PHOENIX TESTLAB
Königswinkel 10
32825 Blomberg
Germany
Phone +49 5235 9500-0
Fax +49 5235 9500-10

TEST REPORT

Test Report Reference: R71312 Edition 1

Equipment under Test:
WLAN Converter for RS232, RS422 and RS485
FL WLAN SPA

Order No.: 28 84 761

Applicant: connectBlue

Manufacturer: connectBlue

Test Laboratory
(CAB)

accredited by DATech GmbH
in compliance with DIN EN ISO/IEC 17025
under the Reg. No. DAT-P-105/99-21,

recognized by Bundesnetzagentur
under the Reg.-No. BNetzA-CAB-02/21-104/1,

CAB Designation Number DE0004,

listed by
FCC 31040/SIT1300F2
FCC Test site registration number 90877

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1 IDENTIFICATION

1.1 APPLICANT

Name:	connectBlue AB
Address:	Norra Vallgatan 64 3V, Malmö
	SE-211 22 Malmö
Country:	Sweden
Name for contact purposes:	Mr. Magnus Johansson
Tel:	+ 46 40 63 07 109
Fax:	+ 46 40 23 71 37
e-mail address:	magnus.johansson@connectblue.se

1.2 MANUFACTURER

Name:	connectBlue AB
Address:	Norra Vallgatan 64 3V, Malmö
	SE-211 22 Malmö
Country:	Sweden
Name for contact purposes:	Mr. Magnus Johansson
Tel:	+ 46 40 63 07 109
Fax:	+ 46 40 23 71 37
e-mail address:	magnus.johansson@connectblue.se

1.3 DATES

Date of receipt of test sample:	09 July 2007
Start of test:	17 July 2007
Finish of test:	26 July 2007

1.4 TEST LABORATORY

The tests were carried out at: **PHOENIX TESTLAB GmbH**
Königswinkel 10
D-32825 Blomberg **Phone: +49 (0) 52 35 / 95 00-0**
Germany **Fax: +49 (0) 52 35 / 95 00-10**

Test engineer:	Dieter SÜTTHOFF		04 September 2007
	Name	Signature	Date
Test report checked:	Bernd STEINER		04 September 2007
	Name	Signature	Date

PHOENIX TESTLAB GmbH
Königswinkel 10
32825 Blomberg
Tel. 0 52 35 / 95 00-0
Fax 0 52 35 / 95 00-10

Stamp

1.5 RESERVATION

This test report is only valid in its original form.

The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT REFERENCE.

1.6 NORMATIVE REFERENCES

[1] **ANSI C63.4:2003** American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

[2] **FCC 47 CFR Part 2** General Rules and Regulations

[3] **FCC 47 CFR Part 15** Radio Frequency Devices (Subpart B)

1.7 TEST RESULTS

The requirements of this test document are fulfilled by the equipment under test. The complete test results are presented in the following.

2 TECHNICAL DATA OF EQUIPMENT

2.1 DEVICE UNDER TEST

Type of equipment:	WLAN Converter for RS232 RS422 and RS485
Type designation:	FL WLAN SPA
Order No.:	28 84 761
Highest operating frequency (module adaptor):	<= 260 kHz
Highest operating frequency (radio module):	2.462 GHz
FCC-ID (WLAN transceiver module)	FCC-ID PVH090802

* declared by the applicant

The following external I/O cables were used:

Cable	Length	Shielding	Connector
AC/DC-input	2 m	No	Combicon
RS422	2.1 m	Yes	D-Sub 9 pin
RS232	2 m	Yes	D-Sub

2.2 PEREPHERY DEVICES

The ancillary equipment mentioned below was in use:

Notebook	ACER TravelMate 525TXV Model No. 1904
Converter RS232 to RS422	PHOENIX CONTACT PSM-ME-RS232/RS422-R
Converter BT to RS422	connectBlue cB-ACOPO332s
Converter BT to RS232	connectBlue cB-RSPA333s
Echo plug to reflect data transfer	Sub-D connector
Mains adapter	Phoenix Contact MINI-PS-100-240AC/24DC/1

3 ADDITIONAL INFORMATION

The tested samples were not marked with a type plate according to the FCC-rules.
The FL WLAN SPA contains two main parts: A module adaptor and a WLAN transceiver module, which is already certified under FCC-ID PVH090802.

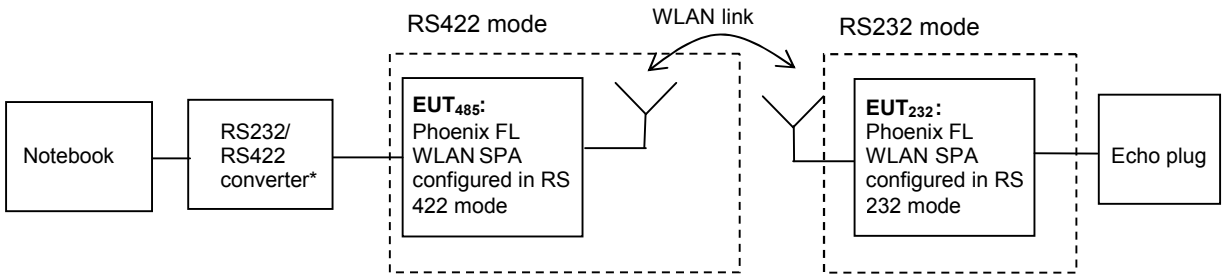
4 OPERATIONAL STATES AND PHYSICAL BOUNDARIES

The following states were defined as the operating conditions:

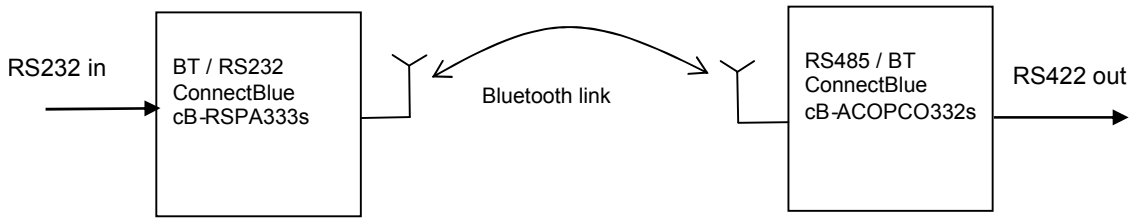
- The setup for RS 232 mode and RS422 mode:
  The EquipmentUnterTest (EUT_{232}) is configured into RS232 mode and the second EquipmentUnterTest (EUT_{485}) is configured into RS422 mode. With test software “Produce and Echo” producer mode is running on a notebook. A bit stream was generated which was fed to the RS232/RS422 converter* The RS232/RS422 converter* transmits the bit stream to the EUT_{485} via RS422 data transfere. The EUT_{485} transmits the bit stream via WLAN to the EUT_{232}. On the RS232 interface an echo plug looped back the bit stream over the same transmission network back to the notebook. The notebook compares the transmitted and received bit stream.

  Depending on what mode was tested, the EUT_{232} or the EUT_{485} is considered as EUT in the described set up.

The system was set up as follows:



*: The RS232 / RS422 converter was realized with two converters in the following way:



5 TESTOVERVIEW

5.1 EMISSION

Conducted emissions FCC 47 CFR Part 15 section 15.107 (b)[2]					
Application	Frequency range	Limits	Reference standard	Remark	Status
On AC supply line	0.15 to 0.5 MHz 0.5 to 5 MHz 5 to 30 MHz	66 to 56 dBµV (QP)* 56 to 46 dBµV (AV)* 56 dBµV (QP) 46 dBµV (AV) 60 dBµV (QP) 50 dBµV (AV)	ANSI C63.4 (2003)	Class B equipment	Passed
Radiated emissions FCC 47 CFR Part 15 section 15.109 (b)[2]					
Application	Frequency range	Limits	Reference standard	Remark	Status
Radiated emissions	30 – 88 MHz 88 – 216 MHz 216 – 960 MHz above 960 MHz	30 dBµV/m 33.5 dBµV/m 36.0 dBµV/m 43.9 dBµV/m	ANSI C63.4 (2003);	Class B equipment	Passed

* Decreases with the logarithm of the frequency.

6 TEST RESULTS

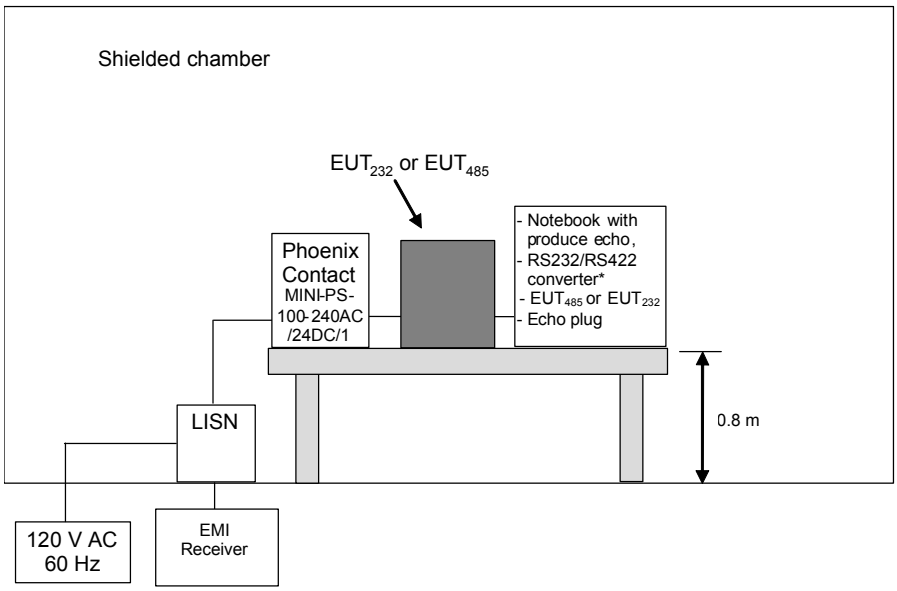
6.1 CONDUCTED EMISSIONS ON POWER SUPPLY LINES (150 kHz to 30 MHz)

6.1.1 METHOD OF MEASUREMENT

This test will be carried out in a shielded chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm above the ground plane. Floor-standing devices will be placed directly on the ground plane. The set up of the Equipment under test will be in accordance to
ANSI C63.4-2003 [1].

The frequency range 150 kHz to 30 MHz will be measured with an EMI Receiver set to MAX Hold mode with peak and average detector and a resolution bandwidth of 9 kHz. A scan will be carried out on the phase (or plus pole in case of DC powered devices) of the AC mains network. If levels detected 10 dB below the appropriable limit, this emission will be measured with the average and quasi-peak detector on all lines.

