



**AT4 wireless, S.A.**  
 Parque Tecnológico de Andalucía,  
 c/ Severo Ochoa nº 2  
 29590 Campanillas/ Málaga/ España  
 Tel. 952 61 91 00 - Fax 952 61 91 13  
 MÁLAGA, C.I.F. A29 507 456  
 Registro Mercantil de Málaga, Tomo 1169,  
 Libro 82, Folio 133, Hoja MA3729

**TEST REPORT (Modification 1)**

**REFERENCE STANDARD:**

**FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B (10-01-12 Edition)**

**&**

**ANSI C63.4:2009**

**FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B:**

**Radio frequency devices Subpart B. Unintentional radiators**

**&**

**American National Standard for Methods of Measurements of Radio-Noise Emissions from  
 Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.**

NIE..... :	39402REM.004A1
Approved by (name / position & signature) .....	Rafael López EMC LAB Manager
Elaboration date .....	2013-08-08
<b>Identification of item tested</b> .....	Polar LOOP
Trademark .....	Polar
Model and/or type reference .....	0C
Other identification of the product .....	S/N : Prototype HW Version: 4.0 SW Version: 0.15.4 FCC ID: IWN0C IC: 6248A-0C
Features .....	Bluetooth Low Energy V.4.0 HR profile.
Description .....	Activity monitor samples with normal SW controlled with R&D PC application to enable RF and EMC testing.
<b>Applicant</b> .....	POLAR ELECTRO OY.
Address.....	Professorintie 5, 90440 Kempele, FINLAND
CIF/NIF/Passport.....	VAT FI02099112
Contact person.....	Antti Häggman
Telephone / Fax.....	+358 8 5202100 / +358 8 5202220
e-mail.....	antti.haggman@polar.com

<b>Test samples supplier</b> .....	POLAR ELECTRO OY.
Address .....	Professorintie 5, 90440 Kempele, FINLAND
CIF/NIF/Passport.....	VAT FI02099112
Contact person.....	Antti Häggman
Telephone / Fax .....	+358 8 5202100 / +358 8 5202220
e-mail.....	antti.haggman@polar.com
<b>Manufacturer</b> .....	POLAR ELECTRO OY.
Address .....	Professorintie 5, 90440 Kempele, FINLAND
CIF/NIF/Passport.....	VAT FI02099112
Contact person.....	Antti Häggman
Telephone / Fax .....	+358 8 5202100 / +358 8 5202220
e-mail.....	antti.haggman@polar.com
<b>Test method requested</b> .....	
Standard.....	FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B (10-01-12 Edition) & ANSI C63.4:2009.
Test procedure.....	PEEM103
Report template No.....	FDT11_14
IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of AT4 wireless S.A.	

## INDEX

Competences and guarantees .....	4
General conditions .....	4
Usage of samples.....	5
Testing period .....	5
Environmental conditions .....	6
Summary .....	7
Remarks and comments .....	7
Testing veredicts .....	7
List of equipment used during the test.....	7
APPENDIX A .....	8
APPENDIX B: Photographs .....	19

### **Competences and guarantees**

This certificate of conformity was issued in accordance with the decision N° 3/2000 of the Joint Committee established under the Agreement on Mutual Recognition between the European Community and the United States of America. By this decision, AT4 wireless can act as Conformity Assessment Body (CAB) on Electromagnetic Compatibility. This Certificate applies to the samples listed at technical reports.

This laboratory is designed by the Federal Communications Commission (ES0004)

AT4 wireless is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance programme for its measurement equipment.

AT4 wireless 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 AT4 wireless at the time of performance of the test.

AT4 wireless 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.

### **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 AT4 wireless.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of AT4 wireless and the Accreditation Bodies.

### **Uncertainty**

Uncertainty (factor  $k=2$ ) was calculated according to the following AT4 wireless's internal documents:

1. PODT000: Procedure for the measure uncertainty calculation.

### Usage of samples

Samples under test have been selected by: The client.

