

R041-10-106301-1A - DM / CHB

RADIO TEST REPORT

According to the standard(s):

FCC part 15 Subpart C

Equipment under test:

MORPHOCHECK 2 XXX


Company:

COPPERNIC

Diffusion: Mr PORTE

(Company: COPPERNIC)

Number of pages: 40 including 1 annex

Ed.	Date	Modified page(s)	Written by		Technical verification and Quality approval	
			Name	Visa	Name	Visa
1	13-July-11	30 to 36	David MONTAULON		Regis GONZALEZ	

Duplication of this report is only permitted for an integral photographic facsimile. It includes the number of pages referenced above. This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole production of the item tested.



NAME OF THE EQUIPMENT UNDER TEST (E.U.T.) : MORPHOCHECK 2 XXX

Serial number : None

Part number : None

Software Version : None

MANUFACTURER'S NAME : COPPERNIC

APPLICANT'S ADDRESS:

Company : COPPERNIC

Address : 185 Avenue Archimède
LES FONTAINES DE LA DURANNE
13857 AIX EN PROVENCE CEDEX 3
FRANCE

Person(s) present during the tests : Mr PORTE

Responsible : Mr PORTE

DATE(S) OF TESTS : April, the 20th and 21st of 2011

TESTS LOCATION(S) : Emitech Grand Sud Laboratory in
Vendargues (34)
Open area test site in Salinelles (30)
FCC Registration number: 8127-19

TESTS SUPERVISOR(S) : None

TESTS OPERATOR(S) : David MONTAULON

CONTENTS

1. INTRODUCTION.....	4
2. REFERENCE DOCUMENT(S).....	4
3. EQUIPMENT UNDER TEST CONFIGURATION.....	4
4. EQUIPMENT UNDER TEST CONFIGURATION SCHEME.....	5
5. SUMMARY OF TEST RESULTS.....	6
6. CONDUCTED EMISSIONS – SECTION 15.207.....	7
7. RADIATED EMISSIONS – SECTION 15.209.....	10
a) Radiated emissions (below 30MHz)	10
b) Radiated emissions pre-measurement (above 30MHz).....	17
8. OPERATION WITHIN THE BAND 13.110-14.010 MHZ – SECTION 15.225	30
a) Field strength.....	30
9. FREQUENCY TOLERANCE – SECTION 15.225.....	37
 ANNEX: PHOTOGRAPH(S).....	 38

1. INTRODUCTION

This document submits the results of Electromagnetic Compatibility tests performed on the equipment MORPHOCHECK 2 XXX (denominated hereafter E.U.T.: equipment under test) according to document(s) listed below.

2. REFERENCE DOCUMENT(S)

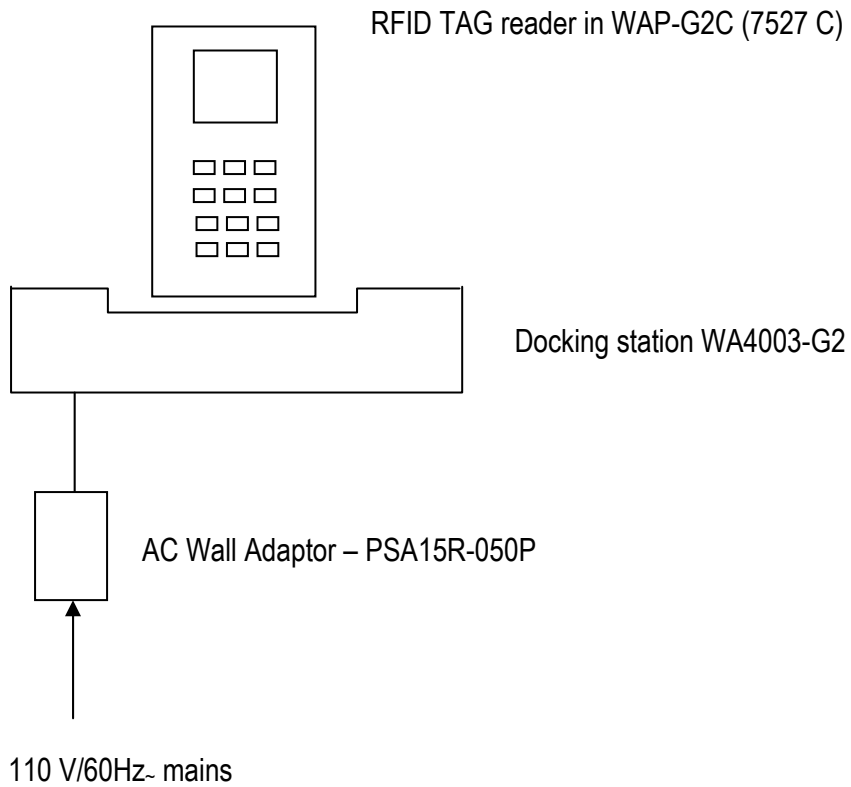
FCC Part 15	Code of Federal Regulations Title 47 – Telecommunications Chapter 1 – Federal Communications Commission Part 15 – Radio frequency devices Subpart C – Intentional Radiators
ANSI C 63.4 (2003)	American National Standard for Methods of measurement of Radio-Noise from low-voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

3. EQUIPMENT UNDER TEST CONFIGURATION

Product description:

The MORPHOCHECK 2 XXX is radio equipment with a contactless card interface (13.56MHz with an internal antenna), Bluetooth and Wi-Fi interfaces.

FCC ID: XGK- HFELYWAP3
Wi-Fi module FCC ID: GM37525BTB
Bluetooth module FCC ID: GM37527RA2041
ITU emission code: /
Utilization: Hand held terminal for e-Id documents control
Antenna type: Incorporated antennas
Antenna gain: Unknown
Operating frequency range: 13.56 MHz
Number of channels: 1
Channel spacing: /
Modulation: ASK
Power source: 115Vac/60Hz
Power level and frequency range are not user adjustable

4. EQUIPMENT UNDER TEST CONFIGURATION SCHEME

5. SUMMARY OF TEST RESULTS

Tests designation	Results satisfying?	Comments
Antenna requirement - section 15.203	YES	Integrated antenna
Restricted band of operation - section 15.205	YES	
Conducted emissions - section 15.207	YES	
Radiated emissions (below 30MHz) - section 15.209	YES	
Radiated emissions (above 30MHz) - section 15.209	YES	
Field strength - section 15.225	YES	
Frequency tolerance - section 15.225	YES	
Collocations - section 15.247	YES	

N.P.: Not Performed.

N.A.: Not Applicable.

▪ In emission:

Sample subject to the test complies with prescriptions of the standard(s) FCC part 15 Subpart C 15.225 (07/2008) according to limits specified in this test report.

6. CONDUCTED EMISSIONS – SECTION 15.207

Standard: FCC part 15 Subpart C 15.207 (07/2008)

Test method: ANSI C63.4:2003

Test configuration:

Tested cable(s)	Measure with	E.U.T. height
110Vac/60Hz power supply (MORPHOCHECK 300)	L.I.S.N.	80cm
110Vac/60Hz power supply (MORPHOCHECK 2X0)	L.I.S.N.	80cm

Frequency band	Tested cable(s)	Resolution bandwidth	Video bandwidth	Detection mode
150kHz-30MHz	110Vac/60Hz power supply (MORPHOCHECK 300)	10KHz	30kHz	Peak / Average & Quasi peak
150kHz-30MHz	110Vac/60Hz power supply (MORPHOCHECK 2X0)	10KHz	30kHz	Peak / Average & Quasi peak

Test method deviation: No

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	CAL. DATE	DUE DATE
Cable		N-1m	2704	18/08/10	17/10/12
Cable		N-5m	2899	04/06/10	03/08/12
Limiter	Hewlett Packard	11947A	0239	07/06/10	06/08/12
LISN	PMM	L3-25	0821	12/08/09	11/10/11
Receiver	Agilent	E4440A	5824	19/04/10	18/06/12
Receiver	Rohde & Schwarz	ESHS10	3371	29/06/10	28/08/12
Shielded enclosure	RAY PROOF	C.GS1	1423	-	-
Software	Nexio	BAT EMC	0000	-	-

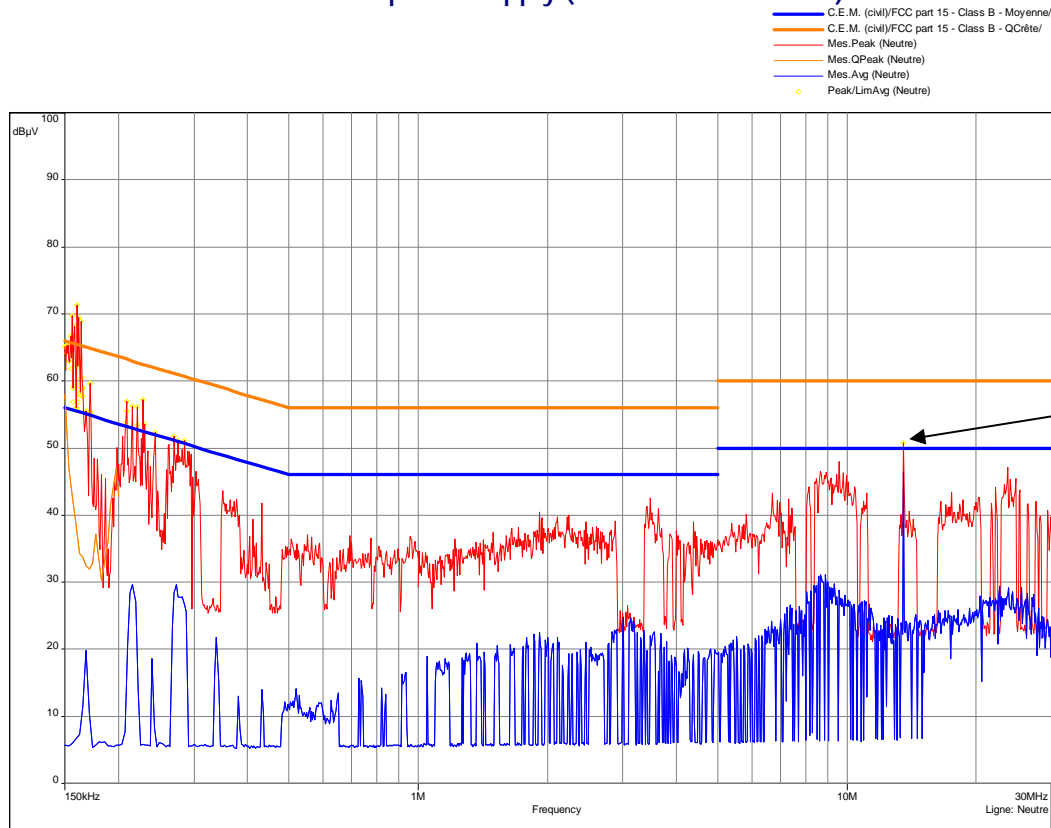
BAT-EMC software version: V3.5.0.2

Results: See Graph(s) hereafter. Limits on the graphs are average and quasi-peak limits (upper limit).

Conducted voltage emission (measurement)

110Vac/60Hz power supply (MORPHOCHECK 300)

EMI923



Date: 20/04/2011

Technician: DM

Class: B of the standard

Detection:
Peak average & quasi peak

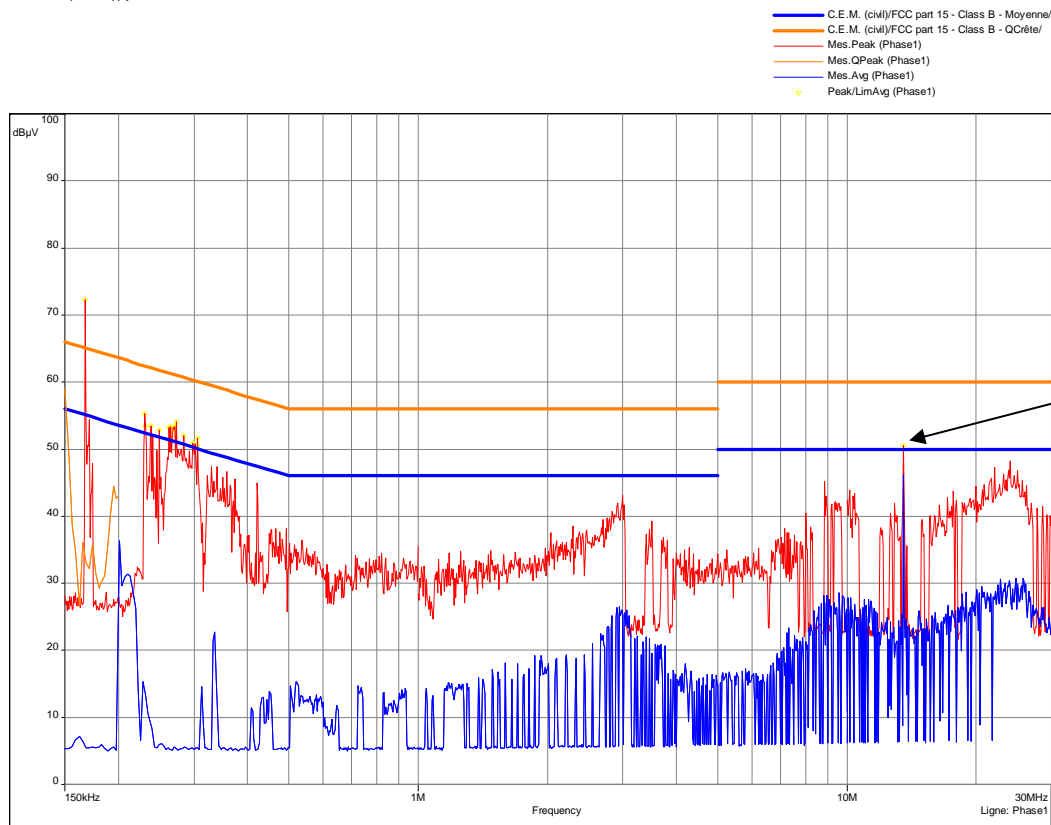
T (°C): 21.7

H (%): 35.7

P (hpa): 1010

Modification(s) during test:

110Vac/60Hz power supply - 04/20/2011 09:12 - 923



110Vac/60Hz power supply - 04/20/2011 09:12 - 923

Conducted voltage emission (measurement) 110Vac/60Hz power supply (MORPHOCHECK 2X0)

EMI929

- C.E.M. (civil)/FCC part 15 - Class B - Moyenne/
- C.E.M. (civil)/FCC part 15 - Class B - QCrête/
- Mes.Peak (Neutre)
- Mes.QPeak (Neutre)
- Mes.Avg (Neutre)
- Peak/LimAvg (Neutre)

