.

The operation modes used by the samples to which the present report refers, are shown in the following table:

Id	Description
OM_01	EUT ON. Bluetooth LE ON, unpaired with auxiliary device. ANT+ not paired with auxiliary device. Power Supply: Internal Battery (3,9Vdc).
OM_02	EUT ON. Bluetooth LE ON, unpaired with auxiliary device. ANT+ not paired with auxiliary device. Transferring data with a PC. Charging batteries via USB (through a laptop powered by 115Vac).

Test standards version applied

The product standards and test standards applied for each test cases are shown in the following table:

Product Test Standard	Test standard	Requirement – Test case
FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) Secs. 15.109 & ICES-003 Issue 7 (October 2020).	ANSI C63.4 (2014)	Radiated emission
FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) Secs. 15.107 & ICES-003 Issue 7 (October 2020).	ANSI C63.4 (2014)	Conducted emission

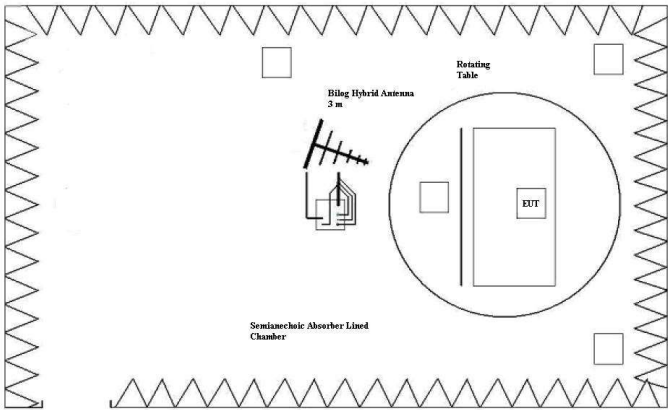
Test Cases Details

FCC CFR 47, Part 15, Subpart B (10-1-19 Edition), Sec. 15.109 &
ICES-003 Issue 7 (October 2020)
RE Radiated emission

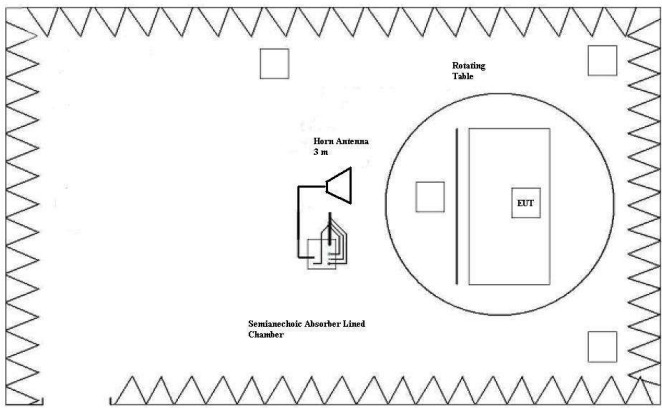
Limits of interference Class B

The applied limit for radiated emissions, 3 m distance, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-19 Edition), Secs. 15.109 & ICES-003 Issue 6 (Updated 04-2019)

Frequency of emission (MHz)	Field strength (microvolt/meter)
30-88	100
88-216	150
21-960	200
Above 960	500
*Above 1GHz, the limit is defined for an AVG detector.	



Setup for measurements < 1GHz.



Setup for measurements > 1GHz.

RESULTS

CRmmnnRR	Description	Result
CR0101LR	Range: 30 MHz - 1000 MHz.	P
CR0101HR	Range: 1 GHz – 12.75 GHz.	P
CR0101HR2	Range: 12.75 GHz – 26 GHz.	N/A*
CR0202LR	Range: 30 MHz - 1000 MHz.	P
CR0202HR	Range: 1 GHz – 12.75 GHz.	P
CR0202HR2	Range: 12.75 GHz – 26 GHz.	N/A*

mm: Sample number; nn: Operation mode; RR: Measurement range.

