



Test report No:

NIE: 52124REM.002A1

Test report

FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-15 Edition) & ICES-003 ISSUE 6 (2016)

Identification of item tested	M430 GPS sports watch with wrist-based heart rate
Trademark	Polar
Model and/or type reference	2P
Other identification of the product	S/N: F7092P1000791
Final HW version	64873.06
Final SW version	0.2.66
FCC ID	INW2P
IC	6248A-2P
Features	BLE, OHR (optical heart rate)
Manufacturer	POLAR ELECTRO OY Professorintie 5, 90440 Kempele, Finland.
Test method requested, standard	FCC CFR 47, Part 15, Subpart B (10-1-15 Edition) & ICES-003 Issue 6 (2016)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Rafael López EMC Lab Manager 
	Firmado digitalmente por RAFAEL LÓPEZ MARTÍN Fecha: 2017.04.24 13:25:49 +02'00'
Date of issue	2017-04-21
Report template No.	FDT08_19

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Competences and guarantees

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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.
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Uncertainty

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

Usage of samples

Samples under test have been selected by: the Client.

Sample S/01 is composed of the following elements:

Control N°	Description	Model	Serial number	Reception date
52124/006	M430 GPS sport watch with wrist-based heart rate	2P	F7092P1000791	2017-03-21

Sample S/02 is composed of the following elements:

Control N°	Description	Model	Serial number	Reception date
52124/006	M430 GPS sport watch with wrist-based heart rate	2P	F7092P1000791	2017-03-21
52124/025	USB cable	---	190-1000033	2017-02-13

Test sample description

The sample consists of a GPS sport watch with Bluetooth low-energy connectivity and wrist-based heart rate measurement.

Identification of the client

POLAR ELECTRO OY
Professorintie 5, 90440 Kempele, Finland.

Testing period

The performed test started on 2017-03-30 and finished on 2017-03-31.
The tests have been performed at AT4 wireless.

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. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

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

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

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. = 30 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Modifications to the reference test report

It was introduced the following modifications in respect to the test report number 52124REM.001 operation modes involved in testing:

It was added the Operation mode OM#03 that was omitted in the report 52124REM.001 by mistake.

This modification test report cancels and replaces the test report 52124REM.001.

Remarks and comments

The tests have been performed by the technical personnel: Daniel López, Jesús García & Jorge Mora.

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 26GHz is $I = \pm 2,6$ dB for peaks and average measurements ($k = 2$)

Testing verdicts (Legend)

Not applicable	:	N/A
Pass	:	P
Fail	:	F
Not measured	:	N/M

List of equipment used during the test					
CONTROL NUMBER	DESCRIPTION	MANUFACTURER	MODEL	LAST CALIBRATION	NEXT CALIBRATION
2942	EMI TEST Receiver	ROHDE & SCHWARZ	ESU40	2016-06-14	2017-10-09
4578	Bilog Antenna	ETS LINDGREN	3142E	2014-03-17	2017-03-17
4658	Preamplifier	SCHWARZBECK	BBV9743	2016-04-28	2017-04-28
4612	Horn Antenna	SCHWARZBECK	BBHA 9120 D	2016-12-19	2019-12-19
3783	Preamplifier	BONN ELEKTRONIK	BLMA 0118-3A	2016-05-03	2017-05-03
4656	Horn Antenna	SCHWARZBECK	BBHA 9170	2014-03-28	2017-03-28
1975	Preamplifier	MITEQ	JS4-12002600-30-5A	2015-10-06	2017-10-06
4570	Thermohigrometer	HW GROUP	HWg-STE	2016-04-28	2017-04-28
4567	Thermohigrometer	HW GROUP	HWg-STE	2016-04-28	2017-04-28

Appendix A – Test result

APPENDIX A CONTENT

DESCRIPTION OF THE OPERATION MODES.....9

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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:

OPERATION MODE	DESCRIPTION
OM#01	EUT ON. Bluetooth in IDLE mode. GPS OFF. Power supply: Internal battery.
OM#02	EUT ON. Bluetooth in IDLE mode. GPS OFF. Transferring data with the PC by USB. Power supply: 5Vdc via USB (Laptop)
OM#03	EUT ON. Bluetooth in Tx mode. GPS ON. Transferring data with the PC by USB. Power supply: 5Vdc via USB (Laptop)

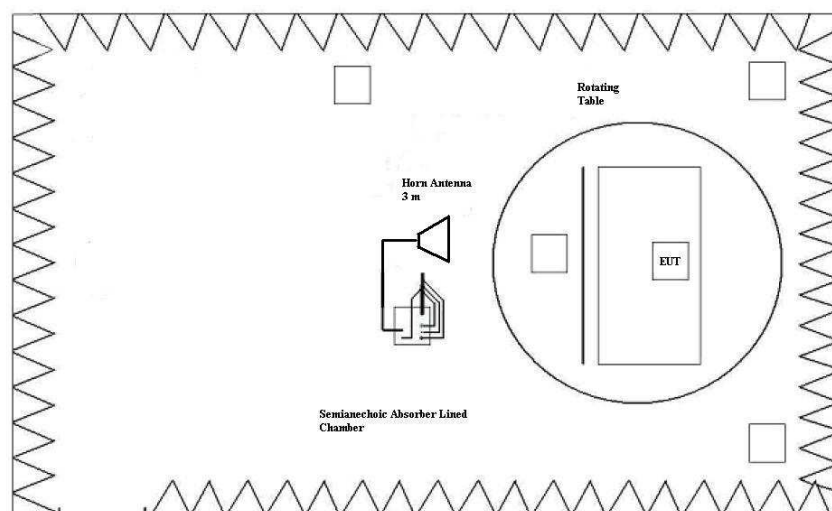
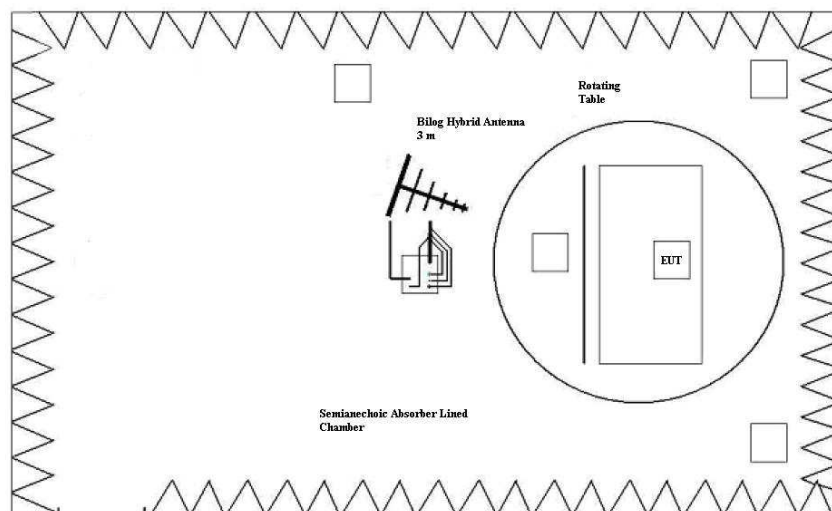
RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE

LIMITS:	Product standard:	FCC CFR 47, Part 15, Subpart B (10-1-15 Edition), Secs. 15.109 & ICES-003 Issue 6 (2016)
	Test standard:	FCC CFR 47, Part 15, Subpart B (10-1-15 Edition), Secs. 15.109 & ICES-003 Issue 6 (2016)

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 (10-01-15 Edition), Secs. 15.109 & ICES-003 Issue 6 (2016) in the frequency range 30 MHz to 26 GHz for class B equipments.

Frequency range (MHz)	QP Limit for 3 m	
	($\mu\text{V/m}$)	($\text{dB}\mu\text{V/m}$)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46
Above 960	500	54



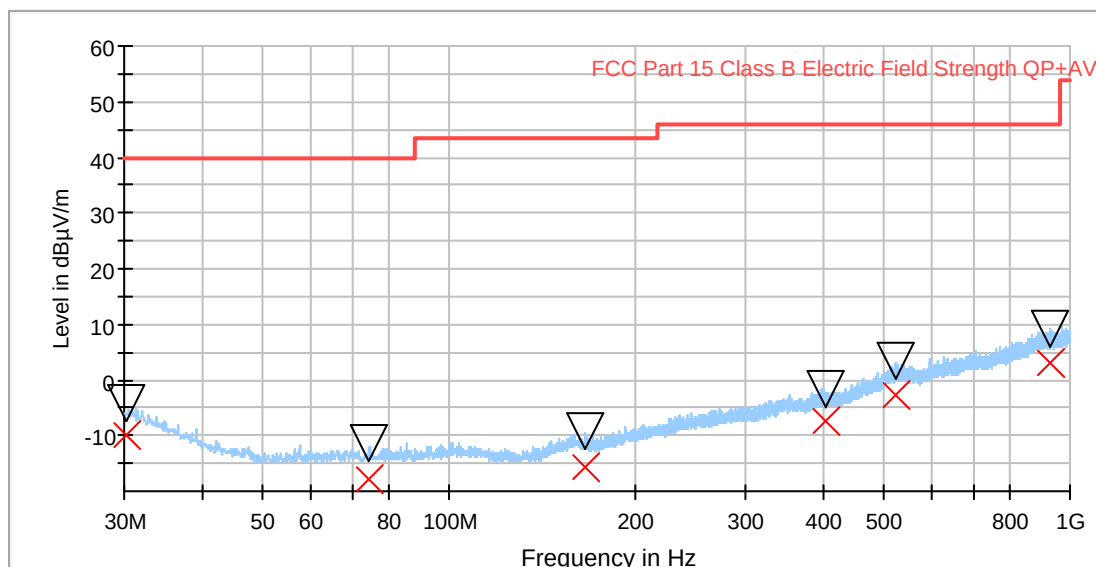
TESTED SAMPLE:	S#01 & S#02	
TESTED OPERATION MODES:	OM#01 & OM#02	
TEST RESULTS:	CRmmnnRRPP: CR, Radiation Condition; mm: Sample number; nn: Operation mode; RR: Range; PP: Polarization.	

CRmmnnRRPP	Description	Result
CR0101LR	Range: 30 MHz - 1000 MHz.	P
CR0101HR1_PH	Range: 1 GHz - 18 GHz. Horizontal Polarization.	P
CR0101HR1_PV	Range: 1 GHz - 18 GHz. Vertical Polarization.	P
CR0101HR2_PH	Range: 18 GHz - 26 GHz. Horizontal Polarization.	P
CR0101HR2_PV	Range: 18 GHz - 26 GHz. Vertical Polarization.	P
CR0202LR	Range: 30 MHz - 1000 MHz.	P
CR0202HR1_PH	Range: 1 GHz - 18 GHz. Horizontal Polarization.	P
CR0202HR1_PV	Range: 1 GHz - 18 GHz. Vertical Polarization.	P
CR0202HR2_PH	Range: 18 GHz - 26 GHz. Horizontal Polarization.	P
CR0202HR2_PV	Range: 18 GHz - 26 GHz. Vertical Polarization.	P

Radiated Emission. CR0101LR

Project: 52124REM.002
Company: POLAR
Sample: S/01
Operation mode: OM#01
Description: EUT ON. Bluetooth IDLE Mode. GPS IDLE Mode. Power supply: Internal battery.

Full Spectrum



— Preview Result 1-PK+
— FCC Part 15 Class B Electric Field Strength QP+AV
X QuasiPeak-QPK
▽ MaxPeak-PK+

