



Informe de ensayo nº:
 Test report No:

NIE: 42238REM.002

Test Report

FCC (USA): Radio frequency devices Subpart B. Unintentional radiators
 IC (CANADA): Information Technology Equipment (ITE)

Identificación del objeto ensayado.....: Identification of item tested	POLAR M400
Marca Trade	POLAR
Modelo y/o referencia tipo Model and /or type reference	0Y
Other identification of the product	N/S: See usage of samples
Final HW version	2.8
Final SW version	0.1.246
Características Features	GPS, BLE, accelerometer
Peticionario Applicant	Polar Electro OY Professorintie 5 90440 Kempele Finland VAT: FI02099112 Antti Häggman +358-8-5202100/ antti.haggman@polar.com
Método de ensayo solicitado, norma.....: Test method requested, standard	FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B (10-01-12 Edition) & ICES – 003 ISSUE 5 (2012)
Resultado.....: Summary	IN COMPLIANCE
Aprobado por (nombre / cargo y firma) Approved by (name / position & signature)	Rafael López Martín LAB EMC Manager
Fecha de realización Date of issue	2014-08-13
Formato de informe No.....: Report template No	FDT08_15

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Competences and guarantees

AT4 wireless 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, AT4 wireless has a calibration and maintenance program 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.

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 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 AT4 wireless internal document PODT000.

Usage of samples

Samples undergoing test have been selected by: the Client

Sample **S/01** is composed of the following elements:

Control N°	Description	Manufacturer	Model	Serial number	Reception date
232	Pulsometer	POLAR	OY	F4270Y0500113 - B2.8 UBX	2014-08-13
238	USB Cable	--	--	--	2014-08-13

Sample **S/02** is composed of the following elements:

Control N°	Description	Manufacturer	Model	Serial number	Reception date
232	Pulsometer	POLAR	OY	F4270Y0500113 - B2.8 UBX	2014-08-13
238	USB Cable	--	--	--	2014-08-13

Sample **S/02** is composed of the following auxiliary elements:

Control N°	Description	Manufacturer	Model	Serial number	Reception date
36156B/18	Pulse Simulator	POLAR	--	--	2012-10-29
39402/136	Polar device	POLAR	0M	34798B1	2014-05-08

Test sample description

The sample consist of an Polar GPS sports watch with Bluetooth Low Energy

Test samples supplier

Polar Electro OY
Professorintie 5
90440. Kempele. . Finland
VAT: FI02099112
Antti Häggman
+358-8-5202100/
antti.haggman@polar.com

Testing period

The performed test started on 2014/08/01 and finished on 2014/08/06.
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 kΩ
Reference resistance to earth	< 0,5 Ω

In the semianechoic chamber, 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 kΩ
Reference resistance to earth	< 0,5 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m & 3m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Site VSWR	< ±6 dB at 3m distance between item under test and receiver antenna, (1 GHz to 18 GHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 18 GHz).

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 kΩ
Reference resistance to earth	< 0,5 Ω

Remarks and comments

The tests have been realized by the technical personnel:: Pedro Manuel Valenzuela, Alberto Parada, Domingo Gálvez.

The total uncertainty of the measurement system for the measured conducted disturbance characteristics of EUT from 150 kHz to 30 MHz is $I = \pm 3,60$ dB for quasi-peak measurements, $I = \pm 3,48$ dB for peak measurements ($k = 2$).

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	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
4523	EMI Receptor	ROHDE & SCHWARZ	ESU 26	2013-08-27	2015-08-27
4612	Horn Antenna	SCHWARZBECK	BBHA 9120 D	2013-12-29	2016-12-29
4658	RF Amplifier	SCHWARZBECK	BBV9743	2014-02-17	2015-02-17
4659	RF Amplifier	SCHWARZBECK	BBV 9718	2014-02-26	2015-02-26
1920	Horn Antenna	AGILENT TECHNOLOGIES	11966J	2011-09-27	2014-09-27
3541	Bilog Hybrid antenna	SUNOL SCIENCES CORPORATION	JB6	2012-04-20	2015-04-20
4576	Temperature and humidity probe	T&D	THA-3151	N/A	N/A
4575	Temp/humidity Data Logger	T&D	TR-702W	2014-01-28	2015-01-28

Appendix A – Test result

CONTENT

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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.