Frequency range	Resolution bandwidth
150 kHz to 30 MHz	9 kHz



*: Details to RS232/RS422 converter are described in the chapter 4

6.1.2 TEST RESULTS (CONDUCTED EMISSIONS ON POWER SUPPLY LINES)

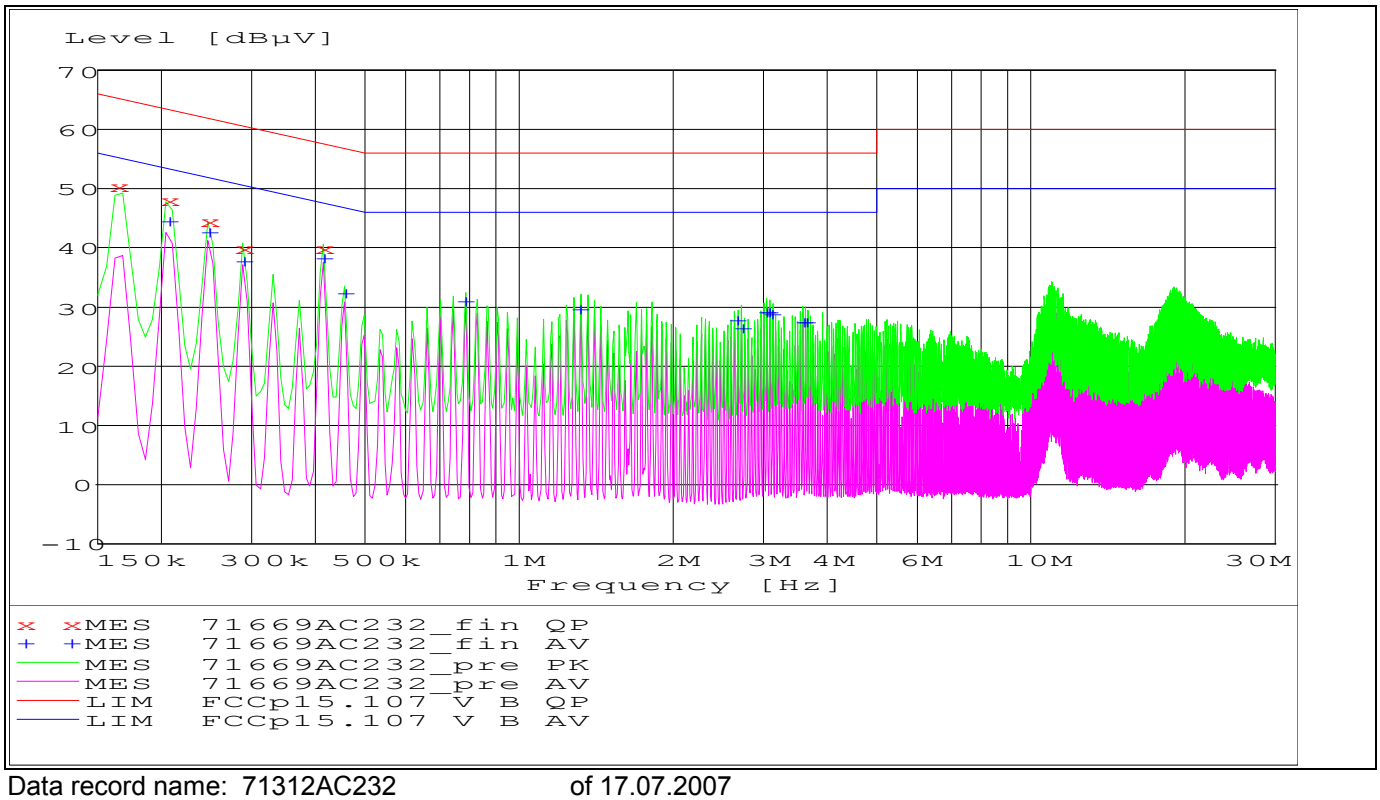
Ambient temperature	23 °C	Relative humidity	53 %

Position of EUT:	The EUT was set-up on a non-conducting table of a height of 0.8 m.
Cable guide:	The cable of the EUT was fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.
Test record:	All results are shown in the following.
Supply voltage:	During all measurements the EUT was supplied with Power supply Phoenix Contact MINI-PS-100-240AC/24DC/1.

Measurement uncertainty: +3.6 dB / -4.5 dB

Title:	Conducted Emission Test with Line Impedance Stabilisation Network
EUT:	FL WLAN SPA
Manufacturer:	connectBlue
Operating Condition:	120 V / 60 Hz; AC
Test site:	PHOENIX TESTLAB Blomberg M4
Operator:	D. Sütthoff
Test Specification:	**RS232 mode**
Comment:	data transfer with produce echo tool

The curves in the diagram only represent for each frequency point the maximum measured value of all preliminary measurements which were made for each power supply line. The top measured curve represents the peak measurement and the bottom measured curve the average measurement. The quasi-peak measured points are marked by x and the average measured points by +.



Data record name: 71312AC232 of 17.07.2007

Result measured with the quasipeak detector:

(These values are marked in the above diagram by x)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.165120	50.70	1.3	65.2	14.5	L1	FLO
0.205530	48.20	1.0	63.4	15.1	L1	FLO
0.247740	44.70	0.9	61.8	17.1	L1	FLO
0.288870	40.20	0.9	60.6	20.4	L1	FLO
0.412890	40.30	0.9	57.6	17.3	L1	FLO

Data record name: 71312AC232_fin QP of 17.07.2007

Result measured with the average detector:

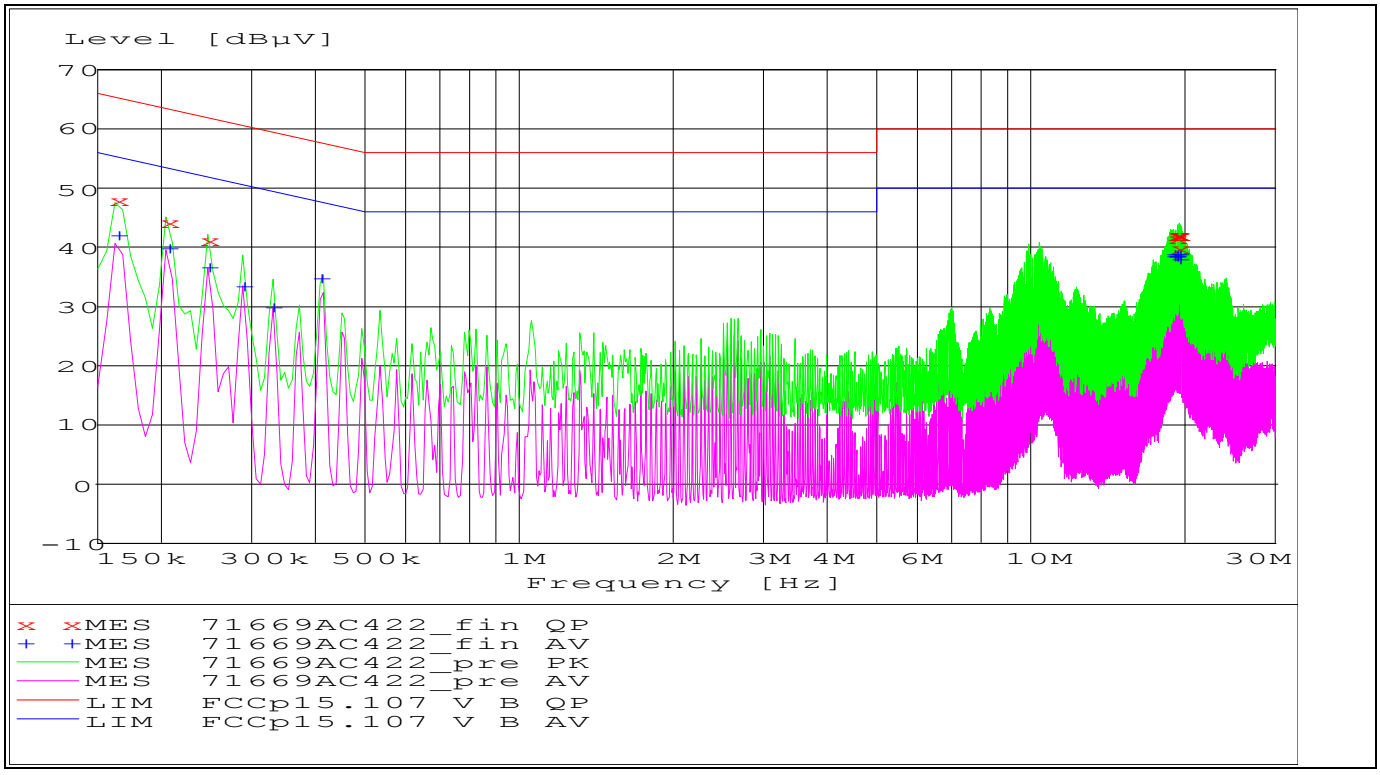
(These values are marked in the above diagram by +)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.206520	44.70	1.0	53.3	8.6	L1	FLO
0.247560	42.70	0.9	51.8	9.1	L1	FLO
0.288960	37.80	0.9	50.6	12.7	L1	FLO
0.412620	38.50	0.9	47.6	9.1	L1	FLO
0.453570	32.30	0.9	46.8	14.5	L1	FLO
0.783870	31.10	0.8	46.0	15.0	L1	FLO
1.320090	30.00	0.7	46.0	16.0	L1	FLO
2.676390	27.90	0.8	46.0	18.1	L1	FLO
2.717250	26.80	0.8	46.0	19.2	L1	FLO
3.046740	29.30	0.8	46.0	16.7	L1	FLO
3.087870	29.40	0.7	46.0	16.6	L1	FLO
3.129000	28.90	0.7	46.0	17.1	L1	FLO
3.581970	27.50	0.7	46.0	18.5	L1	FLO
3.623010	27.50	0.7	46.0	18.5	L1	FLO

Data record name: 71312AC232_fin AV of 17.07.2007

Title:	Conducted Emission Test with Line Impedance Stabilisation Network
EUT:	FL WLAN SPA
Manufacturer:	connectBlue
Operating Condition:	120 V / 60 Hz; AC
Test site:	PHOENIX TESTLAB Blomberg M4
Operator:	D. Sütthoff
Test Specification:	**RS422 mode**
Comment:	data transfer with produce echo tool

The curves in the diagram only represent for each frequency point the maximum measured value of all preliminary measurements which were made for each power supply line. The top measured curve represents the peak measurement and the bottom measured curve the average measurement. The quasi-peak measured points are marked by x and the average measured points by +.



Data record name: 71312AC422 of 17.07.2007

Result measured with the quasipeak detector:

(These values are marked in the above diagram by x)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.164670	48.00	1.3	65.2	17.2	L1	FLO
0.205800	44.50	1.0	63.4	18.8	L1	FLO
0.247290	41.10	0.9	61.8	20.8	L1	FLO
19.337280	42.20	2.4	60.0	17.8	L1	FLO
19.376610	41.70	2.4	60.0	18.3	L1	FLO
19.418820	42.10	2.4	60.0	17.9	L1	FLO
19.502070	42.30	2.4	60.0	17.7	L1	FLO
19.544280	42.20	2.4	60.0	17.8	L1	FLO
19.583700	42.30	2.4	60.0	17.7	L1	FLO
19.621860	39.80	2.4	60.0	20.2	N	FLO

Data record name: 71312AC422_fin QP of 17.07.2007

Result measured with the average detector:

(These values are marked in the above diagram by +)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.164940	42.10	1.3	55.2	13.1	L1	FLO
0.206160	40.00	1.0	53.4	13.3	L1	FLO
0.246930	36.70	0.9	51.9	15.2	L1	FLO
0.288060	33.70	0.9	50.6	16.9	N	FLO
0.329550	30.00	0.9	49.5	19.5	N	FLO
0.411540	35.00	0.9	47.6	12.6	L1	FLO
19.008960	38.80	2.3	50.0	11.2	L1	FLO
19.091940	38.90	2.3	50.0	11.1	L1	FLO
19.338540	38.80	2.4	50.0	11.2	L1	FLO
19.379760	38.70	2.4	50.0	11.3	L1	FLO
19.420080	39.20	2.4	50.0	10.8	L1	FLO
19.503060	39.00	2.4	50.0	11.0	L1	FLO
19.626720	38.20	2.4	50.0	11.8	L1	FLO

Data record name: 71312AC422_fin AV of 17.07.2007

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
1 – 3, 5, 6

6.2 RADIATED EMISSIONS

6.2.1 METHOD OF MEASUREMENT (RADIATED EMISSIONS)

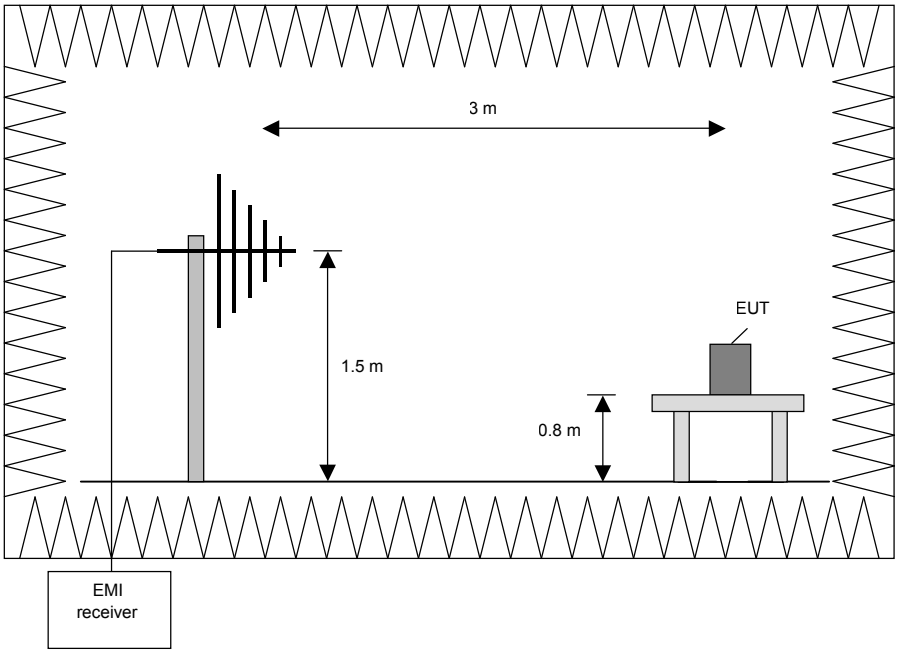
Preliminary measurement (30 MHz to 1 GHz)

In the first stage a preliminary measurement will be performed in a fully anechoic chamber with a measuring distance of 3 meter. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003 [1].

The frequency range 30 MHz to 1 GHz will be measured with an EMI Receiver set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 °.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 230 MHz	100 kHz
230 MHz to 1 GHz	100 kHz



Procedure preliminary measurement:

Prescans were performed in the frequency range 30 MHz to 230 MHz and 230 MHz to 1 GHz.
The following procedure will be used:

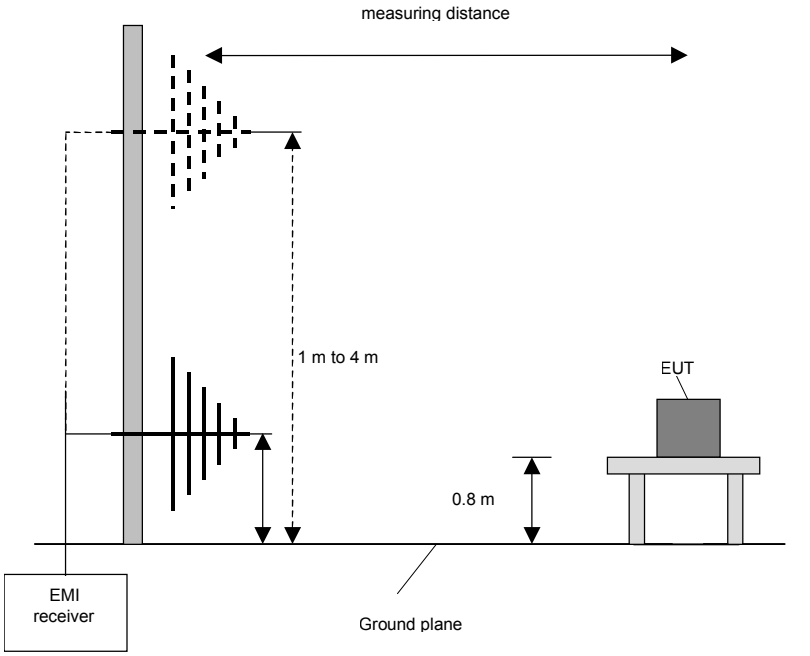
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
6. Repeat 1) to 4) with the other orthogonal axes of the EUT if handheld equipment.
7. Repeat 1) to 5) with the vertical polarisation of the measuring antenna.