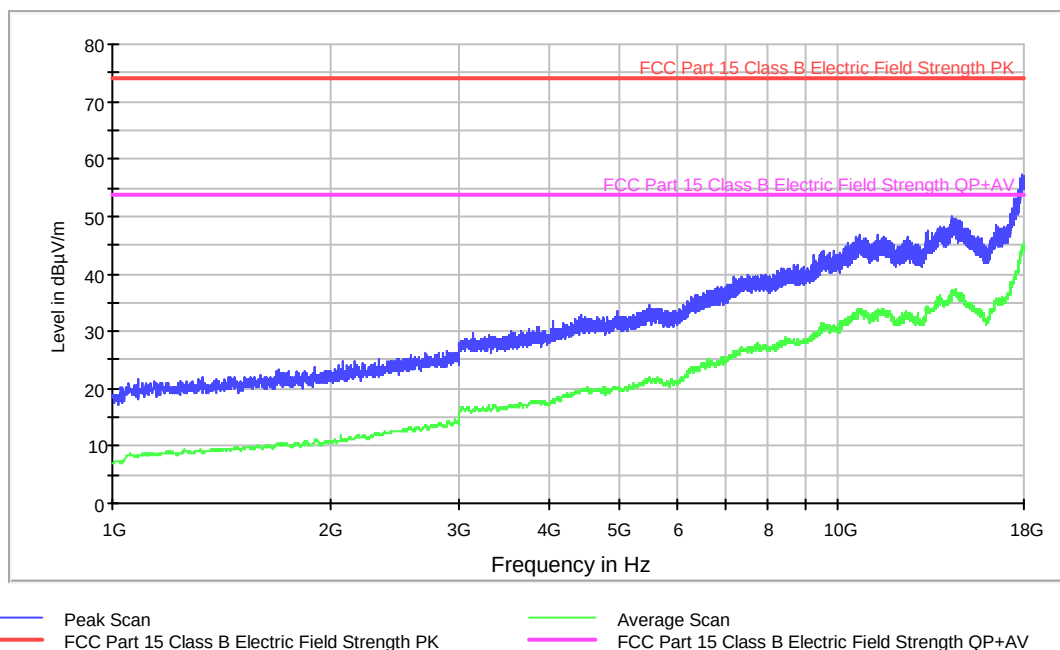
Maximizations

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Height (cm)	Pol	Azimuth (deg)
30.246753	-9.85	-4.06	319.0	H	75.0
74.435065	-17.74	-11.42	219.0	V	185.0
165.607792	-15.62	-9.13	197.0	V	351.0
402.559740	-7.54	-1.64	233.0	H	257.0
522.563636	-2.85	3.58	279.0	V	63.0
928.000000	3.06	9.12	180.0	H	194.0

Radiated Emission. CR0101HR1_PH

Project: 52124REM.002
Company: POLAR ELECTRO OY
Sample: S/01
Operation mode: OM#01
Description: EUT ON. Bluetooth IDLE Mode. GPS IDLE Mode. Power supply: Internal battery.. Horizontal Polarization.

ER EMI FCC 15 Class B (1-18GHz)



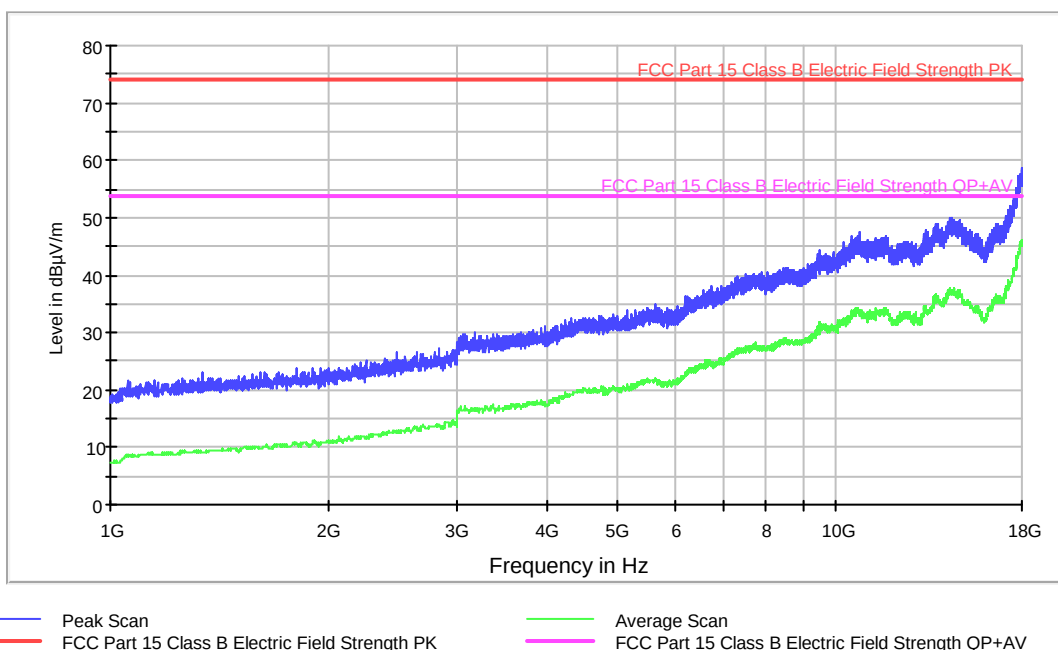
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
1331.000000	22.0	9.0
1689.000000	23.3	10.2
2330.000000	25.3	12.1
3137.000000	29.6	16.5
4042.000000	31.7	18.1
5477.000000	34.5	21.7
7512.000000	39.9	27.1
9841.000000	44.2	30.9
13257.000000	47.4	34.1
17921.000000	57.3	44.7

Radiated Emission. CR0101HR1_PV

Project: 52124REM.002
Company: POLAR ELECTRO OY
Sample: S/01
Operation mode: OM#01
Description: EUT ON. Bluetooth IDLE Mode. GPS IDLE Mode. Power supply: Internal battery. Vertical Polarization.

ER EMI FCC 15 Class B (1-18GHz)



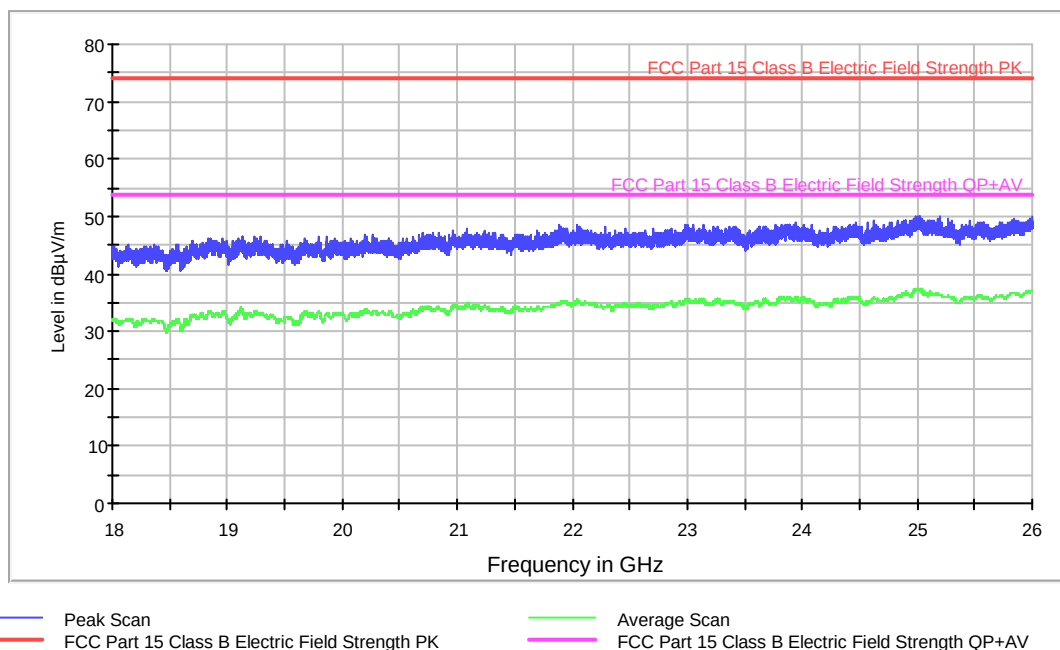
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
1323.000000	22.1	9.4
1633.000000	23.2	10.2
2248.000000	25.1	11.6
3060.000000	29.7	16.3
4220.000000	32.0	19.0
5637.000000	35.1	21.8
7512.000000	40.3	27.4
9492.000000	44.3	31.7
13298.000000	47.7	33.9
17997.000000	58.8	46.1