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

OPERATION MODE	DESCRIPTION
MO#01	EUT ON. BT IDLE Mode. GPS IDLE Mode. Charging Batteries. Powered by USB.
MO#02	EUT ON. Equipment with the Bluetooth linked to a OM device and realizing a Fitness test. Rx GPS Mode. Equipment charging batteries by means of a 5Vdc USB connection.

CONTINUOUS CONDUCTED EMISSION ON POWER LEADS

LIMITS :	Product standard :	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B (10-01-12 Edition); ICES-003 ISSUE 5 & ANSI C63.10-2009
	Test standard :	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B (10-01-12 Edition); ICES-003 ISSUE 5 & ANSI C63.10-2009

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); ICES-003 ISSUE 5 & ANSI C63.10-2009, in the frequency range 0,15 to 30 MHz, for Class B equipment was:

Frequency range (MHz)	Limit (dBµV)	
	Quasi-peak	Average
0,15 to 0,5	66-56	56-46
0,5 to 5	56	46
5 to 30	60	50

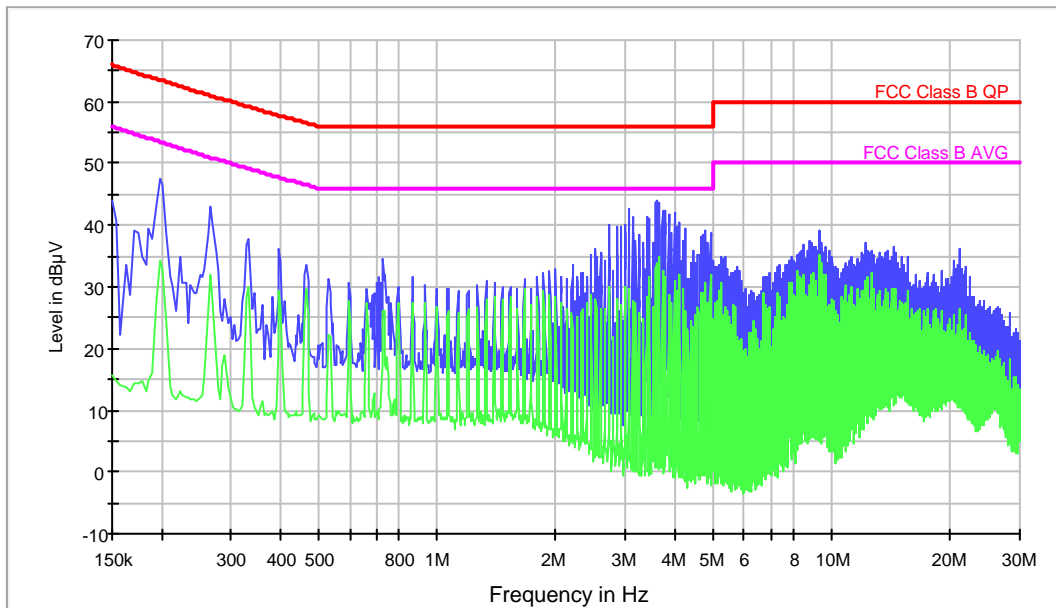
TESTED SAMPLES:	S/01 & S/02
TESTED OPERATION MODES:	OM#01 & OM#02
TEST RESULTS :	CCmmnnhh: CC, Conducted Condition; mm: Sample number; nn: Operation mode; hh: wire

CCmmnnhh	Description	Result
CC0101N	Pass	P
CC0101L1	Pass	P
CC0202N	Pass	P
CC0202L1	Pass	P

Continuous Conducted Emission: CC0101L1

Project: 42238rem002
 Company: POLAR
 Sample: S/01
 Operation mode: OM#01
 Description: EUT ON. BT IDLE Mode. GPS IDLE Mode. Charging Batteries. Powered by USB.
 Phase wire noise