Date: 20/04/2011

Technician: DM

Class: B of the standard

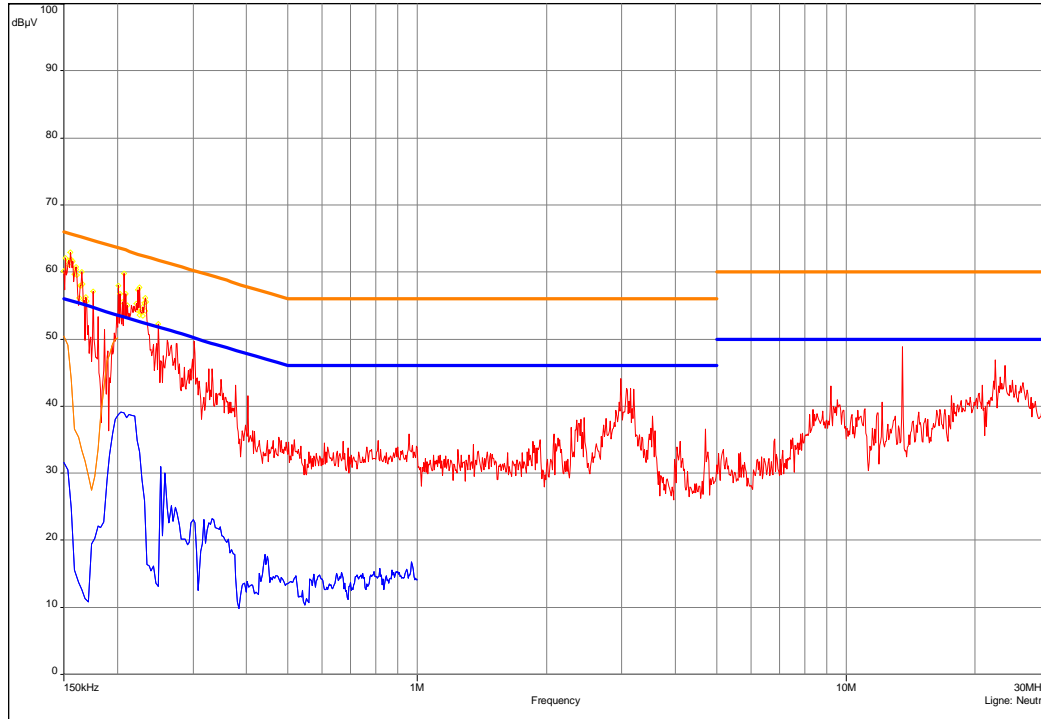
Detection:
Peak average & quasi peak

T (°C): 21.7

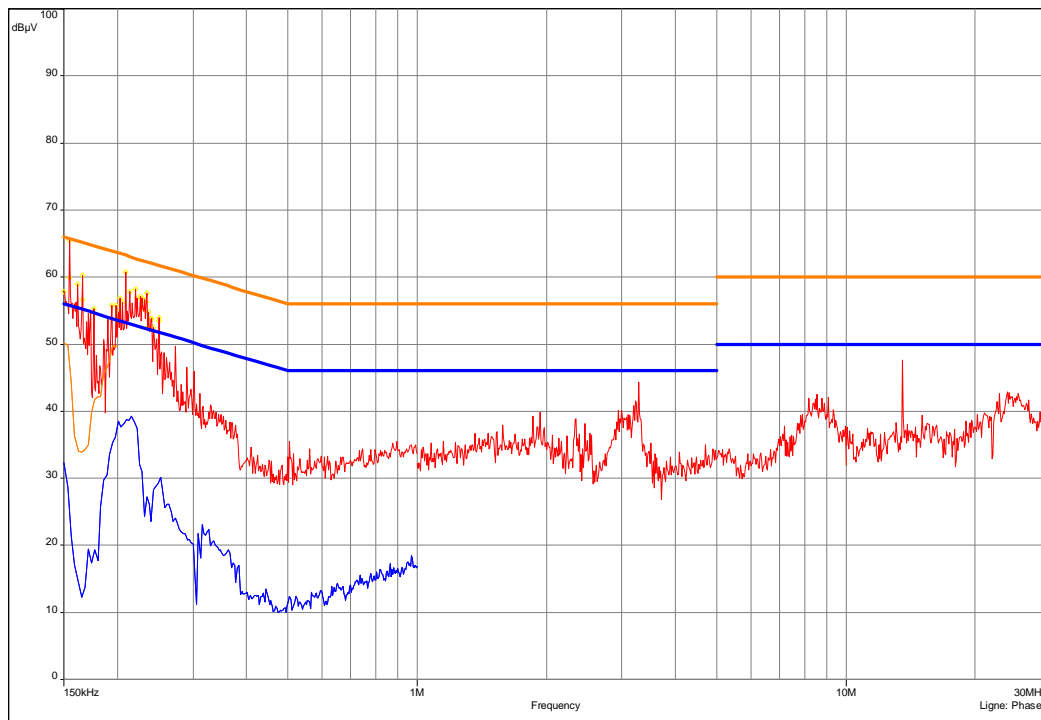
H (%): 35.7

P (hpa): 1010

Modification(s) during test:



- C.E.M. (civil)/FCC part 15 - Class B - Moyenne/
- C.E.M. (civil)/FCC part 15 - Class B - QCrête/
- Mes.Peak (Phase1)
- Mes.QPeak (Phase1)
- Mes.Avg (Phase1)
- Peak/LimAvg (Phase1)



7. RADIATED EMISSIONS – SECTION 15.209

Temperature (°C): 24.3

Humidity (%HR): 34.6

Pressure (hPa): 1016

a) Radiated emissions (below 30MHz)

Standard: FCC part 15 Subpart C 15.209 (07/2008)

Test method: ANSI C63.4:2003

Test configuration:

Frequency band	Tested side	Resolution bandwidth	Video bandwidth	Detection mode	E.U.T. height
9kHz-150kHz	MORPHOCHECK 300 / antenna 0°	200Hz	1kHz	Peak	80cm
9kHz-150kHz	MORPHOCHECK 300 / antenna 45°	200Hz	1kHz	Peak	80cm
9kHz-150kHz	MORPHOCHECK 300 / antenna 90°	200Hz	1kHz	Peak	80cm
9kHz-150kHz	MORPHOCHECK 2X0 / antenna 90°	200Hz	1kHz	Peak	80cm
9kHz-150kHz	MORPHOCHECK 2X0 / antenna 45°	200Hz	1kHz	Peak	80cm
9kHz-150kHz	MORPHOCHECK 2X0 / antenna 0°	200Hz	1kHz	Peak	80cm
150kHz-30MHz	MORPHOCHECK 300 / antenna 0°	10kHz	30kHz	Peak	80cm
150kHz-30MHz	MORPHOCHECK 300 / antenna 45°	10kHz	30kHz	Peak	80cm
150kHz-30MHz	MORPHOCHECK 300 / antenna 90°	10kHz	30kHz	Peak	80cm
150kHz-30MHz	MORPHOCHECK 2X0 / antenna 90°	10kHz	30kHz	Peak	80cm
150kHz-30MHz	MORPHOCHECK 2X0 / antenna 45°	10kHz	30kHz	Peak	80cm
150kHz-30MHz	MORPHOCHECK 2X0 / antenna 0°	10kHz	30kHz	Peak	80cm

During tests RFID is in permanent modulated emission mode, Wi-Fi is switched on channel 6 & Bluetooth is switched on channel 79. Measure is done with an antenna position of 0°, 90° and 45°.

Test method deviation:

Measurements are made in peak detection instead of average mode in frequency band 9 kHz-500 kHz

- Measurements are given in dBμA/m instead of μV/m
- Measuring distance is 3 meters instead of 30 and 300 meters

Radiated emissions limits in this frequency band are specified at 30 or 300 meters. Measurement distance used during the test, subject of this report, is 3 meters. Then published limits come from a theoretical conversion using an extrapolation factor of 40dB / decade.

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	CAL DATE	DUE DATE
Antenna	Rohde & Schwarz	HFH2-Z2	5825	20/08/10	19/10/12
Cable	C&C	N-1.5m	5017	31/08/09	30/10/11
Cable	C&C	N-8m	5014	18/08/10	17/10/12
Receiver	Agilent	E4440A	5824	19/04/10	18/06/12
Shielded enclosure	RAY PROOF	C.GS1	1423	-	-
Software	Nexio	BAT EMC	0000	-	-

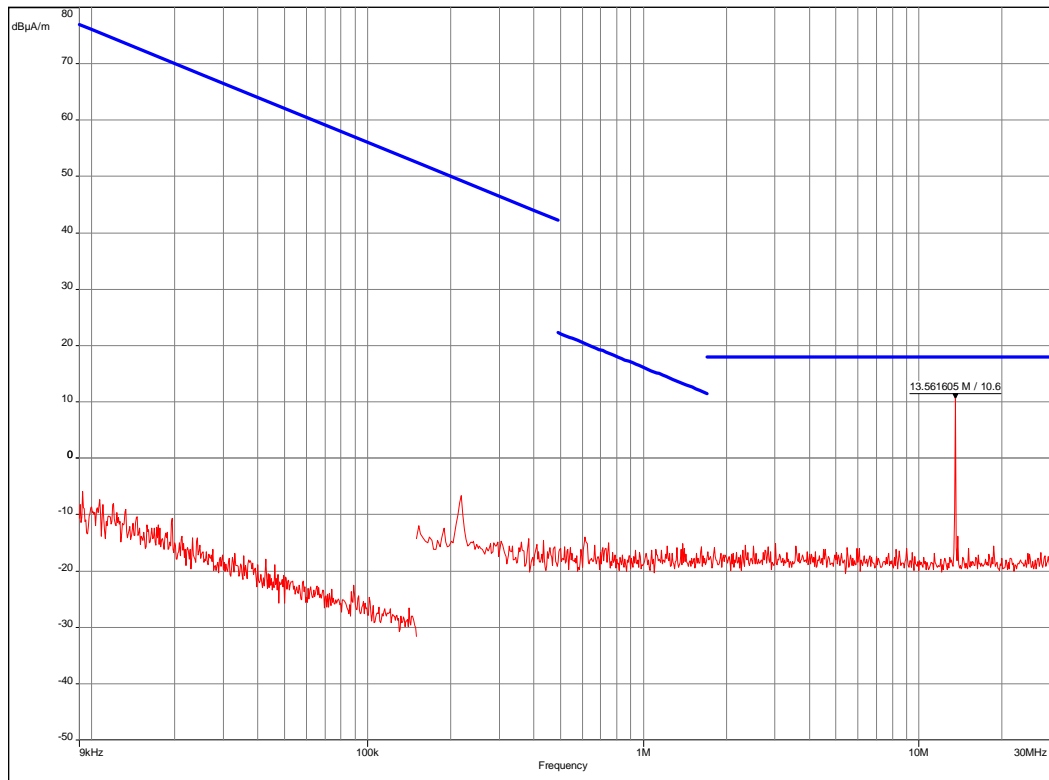
BAT-EMC software version: V3.5.0.2

Results: See Graph(s) hereafter (pre-measurement).

Radiated magnetic field emission (measurement)

EMI1042

MORPHOCHECK 300 / BT CH 79 / WIFI CH6 / antenna 0°

— RADIO/FCC part15.209 (40dB/dec) - Class:ss - Crête/3.0m/
— Mes. Peak


MORPHOCHECK 300 / BT CH 79 / WIFI CH6 / antenna 0° - 04/20/2011 14:48 - 1042

Date: 20/04/2011

Technician: DM

Class: ss of the standard

Detection:
Peak

T (°C): 24.3
H (%): 33.6
P (hpa): 1012

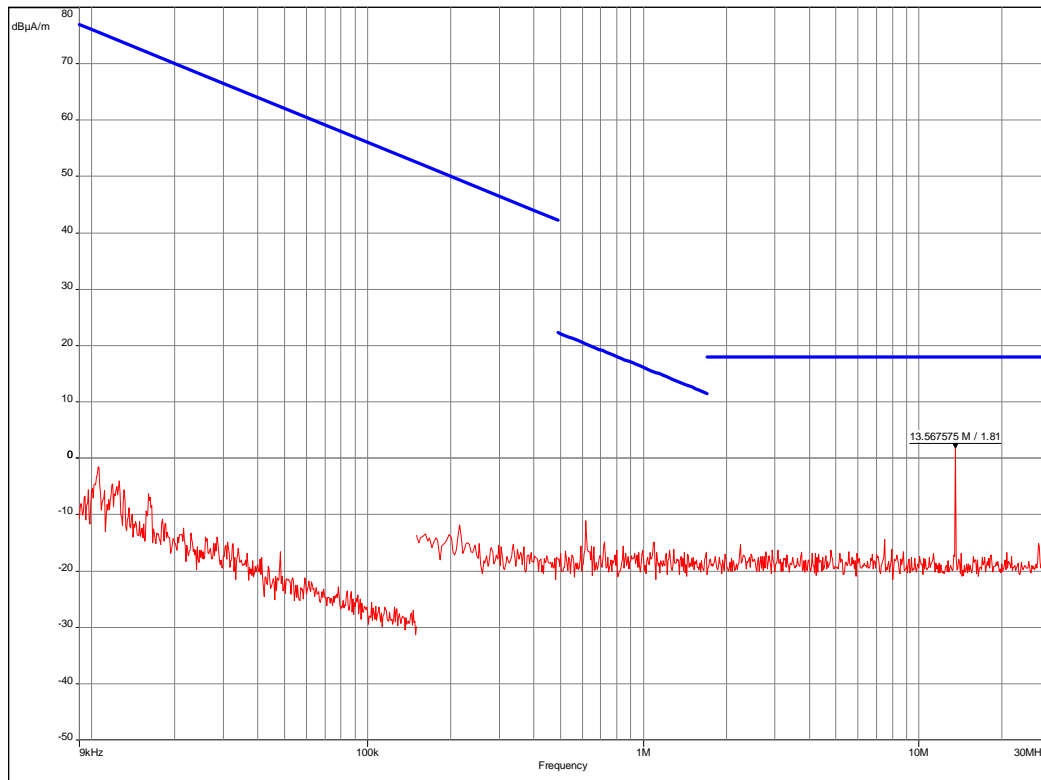
Modification(s) during test:

Limit indicated on this plot is calculated with 40 dB/decade extrapolation factor and 51.5 dB conversion factor.

Radiated magnetic field emission (measurement) MORPHOCHECK 300 / BT CH 79 / WIFI CH6 / antenna 45°

EMI1046

RADIO/FCC part15.209 (40dB/dec) - Class:ss - Crête/3.0m/
Mes. Peak



Date: 20/04/2011

Technician: DM

Class: ss of the standard

Detection:
Peak

T (°C): 24.3
H (%): 33.6
P (hpa): 1012

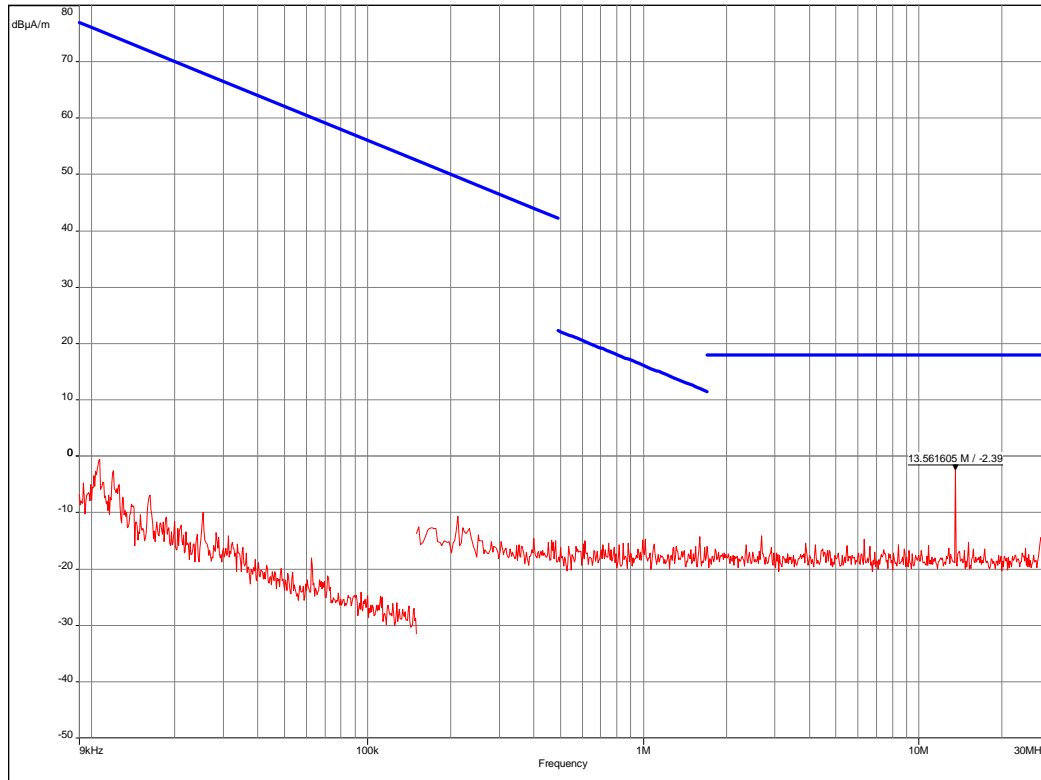
Modification(s) during test:

Limit indicated on this plot is calculated with 40 dB/decade extrapolation factor and 51.5 dB conversion factor.