Radiated Emission. CR0101HR2_PH

Project: 52124REM.002
Company: POLAR ELECTRO OY
Sample: S/01
Operation mode: OM#01
Description: EUT ON. Bluetooth IDLE Mode. GPS IDLE Mode. Power supply: Internal battery. Horizontal Polarization.

ER EMI FCC 15 Class B(18-26GHz)



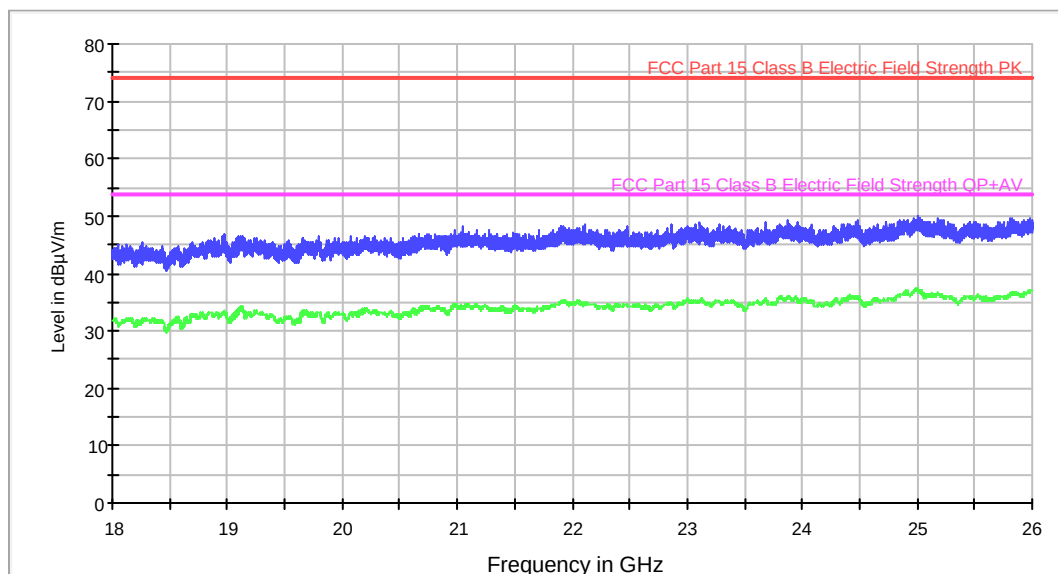
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
18560.000000	45.2	32.0
19133.200000	46.5	33.9
19873.200000	46.4	33.2
20792.000000	47.3	33.7
21088.000000	47.8	34.7
21893.200000	48.6	34.8
23002.000000	48.6	35.5
23951.200000	48.9	35.9
24994.800000	49.9	37.3
26000.000000	50.0	37.0

Radiated Emission. CR0101HR2_PV

Project: 52124REM.002
Company: POLAR ELECTRO OY
Sample: S/01
Operation mode: OM#01
Description: EUT ON. Bluetooth IDLE Mode. GPS IDLE Mode. Power supply: Internal battery. Vertical Polarization.

ER EMI FCC 15 Class B(18-26GHz)



— Peak Scan
— FCC Part 15 Class B Electric Field Strength PK
— Average Scan
— FCC Part 15 Class B Electric Field Strength QP+AV

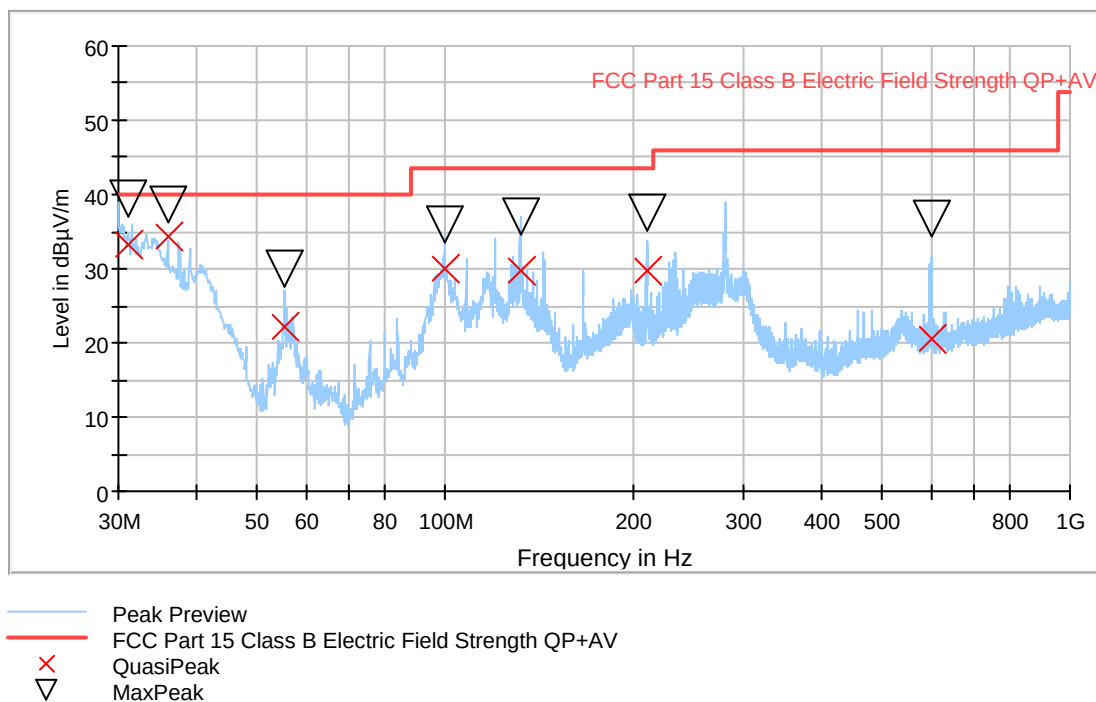
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
18268.000000	45.3	32.0
18970.400000	46.8	33.3
20075.600000	46.6	33.0
20810.800000	46.8	33.7
21050.000000	48.1	33.9
22107.600000	48.6	34.7
23115.200000	48.8	35.4
23881.600000	49.1	35.9
25010.400000	50.0	37.1
25810.800000	49.7	36.3