EC FCC Class B ESPI CC



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

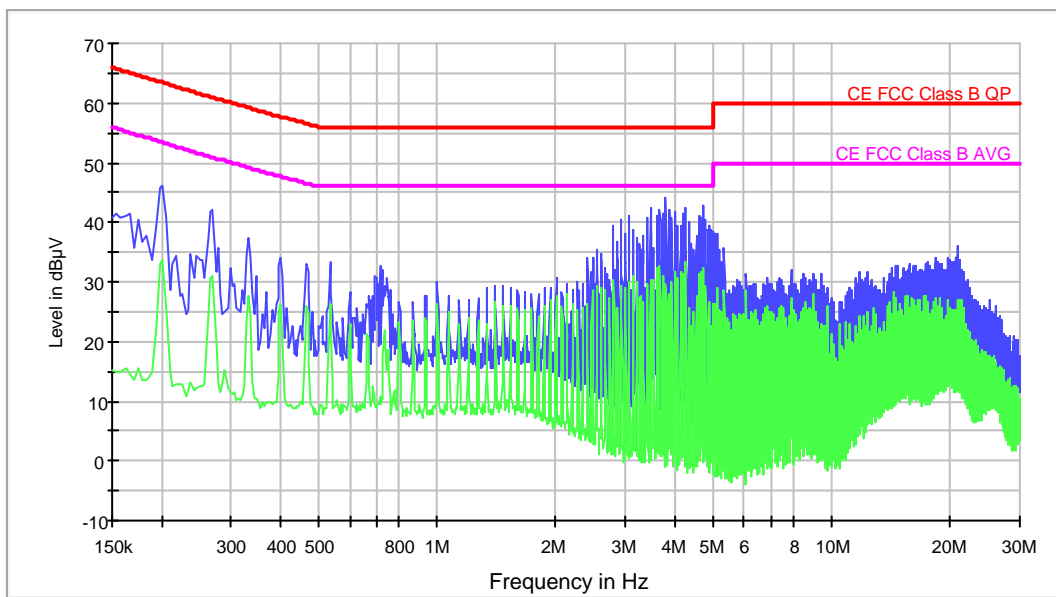
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.198000	47.7	34.2
0.266000	43.1	32.1
0.730000	34.5	26.0
0.738000	32.1	17.4
1.998000	32.9	26.3
3.594000	43.9	33.9
3.658000	43.5	34.8
9.318000	39.0	35.2
12.250000	37.1	30.3
21.238000	36.2	26.4

Continuous Conducted Emission: CC0101N

Project: 42238rem002
 Company: POLAR
 Sample: S/01
 Operation mode: OM#01
 Description: EUT ON. BT IDLE Mode. GPS IDLE Mode. Charging Batteries.
 Powered by USB. Neutral wire noise

EC FCC Class B ESPI CC



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

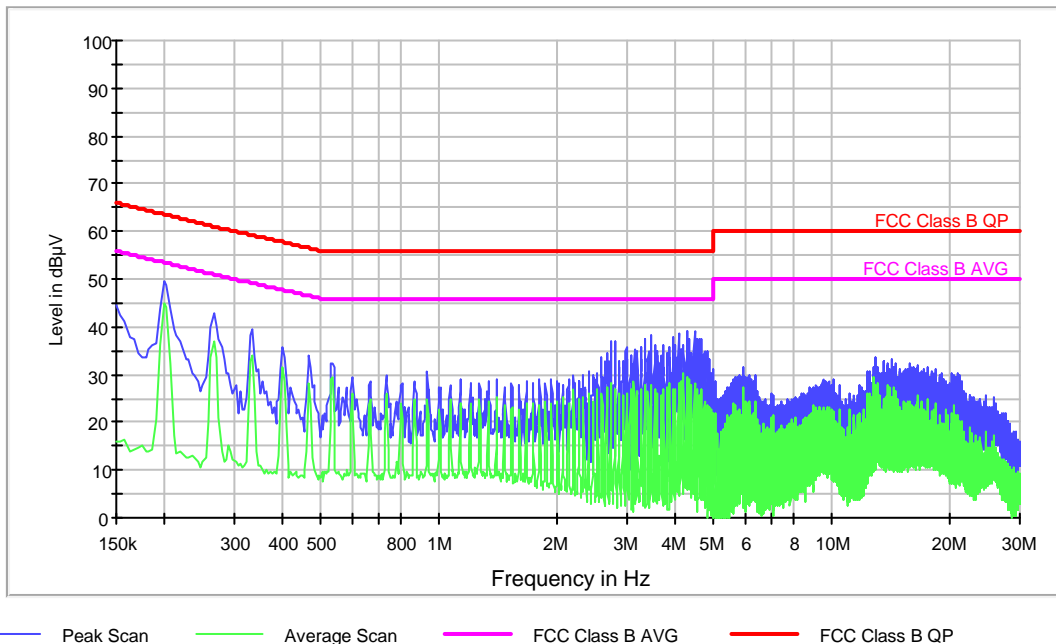
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.202000	46.3	33.8
0.270000	41.9	30.9
0.534000	33.3	26.4
0.746000	30.6	18.6
2.006000	30.5	25.7
3.470000	42.5	30.3
3.806000	44.1	29.5
7.882000	32.2	27.4
17.494000	33.4	26.6
20.906000	36.1	27.0