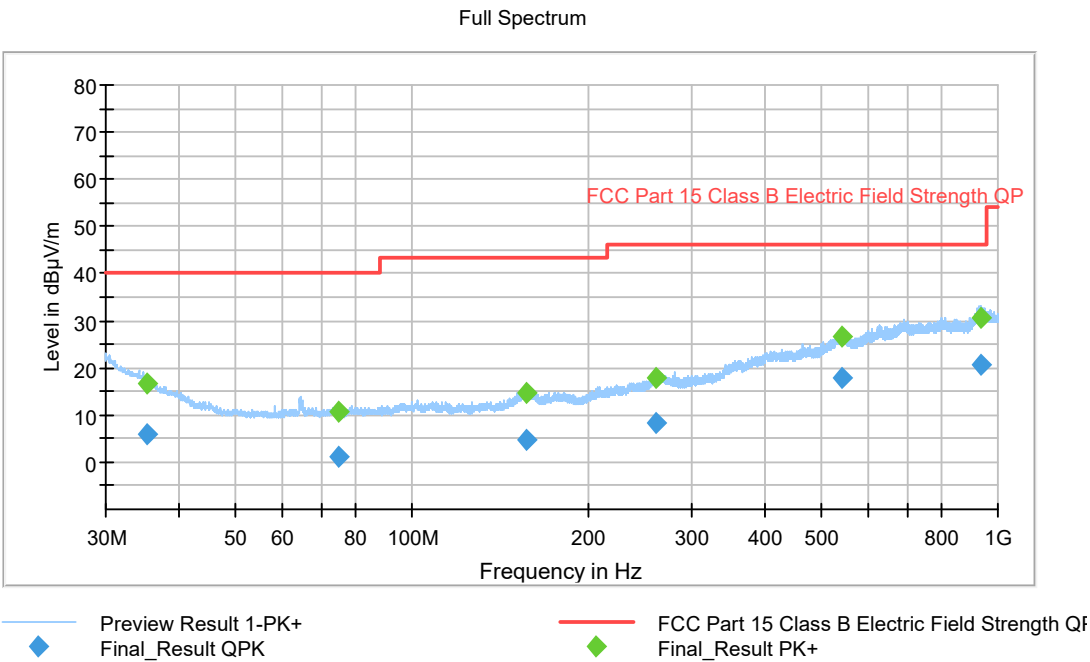
*According to FCC 47 CFR Part 15B / ICES-003 Issue 6, test required only to the 5th harmonics of the maximum internal work frequency in the EUT.

VERDICT

Pass

Images:

Project: 66096REM.002
Company: POLAR ELECTRO OY
Sample: S/01
Operation mode: OM#01
Graphical code: RE0101LR
Description: EUT ON. Bluetooth LE ON, unpaired with auxiliary device. ANT+ not paired with auxiliary device. Power Supply: Internal Battery (3,9Vdc).
Verdict: Passed