Radiated Emission. CR0202LR

Project: 52124REM.002
Company: POLAR
Sample: S/02
Operation mode: OM#02
Description: EUT ON. Bluetooth in IDLE mode. GPS OFF. Transferring data with the PC by USB. Power supply: 5Vdc via USB (Laptop)

Full Spectrum



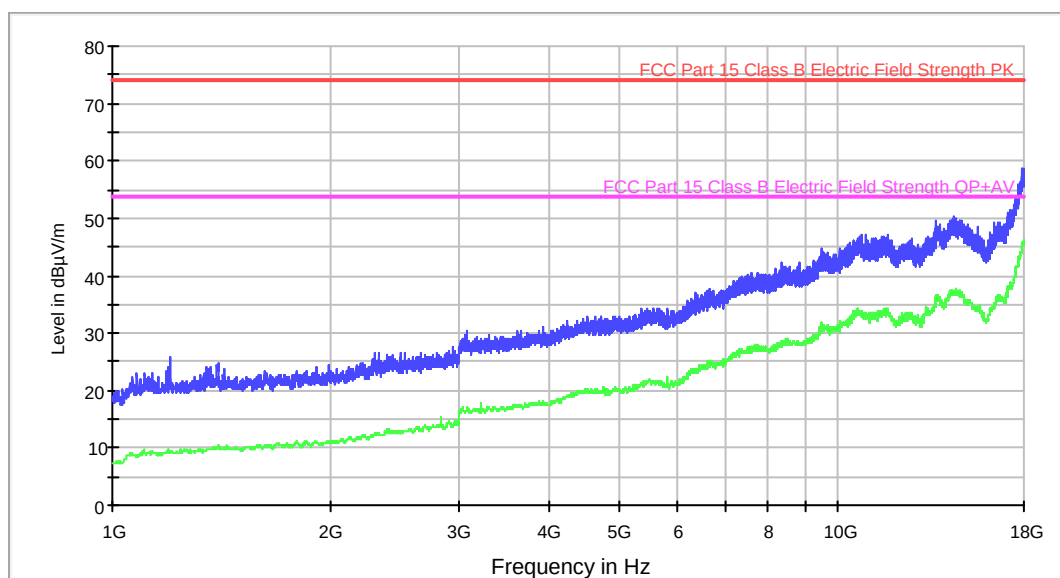
Maximizations

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
31.045455	33.14	39.46	40.00	6.86	104.0	V	165.0
35.993506	34.36	38.53	40.00	5.64	98.0	V	252.0
55.358442	22.14	30.00	40.00	17.86	98.0	V	116.0
99.864935	29.97	35.86	43.50	13.53	156.0	V	119.0
132.237662	29.75	36.97	43.50	13.75	150.0	H	183.0
209.879221	29.77	37.56	43.50	13.73	140.0	H	121.0
599.958442	20.41	36.78	46.00	25.59	178.0	V	174.0

Radiated Emission. CR0202HR1_PH

Project: 52124REM.002
Company: POLAR ELECTRO OY
Sample: S/02
Operation mode: OM#02
Description: EUT ON. Bluetooth in IDLE mode. GPS OFF. Transferring data with the PC by USB. Power supply: 5Vdc via USB (Laptop). Horizontal Polarization

ER EMI FCC 15 Class B (1-18GHz)



— Peak Scan
— FCC Part 15 Class B Electric Field Strength PK
— Average Scan
— FCC Part 15 Class B Electric Field Strength QP+AV

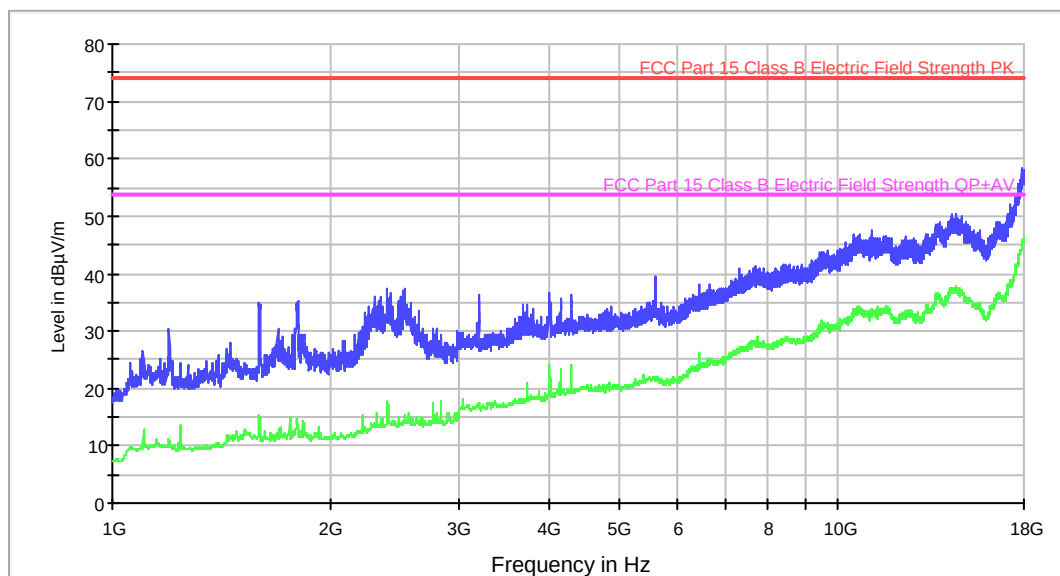
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
1202.000000	26.0	9.0
1400.000000	24.6	10.1
2300.000000	26.6	12.4
3070.000000	30.3	16.7
4226.000000	32.2	19.3
5631.000000	34.4	21.7
7500.000000	40.1	27.2
10057.000000	44.8	31.8
10782.000000	47.3	33.4
18000.000000	58.8	46.2

Radiated Emission. CR0202HR1_PV

Project: 52124REM.002
Company: POLAR ELECTRO OY
Sample: S/02
Operation mode: OM#02
Description: EUT ON. Bluetooth in IDLE mode. GPS OFF. Transferring data with the PC by USB. Power supply: 5Vdc via USB (Laptop). Vertical Polarization.