Sample S/01 is composed of the following element:

<u>Control N°</u>	<u>Description</u>	<u>Model</u>	<u>Serial N°</u>	<u>Date of reception</u>
39402/42	Polar LOOP	0C	F3260C0800206	2013-07-16

Auxiliary elements used with the sample S/01:

<u>Control N°</u>	<u>Description</u>	<u>Model</u>	<u>Serial N°</u>	<u>Date of reception</u>
39402/47	USB cable	---	---	2013-07-16
CTC-1172-X	Lenovo Laptop PC	Thinkpad	25453RG	N/A
---	Lenovo AC/DC Adapter	---	---	N/A

### Testing period

The performed test started on 2013-07-17 and finished on the 2013-07-18.

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. = 20 % Max. = 80 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 k $\Omega$
Reference resistance to earth	< 0,5 $\Omega$

In the semianechoic chamber (21 meters x 11 meters x 8 meters), the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 30 °C
Relative humidity	Min. = 45 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 k $\Omega$
Reference resistance to earth	< 0,5 $\Omega$
Normal site attenuation (NSA)	< $\pm 4$ dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 1000 MHz).

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

Temperature	Min. = 15 °C Max. = 30 °C
Relative humidity	Min. = 45 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 k $\Omega$
Reference resistance to earth	< 0,5 $\Omega$

### Modifications to the reference test report

It was introduced the following modifications in respect to the test report number 39402REM.004 related with the same samples, in the next clauses and sub-clauses:

By TCB requirements it was added to the test report a reference to the ANSI C63.4:2009 Standard and it was modified the photograph appendix to add more details.

### Summary

Considering the results of the performed test according to standard **FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B (10-01-12 Edition) & ANSI C63.4:2009**, the items under test are **IN COMPLIANCE** with the requested specifications specified in the standard.

NOTE: The results presented in this Test Report apply only to the particular item under test established in page 1 of this document, as presented for test on the date(s) shown in section, "USAGE OF SAMPLES, TESTING PERIOD AND ENVIRONMENTAL CONDITIONS".

### Remarks and comments

The tests have been realized by the technical personnel: Antonio Jurado & Pedro Manuel Valenzuela Comino.

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1 GHz is  $I = \pm 4,57$  dB for quasi-peak measurements,  $I = \pm 4,48$  dB for peak measurements ( $k = 2$ ) and from 1 to 12,75 GHz is  $I = \pm 3,43$  dB for average and peak measurements.

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 12,75 GHz to 26 GHz is  $I = \pm 4,09$  dB for average and peak measurements.

### Testing verdicts

Not applicable .....: NA  
 Pass.....: P  
 Fail .....: F  
 Not measured.....: NM

### List of equipment used during the test

CONTROL NUMBER	DESCRIPTION	MANUFACTURE R	MODEL	LAST CALIBRATION	NEXT CALIBRATION
1999	EMI Receptor	ROHDE & SCHWARZ	ESIB 26	2011-11-03	2013-11-03
2942	EMI Receptor	ROHDE & SCHWARZ	ESU 40	2012-03-05	2014-03-05
245	Horn Antenna	HEWLETT PACKARD	11966E	2011-03-18	2014-03-18
246	Horn Antenna	HEWLETT PACKARD	11966E	2013-03-06	2015-03-06
1658	RF Amplifier	SCHAFFNER	CPA9231A	2013-06-15	2015-06-15
3541	Bilog Hybrid antenna	SUNOL SCIENCES CORPORATION	JB6	2012-06-01	2015-06-01
3556	Thermohygrograph	T&D	TR-72W	2012-11-30	2013-11-30
3822	Horn Antenna	ROHDE & SCHWARZ	HF907	2010-11-03	2013-11-03

# APPENDIX A

## Test Result

### APPENDIX A CONTENT:

DESCRIPTION OF THE OPERATION MODES.....	9
RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE. ....	10
CONTINUOUS CONDUCTED EMISSION ON POWER LEADS .....	16



## 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.

In the following table appears the operation modes used by the samples tested to that it refers the present test report.