Continuous Conducted Emission: CC0202L1

Project: 42238rem002
 Company: POLAR
 Sample: S/02
 Operation mode: OM#02
 Description: EUT ON. Equipment with the Bluetooth linked to a OM device and realizing a Fitness test. Rx GPS Mode. Equipment charging batteries by means of a 5Vdc USB connection. Phase wire noise

EC FCC Class B ESPI CC



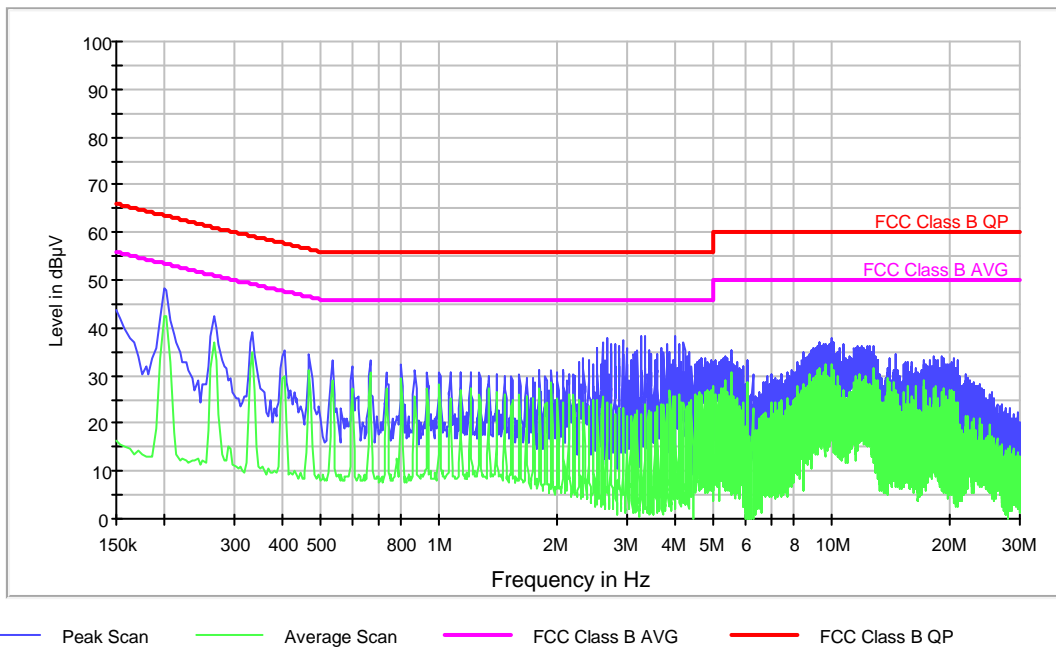
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.198000	49.7	45.1
0.266000	43.0	37.0
0.466000	33.9	28.1
0.930000	30.5	25.0
1.394000	29.2	25.1
3.458000	38.0	26.8
4.450000	39.2	28.1
6.378000	29.8	24.4
12.894000	33.8	27.9
18.278000	31.0	23.0

Continuous Conducted Emission: CC0102N

Project: 42238rem002
 Company: POLAR
 Sample: S/02
 Operation mode: OM#02
 Description: EUT ON. Equipment with the Bluetooth linked to a OM device and realizing a Fitness test. Rx GPS Mode. Equipment charging batteries by means of a 5Vdc USB connection. Neutral wire noise

EC FCC Class B ESPI CC



Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.198000	48.2	42.6
0.266000	42.3	37.0
0.466000	34.5	31.2
0.798000	32.2	29.5
2.054000	31.2	13.5
3.262000	38.3	21.6
3.990000	38.4	25.8
9.910000	37.9	32.2
10.646000	36.5	27.0
18.162000	34.2	25.8