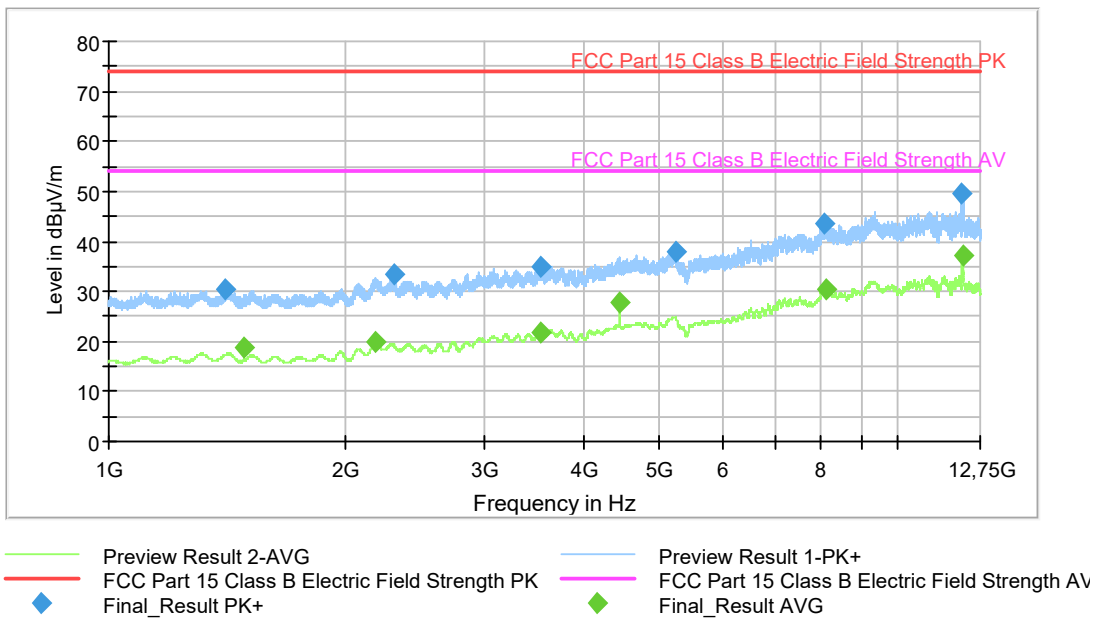


Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
35.381000	---	16.50	---	---	306.0	V	12.8
35.381000	5.88	---	40.00	34.12	306.0	V	12.8
74.870000	1.29	---	40.00	39.29	121.0	H	7.1
74.870000	---	10.54	---	---	121.0	H	7.1
156.650000	---	14.86	---	---	386.0	V	11.0
156.650000	4.86	---	40.00	35.14	386.0	V	11.0
261.533000	---	18.06	---	---	319.0	H	14.2
261.533000	8.22	---	47.00	38.78	319.0	H	14.2
540.037000	17.70	---	47.00	29.30	400.0	V	22.0
540.037000	---	26.63	---	---	400.0	V	22.0
932.905000	---	30.43	---	---	351.0	H	47.0
932.905000	20.48	---	27.00	26.52	351.0	H	47.0

Project: 66096REM.002
Company: POLAR ELECTRO OY
Sample: S/01
Operation mode: OM#01
Graphical code: RE0101HR
Description: EUT ON. Bluetooth LE ON, unpaired with auxiliary device. ANT+ not paired with auxiliary device. Power Supply: Internal Battery (3,9Vdc).
Verdict: Passed

Full Spectrum



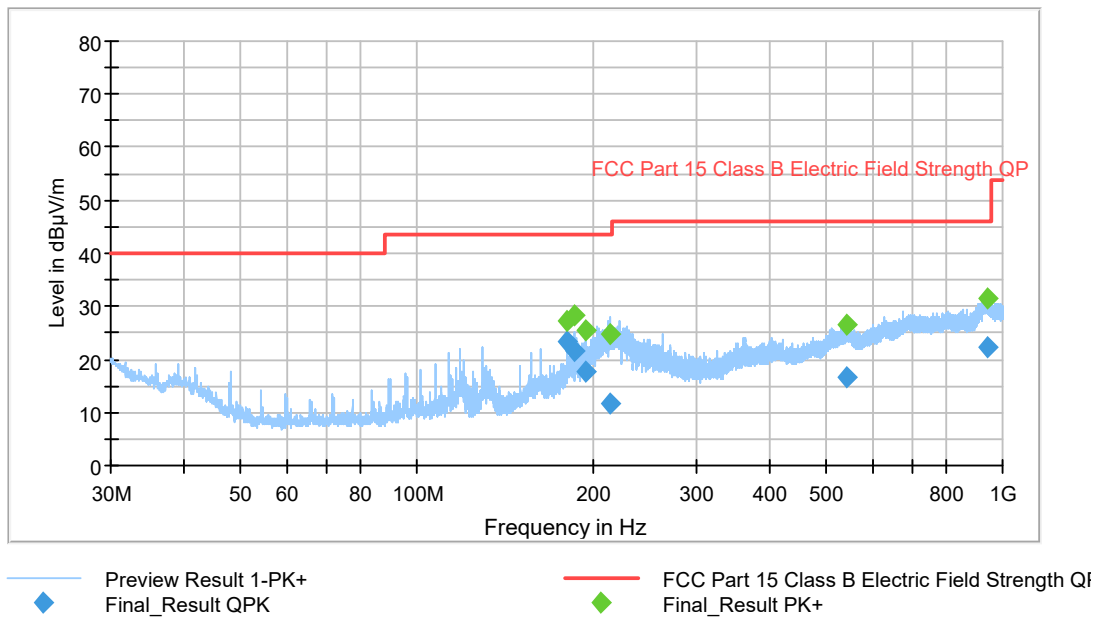
Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)
1406.800000	30.41	---
1484.800000	---	18.84
2179.600000	---	19.99
2306.400000	33.33	---
3523.600000	35.01	---
3532.000000	---	21.88
4454.800000	---	27.91
5251.200000	38.02	---
8073.600000	43.62	---
8124.400000	---	30.34
12101.600000	49.58	---
12103.200000	---	37.03

Project: 66096REM.002
Company: POLAR ELECTRO OY
Sample: S/02
Operation mode: OM#02
Graphical code: RE0202LR
Description: EUT ON. Bluetooth LE ON, unpaired with auxiliary device. ANT+ not paired with auxiliary device. Transferring data with a PC. Charging batteries via USB (through a laptop powered by 115Vac).