<b>OPERATION MODE</b>	<b>DESCRIPTION</b>
OM#01	EUT ON. Bluetooth in Idle mode. Equipment charging batteries by means of an USB connection.

## RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE.

<b>LIMITS:</b>	Product standard:	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B (10-01-12 ED) & ANSI C63.4:2009
	Test standard:	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B (10-01-12 ED) & ANSI C63.4:2009

### 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 15.109, Subpart B (10-01-12 Edition) & ANSI C63.4:2009 in the frequency range 30 MHz to 25 GHz, for Class B equipment, which is a transmitter in a band over 500 MHz, was:

Frequency range (MHz)	Limit for 3 m ( $\mu\text{V/m}$ )	Limit for 3 m (dB $\mu\text{V/m}$ )
30 to 88	100	40
88 to 216	150	43,52
216 to 960	200	46,02
Above 960	500	53,98

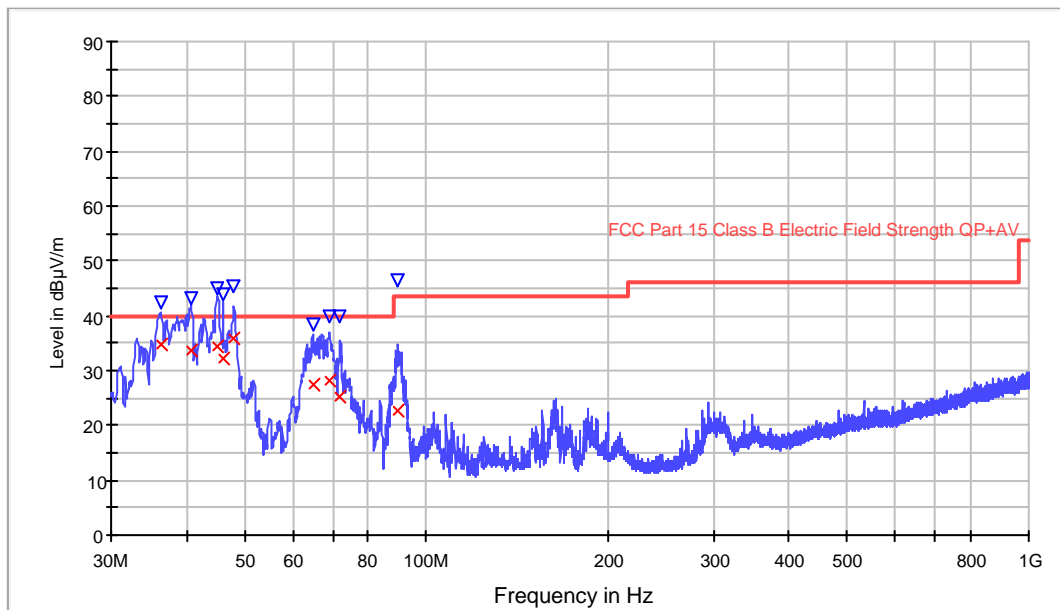
<b>TESTED SAMPLES:</b>	S/01
<b>TESTED OPERATION MODES:</b>	OM#01
<b>TEST RESULTS :</b>	<b>CRmmnn:</b> CR, Radiation Condition; mm: Sample number; nn: Operation mode, xx: Polarisation.

CRmmnn	Description	Result
CR0101	EUT ON. Idle Bluetooth. Range 30MHz-1 GHz.	P
CR0101_RA1_PH	EUT ON. Idle Bluetooth. Range 1-18 GHz. Horizontal Pol.	P
CR0101_RA1_PV	EUT ON. Idle Bluetooth. Range 1-18 GHz. Vertical Pol.	P
CR0101_RA2_PH	EUT ON. Idle Bluetooth. Range 18-26 GHz. Horizontal Pol.	P
CR0101_RA2_PV	EUT ON. Idle Bluetooth. Range 18-26 GHz. Vertical Pol.	P

**Radiated Emission: CR0101 (30MHz to 1GHz)**

Project: 39402REM.004  
 Company: POLAR  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. Bluetooth in Idle mode. Equipment charging batteries by means of an USB connection.