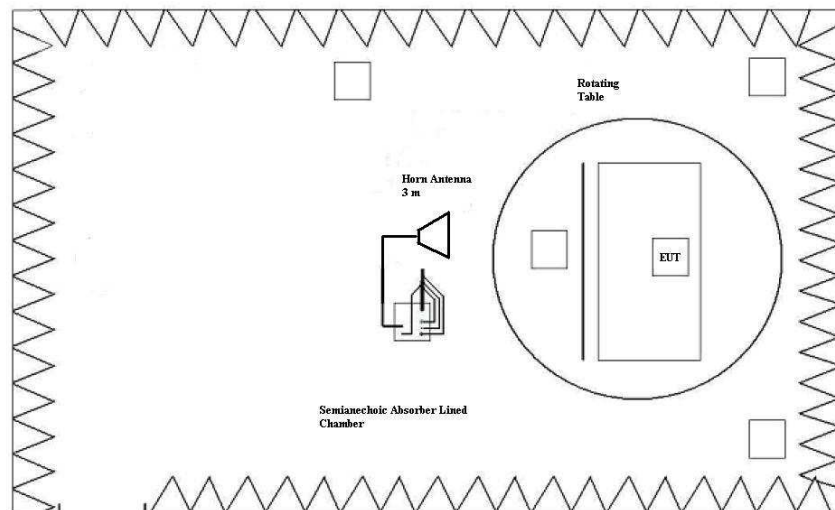
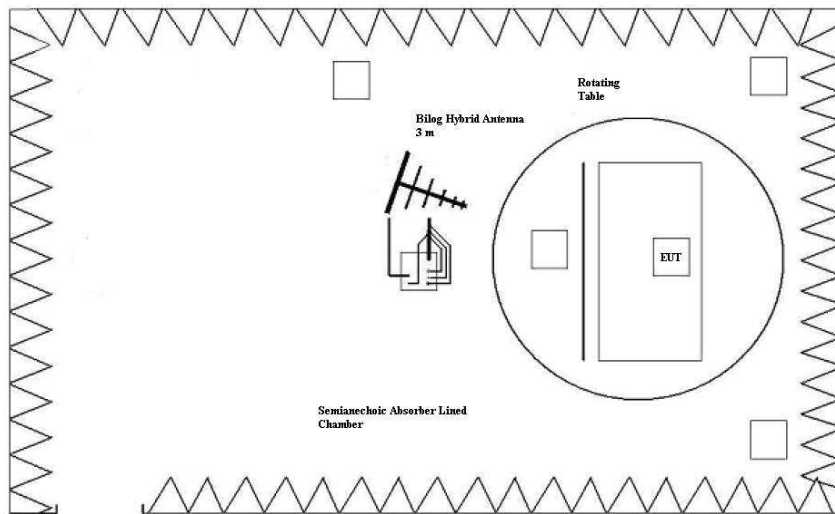
RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE.

LIMITS:	Product standard :	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B (10-01-12 Edition); ICES-003 ISSUE 5 & ANSI C63.10-2009
	Test standard :	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B (10-01-12 Edition); ICES-003 ISSUE 5 & ANSI C63.10-2009

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); ICES-003 ISSUE 5 & ANSI C63.10-2009 in the frequency range 30 MHz to 26 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 ($\text{dB}\mu\text{V/m}$)
30 to 88	100	40
88 to 216	150	43,52
216 to 960	200	46,02
Above 960	500	53,98



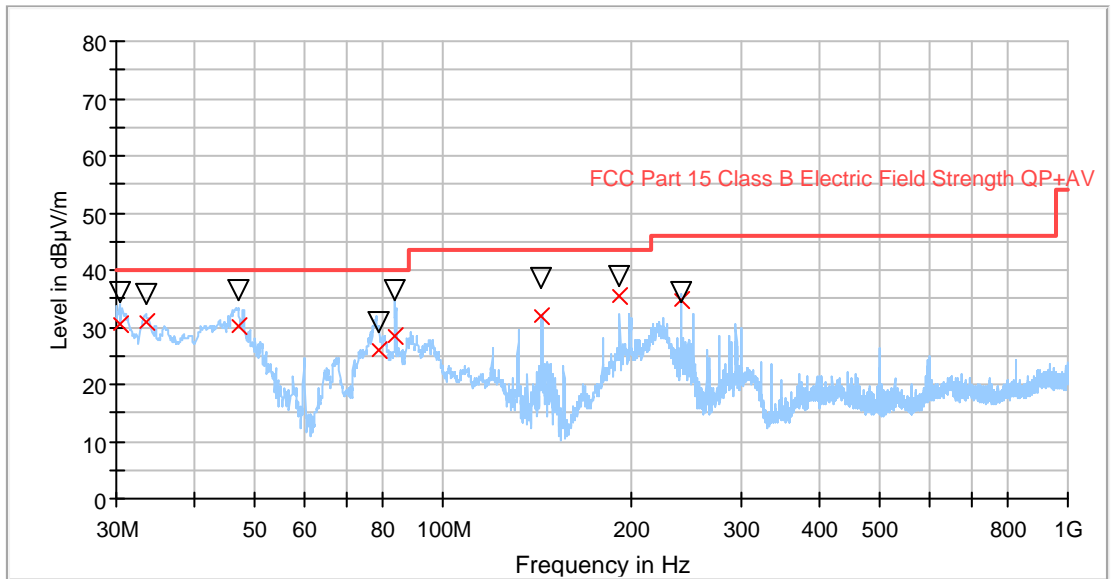
TESTED SAMPLES:	S/01
TESTED OPERATION MODES:	OM#01
TEST RESULTS :	CRmmnn: CR, Condición de Radiación; mm: Sample number; nn: Operation mode.