ER EMI FCC 15 Class B (1-18GHz)



— Peak Scan
— FCC Part 15 Class B Electric Field Strength PK
— Average Scan
— FCC Part 15 Class B Electric Field Strength QP+AV

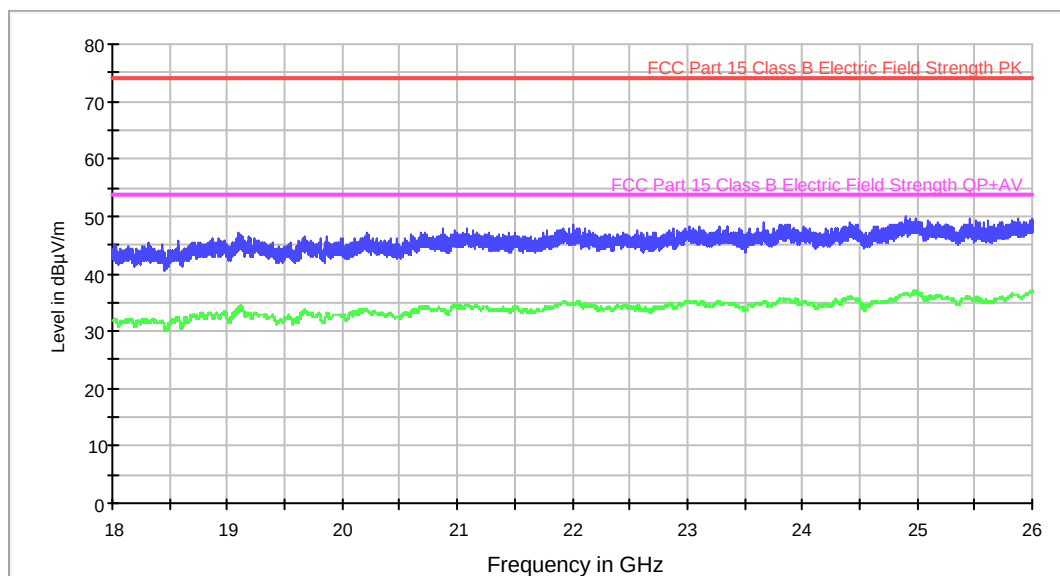
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
1198.000000	30.4	11.0
1593.000000	35.0	14.8
2336.000000	36.1	13.4
2524.000000	37.5	14.4
3999.000000	36.7	22.6
5597.000000	39.5	21.5
7318.000000	40.9	27.1
10065.000000	44.3	31.8
11074.000000	47.3	33.4
17921.000000	58.3	45.5

Radiated Emission. CR0202HR2_PH

Project: 52124REM.002
Company: POLAR ELECTRO OY
Sample: S/02
Operation mode: OM#02
Description: EUT ON. Bluetooth in IDLE mode. GPS OFF. Transferring data with the PC by USB. Power supply: 5Vdc via USB (Laptop). Horizontal Polarization.

ER EMI FCC 15 Class B(18-26GHz)



— Peak Scan
— FCC Part 15 Class B Electric Field Strength PK
— Average Scan
— FCC Part 15 Class B Electric Field Strength QP+AV

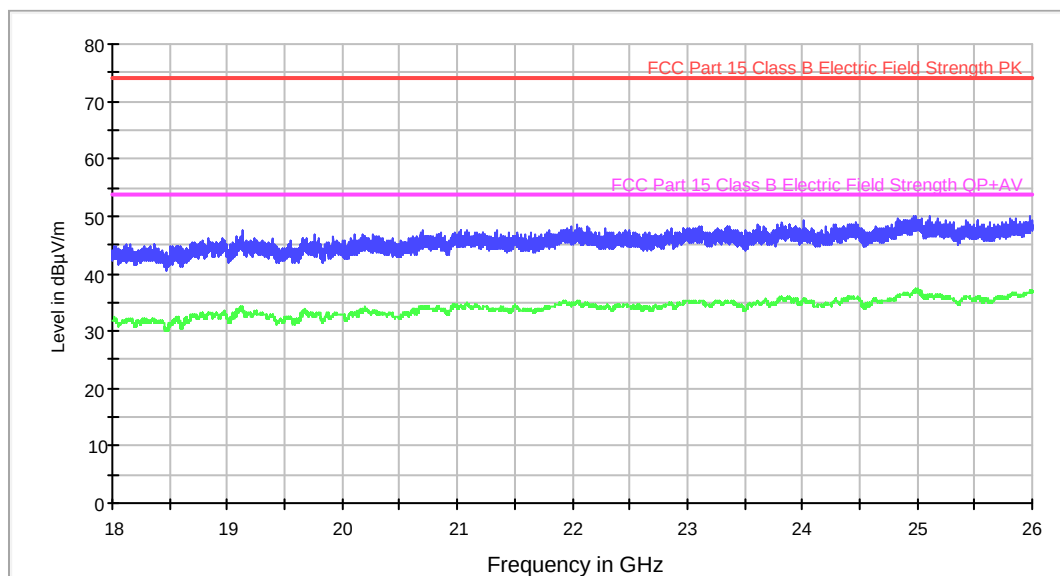
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
18579.200000	45.7	31.9
19105.600000	47.1	33.9
19872.800000	46.4	33.1
20220.400000	47.1	33.5
21083.200000	48.0	34.5
22006.000000	48.4	34.6
23273.600000	48.2	35.1
23666.400000	48.9	35.0
24906.400000	50.1	36.8
25876.800000	49.6	36.3

Radiated Emission. CR0202HR2_PV

Project: 52124REM.002
Company: POLAR ELECTRO OY
Sample: S/02
Operation mode: OM#02
Description: EUT ON. Bluetooth in IDLE mode. GPS OFF. Transferring data with the PC by USB. Power supply: 5Vdc via USB (Laptop). Vertical Polarization.