**ER EMI FCC15 ESIB Bilog Hybrid AMP1658**



— QP Limit    — MaxPeak Preview    ▽ MaxPeak    × QuasiPeak

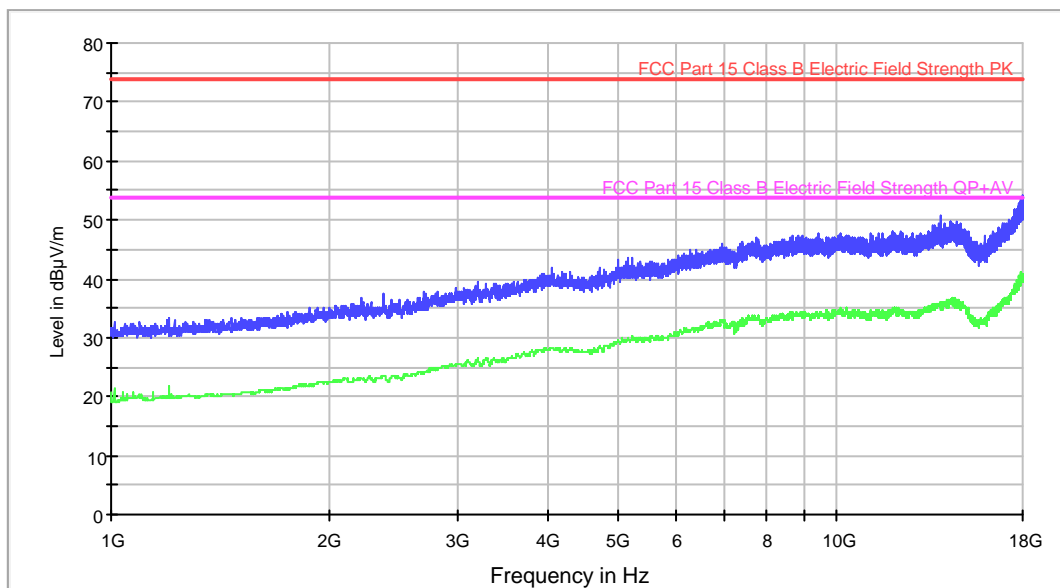
**Maximizations**

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)
36.200000	42.5	34.6	150.0	V	358.0
40.700000	43.3	33.7	120.0	V	-3.0
45.000000	45.1	34.5	210.0	V	23.0
46.100000	44.0	32.4	160.0	V	342.0
47.900000	45.3	36.0	180.0	V	298.0
64.800000	38.5	27.3	220.0	V	-3.0
69.200000	39.9	28.0	155.0	V	325.0
72.000000	40.1	25.4	170.0	V	35.0
90.000000	46.4	22.8	130.0	V	-3.0

**Radiated Emission: CR0101\_RA1\_PH (1 – 18 GHz)**

Project: 39402REM.004  
 Company: POLAR  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. Bluetooth in Idle mode. Equipment charging batteries by means of an USB connection. Horizontal polarization.

**FCC 1-18GHz class B ESIB Horn0245 AMP3783**



— MaxPeak-ClearWrite-PK+      — Average-ClearWrite-AVG  
— FCC Part 15 Class B Electric Field Strength PK      — FCC Part 15 Class B Electric Field Strength QP+AV