Radiated magnetic field emission (measurement) MORPHOCHECK 300 / BT CH 79 / WIFI CH6 / antenna 90°

EMI1047

RADIO/FCC part15.209 (40dB/dec) - Class:ss - Crête/3.0m/
Mes. Peak



MORPHOCHECK 300 / BT CH 79 / WIFI CH6 / antenna 90° - 04/20/2011 15:17 - 1047

Date: 20/04/2011

Technician: DM

Class: ss of the standard

Detection:
Peak

T (°C): 24.3
H (%): 33.6
P (hpa): 1012

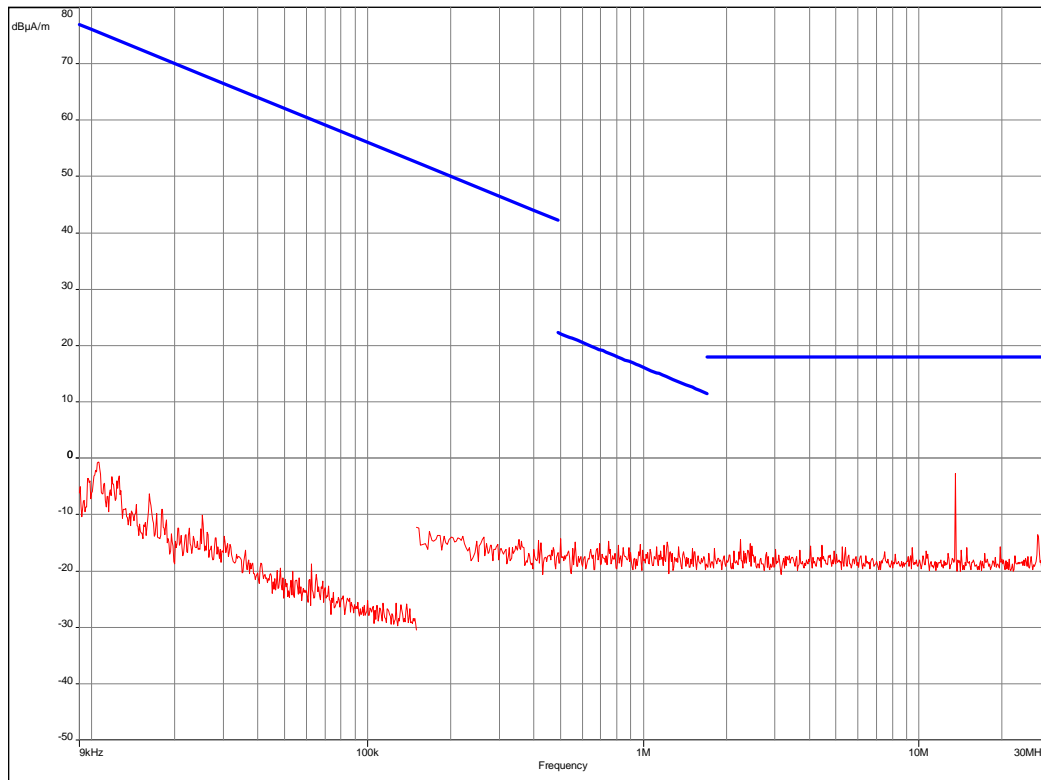
Modification(s) during test:

Limit indicated on this plot is calculated with 40 dB/decade extrapolation factor and 51.5 dB conversion factor.

Radiated magnetic field emission (measurement)

EMI1050

MORPHOCHECK 2X0 / BT CH 79 / WIFI CH6 / antenna 90°

RADIO/FCC part15.209 (40dB/dec) - Class:ss - Crête/3.0m/
Mes. Peak


Date: 20/04/2011

Technician: DM

Class: ss of the standard

Detection:
Peak

T (°C): 24.3

H (%): 33.6

P (hpa): 1012

Modification(s) during test:

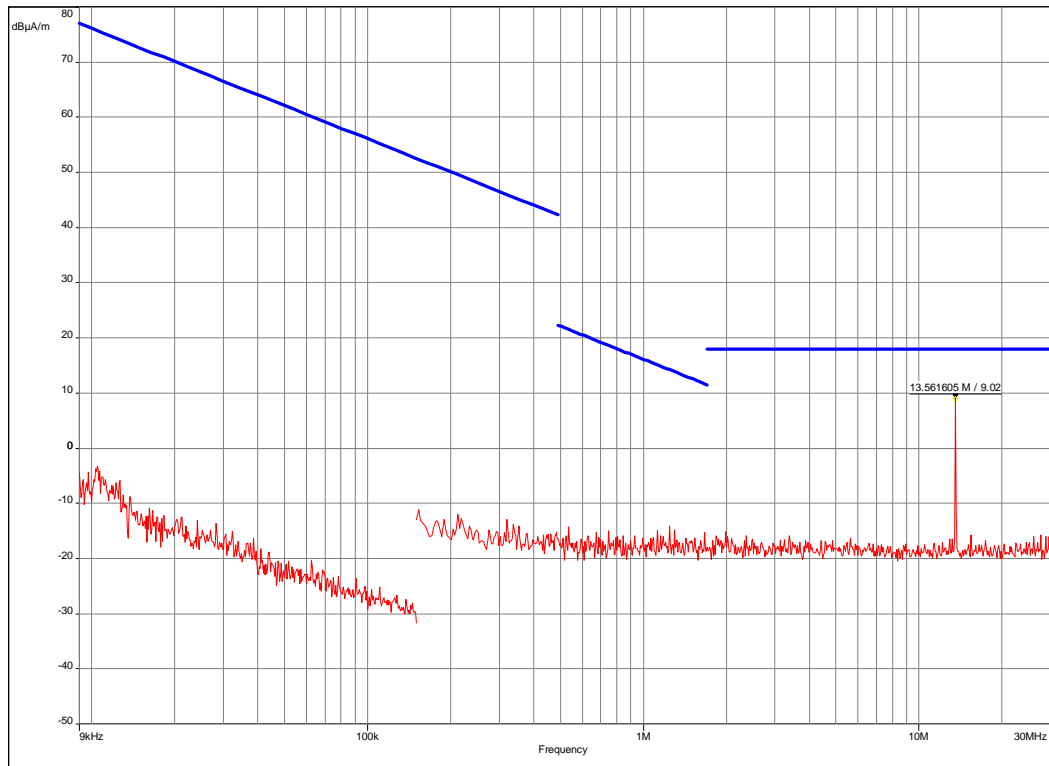
Limit indicated on this plot is calculated with 40 dB/decade extrapolation factor and 51.5 dB conversion factor.

Radiated magnetic field emission (measurement)

EMI1051

MORPHOCHECK 2X0 / BT CH 79 / WIFI CH6 / antenna 45°

RADIO/FCC part15.209 (40dB/dec) - Class:ss - Crête/3.0m/
 Mes. Peak
 Peak/LimPeak



MORPHOCHECK 2X0 / BT CH 79 / WIFI CH6 / antenna 45° - 04/20/2011 15:34 - 1051

Date: 20/04/2011

Technician: DM

Class: ss of the standard

Detection:
 Peak

T (°C): 24.3

H (%): 33.6

P (hpa): 1012

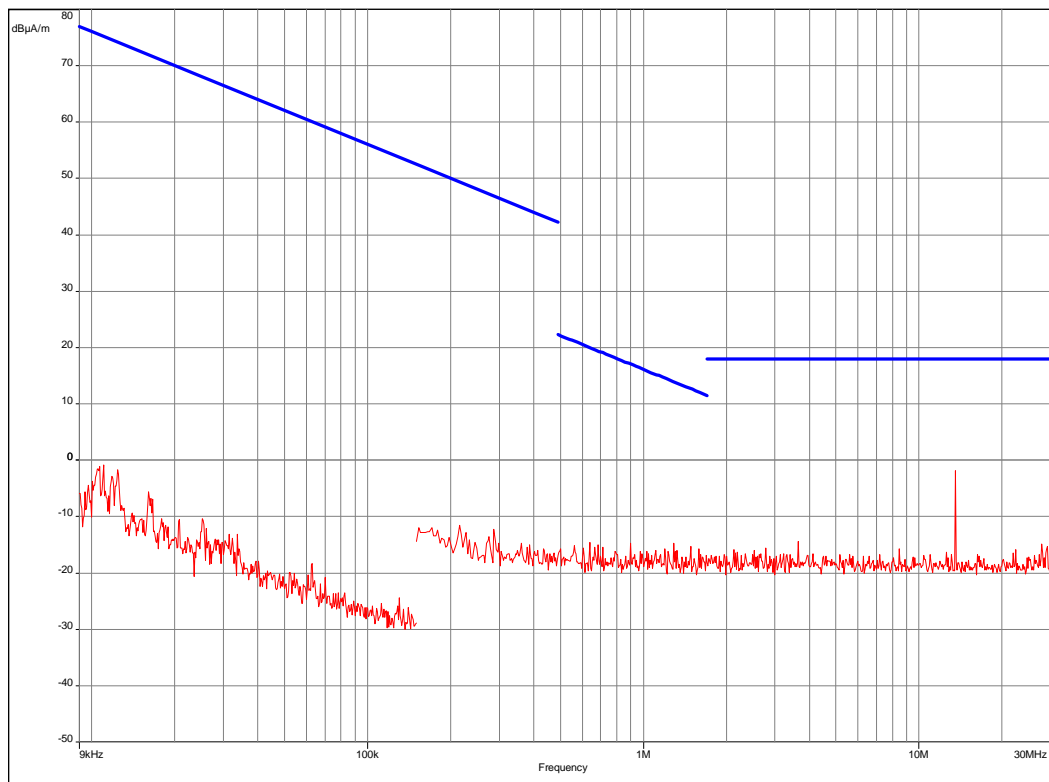
Modification(s) during test:

Limit indicated on this plot is calculated with 40 dB/decade extrapolation factor and 51.5 dB conversion factor.

Radiated magnetic field emission (measurement)

EMI1054

MORPHOCHECK 2X0 / BT CH 79 / WIFI CH6 / antenna 0°

— RADIO/FCC part15.209 (40dB/dec) - Class:ss - Crête/3.0m/
— Mes. Peak


MORPHOCHECK 2X0 / BT CH 79 / WIFI CH6 / antenna 0° - 04/20/2011 15:42 - 1054

Date: 20/04/2011

Technician: DM

Class: ss of the standard

Detection:
Peak

T (°C): 24.3
H (%): 33.6
P (hpa): 1012

Modification(s) during test:

Limit indicated on this plot is calculated with 40 dB/decade extrapolation factor and 51.5 dB conversion factor.

b) Radiated emissions pre-measurement (above 30MHz)

Standard: FCC part 15 Subpart C 15.225 & 15.247

Test method: ANSI C63.4:2003

Test configuration:

Frequency band	Tested side	Resolution bandwidth	Video bandwidth	Detection mode	E.U.T. height
30MHz-1GHz	MORPHOCHECK 2X0 / Bluetooth Ch1 / Wi-Fi Ch11	100kHz	300kHz	Peak	80cm
30MHz-1GHz	MORPHOCHECK 300 / Bluetooth Ch79 / Wi-Fi Ch6	100kHz	300kHz	Peak	80cm
1GHz-18GHz	MORPHOCHECK 2X0 / Bluetooth Ch1 / Wi-Fi Ch11	1MHz	3MHz	Peak and average	80cm
1GHz-18GHz	MORPHOCHECK 2X0 / Bluetooth Ch6 / Wi-Fi Ch1	1MHz	3MHz	Peak and average	80cm
1GHz-18GHz	MORPHOCHECK 2X0 / Bluetooth Ch79 / Wi-Fi Ch6	1MHz	3MHz	Peak and average	80cm
1GHz-18GHz	MORPHOCHECK 300 / Bluetooth Ch1 / Wi-Fi Ch11	1MHz	3MHz	Peak and average	80cm
1GHz-18GHz	MORPHOCHECK 300 / Bluetooth Ch6 / Wi-Fi Ch1	1MHz	3MHz	Peak and average	80cm
1GHz-18GHz	MORPHOCHECK 300 / Bluetooth Ch79 / Wi-Fi Ch6	1MHz	3MHz	Peak and average	80cm

Test method deviation: No

Measuring distance: 3 meters

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	CAL DATE	DUE DATE
Antenna	Electro-Metrics	BIA-30HF	0824	03/03/11	02/05/15
Antenna	Electro-Metrics	LPA-30	0855	03/03/11	02/05/15
Antenna	Emco	3115	1053	04/03/08	03/05/12
Cable	C& Connetiques	N-1.5m	4201	06/10/09	05/12/11
Cable	C& Connetiques	N-1.5m	4203	06/10/09	05/12/11
Cable	C&C	N-1.5m	5016	06/10/09	05/12/11
Cable		N-10m	2717	12/01/2011	03/03/15
Cable		N-1m	2700	18/08/10	17/10/12
Cable	C&C	N-8m	5014	18/08/10	17/10/12
Filter	Micro-tronics	HPM 15162	5457	12/01/2010	12/03/2012
Preamplifier	Microwave	C005180F-4B1	2165	14/04/10	13/06/11
Receiver	Agilent	E4440A	5824	19/04/10	18/06/12
Shielded enclosure	RAY PROOF	C.GS3	1123	-	-
Software	Nexio	BAT EMC	0000	-	-

BAT-EMC software version: V3.5.0.2

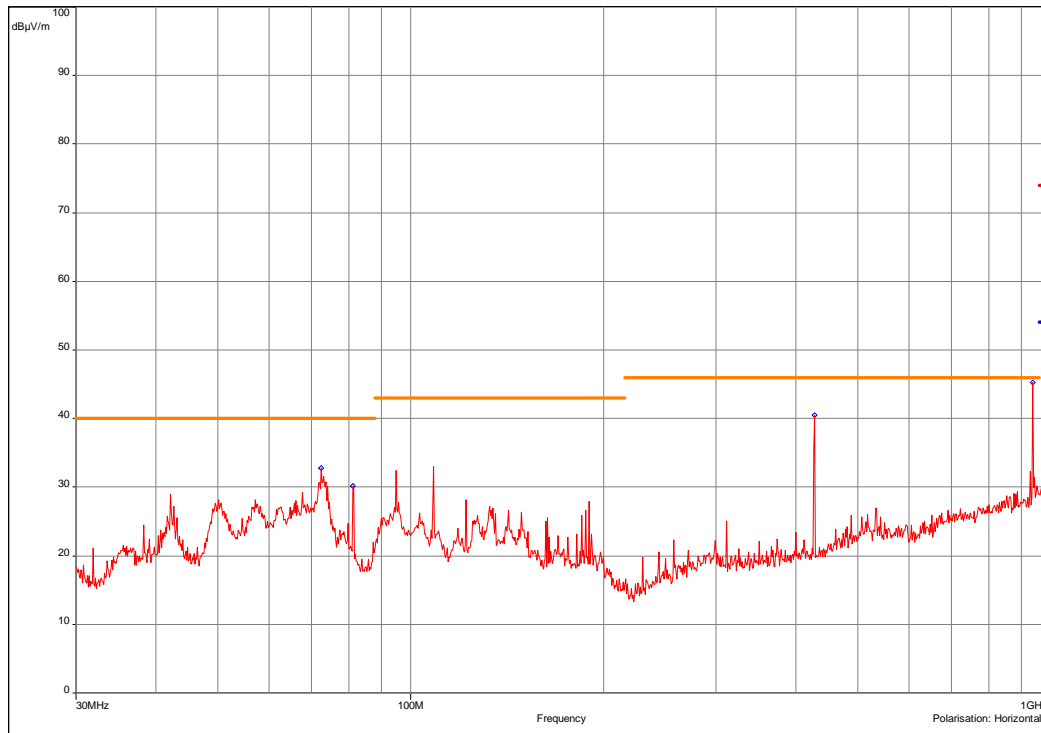
Results: See Graph(s) (indoor pre-measurement)

Radiated electric emission (measurement)

EMI927

MORPHOCHECK 2X0 / Bluetooth Ch1 / Wi-Fi Ch11

- C.E.M. (civil)/FCC Part.15 - Class:B - Moyenne/3.0m/
- C.E.M. (civil)/FCC Part.15 - Class:B - QCrête/3.0m/
- C.E.M. (civil)/FCC Part.15 - Class:B - Crête/3.0m/
- Mes.Peak (Horizontale)
- ◊ Peak/LimQ-Peak (Horizontale)