CRmmnn	Description	Result
CR0101	Pass.	P
CR0101_RA	Pass	P
CR0101_RA2	Pass	P

Radiated Emission: CR0101

Project: 42238rem002
 Company: POLAR
 Sample: S/01
 Operation mode: OM#01
 Description: EUT ON. BT IDLE Mode. GPS IDLE Mode. Charging Batteries.
 Powered by USB.

Full Spectrum



- Peak Preview
- FCC Part 15 Class B Electric Field Strength QP+AV
- X QuasiPeak
- ▽ MaxPeak

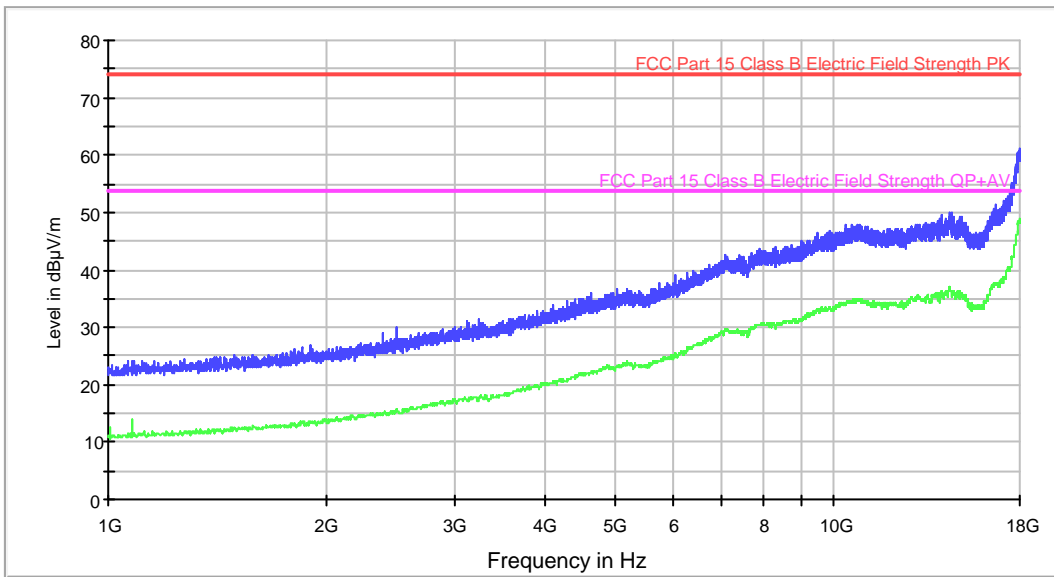
Maximizations

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Height (cm)	Pol	Azimuth (deg)
30.543506	30.36	36.12	299.0	V	227.0
33.536364	31.04	35.74	98.0	V	256.0
47.054545	30.02	36.44	111.0	V	228.0
78.774026	26.04	30.85	158.0	V	162.0
83.867532	28.34	36.33	197.0	H	154.0
143.963636	32.07	38.56	194.0	H	281.0
192.000000	35.27	39.12	144.0	H	176.0
239.974026	34.68	35.99	149.0	H	103.0

Radiated Emission: CR0101RA_PH

Project: 42238rem002
 Company: POLAR
 Sample: S/01
 Operation mode: OM#01
 Description: EUT ON. BT IDLE Mode. GPS IDLE Mode. Charging Batteries.
 Powered by USB. Horizontal Polarization.