Final measurement (30 MHz to 1 GHz)

A final measurement on an open area test site will be performed on selected frequencies found in the preliminary measurement. During this test the EUT will be rotated in the range of
0 ° to 360 °, the measuring antenna will be set to horizontal and vertical polarisation and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 1 GHz	120 kHz



Procedure final measurement:

The following procedure will be used:

1) Measure on the selected frequencies at an antenna height of 1 m and a EUT azimuth of 23 °.
2) Move the antenna from 1 m to 4 m and note the maximum value at each frequency.
3) Rotate the EUT by 45 ° and repeat 2) until an azimuth of 337 ° is reached.
4) Repeat 1) to 3) for the other orthogonal antenna polarization.
5) Move the antenna and the turntable to the position where the maximum value is detected.
6) Measure while moving the antenna slowly +/- 1 m.
7) Set the antenna to the position where the maximum value is found.
8) Measure while moving the turntable +/- 45 °.
9) Set the turntable to the azimuth where the maximum value is found.
10) Measure with Final detector (QP and AV) and note the value.
11) Repeat 5) to 10) for each frequency.
12) Repeat 1) to 11) for each orthogonal axes of the EUT if handheld equipment.

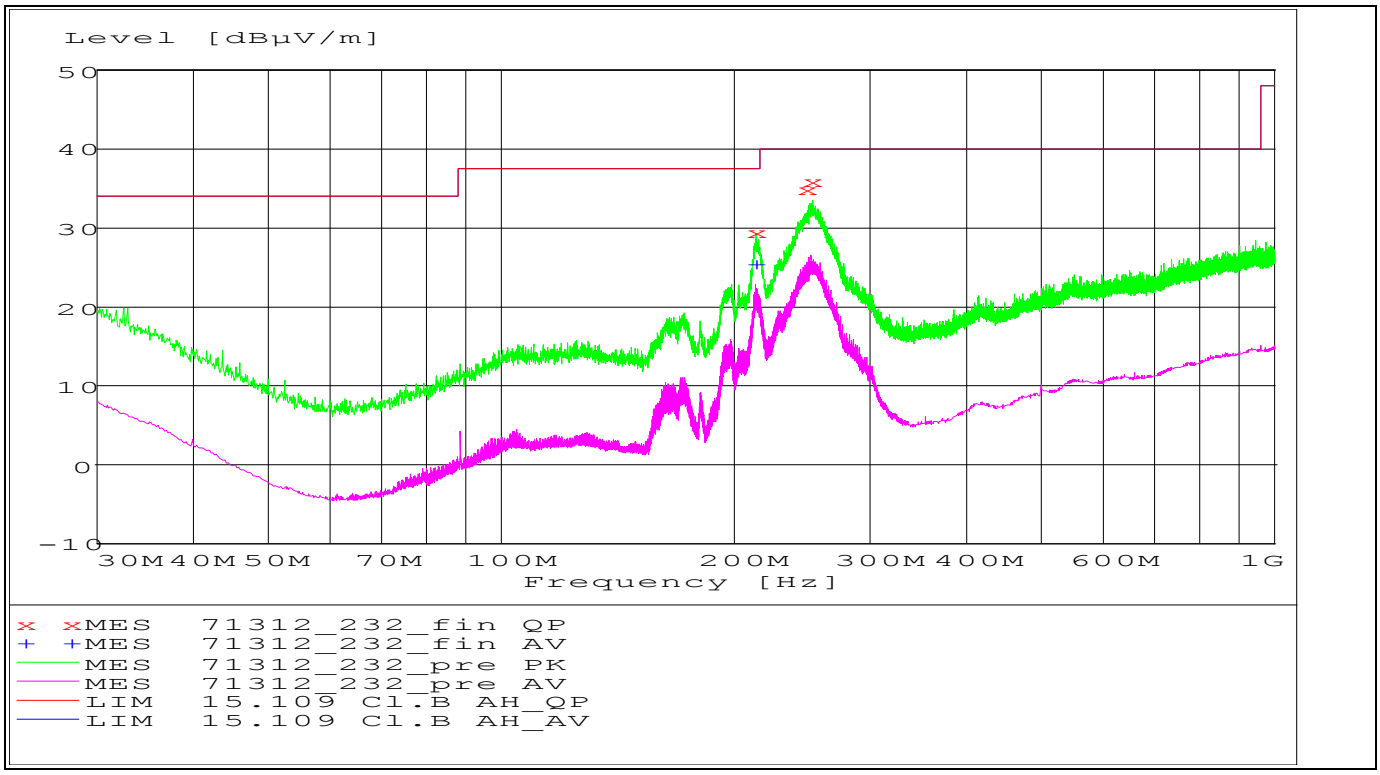
6.2.2 PRELIMINARY MEASUREMENT (30 MHz to 1 GHz)

Ambient temperature	23 °C	Relative humidity	57 %

Position of EUT:	The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m (preliminary measurement).
Cable guide:	The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.
Test record:	RS232/RS422 and WLAN active.
Supply voltage:	During all measurements the EUT was supplied with 24.0 V DC.

Title:	preliminary emission measurement according CFR 47 Part 15.109
EUT:	FL WLAN SPA
Manufacturer:	connectBlue
Operating Condition:	**RS232 mode**
Test site:	fully anechoic chamber M20; PHOENIX TEST LAB GmbH
Operator:	D. Sütthoff
Test Specification:	
Comment:	

The limit line and measurement curve shown in the diagram below refer to the preliminary measurements. Here, it must be noted that because of the reduced measuring distance and because of the floor absorbers, the measured values do not comply with the values of the above mentioned standard; they only serve as orientation in determining which frequencies must be measured on the open area test site.
The limit line is achieved with the applied standard by converting to a 3m measurement distance (+10 dB) and the correction for the free space in which in the "worst case" the reflected floor wave is missing entirely (-6dB). Therefore 4dB is added to the limit line of the standard concerned.
The curves in the diagram only represent the maximum measured value for each frequency point of all preliminary measurements, which were carried out with the EUT in various positions.
The top measured curve represents the peak measurement. The measured points marked with x are frequency points for which later measurements with a quasi-peak detector were carried out. These values are indicated in the following table. The bottom measured curve represents average values, which are only required for control purposes.