MORPHOCHECK 2X0 / BT CH1 / WIFI CH11 - 04/20/2011 10:49 - 927

Date: 20/04/2011

Technician: DM

Class: B of the standard

Detection:
Peak

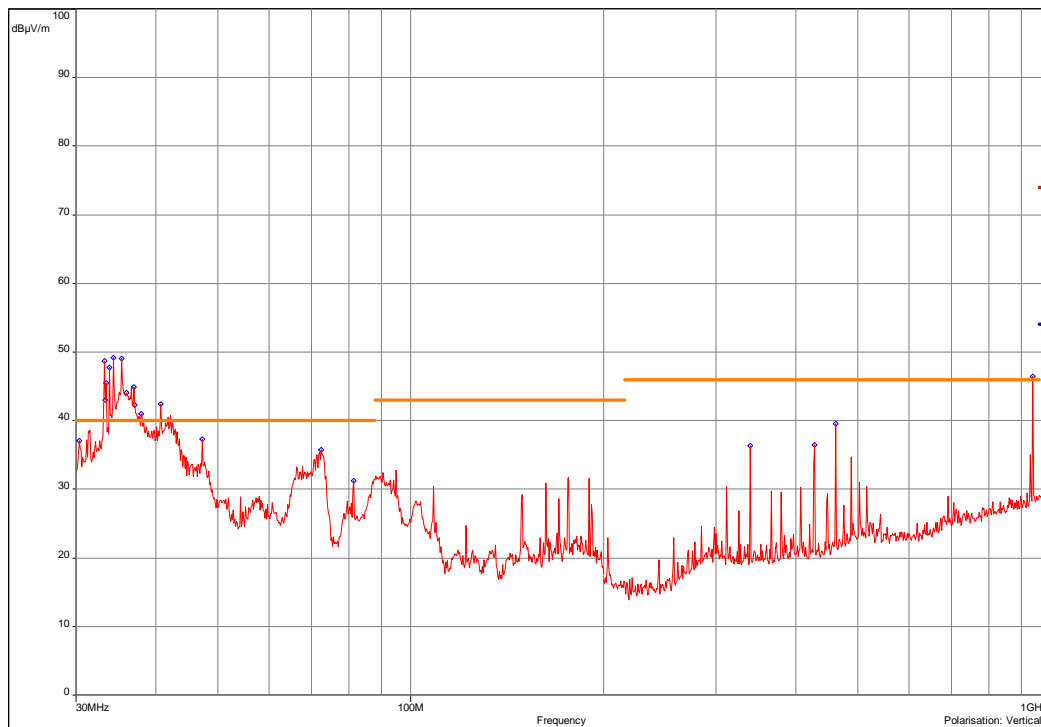
T (°C): 23.2

H (%): 35

P (hpa): 1010

Modification(s) during test:

- C.E.M. (civil)/FCC Part.15 - Class:B - Moyenne/3.0m/
- C.E.M. (civil)/FCC Part.15 - Class:B - QCrête/3.0m/
- C.E.M. (civil)/FCC Part.15 - Class:B - Crête/3.0m/
- Mes.Peak (Verticale)
- ◊ Peak/LimQ-Peak (Verticale)



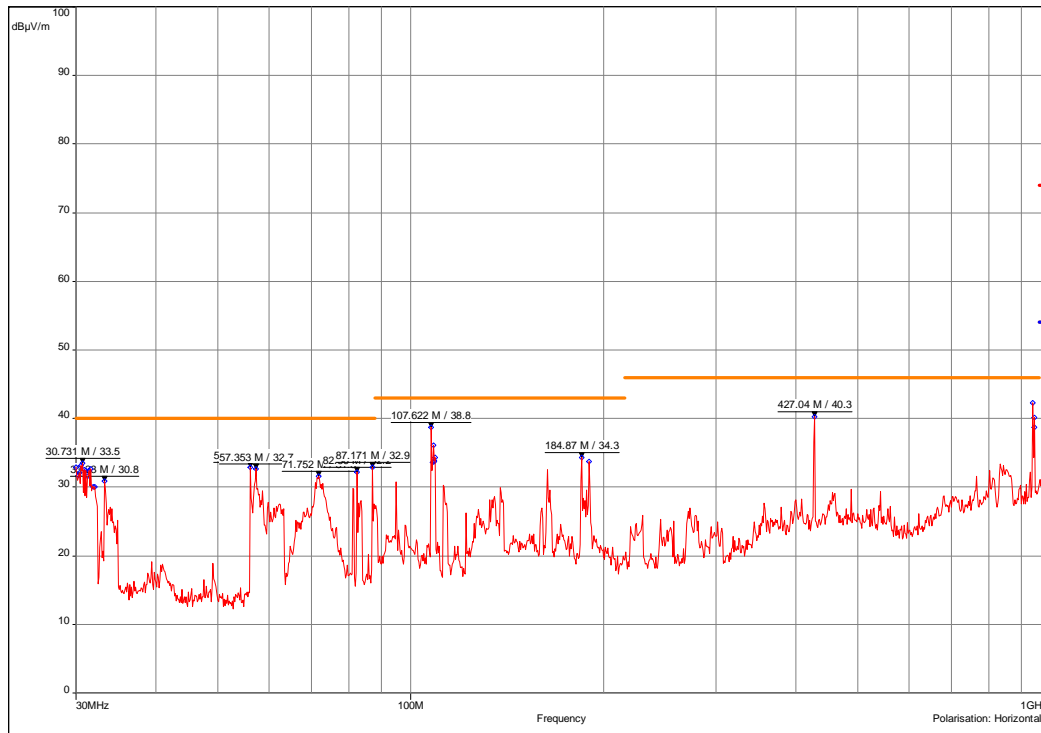
MORPHOCHECK 2X0 / BT CH1 / WIFI CH11 - 04/20/2011 10:49 - 927

Radiated electric emission (measurement)

EMI936

MORPHOCHECK 300 / Bluetooth Ch79 / Wi-Fi Ch6

- C.E.M. (civil)/FCC Part.15 - Class:B - Moyenne/3.0m/
- C.E.M. (civil)/FCC Part.15 - Class:B - QCrête/3.0m/
- C.E.M. (civil)/FCC Part.15 - Class:B - Crête/3.0m/
- Mes.Peak (Horizontale)
- ◊ Peak/LimQ-Peak (Horizontale)



MORPHOCHECK 300 / BT CH79 / WIFI CH6 - 04/20/2011 14:28 - 936

Date: 20/04/2011

Technician: DM

Class: B of the standard

Detection:
Peak

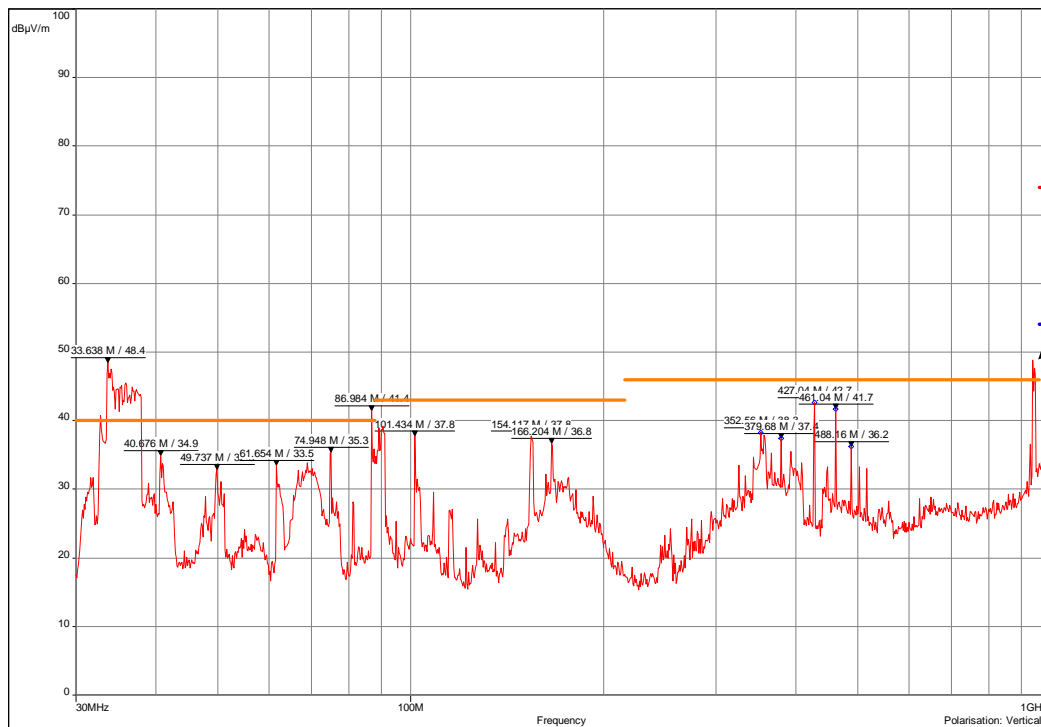
T (°C): 23.2

H (%): 35

P (hpa): 1010

Modification(s) during test:

- C.E.M. (civil)/FCC Part.15 - Class:B - Moyenne/3.0m/
- C.E.M. (civil)/FCC Part.15 - Class:B - QCrête/3.0m/
- C.E.M. (civil)/FCC Part.15 - Class:B - Crête/3.0m/
- Mes.Peak (Verticale)
- ◊ Peak/LimQ-Peak (Verticale)

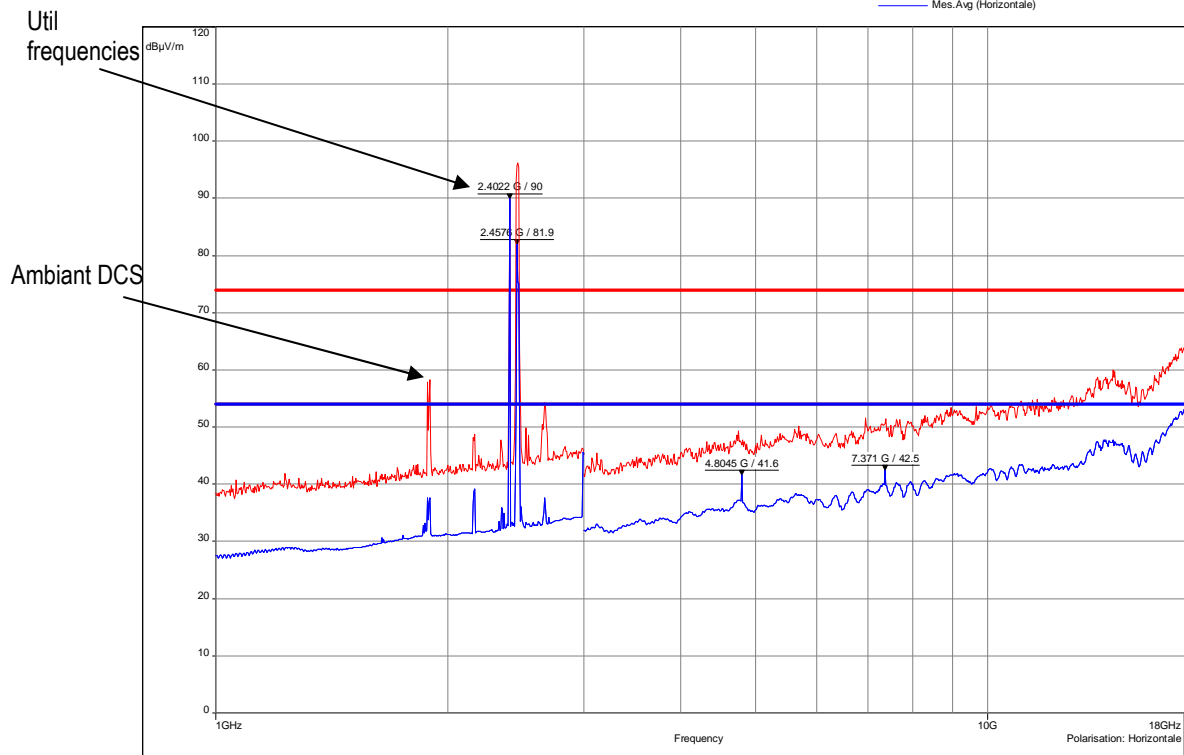


MORPHOCHECK 300 / BT CH79 / WIFI CH6 - 04/20/2011 14:28 - 936

GSM

Radiated electric emission (measurement) MORPHOCHECK 2X0 / Bluetooth Ch1 / Wi-Fi Ch11

EMI930



Date: 20/04/2011

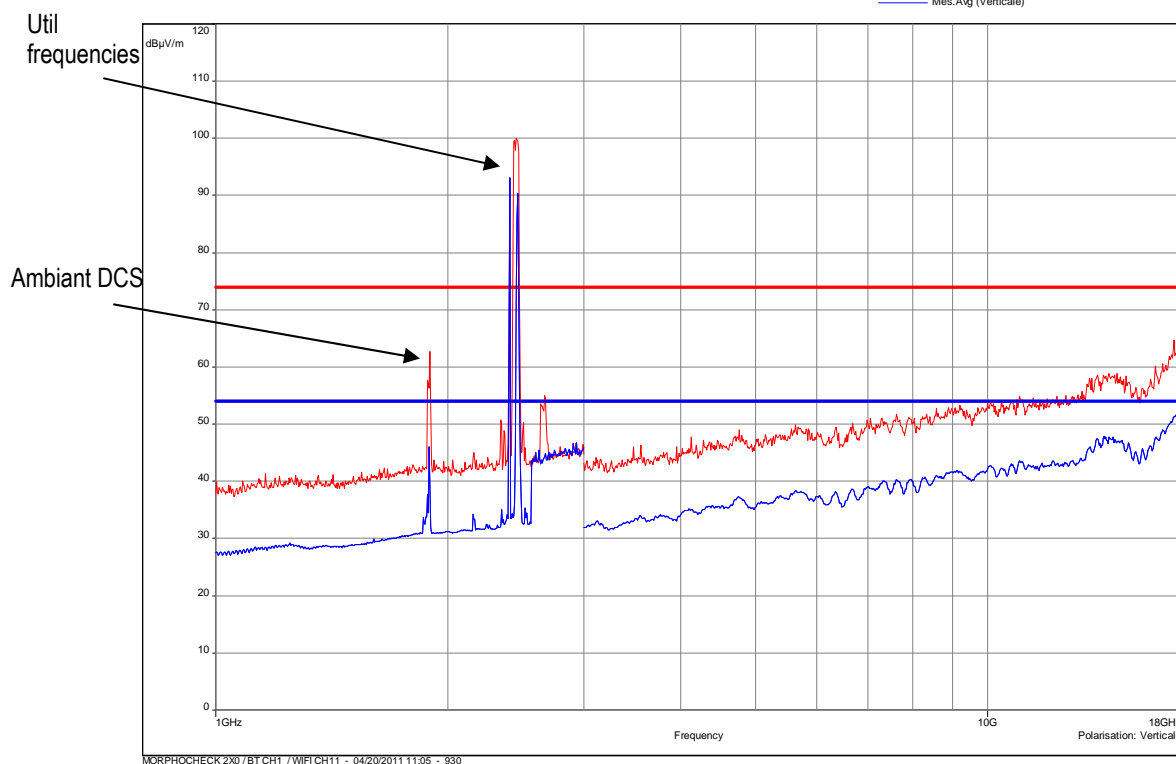
Technician: DM

Class: B of the standard

Detection:
Peak

T (°C): 23.2
H (%): 35
P (hpa): 1010

Modification(s) during test:



Radiated electric emission (measurement) MORPHOCHECK 2X0 / Bluetooth Ch6 / Wi-Fi Ch1

EMI931

C.E.M. (civil)/FCC Part.15 - Class:B - Moyenne/3.0m/
C.E.M. (civil)/FCC Part.15 - Class:B - QCrête/3.0m/
C.E.M. (civil)/FCC Part.15 - Class:B - Crête/3.0m/
Mes.Peak (Horizontale)
Mes.Avg (Horizontale)