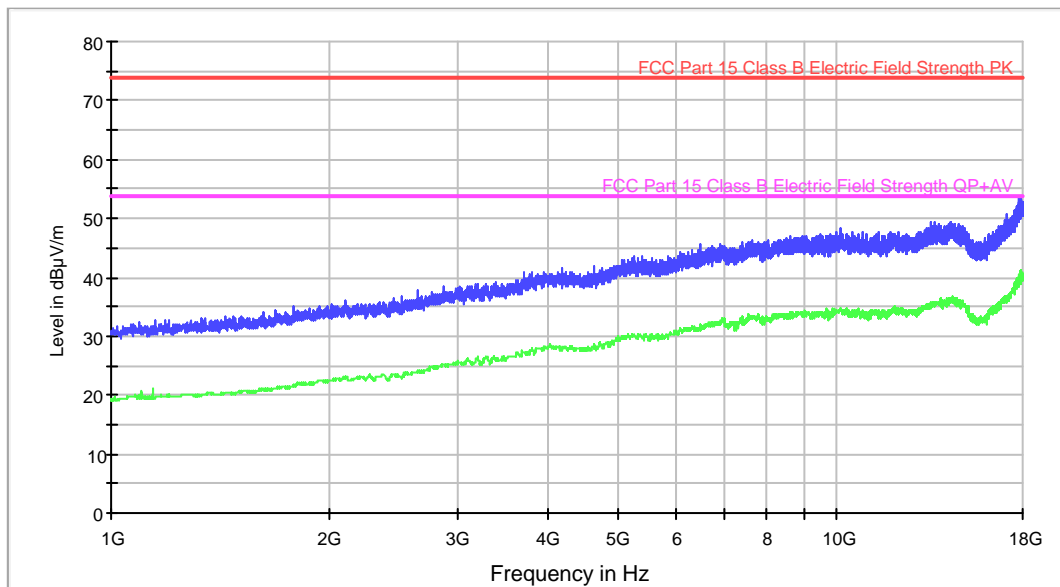
**Max PK-AVG**

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
1200.000000	33.3	21.8
1745.000000	34.4	21.4
2369.000000	37.5	23.4
3168.000000	38.7	25.6
4050.000000	41.8	28.1
5155.000000	43.4	29.9
7391.000000	46.1	33.0
10095.000000	47.8	34.7
12202.000000	48.0	34.3
17958.000000	54.0	40.2

**Radiated Emission: CR0101\_RA1\_PV (1 – 18 GHz)**

Project: 39402REM.004  
 Company: POLAR  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. Bluetooth in Idle mode. Equipment charging batteries by means of an USB connection. Vertical polarization.

**FCC 1-18GHz class B ESIB Horn0245 AMP3783**



— MaxPeak-ClearWrite-PK+      — Average-ClearWrite-AVG  
— FCC Part 15 Class B Electric Field Strength PK      — FCC Part 15 Class B Electric Field Strength QP+AV