Verdict: Passed

Full Spectrum

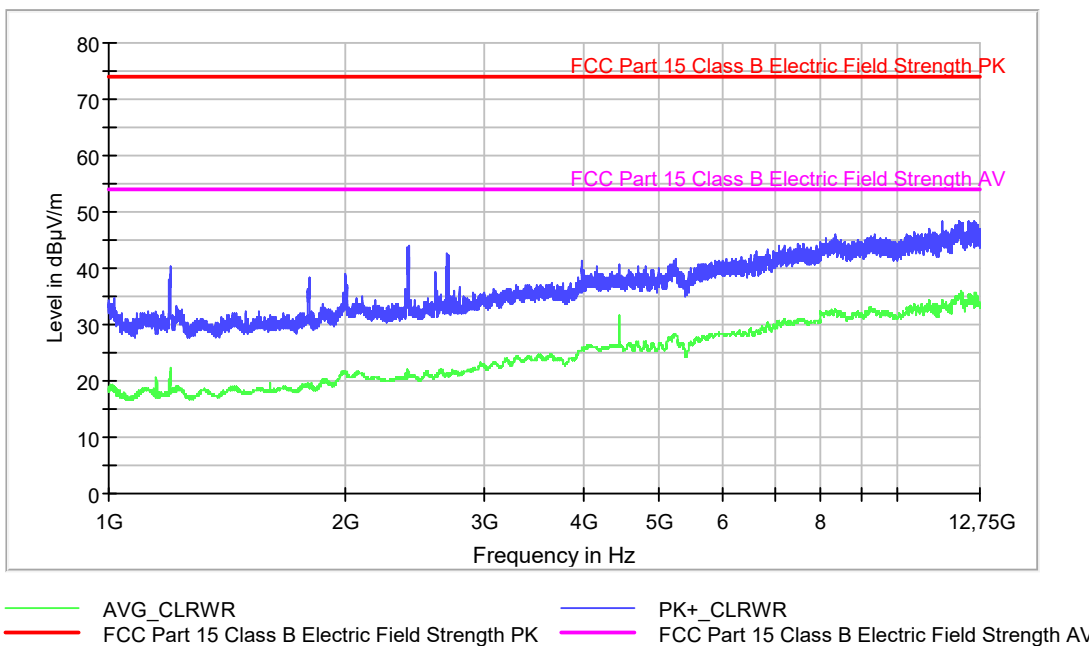


Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
180.457000	---	27.21	---	---	133.0	H	256.0
180.457000	23.37	---	43.52	20.15	133.0	H	256.0
186.398000	---	28.41	---	---	143.0	H	161.0
186.398000	21.46	---	43.52	22.06	143.0	H	161.0
194.581000	17.58	---	43.52	25.94	120.0	H	187.0
194.581000	---	25.57	---	---	120.0	H	187.0
214.095000	---	24.92	---	---	123.0	H	163.0
214.095000	11.85	---	43.52	31.67	123.0	H	163.0
542.176000	16.80	---	46.00	29.20	317.0	H	238.0
542.176000	---	26.55	---	---	317.0	H	238.0
943.675000	---	31.52	---	---	366.0	H	283.0
943.675000	22.39	---	46.00	23.61	366.0	H	283.0

Project: 66096REM.002
Company: POLAR ELECTRO OY
Sample: S/02
Operation mode: OM#02
Graphical code: RE0202HR
Description: EUT ON. Bluetooth LE ON, unpaired with auxiliary device. ANT+ not paired with auxiliary device. Transferring data with a PC. Charging batteries via USB (through a laptop powered by 115Vac).