ESU26 ER EMI FCC 15 Class B AMP_4659 HORN_4612 1m



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

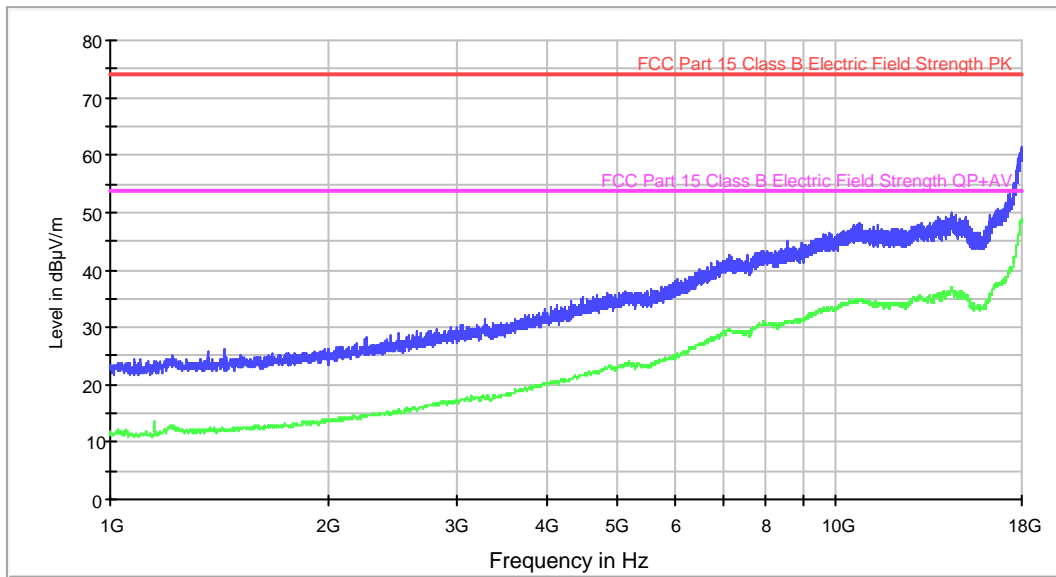
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
1275.000000	24.3	11.9
1739.000000	25.5	13.1
2301.000000	27.4	14.9
3114.000000	31.1	17.5
4109.000000	33.7	20.5
5648.000000	36.8	23.9
7374.000000	42.5	29.4
9834.000000	47.0	33.3
13377.000000	48.3	34.4
17962.000000	61.2	48.6

Radiated Emission: CR0101RA_PV

Project: 42238rem002
 Company: POLAR
 Sample: S/01
 Operation mode: OM#01
 Description: EUT ON. BT IDLE Mode. GPS IDLE Mode. Charging Batteries.
 Powered by USB. Vertical Polarization.

ESU26 ER EMI FCC 15 Class B AMP_4659 HORN_4612 1m



MaxPeak (blue line) Average (green line)
 FCC Part 15 Class B Electric Field Strength PK (red line) FCC Part 15 Class B Electric Field Strength QP+AV (magenta line)

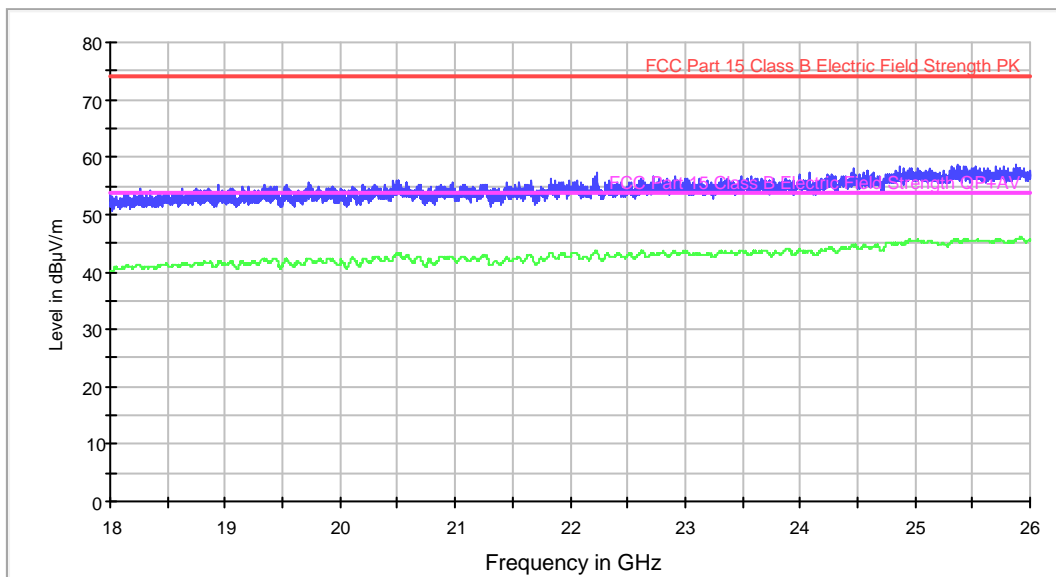
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
1221.000000	25.3	12.9
1433.000000	26.1	12.1
2260.000000	28.2	14.5
3060.000000	30.4	17.5
4130.000000	33.7	20.2
5554.000000	36.8	23.3
7129.000000	42.8	29.5
9809.000000	46.3	33.0
10792.000000	48.2	34.6
17969.000000	61.4	48.4