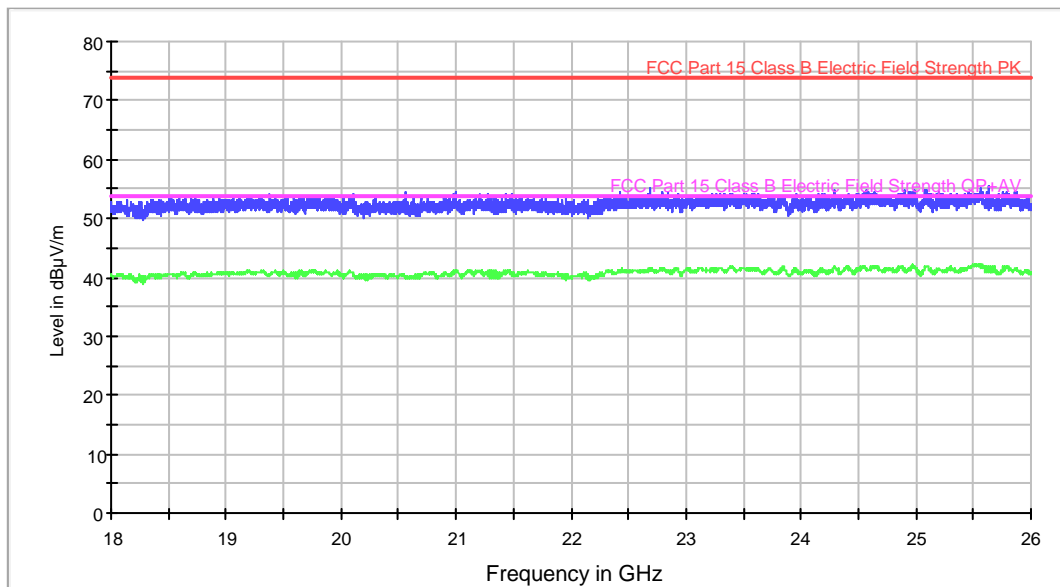
**Max PK-AVG**

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
1335.000000	32.9	19.9
1778.000000	35.2	21.4
2098.000000	36.1	22.9
3125.000000	38.6	25.5
4176.000000	41.5	28.0
5252.000000	43.5	29.9
7382.000000	45.9	33.2
9941.000000	47.5	34.3
13451.000000	49.3	35.6
17942.000000	53.5	41.0

**Radiated Emission: CR0101\_RA2\_PH (18 – 26 GHz)**

Project: 39402REM.004  
 Company: POLAR  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. Bluetooth in Idle mode. Equipment charging batteries by means of an USB connection. Horizontal polarization.

**FCC 18-26GHz class B ESIB Horn1920 AMP1975**



— MaxPeak-ClearWrite-PK+      — Average-ClearWrite-AVG  
— FCC Part 15 Class B Electric Field Strength PK      — FCC Part 15 Class B Electric Field Strength QP+AV

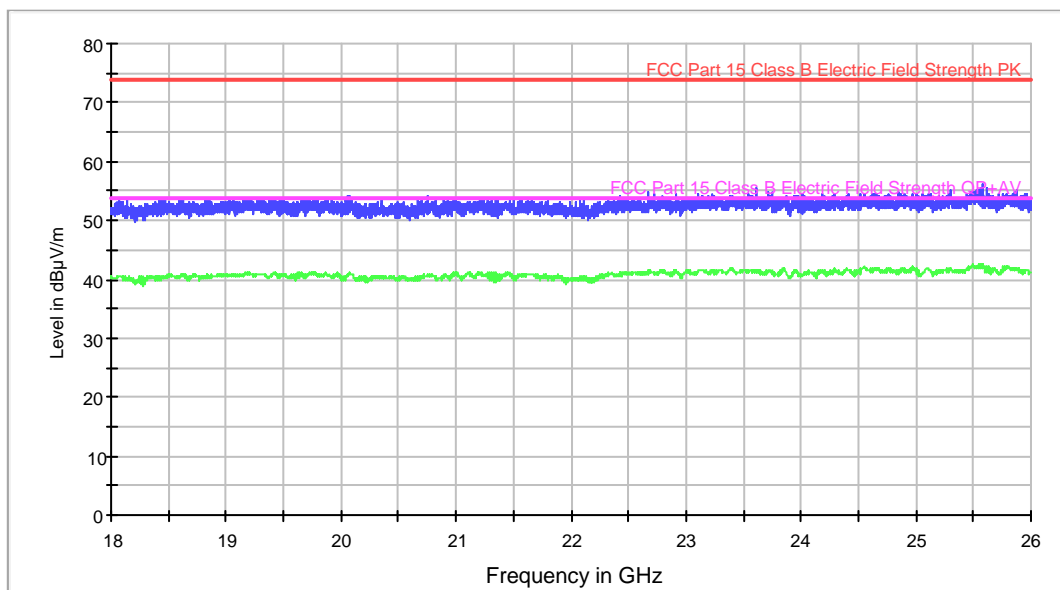
**Max PK-AVG**

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
18598.000000	53.8	40.6
19312.000000	53.7	41.0
19385.000000	54.3	40.4
20561.000000	54.4	40.2
20992.000000	54.4	41.0
22433.000000	54.3	41.2
22693.000000	55.3	41.4
23293.000000	54.2	41.4
24572.000000	54.7	41.3
25633.000000	55.6	41.8

**Radiated Emission: CR0101\_RA2\_PV (18 – 26 GHz)**

Project: 39402REM.004  
 Company: POLAR  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. Bluetooth in Idle mode. Equipment charging batteries by means of an USB connection. Vertical polarization.