Verdict: Passed



Final Result

Frequency (MHz)	PK+ _CLRWR (dBµV/m)	AVG _CLRWR (dBµV/m)
1200.000000	40.2	22.2
2400.400000	43.9	21.0
3981.600000	41.3	25.9
5251.200000	41.6	28.2
6854.400000	43.5	30.1
8018.400000	44.6	32.1
8359.600000	45.8	32.4
10300.800000	46.0	33.0
11417.200000	48.3	34.0
12572.800000	48.5	35.6

FCC CFR 47, Part 15, Subpart B (10-1-19 Edition), Sec. 15.107 &
ICES-003 Issue 7 (October 2020)
CE Conducted emission

Limits of interference Class B

The applied limit for continuous conducted emissions in power leads, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-19 Edition), Secs. 15.107 & ICES-003 Issue 6, in the frequency range 0,15 to 30 MHz, for Class B equipment was:

Frequency range (MHz)	Limit (dB μ V)	
	Quasi-Peak	Average
0,15 to 0,5	66 - 56	56 - 46
0,5 to 5	56	46
5 to 30	60	50

RESULTS

CCmmnnhh	Description	Result
CC02020N	Range: 150kHz – 30MHz. Neutral AC wire noise.	P
CC0202L1	Range: 150kHz – 30MHz. Phase AC wire noise.	P

mm: Sample number; nn: Operation mode; hh: Wire

VERDICT

Pass

Images:

Project:

Company:

Sample:

Operation mode:

Description:

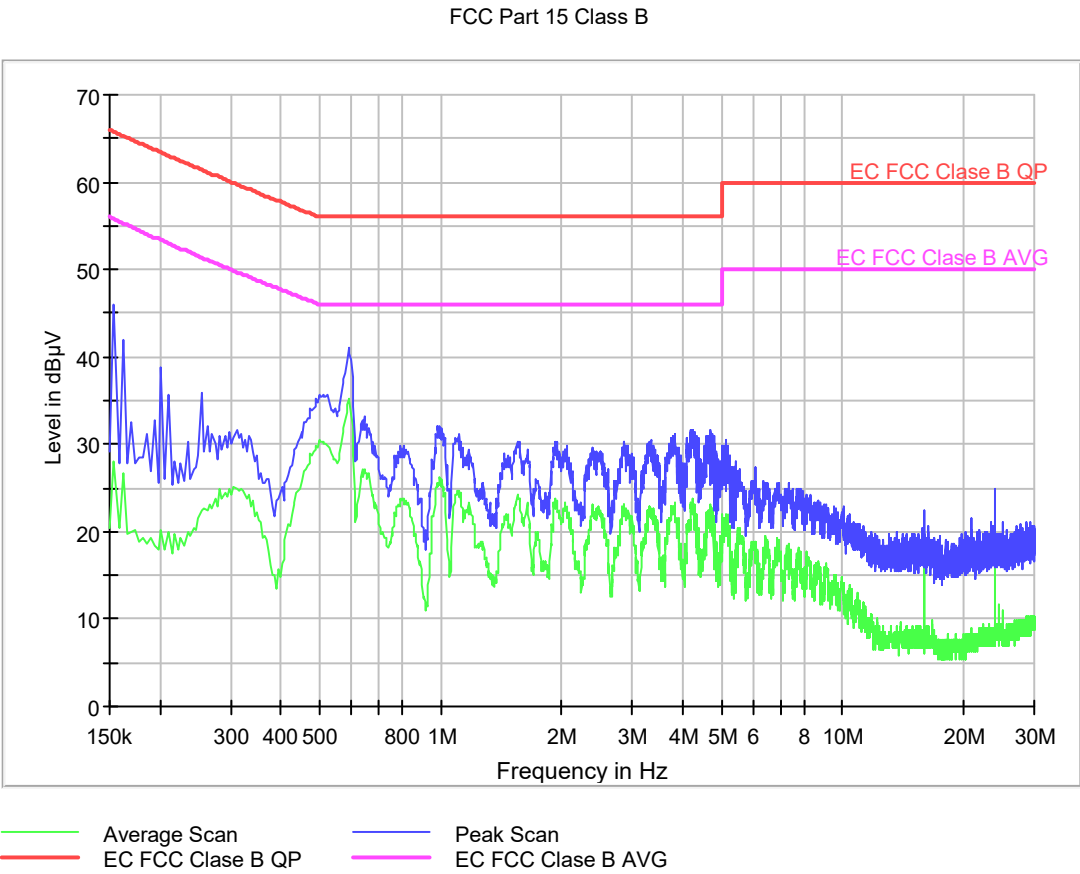
66096REM.002

POLAR ELECTRO OY

S/02

OM#02

EUT ON. Bluetooth LE ON, unpaired with auxiliary device. ANT+ not paired with auxiliary device. Transferring data with a PC. Charging batteries via USB (through a laptop powered by 115Vac). Neutral wire noise.