Data record name: 71312_232 of 19.07.07

Result measured with the quasipeak detector:

(These values are marked in the above diagram by x)

Frequency MHz	Level dBµV/m	Transducer dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
213.648000	29.50	9.7	37.5	8.0	150.0	134.00	HORIZONTAL
249.204000	35.00	13.0	40.0	5.0	150.0	269.00	HORIZONTAL
253.072000	35.90	13.6	40.0	4.1	150.0	255.00	HORIZONTAL

Data record name: 71312_232_fin QP of 19.07.07

Result measured with the average detector:

(These values are marked in the above diagram by +)

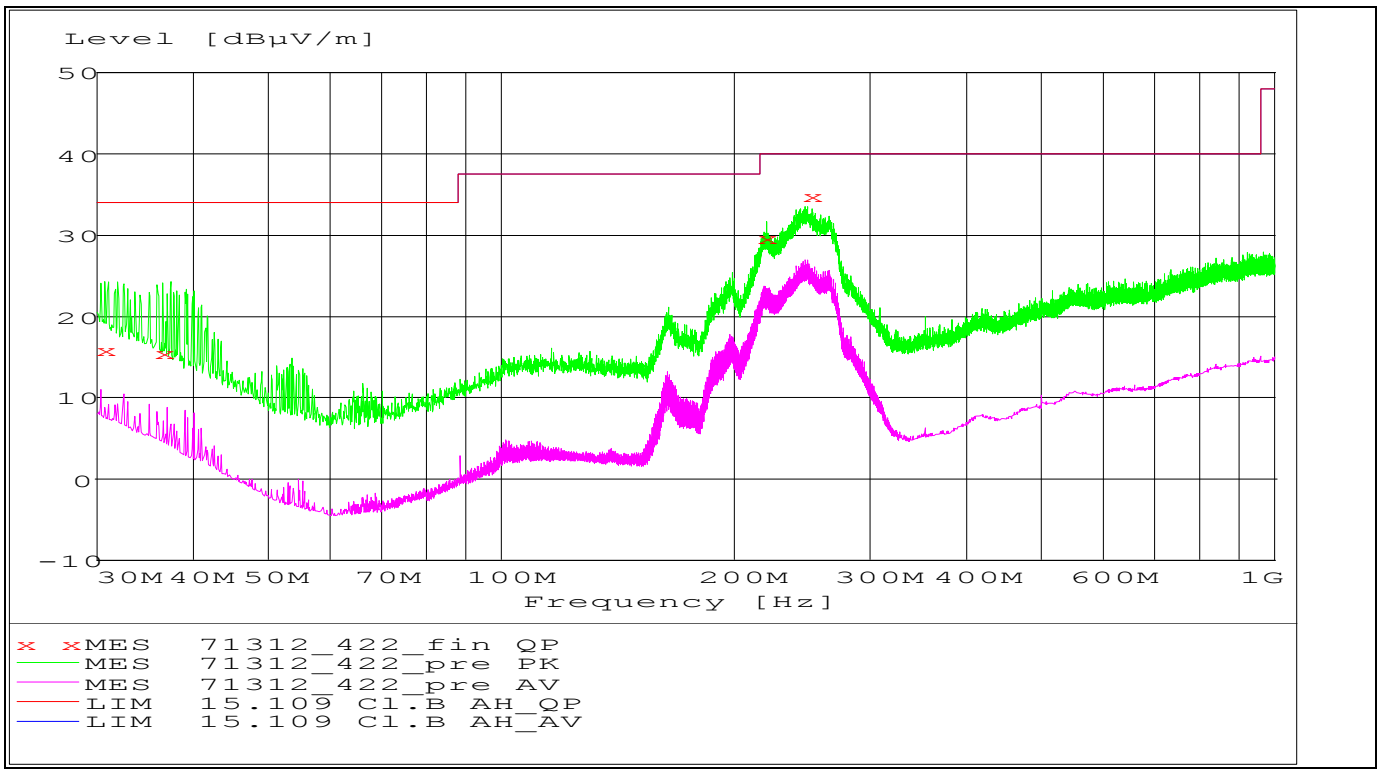
Frequency MHz	Level dBµV/m	Transducer dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
213.180000	25.50	9.6	37.5	12.0	150.0	128.00	HORIZONTAL

Data record name: 71312_232_fin AV of 19.07.07

In this case it was necessary to carry out subsequent measurements because at some frequency points a value was above the Qualify limit curve during the preliminary measurements. The results from the standard subsequent measurements on the open area test site are presented in the following.

Title:	preliminary emission measurement according CFR 47 Part15.109
EUT:	FL WLAN SPA
Manufacturer:	connectBlue
Operating Condition:	**RS422 mode**
Test site:	fully anechoic chamber M20; PHOENIX TEST LAB GmbH
Operator:	
Test Specification:	
Comment:	

The limit line and measurement curve shown in the diagram below refer to the preliminary measurements. Here, it must be noted that because of the reduced measuring distance and because of the floor absorbers, the measured values do not comply with the values of the above mentioned standard; they only serve as orientation in determining which frequencies must be measured on the open area test site.
The limit line is achieved with the applied standard by converting to a 3m measurement distance (+10 dB) and the correction for the free space in which in the "worst case" the reflected floor wave is missing entirely (-6dB). Therefore 4dB is added to the limit line of the standard concerned.
The curves in the diagram only represent the maximum measured value for each frequency point of all preliminary measurements, which were carried out with the EUT in various positions.
The top measured curve represents the peak measurement. The measured points marked with x are frequency points for which later measurements with a quasi-peak detector were carried out. These values are indicated in the following table. The bottom measured curve represents average values, which are only required for control purposes.