ER EMI FCC 15 Class B(18-26GHz)



— Peak Scan
— FCC Part 15 Class B Electric Field Strength PK
— Average Scan
— FCC Part 15 Class B Electric Field Strength QP+AV

Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBμV/m)	Average-ClearWrite (dBμV/m)
18127.600000	45.2	31.8
19126.000000	47.5	33.7
19761.200000	46.8	32.5
20704.800000	47.4	34.2
21032.800000	47.5	34.3
22046.400000	48.5	35.2
23104.400000	48.2	35.0
24020.800000	49.3	35.3
24994.400000	50.1	37.2
25118.000000	49.9	36.1

CONTINUOUS CONDUCTED EMISSION

LIMITS:	Product standard :	FCC CFR 47, Part 15, Subpart B (10-1-15 Edition), Secs. 15.107 and Subpart C (10-1-15 Edition) Secs. 15.207 & ICES-003 Issue 6 (2016)
	Test standard :	FCC CFR 47, Part 15, Subpart B (10-1-15 Edition), Secs. 15.107, 15 and Subpart C (10-1-15 Edition) Secs. 15.207 & ICES-003 Issue 6 (2016)

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 (10-01-15 Edition), Secs. 15.107 and Subpart C (10-1-15 Edition) Secs. 15.207 & ICES-003 Issue 6 (2016), 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

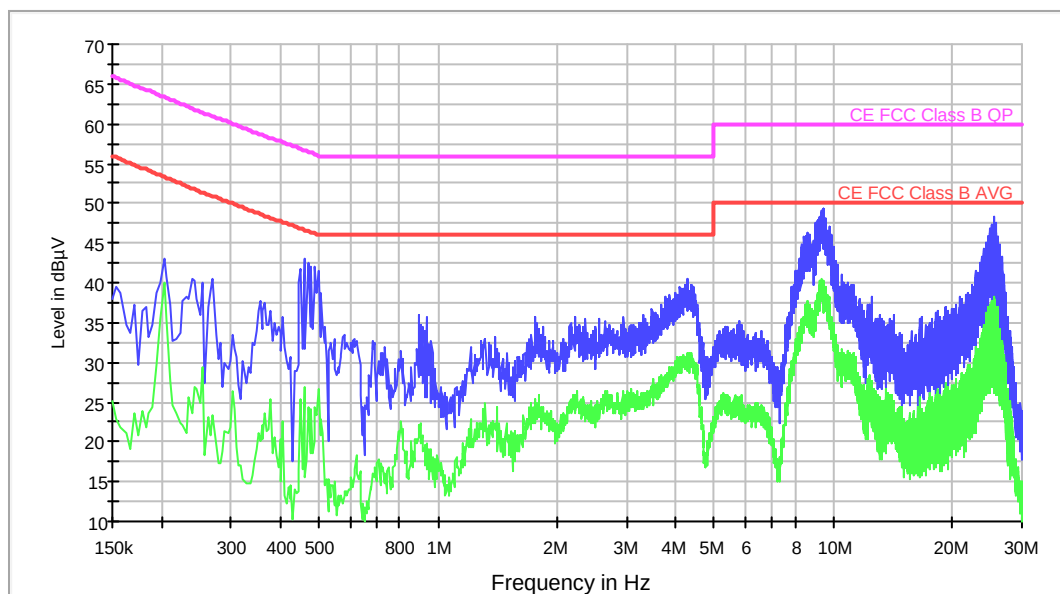
TESTED SAMPLES:	S/02
TESTED OPERATION MODES:	OM#02 & OM#03
TEST RESULTS:	CCmmnnhh: CC, Conducted Condition; mm: Sample number; nn: Operation mode; hh: wire

CCmmnnhh	Description	Result
CC02020N	Neutral wire noise.	P
CC0202L1	Phase wire noise.	P
CC02030N	Neutral wire noise.	P
CC0203L1	Phase wire noise.	P

Conducted Emission. CC02020N

Project: 52124REM.002
Company: POLAR ELECTRO OY
Sample: S/02
Operation mode: OM#02
Description: EUT ON. Bluetooth in IDLE mode. GPS OFF. Transferring data with the PC by USB. Power supply: 5Vdc via USB (Laptop). Neutral wire noise.

EC FCC Class B ESPI CC



— Peak Scan — Average Scan — CE FCC Class B AVG — CE FCC Class B QP

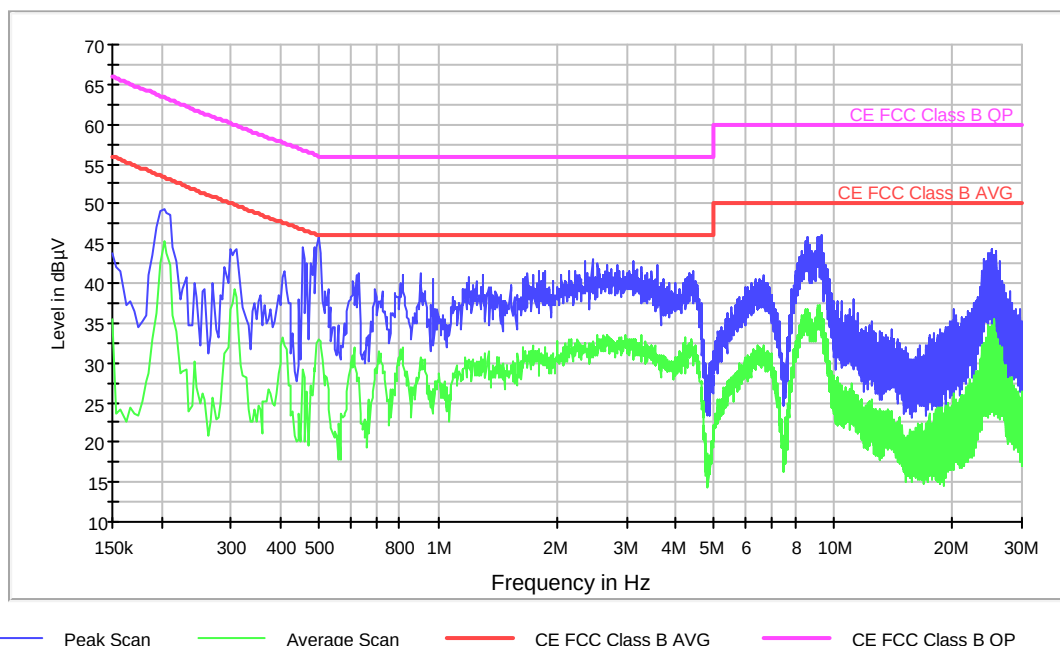
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBμV)	Average-ClearWrite (dBμV)
0.202000	43.0	40.0
0.270000	40.4	23.4
0.458000	42.9	26.9
0.894000	35.9	22.1
1.758000	35.8	25.5
3.482000	36.6	27.0
4.270000	40.6	30.9
9.418000	49.3	40.3
10.438000	40.9	30.9
25.338000	48.2	35.3

Conducted Emission. CC0202L1

Project: 52124REM.002
Company: POLAR ELECTRO OY
Sample: S/02
Operation mode: OM#02
Description: EUT ON. Bluetooth in IDLE mode. GPS OFF. Transferring data with the PC by USB. Power supply: 5Vdc via USB (Laptop). Phase wire noise.