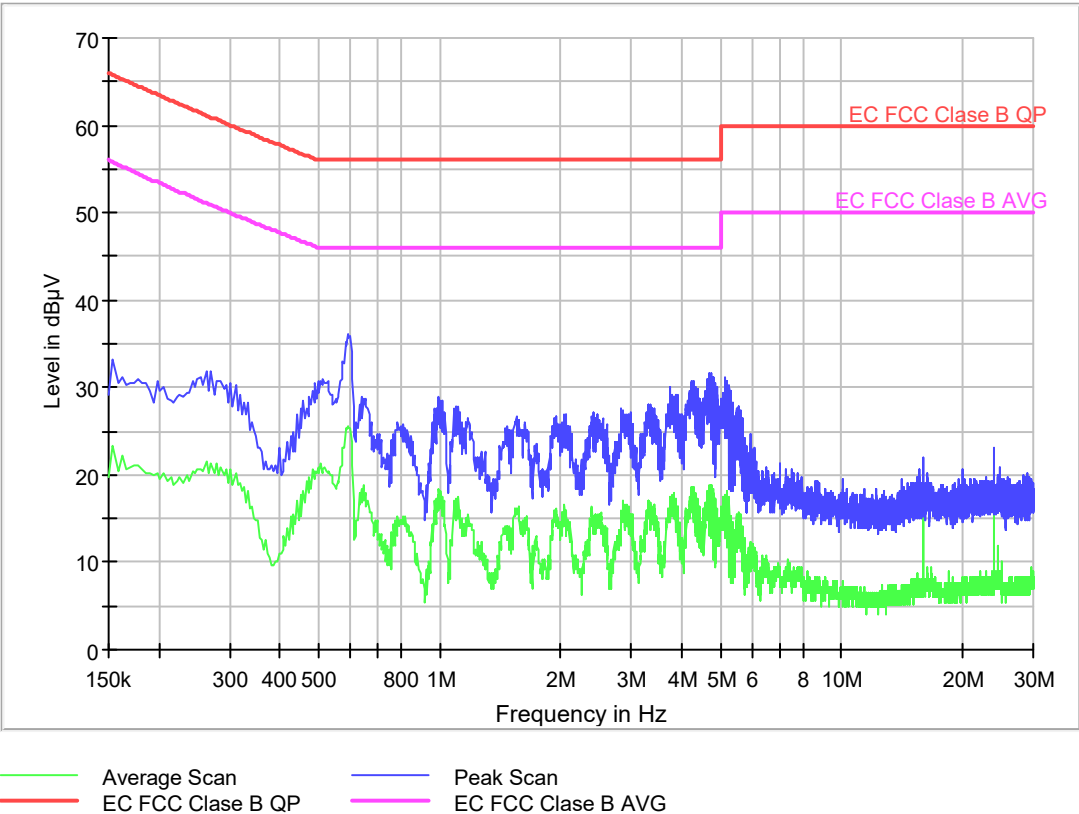


Subrange Maxima

Frequency (MHz)	PK+ _CLRWR (dBµV)	AVG_CLRWR (dBµV)
0.154000	45.9	28.1
0.262000	32.1	22.4
0.590000	41.1	35.2
0.982000	32.1	25.6
1.942000	30.2	23.6
3.330000	30.5	22.6
4.258000	31.7	23.1
6.334000	25.7	17.7
15.998000	22.4	14.7
24.002000	24.8	18.4

Project: 66096REM.002
Company: POLAR ELECTRO OY
Sample: S/02
Operation mode: OM#02
Description: EUT ON. Bluetooth LE ON, unpaired with auxiliary device. ANT+ not paired with auxiliary device. Transferring data with a PC. Charging batteries via USB (through a laptop powered by 115Vac). Phase wire noise.

FCC Part 15 Class B



Subrange Maxima

Frequency (MHz)	PK+ _CLRWR (dBµV)	AVG_CLRWR (dBµV)
0.154000	33.2	23.3
0.270000	31.8	21.4
0.590000	36.1	25.6
0.998000	28.9	18.4
2.058000	26.8	16.0
3.342000	28.1	16.8
4.746000	31.7	13.1
7.002000	21.2	8.3
16.002000	22.0	15.8
24.002000	23.0	17.9