Radiated Emission: CR0101RA2_PH

Project: 42238rem002
 Company: POLAR
 Sample: S/01
 Operation mode: OM#01
 Description: EUT ON. BT IDLE Mode. GPS IDLE Mode. Charging Batteries.
 Powered by USB. Horizontal Polarization.

ESU26 ER EMI FCC 15 Class B AMP_4729 HORN_1920 1m



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

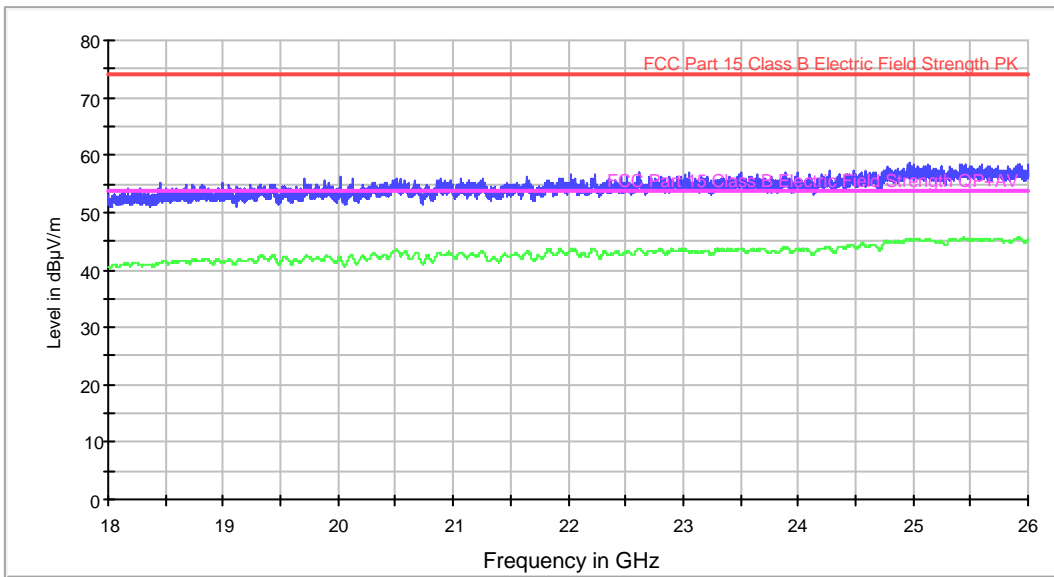
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
18625.000000	54.5	41.3
19341.000000	55.3	42.3
19732.000000	55.6	42.3
20505.000000	55.9	43.2
21564.000000	55.6	42.5
22240.000000	57.2	43.4
22720.000000	56.7	43.2
24086.000000	57.3	43.6
24870.000000	58.4	45.1
25879.000000	58.9	45.6

Radiated Emission: CR0101RA2_PV

Project: 42238rem002
 Company: POLAR
 Sample: S/01
 Operation mode: OM#01
 Description: EUT ON. BT IDLE Mode. GPS IDLE Mode. Charging Batteries.
 Powered by USB. Vertical Polarization.

ESU26 ER EMI FCC 15 Class B AMP_4729 HORN_1920 1m



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

Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
18452.000000	55.1	41.2
18989.000000	55.1	41.4
20016.000000	56.1	42.3
20511.000000	56.1	43.2
21072.000000	56.0	42.9
22235.000000	56.7	43.6
22618.000000	57.1	43.6
23891.000000	57.1	43.9
24976.000000	58.6	45.2
25408.000000	58.4	45.1