Date: 20/04/2011

Technician: DM

Class: B of the standard

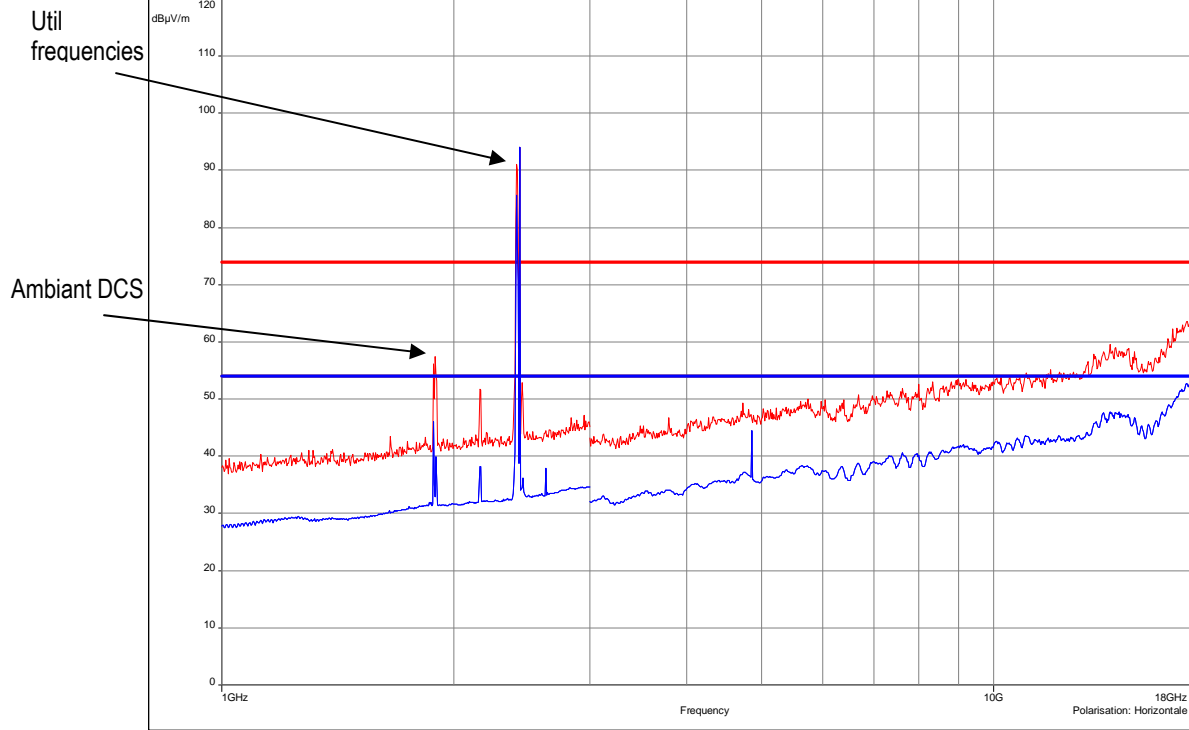
Detection:
Peak

T (°C): 23.2

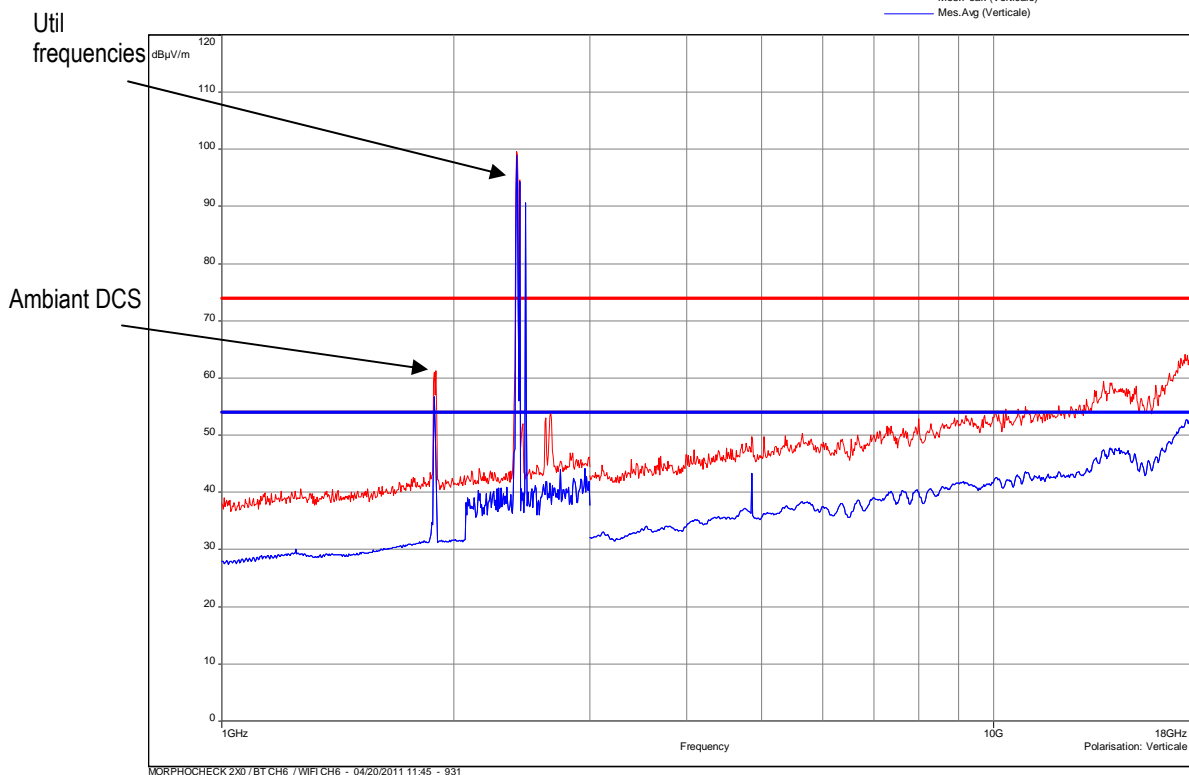
H (%): 35

P (hpa): 1010

Modification(s) during test:



C.E.M. (civil)/FCC Part.15 - Class:B - Moyenne/3.0m/
C.E.M. (civil)/FCC Part.15 - Class:B - QCrête/3.0m/
C.E.M. (civil)/FCC Part.15 - Class:B - Crête/3.0m/
Mes.Peak (Verticale)
Mes.Avg (Verticale)



Radiated electric emission (measurement)

EMI932

MORPHOCHECK 2X0 / Bluetooth Ch79 / Wi-Fi Ch6

C.E.M. (civil)/FCC Part.15 - Class:B - Moyenne/3.0m/
 C.E.M. (civil)/FCC Part.15 - Class:B - QCrête/3.0m/
 C.E.M. (civil)/FCC Part.15 - Class:B - Crête/3.0m/
 Mes.Peak (Horizontale)
 Mes.Avg (Horizontale)

Date: 20/04/2011

Technician: DM

Class: B of the standard

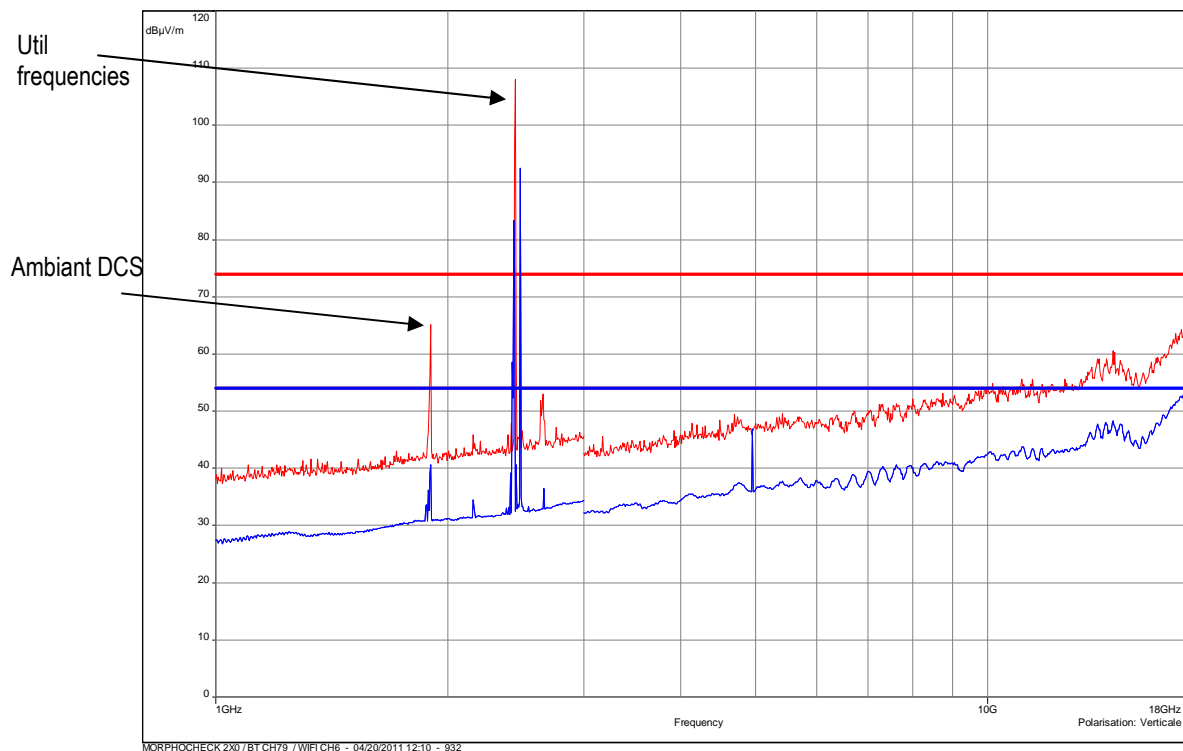
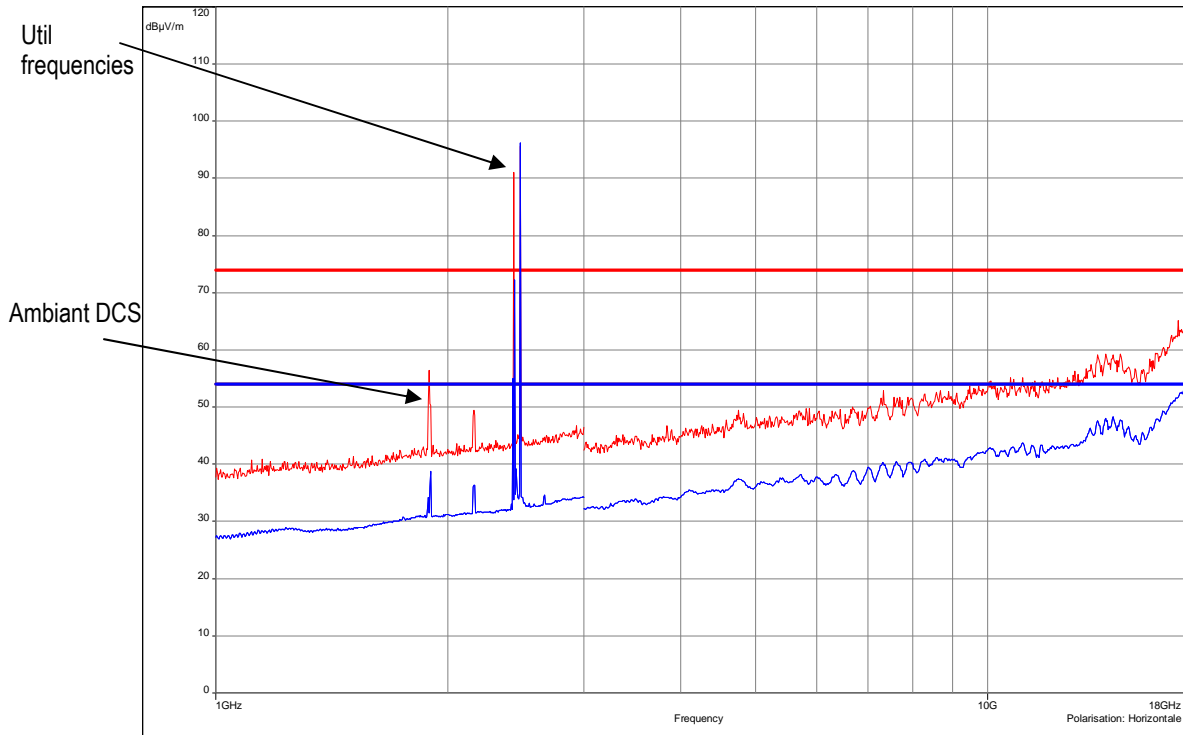
Detection:
 Peak

 $T(^{\circ}C)$: 23.2

 $H(\%)$: 35

 $P(hpa)$: 1010

Modification(s) during test:

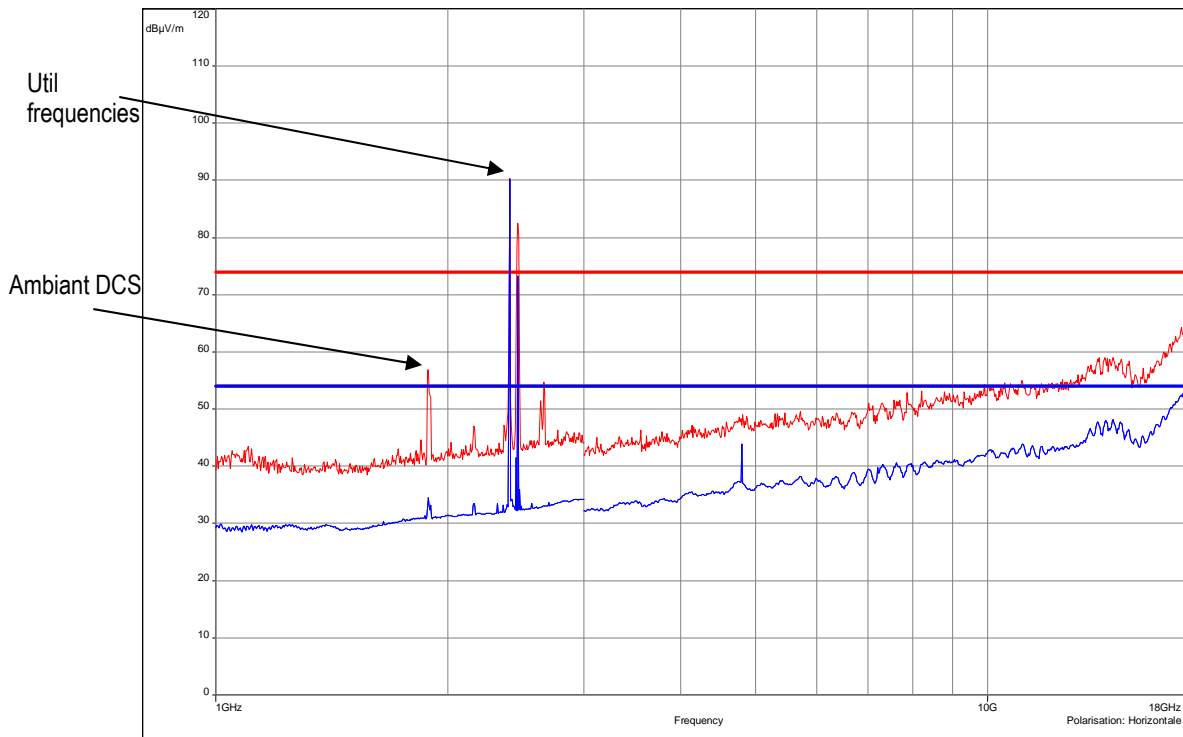


Radiated electric emission (measurement)

EMI933

MORPHOCHECK 300 / Bluetooth Ch1 / Wi-Fi Ch11

C.E.M. (civil)/FCC Part.15 - Class:B - Moyenne/3.0m/
 C.E.M. (civil)/FCC Part.15 - Class:B - QCrête/3.0m/
 C.E.M. (civil)/FCC Part.15 - Class:B - Crête/3.0m/
 Mes.Peak (Horizontale)
 Mes.Avg (Horizontale)