**FCC 18-26GHz class B ESIB Horn1920 AMP1975**



— MaxPeak-ClearWrite-PK+      — Average-ClearWrite-AVG  
— FCC Part 15 Class B Electric Field Strength PK      — FCC Part 15 Class B Electric Field Strength QP+AV

**Max PK-AVG**

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
18077.000000	53.8	40.6
19294.000000	53.9	40.9
20063.000000	54.1	40.9
20756.000000	54.1	40.6
21568.000000	53.9	40.8
22420.000000	54.0	41.0
22678.000000	54.6	41.3
23610.000000	55.4	41.5
24857.000000	54.6	41.6
25574.000000	56.1	42.5

**CONTINUOUS CONDUCTED EMISSION ON POWER LEADS**

<b>LIMITS:</b>	Product standard :	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B (10-01-12 ED) & ANSI C63.4:2009
	Test standard :	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B (10-01-12 ED) & ANSI C63.4:2009

**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 (10-01-12 Edition) & ANSI C63.4:2009 in the frequency range 0,15 to 30 MHz, for Class B equipment was:

Frequency range (MHz)	Limit (dB $\mu$ V)	
	Quasi-peak	Average
0,15 to 0,5	66-56	56-46
0,5 to 5	56	46
5 to 30	60	50

<b>TESTED SAMPLES:</b>	S/01
<b>TESTED OPERATION MODES:</b>	OM#01
<b>TEST RESULTS :</b>	CCmmnnhh: CC, Conducted Condition; mm: Sample number; nn: Operation mode; hh: wire

CCmmnnhh	Description	Result
CC01010N	Neutral wire noise	P
CC0101L1	Phase wire noise	P

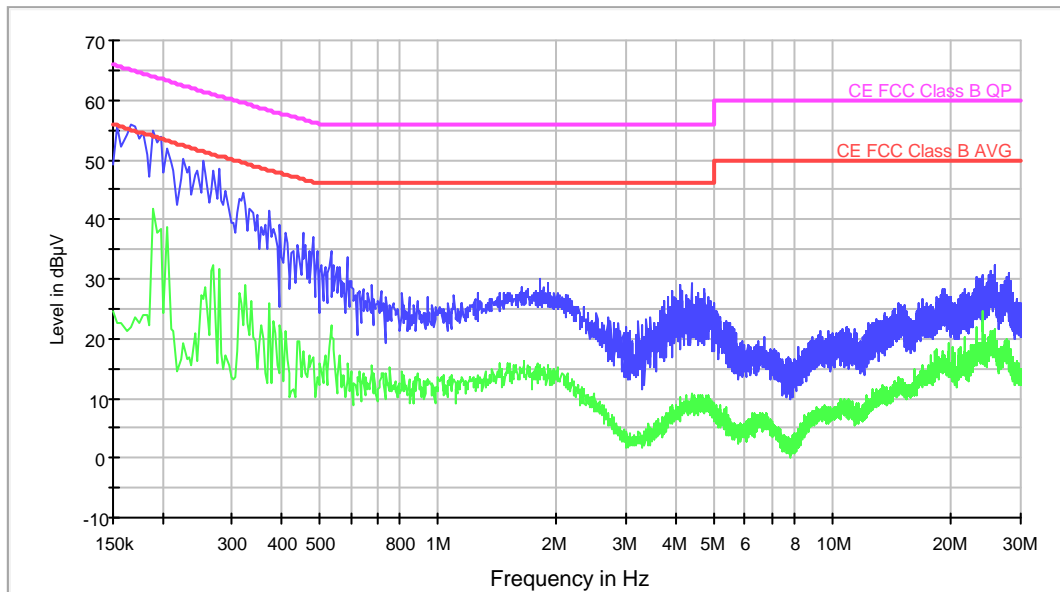


Continuous Conducted emission : CC01010N

Detector : Peak / Average / Cuasi-peak

Project: 39402REM.004  
 Company: POLAR  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. Bluetooth in Idle mode. Equipment charging batteries by means of an USB connection. Neutral wire noise.