EC FCC Class B ESPI CC



— Peak Scan — Average Scan — CE FCC Class B AVG — CE FCC Class B QP

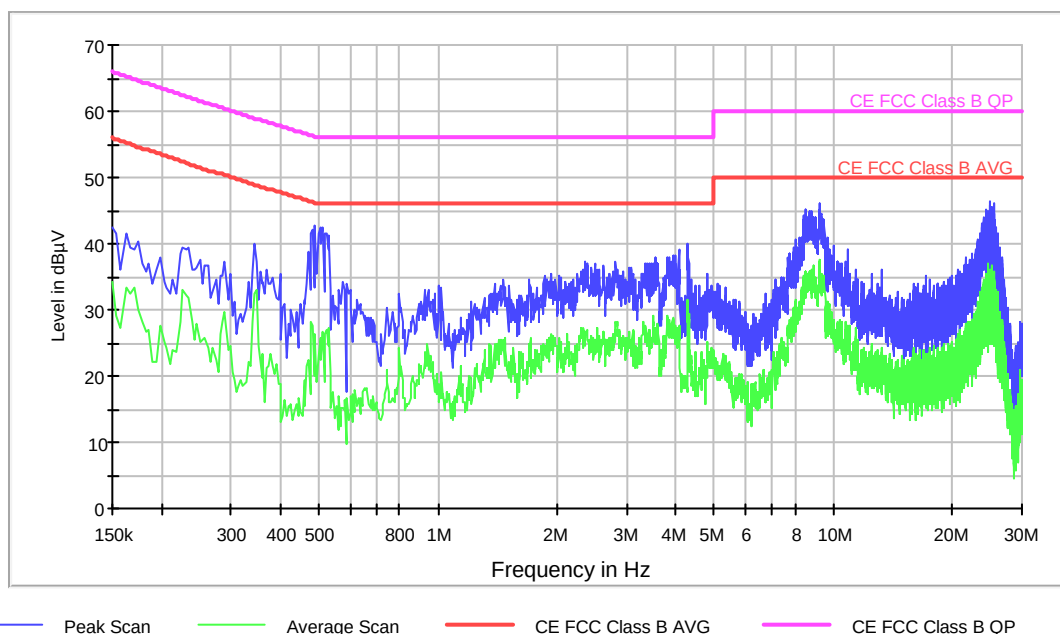
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.202000	49.4	45.4
0.298000	44.4	36.7
0.498000	45.9	33.0
0.902000	41.3	30.6
1.862000	41.6	32.0
2.458000	42.9	31.1
4.426000	41.5	31.0
9.298000	45.9	35.1
11.202000	38.0	26.4
25.250000	44.4	33.1

Conducted Emission. CC02030N

Project: 52124REM.002
Company: POLAR ELECTRO OY
Sample: S/02
Operation mode: OM#03
Description: EUT ON. Bluetooth in Tx mode. GPS ON. Transferring data with the PC by USB. Power supply: 5Vdc via USB (Laptop). Neutral wire noise.

EC FCC Class B ESPI CC



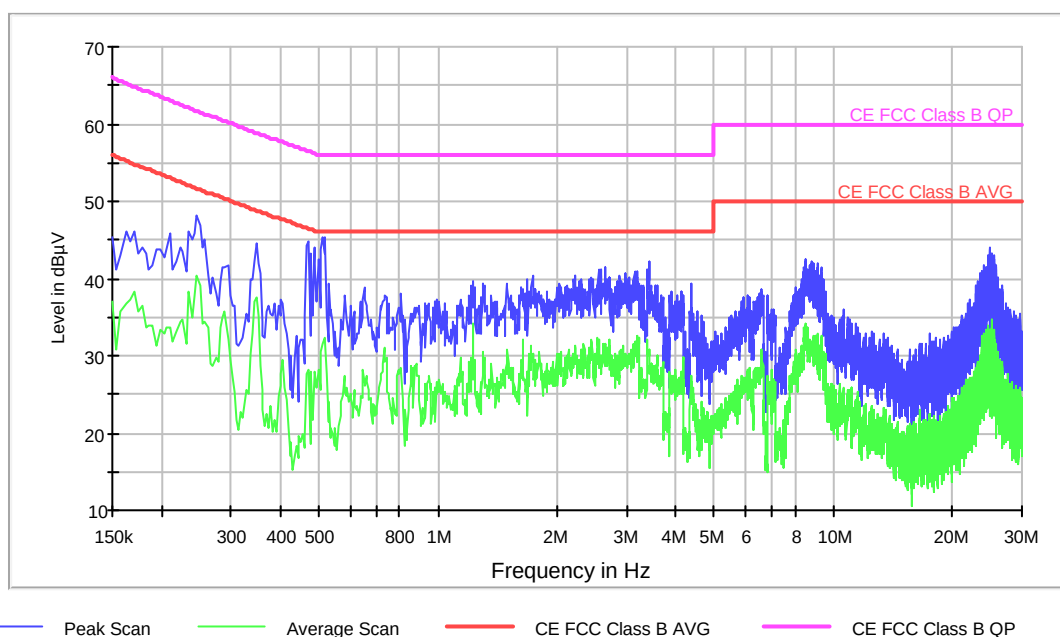
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.150000	42.3	34.3
0.342000	39.9	32.4
0.490000	42.8	26.4
1.006000	33.7	18.4
1.930000	35.6	24.1
3.554000	38.0	27.1
4.270000	40.0	31.4
9.206000	46.0	35.2
10.858000	39.0	26.3
24.770000	46.3	35.8

Conducted Emission. CC0203L1

Project: 52124REM.002
Company: POLAR ELECTRO OY
Sample: S/02
Operation mode: OM#03
Description: EUT ON. Bluetooth in Tx mode. GPS ON. Transferring data with the PC by USB. Power supply: 5Vdc via USB (Laptop). Phase wire noise.

EC FCC Class B ESPI CC



Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.246000	48.2	40.4
0.258000	45.2	34.4
0.510000	45.4	31.6
1.226000	39.5	34.3
1.730000	40.4	29.1
3.410000	42.2	30.9
4.358000	39.4	26.5
8.534000	42.6	33.0
10.574000	36.0	24.6
24.746000	43.9	31.4