Date: 20/04/2011

Technician: DM

Class: B of the standard

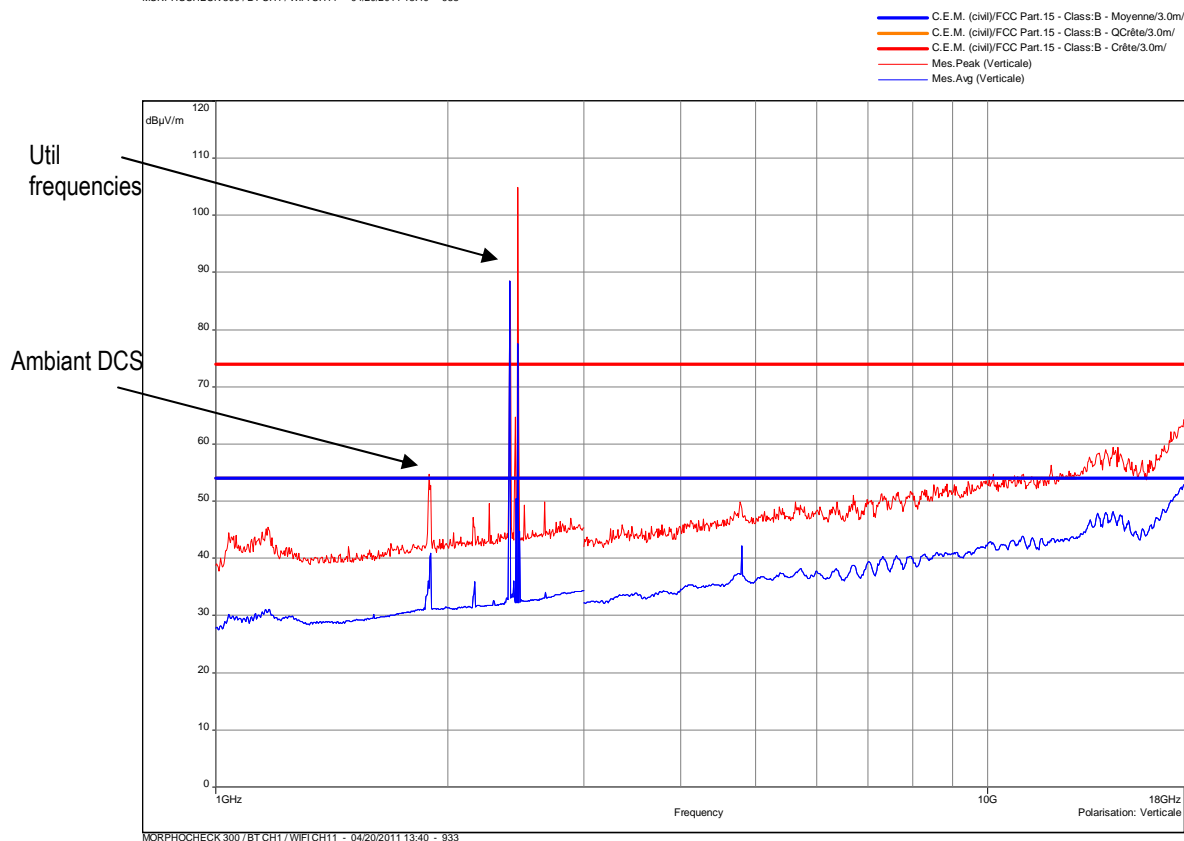
Detection:
Peak

T (°C): 23.2

H (%): 35

P (hpa): 1010

Modification(s) during test:



Radiated electric emission (measurement) MORPHOCHECK 300 / Bluetooth Ch6 / Wi-Fi Ch1

EMI934

- C.E.M. (civil)/FCC Part.15 - Class:B - Moyenne/3.0m/
- C.E.M. (civil)/FCC Part.15 - Class:B - QCrête/3.0m/
- C.E.M. (civil)/FCC Part.15 - Class:B - Crête/3.0m/
- Mes.Peak (Horizontale)
- Mes.Avg (Horizontale)
- Peak/LimAvg (Horizontale)

Date: 20/04/2011

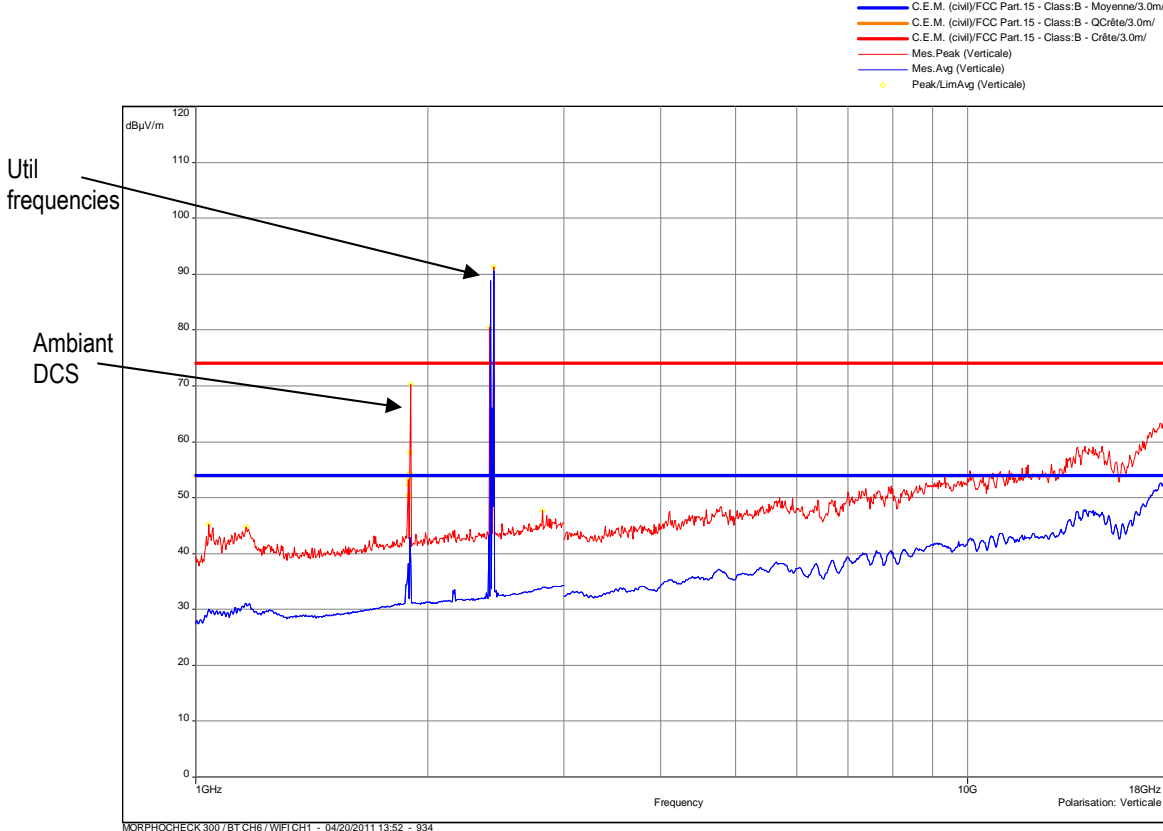
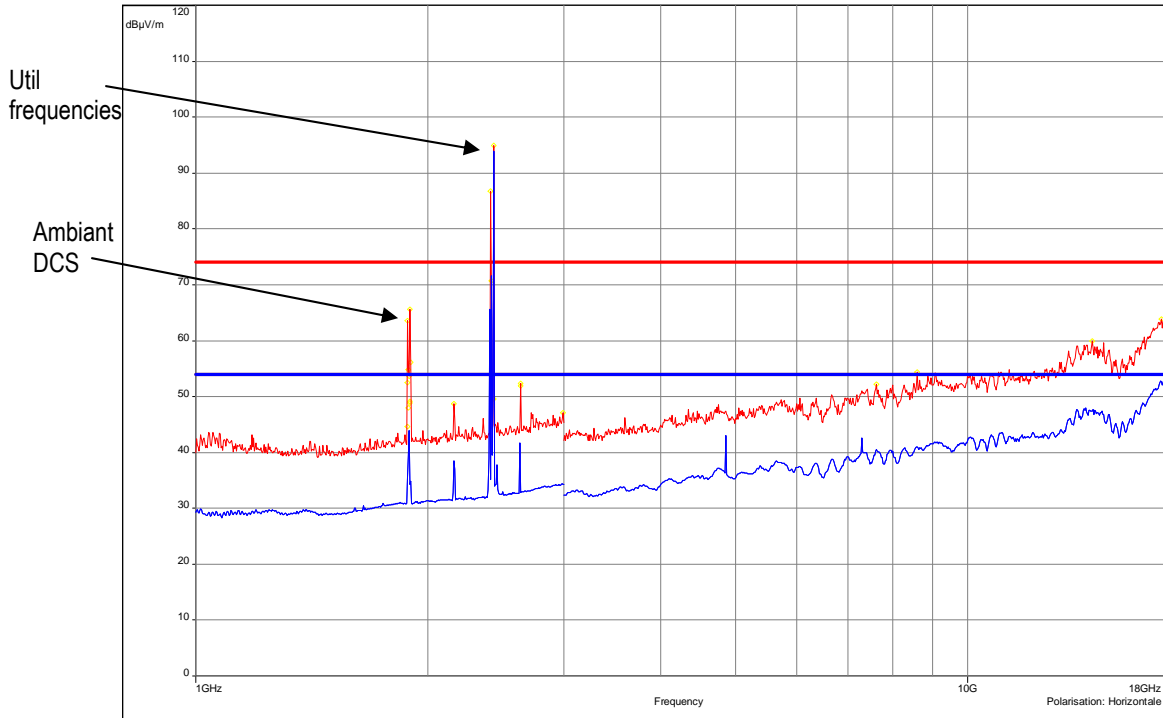
Technician: DM

Class: B of the standard

Detection:
Peak

T (°C): 23.2
H (%): 35
P (hpa): 1010

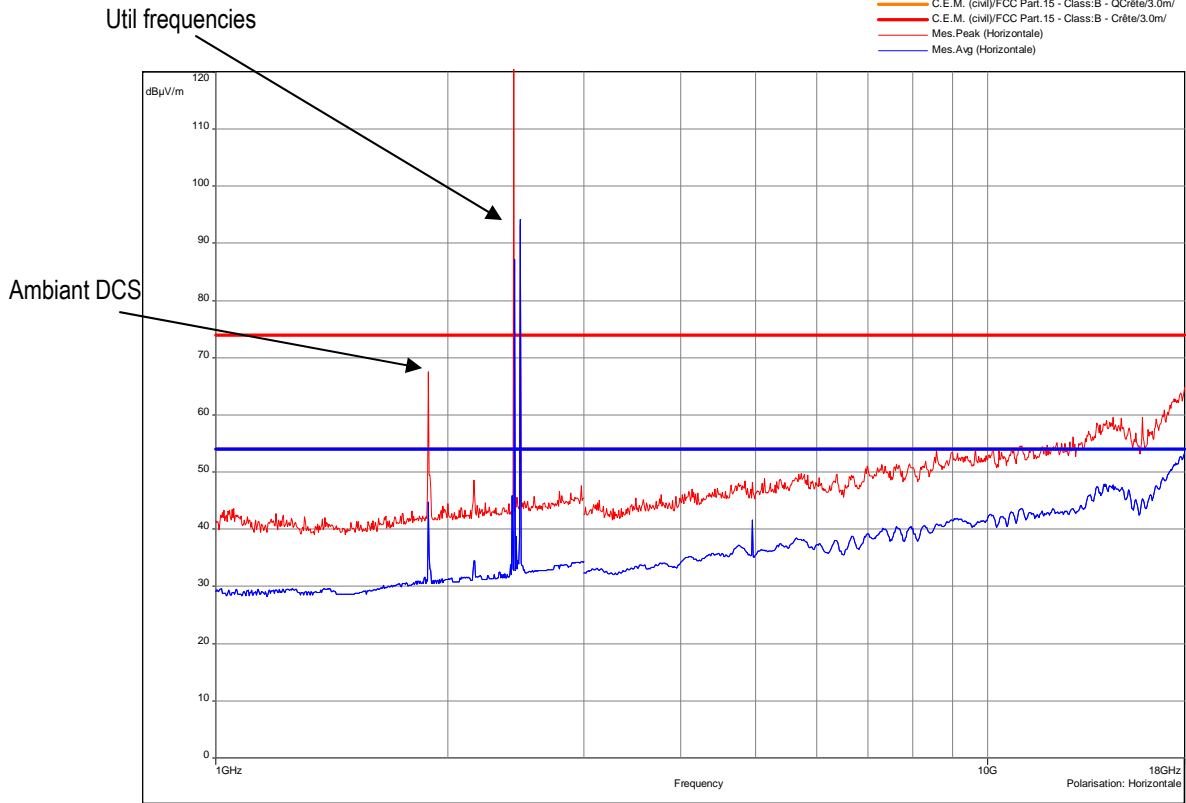
Modification(s) during test:



Radiated electric emission (measurement)

EMI935

MORPHOCHECK 300 / Bluetooth Ch79 / Wi-Fi Ch6



Date: 20/04/2011

Technician: DM

Class: B of the standard

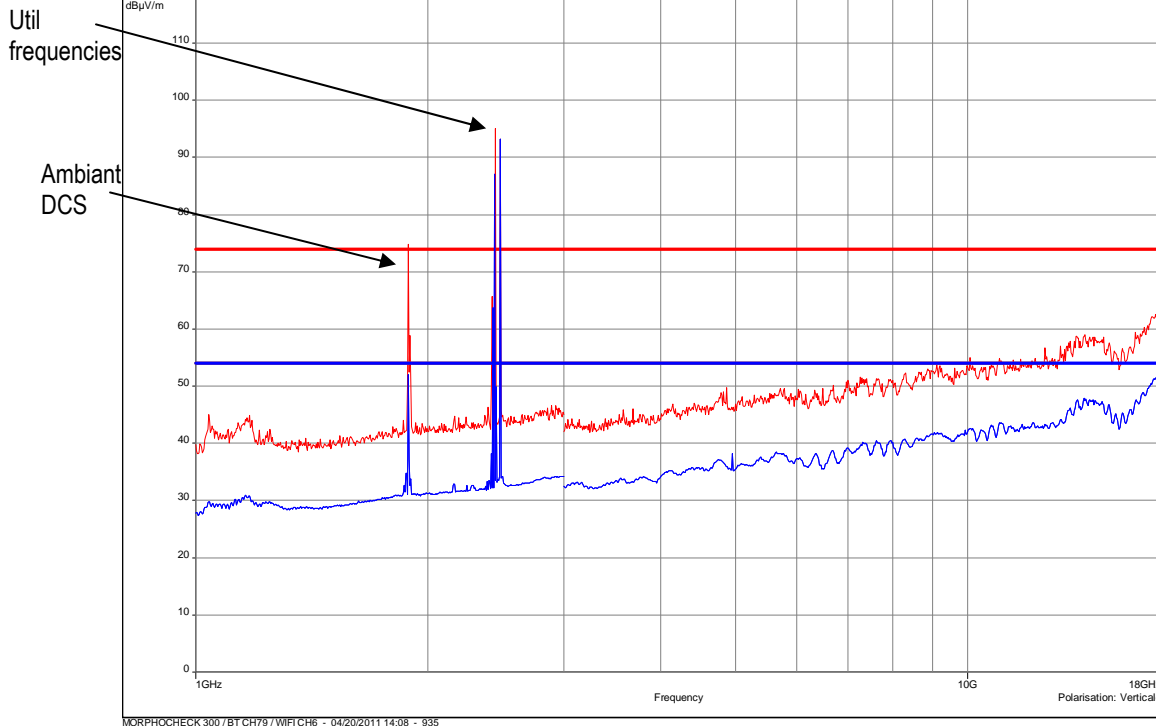
Detection:
Peak

T (°C): 23.2

H (%): 35

P (hpa): 1010

Modification(s) during test:



c) Final radiated electric emission on Open Area Test Site

Test configuration:

Frequency band	E.U.T. Configuration	Resolution bandwidth	Video bandwidth	Detection mode	E.U.T. height
30MHz-1GHz	MORPHOCHECK 2X0 / Bluetooth Ch1 / Wi-Fi Ch11	120kHz	300kHz	Quasi peak	80cm
30MHz-1GHz	MORPHOCHECK 300 / Bluetooth Ch79 / Wi-Fi Ch6	120kHz	300kHz	Quasi peak	80cm
1GHz-18GHz	MORPHOCHECK 2X0 / Bluetooth Ch1 / Wi-Fi Ch11	1MHz	3MHz	Peak and average	80cm
1GHz-18GHz	MORPHOCHECK 300 / Bluetooth Ch1 / Wi-Fi Ch11	1MHz	3MHz	Peak and average	80cm

For each measured frequencies, E.U.T. is set via a turntable in order to find the highest level. Test antenna is set between 1m and 4m in order to find the highest level in vertical and horizontal polarization.

Only highest levels are recorded.

E.U.T. is powered at its nominal power supply.