### EC FCC Class B ESPI CC



— MaxPeak — Average — CE FCC Class B AVG — CE FCC Class B QP

### Max Peak

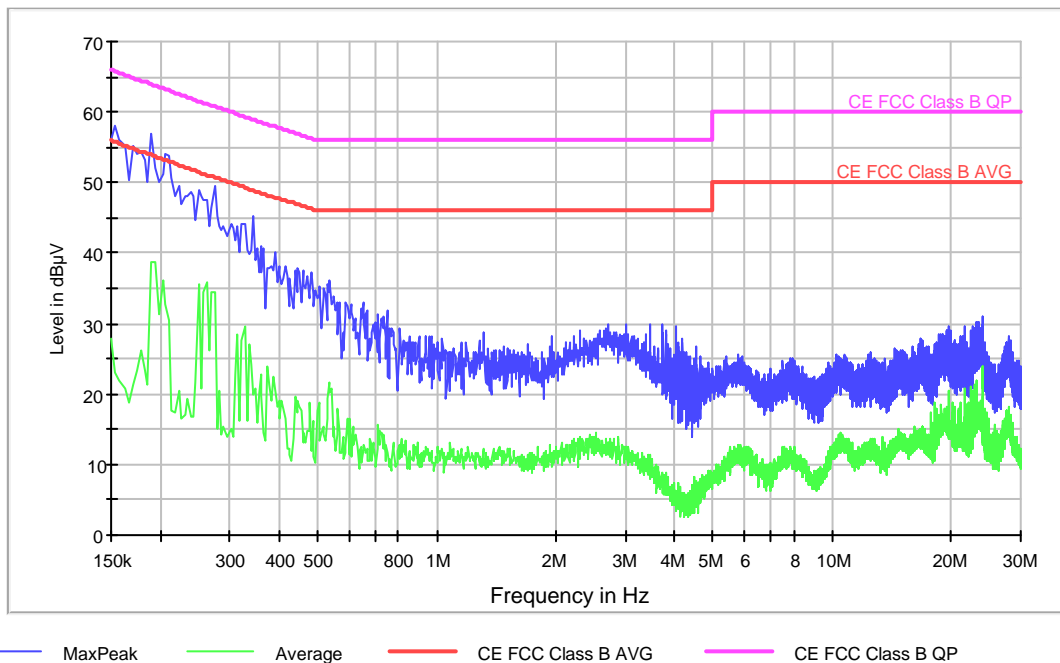
Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.166000	55.8	21.8
4.382000	29.4	10.8
8.890000	20.3	6.8
10.798000	22.0	9.5
14.718000	26.0	11.9
16.902000	26.7	15.4
19.254000	28.3	16.4
24.002000	30.8	24.6
25.694000	32.2	21.6
27.946000	30.9	19.2

Continuous Conducted emission : CC0101L1

Detector : Peak / Average / Cuasi-peak

Project: 39402REM.004  
 Company: POLAR  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. Bluetooth in Idle mode. Equipment charging batteries by means of an USB connection. Phase wire noise.

### EC FCC Class B ESPI CC



### Max Peak

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.154000	58.2	23.1
3.450000	29.9	11.3
7.822000	25.1	10.5
10.234000	25.5	12.5
14.326000	26.4	13.1
16.742000	27.9	15.1
19.714000	29.6	18.0
23.990000	31.0	23.9
24.046000	27.9	19.7
27.914000	28.1	17.2

## **APPENDIX B: Photographs**