Measuring distance: 3 meters

Test equipment list (Open area measurement):

CATEGORY	BRAND	TYPE	N° EMITECH	CAL DATE	DUE DATE
Antenna	Electro-Metrics	BIA-30HF	1107	13/11/06	12/01/11
Antenna	Rohde & Schwarz	HL223	3126	13/11/06	12/01/11
Antenna	Emco	3115	1053	04/03/08	03/05/12
Antenna mast	Heinrich Deisel	HD100	4036	-	-
Antenna mast	Heinrich Deisel	MA240	4037	-	-
Cable		N-1m	2704	18/08/10	17/10/12
Cable		N-17m	3620	21/02/08	20/04/11
Cable		N-5m	2715	21/02/08	20/04/11
Cable		N-8m	3694	21/02/08	20/04/11
Filter	Micro-tronics	HPM 15162	5457	12/01/2010	12/03/2012
Preamplifier	Microwave	C005180F-4B1	2165	14/04/10	13/06/11
Open area test site	Emitech	Salinelles	3482	21/02/08	20/04/11
Receiver	Agilent Technologies	E7405A	2161	30/12/10	28/02/13
Turntable	Heinrich Deisel	D4420	4038	-	-

Results: See Board(s) hereafter

MORPHOCHECK 2X0

Frequency (MHz)	Polarization	Azimut (degree)	Antenna Height (cm)	Measure (dB μ V/m)	Limit (dB μ V/m)	Comments
39.11	Vertical	200	100	29.93	40	C
72.40	Vertical	0	100	17.70	40	C
72.40	Horizontal	120	200	15.90	40	C
81.36	Vertical	117	100	26.68	40	C
81.36	Horizontal	0	200	25.13	40	C
339.04	Vertical	240	135	35.68	46	C
427.04	Horizontal	0	100	19.90	46	C
427.04	Vertical	0	100	19.90	46	C
461.04	Vertical	0	113	41.96	46	C

C= Compliant

NC= Not compliant

MORPHOCHECK 300

Frequency (MHz)	Polarization	Azimut (degree)	Antenna Height (cm)	Measure (dB μ V/m)	Limit (dB μ V/m)	Comments
33.00	Horizontal	136	160	17.73	40	C
38.39	Vertical	180	115	33.91	40	C
57.35	Horizontal	99	161	11.71	40	C
63.04	Vertical	180	115	20.15	40	C
71.75	Horizontal	99	161	11.53	40	C
74.94	Vertical	180	115	16.60	40	C
86.98	Vertical	180	115	23.08	40	C
87.17	Horizontal	99	161	18.68	40	C
101.43	Vertical	180	100	41.65	43	C
107.62	Horizontal	180	100	36.78	43	C
154.32	Vertical	180	115	20.12	43	C
166.20	Vertical	180	115	23.92	43	C
184.87	Horizontal	180	115	15.74	43	C
352.55	Vertical	240	115	39.09	46	C
379.69	Vertical	240	100	35.44	46	C
427.04	Vertical	0	100	19.90	46	C
427.04	Horizontal	0	100	19.90	46	C
461.04	Vertical	97	113	43.62	46	C
488.16	Vertical	0	100	44.12	46	C

C= Compliant

NC= Not compliant

MORPHOCHECK XXX / BLUETOOTH CH79

Frequency (MHz)	Polarization	Azimut (degree)	Antenna Height (cm)	Measures (dB μ V/m)		Limits (dB μ V/m)		Comments
				Peak	AV	Peak	AV	
2480.00	Horizontal	74	100	90.10	-	125.2(*)	-	C
2480.00	Vertical	269	100	87.56	-	125.2(*)	-	C
4960.00	Vertical	0	100	54.12	39.60	74	54	C
4960.00	Horizontal	0	100	51.92	40.00	74	54	C

AV=Average measurement

C= Compliant

NC= Not compliant

All other radiated emissions are lower than limit.

MORPHOCHECK XXX / Wi-Fi CH6

Frequency (MHz)	Polarization	Azimut (degree)	Antenna Height (cm)	Measures (dB μ V/m)		Limits (dB μ V/m)		Comments
				Peak	AV	Peak	AV	
2437.50	Vertical	0	100	90.23	-	125.2(*)	-	C

AV=Average measurement

C= Compliant

NC= Not compliant

All other radiated emissions are lower than limit.

MORPHOCHECK XXX / BLUETOOTH CH6

Frequency (MHz)	Polarization	Azimut (degree)	Antenna Height (cm)	Measures (dB μ V/m)		Limits (dB μ V/m)		Comments
				Peak	AV	Peak	AV	
2432.00	Horizontal	225	161	90.96	-	125.2(*)	-	C
2432.00	Vertical	160	164	87.10	-	125.2(*)	-	C

AV=Average measurement

C= Compliant

NC= Not compliant

All other radiated emissions are lower than limit.

MORPHOCHECK XXX / Wi-Fi CH1

Frequency (MHz)	Polarization	Azimut (degree)	Antenna Height (cm)	Measures (dB μ V/m)		Limits (dB μ V/m)		Comments
				Peak	AV	Peak	AV	
2412.00	Vertical	88	160	94.74	-	125.2(*)	-	C
2412.00	Horizontal	240	160	98.94	-	125.2(*)	-	

AV=Average measurement

C= Compliant

NC= Not compliant

All other radiated emissions are lower than limit.

MORPHOCHECK XXX / BLUETOOTH CH1

Frequency (MHz)	Polarization	Azimut (degree)	Antenna Height (cm)	Measures (dB μ V/m)		Limits (dB μ V/m)		Comments
				Peak	AV	Peak	AV	
2402.00	Horizontal	225	116	90.99	-	125.2(*)	-	C
2402.00	Vertical	148	160	86.48	-	125.2(*)	-	C

AV=Average measurement

C= Compliant

NC= Not compliant

All other radiated emissions are lower than limit.

MORPHOCHECK XXX / Wi-Fi CH11

Frequency (MHz)	Polarization	Azimut (degree)	Antenna Height (cm)	Measures (dBμV/m)		Limits (dBμV/m)		Comments
				Peak	AV	Peak	AV	
2467.00	Vertical	91	160	91.78	-	125.2(*)	-	C
2467.00	Horizontal	91	160	93.38		125.2(*)		

AV=Average measurement

C= Compliant

NC= Not compliant

All other radiated emissions are lower than limit.

(*) This limit is a theoretical conversion of standard limit given for 1W conducted power. E.U.T. antenna gain is less than 6dBi. Limit is reached by the following calculation:

$$E = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{with} \quad \begin{array}{l} P \text{ in Watt (conducted power limit)} \\ G = 1 \text{ (dipole antenna theoretical gain)} \\ d = 3 \text{ m (test distance)} \\ E = \text{Equivalent radiated electric field (V/m)} \end{array}$$

8. OPERATION WITHIN THE BAND 13.110-14.010 MHZ – SECTION 15.225

a) Field strength

Standard: FCC part 15 Subpart C 15.225

Test method: ANSI C63.4:2003

Test configuration:

Frequency band	Tested side	Resolution bandwidth	Video bandwidth	Detection mode	E.U.T. height
13.11MHz-14.01MHz	MORPHOCHECK antenna 0°	10kHz	30kHz	Peak	80cm
13.11MHz-14.01MHz	MORPHOCHECK 300 antenna 45°	10kHz	30kHz	Peak	80cm
13.11MHz-14.01MHz	MORPHOCHECK 300 antenna 90°	10kHz	30kHz	Peak	80cm
13.11MHz-14.01MHz	MORPHOCHECK 2X0 antenna 90°	10kHz	30kHz	Peak	80cm
13.11MHz-14.01MHz	MORPHOCHECK 2X0 antenna 45°	10kHz	30kHz	Peak	80cm
13.11MHz-14.01MHz	MORPHOCHECK 2X0 antenna 0°	10kHz	30kHz	Peak	80cm

Measure is done with an antenna position of 0°, 90° and 45°.

E.U.T. configuration: Bluetooth Ch79 / Wi-Fi Ch6 only.

Test method deviation: Measurements are given in dBμA/m instead of dBμV/m (conversion factor: 51.5 dB). Final measuring distance is 10 meters instead of 30 m. Pre measurement distance is 3m.

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	CAL DATE	DUE DATE
Antenna	Rohde & Schwarz	HFH2-Z2	5825	20/08/10	19/10/12
Cable	C&C	N-1.5m	5017	31/08/09	30/10/11
Cable	C&C	N-8m	5014	18/08/10	17/10/12
Cable		N-17m	3620	21/02/08	20/04/11
Open area test site	Emitech	Salinelles	3482	21/02/08	20/04/11
Receiver	Agilent	E4440A	5824	19/04/10	18/06/12
Software	Nexio	BAT EMC	0000	-	-

BAT-EMC software version: V3.5.0.2

Results: See Graph(s) of pre-measurements hereafter

For Morphocheck 300: Carrier outdoor measurement at 10m: 3.2 dBμA/m (≈ 54.7 dBμV/m)
Using an extrapolation factor of 40 dB/decade (as described in section 15.31 (f)), the level is about 34.7 dBμV/m (54.32μV/m) at 30m for a limit at 15.848 mV/m.

For Morphocheck 2X0: Carrier outdoor measurement at 10m: 3.4 dBμA/m (≈ 54.9 dBμV/m)
Using an extrapolation factor of 40 dB/decade (as described in section 15.31 (f)), the level is about 34.9 dBμV/m (55.59μV/m) at 30m for a limit at 15.848 mV/m.

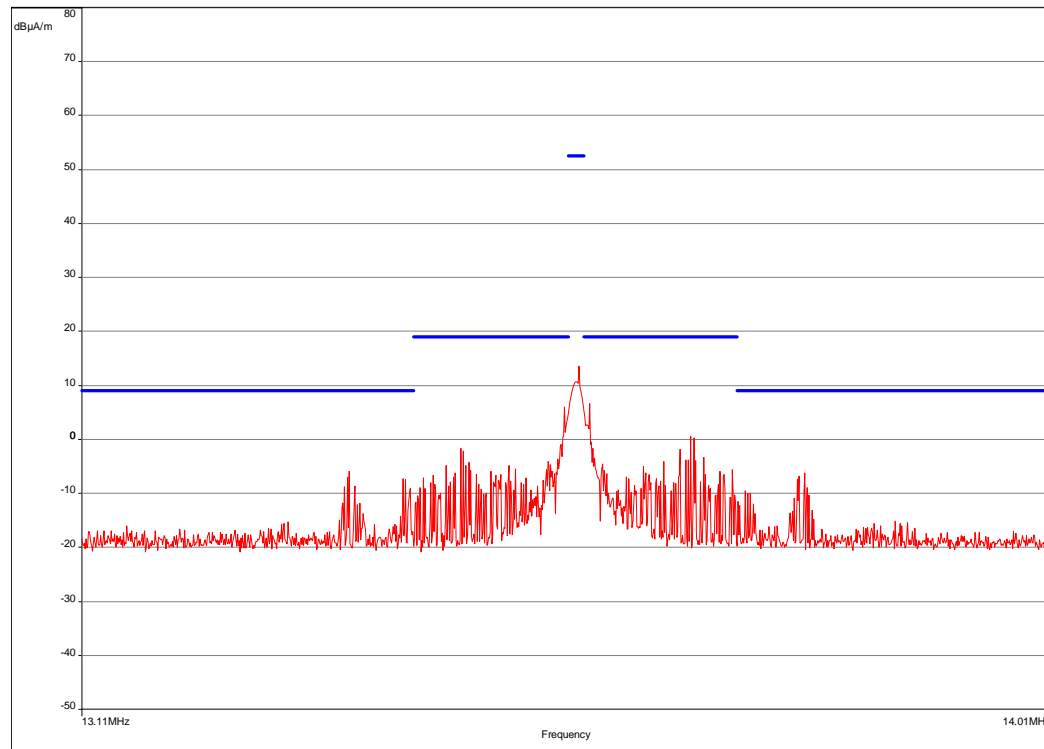
Radiated magnetic field emission (indoor 3m measurement)

EMI1044

MORPHOCHECK 300 / BT CH 79 / WIFI CH6 / 13.56M / antenna 0°

Frequency : 13.11 MHz - 14.01 MHz (Analyzer mode)
 Settings: RBW: 10 kHz, VBW: 30 kHz, Holding time: 1 ms/Pl, sweep count 5
 Polarisation : Circulaire
 Distance: 3 m

RADIO/FCC Part.15 (13.56MHz) - Class:em - QCrête/3.0m/
 Mes.Peak



MORPHOCHECK 300 / BT CH 79 / WIFI CH6 / 13.56M / antenna 0° - 04/20/2011 15:06 - 1044

Date: 20/04/2011

Technician: DM

Class: em of the standard

Detection:
 Peak

T (°C): 24.3
 H (%): 33.6
 P (hpa): 1012

Modification(s) during test:

Limit indicated on this plot is calculated with 20 dB/decade extrapolation factor and 51.5 dB conversion factor.

$$L = 20 \log(L_s) - 51.5 + 20 \quad (F > 490 \text{ kHz})$$

with L : limit of this graph (in dBμA/m) and Ls : limit of the standard (in μV/m)

For a 40 dB/decade extrapolation factor, please add 20 dB on graph limit.

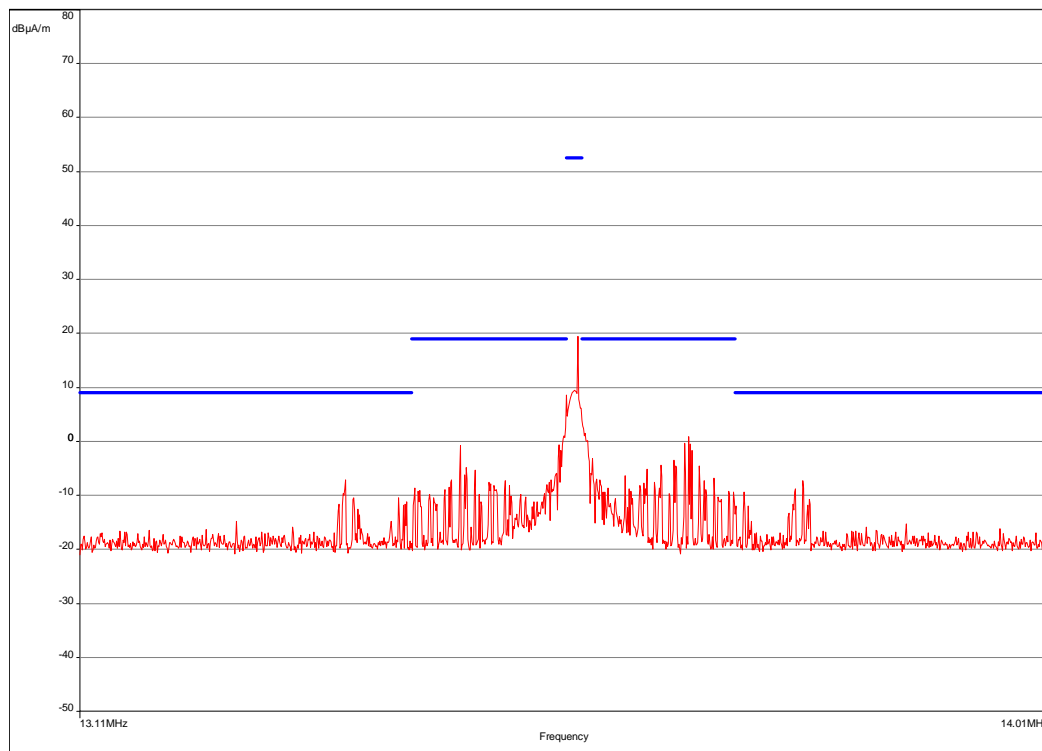
Radiated magnetic field emission (indoor 3m measurement)

EMI1045

MORPHOCHECK 300 / BT CH 79 / WIFI CH6 / 13.56M / antenna 45°

Frequency : 13.11 MHz - 14.01 MHz (Analyzer mode)
 Settings: RBW: 10 kHz, VBW: 30 kHz, Holding time: 1 ms/Pl, sweep count 5
 Polarisation : Circulaire
 Distance: 3 m

RADIO/FCC Part.15 (13.56MHz) - Class:em - QCrête/3.0m/
 Mes.Peak



MORPHOCHECK 300 / BT CH 79 / WIFI CH6 / 13.56M / antenna 45° - 04/20/2011 15:09 - 1045

Date: 20/04/2011

Technician: DM

Class: em of the standard

Detection:
 Peak

T (°C): 24.3
 H (%): 33.6
 P (hpa): 1012

Modification(s) during test:

Limit indicated on this plot is calculated with 20 dB/decade extrapolation factor and 51.5 dB conversion factor.

$$L = 20 \log(L_s) - 51.5 + 20 \quad (F > 490 \text{ kHz})$$

with L : limit of this graph (in dBμA/m) and Ls : limit of the standard (in μV/m)

For a 40 dB/decade extrapolation factor, please add 20 dB on graph limit.

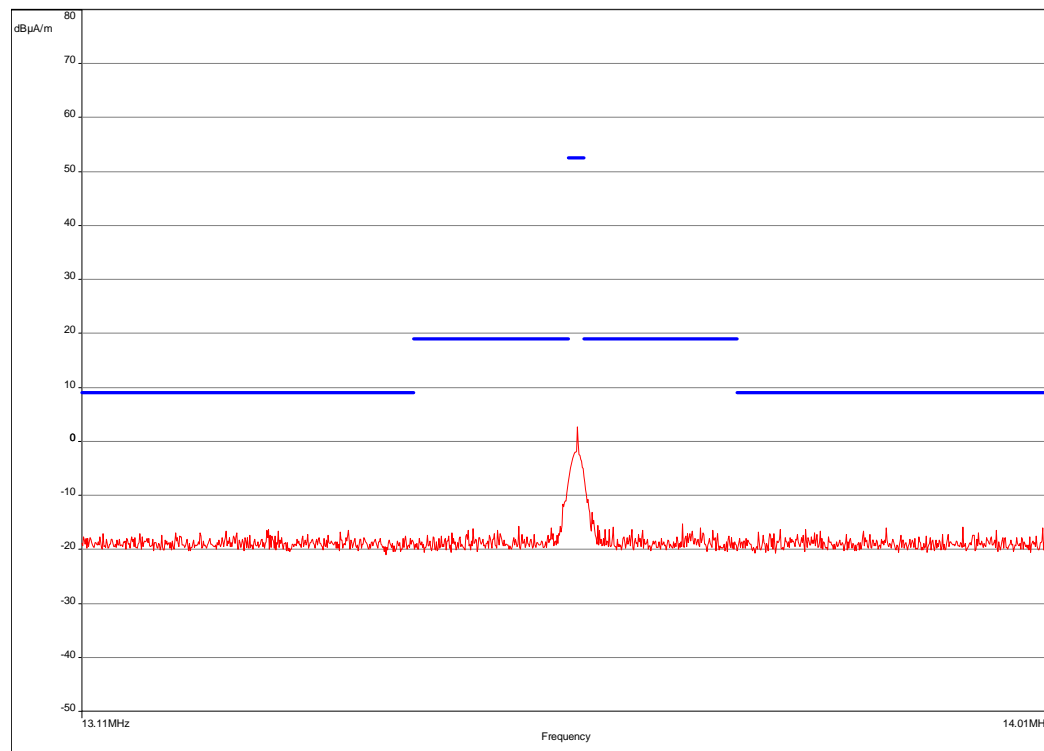
Radiated magnetic field emission (indoor 3m measurement)

EMI1048

MORPHOCHECK 300 / BT CH 79 / WIFI CH6 / 13.56M / antenna 90°

Frequency : 13.11 MHz - 14.01 MHz (Analyzer mode)
 Settings: RBW: 10 kHz, VBW: 30 kHz, Holding time: 1 ms/Pl, sweep count 5
 Polarisation : Circular
 Distance: 3 m

RADIO/FCC Part.15 (13.56MHz) - Class:em - QCrête/3.0m/
 Mes.Peak



Date: 20/04/2011

Technician: DM

Class: em of the standard

Detection:
Peak

T (°C): 24.3

H (%): 33.6

P (hpa): 1012

Modification(s) during test:

Limit indicated on this plot is calculated with 20 dB/decade extrapolation factor and 51.5 dB conversion factor.

$$L = 20 \log(L_s) - 51.5 + 20 \quad (F > 490 \text{ kHz})$$

with L : limit of this graph (in dBμA/m) and Ls : limit of the standard (in μV/m)

For a 40 dB/decade extrapolation factor, please add 20 dB on graph limit.

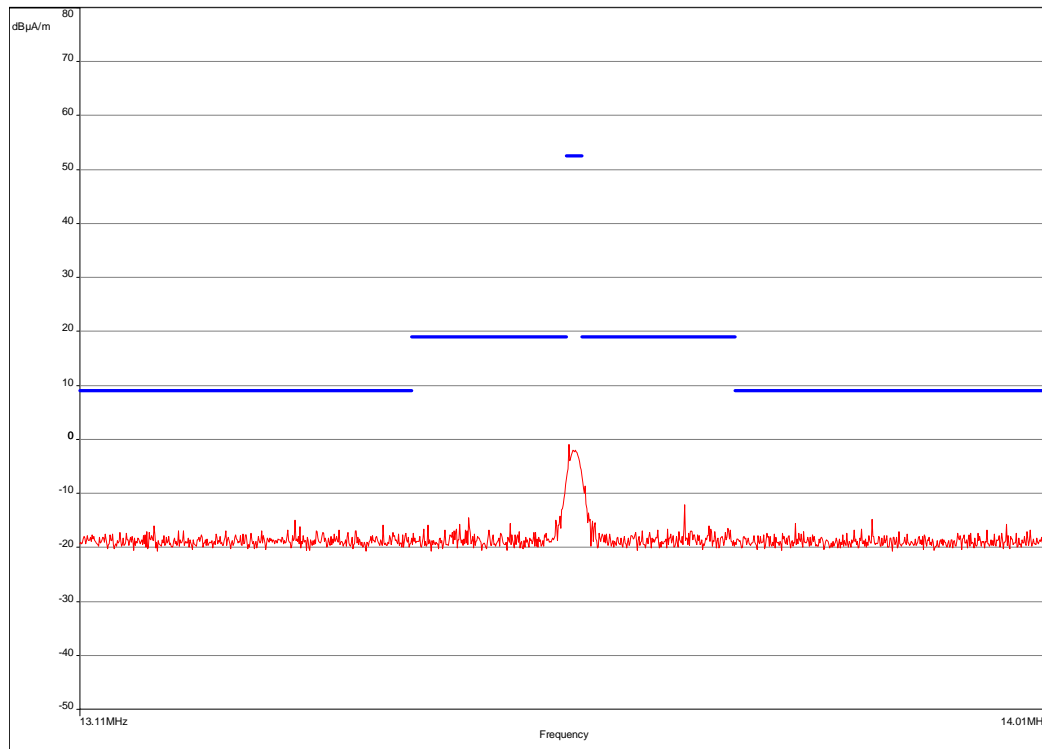
Radiated magnetic field emission (indoor 3m measurement)

EMI1049

MORPHOCHECK 2X0 / BT CH 79 / WIFI CH6 / 13.56M / antenna 90°

Frequency : 13.11 MHz - 14.01 MHz (Analyzer mode)
 Settings: RBW: 10 kHz, VBW: 30 kHz, Holding time: 1 ms/Pl, sweep count 5
 Polarisation : Circular
 Distance: 3 m

RADIO/FCC Part.15 (13.56MHz) - Class:em - QCrête/3.0m/
 Mes.Peak



Date: 20/04/2011

Technician: DM

Class: em of the standard

Detection:
Peak

T (°C): 24.3

H (%): 33.6

P (hpa): 1012

Modification(s) during test:

Limit indicated on this plot is calculated with 20 dB/decade extrapolation factor and 51.5 dB conversion factor.

$$L = 20 \log(L_s) - 51.5 + 20 \quad (F > 490 \text{ kHz})$$

with L : limit of this graph (in dBμA/m) and Ls : limit of the standard (in μV/m)

For a 40 dB/decade extrapolation factor, please add 20 dB on graph limit.

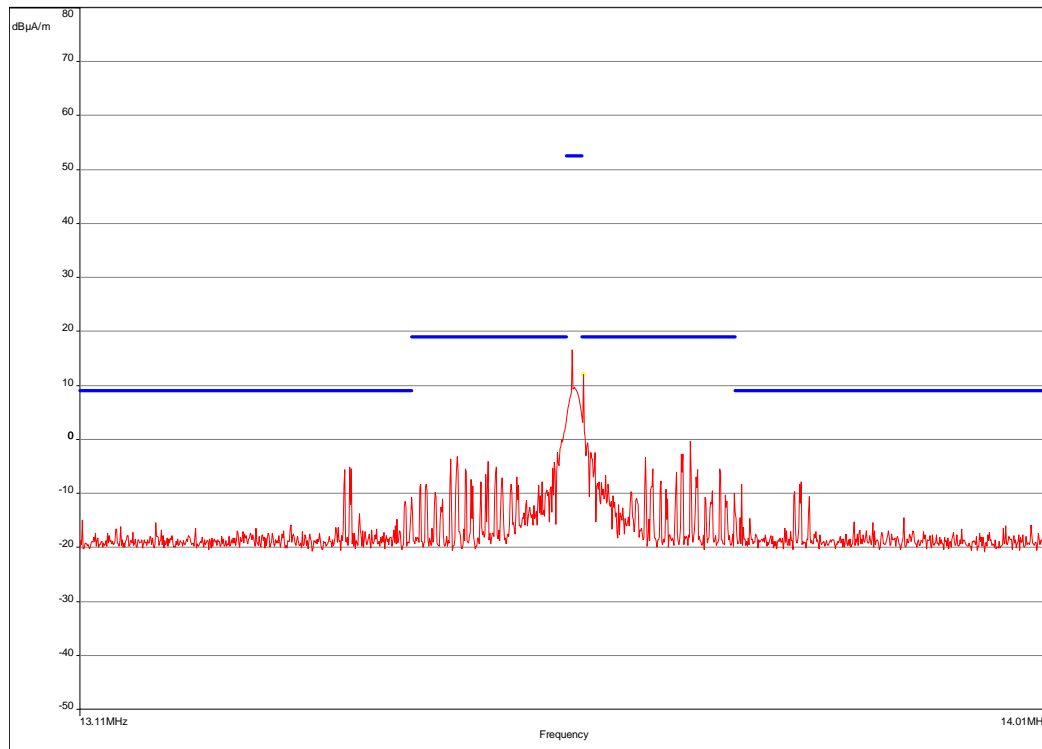
Radiated magnetic field emission (indoor 3m measurement)

EMI1052

MORPHOCHECK 2X0 / BT CH 79 / WIFI CH6 / 13.56M / antenna 45°

Frequency : 13.11 MHz - 14.01 MHz (Analyzer mode)
 Settings: RBW: 10 kHz, VBW: 30 kHz, Holding time: 1 ms/Pl, sweep count 5
 Polarisation : Circulaire
 Distance: 3 m

RADIO/FCC Part.15 (13.56MHz) - Class:em - QCrête/3.0m/
 Mes. Peak
 Peak/LimQ-Peak



MORPHOCHECK 2X0 / BT CH 79 / WIFI CH6 / 13.56M / antenna 45° - 04/20/2011 15:37 - 1052

Date: 20/04/2011

Technician: DM

Class: em of the standard

Detection:
Peak

T (°C): 24.3
H (%): 33.6
P (hpa): 1012

Modification(s) during test:

Limit indicated on this plot is calculated with 20 dB/decade extrapolation factor and 51.5 dB conversion factor.

$$L = 20 \log(L_s) - 51.5 + 20 \quad (F > 490 \text{ kHz})$$

with L : limit of this graph (in dBμA/m) and Ls : limit of the standard (in μV/m)

For a 40 dB/decade extrapolation factor, please add 20 dB on graph limit.

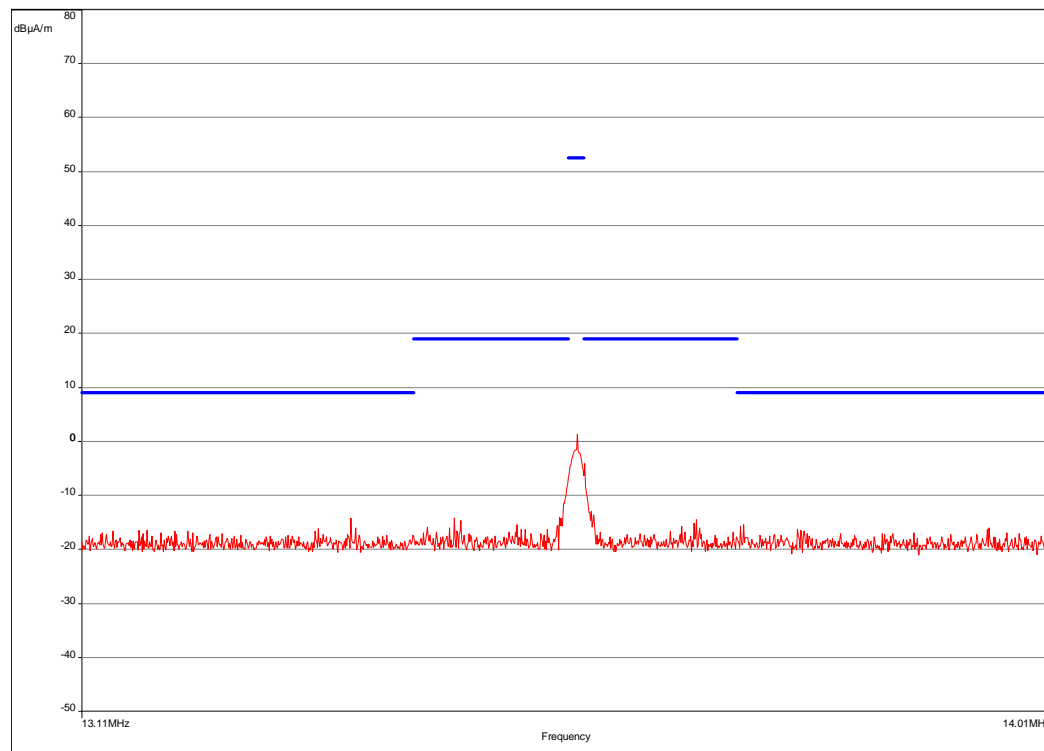
Radiated magnetic field emission (indoor 3m measurement)

EMI1053

MORPHOCHECK 2X0 / BT CH 79 / WIFI CH6 / 13.56M / antenna 0°

Frequency : 13.11 MHz - 14.01 MHz (Analyzer mode)
 Settings: RBW: 10 kHz, VBW: 30 kHz, Holding time: 1 ms/Pl, sweep count 5
 Polarisation : Circular
 Distance: 3 m

RADIO/FCC Part.15 (13.56MHz) - Class:em - QCrête/3.0m/
 Mes.Peak



Date: 20/04/2011

Technician: DM

Class: em of the standard

Detection:
Peak

T (°C): 24.3

H (%): 33.6

P (hpa): 1012

Modification(s) during test:

Limit indicated on this plot is calculated with 20 dB/decade extrapolation factor and 51.5 dB conversion factor.

$$L = 20 \log(L_s) - 51.5 + 20 \quad (F > 490 \text{ kHz})$$

with L : limit of this graph (in dBμA/m) and Ls : limit of the standard (in μV/m)

For a 40 dB/decade extrapolation factor, please add 20 dB on graph limit.

9. FREQUENCY TOLERANCE – SECTION 15.225

Standard: FCC part 15 Subpart C 15.225

Test method: FCC part 15 Subpart C 15.225

Test configuration: A near field probe detects field near equipment (relative measurement).

Resolutions:

Frequency	Resolution bandwidth	Video bandwidth
13.56MHz	3Hz	10Hz

Test method deviation: E.U.T. is powered by internal batteries witch cannot be submitted by external power supply (smart batteries); due to this E.U.T. configuration no power supply variations were done.

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	CAL DATE	DUE DATE
Antenna	Emitech	3.5 cm	4653	-	-
Climatic enclosure	Secasi	SM600C	1670	10/10/08	09/12/10
Multimeter	Agilent	U1252A	6138	15/10/08	14/12/10
Power supply	KIKUSUI	PCR2000L	0800	-	-
Receiver	Agilent	E4440A	5824	19/04/10	18/06/12

Standard limits: +/- 0.01% of the operating frequency

Results: See Board(s) below

E.U.T. operating mode: with modulation

	Temperature	Power supply	Measured Frequency (MHz)	Frequency tolerance (kHz)	Limit (kHz)
Normal condition	20°C Humidity 32%	No variations	13.560223	-	+/-1.35606
	-20°C	No variations	13.560333	-0.110	
	+50°C	No variations	13.560193	-0.030	

□□□ End of report – 1 annex to be forwarded □□□

ANNEX: PHOTOGRAPH(S)

EQUIPMENT UNDER TEST (E.U.T.) PHOTOGRAPH(S)

MORPHOCHECK 2 XXX

Radiated electric
field emission on
OATS



Conducted emission