Data record name: 71312_422 of 19.07.07

Result measured with the quasipeak detector:

(These values are marked in the above diagram by x)

Frequency MHz	Level dBµV/m	Transducer dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
30.708000	15.90	18.2	34.0	18.1	150.0	83.00	VERTICAL
36.516000	15.70	15.0	34.0	18.3	150.0	260.00	VERTICAL
220.236000	29.70	9.9	40.0	12.3	150.0	270.00	HORIZONTAL
252.592000	35.10	13.5	40.0	4.9	150.0	269.00	HORIZONTAL

Data record name: 71312_422_fin QP of 19.07.07

In this case it was necessary to carry out subsequent measurements because at some frequency points a value was above the Qualify limit curve during the preliminary measurements. The results from the standard subsequent measurements on the open area test site are presented in the following.

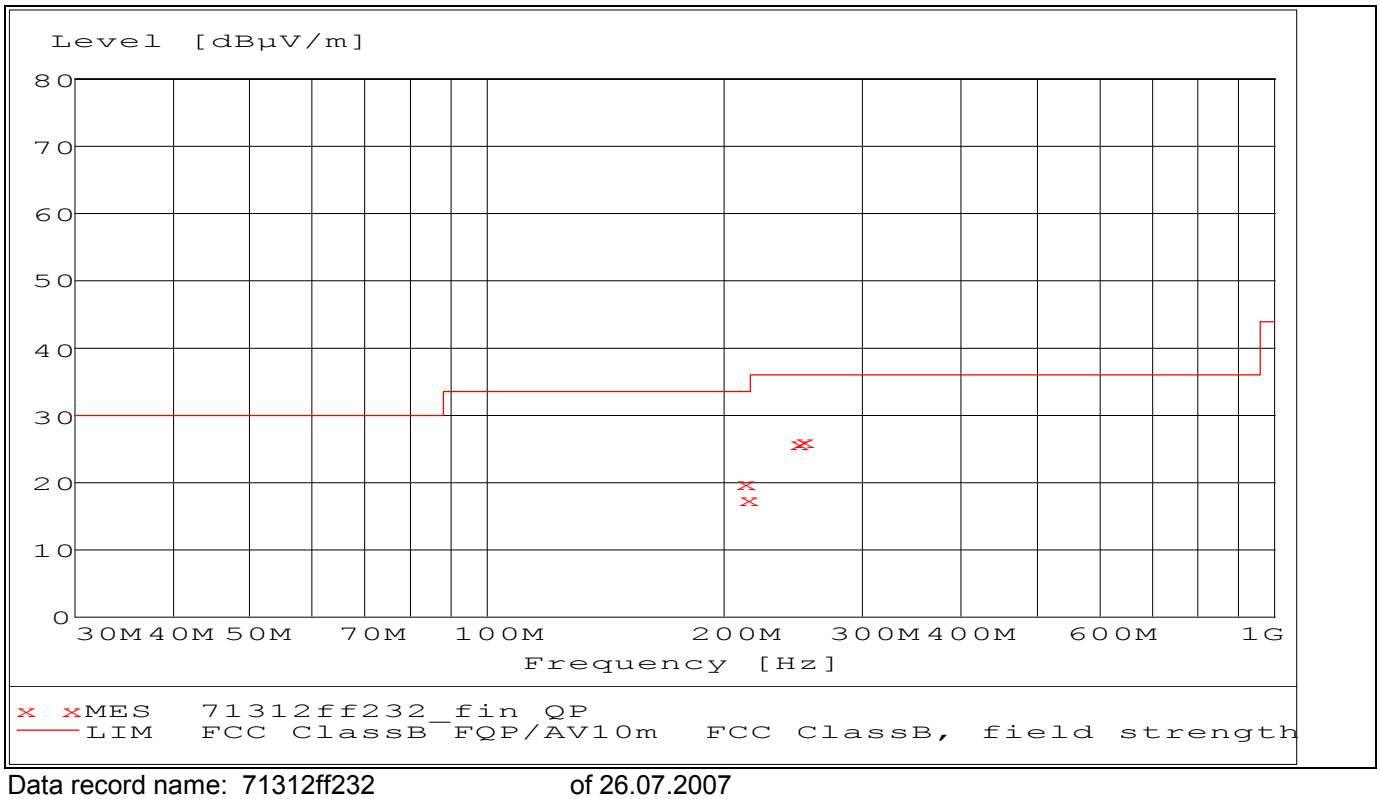
TEST EQUIPMENT USED FOR THE TEST:
29, 31 – 35, 43, 53, 54

6.2.3 FINAL MEASUREMENT (30 MHz to 1 GHz)

Ambient temperature:	25 °C	Relative humidity:	48 %

Position of EUT:	The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 10 m.
Cable guide:	The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.
Test record:	All results are shown in the following.
Supply voltage:	During all measurements the EUT was supplied with 24.0 V DC
Title:	final measurement on 10m open area test site according to CFR47 Part 15.109
EUT:	FL WLAN SPA
Manufacturer:	connectBlue
Operating Condition:	**RS232 mode**
Test site:	PHOENIX TESTLAB Blomberg; open area test site M6
Operator:	D. Sütthoff
Test Specification:	power supply: 24 V DC
Comment:	

The measured points and the limit line in the following diagram refer to the standard measurement of the emitted interference in compliance with the above mentioned standard. The measured points marked with x are the measured results of the standard subsequent measurement on the open area test site.



Data record name: 71312ff232 of 26.07.2007

The results of the standard subsequent measurement on the open area test site are indicated in the table below. The limits as well as the measured results (levels) refer to the above mentioned standard while taking account of the specified requirements for a 10 m measuring distance.

Result measured with the quasipeak detector:

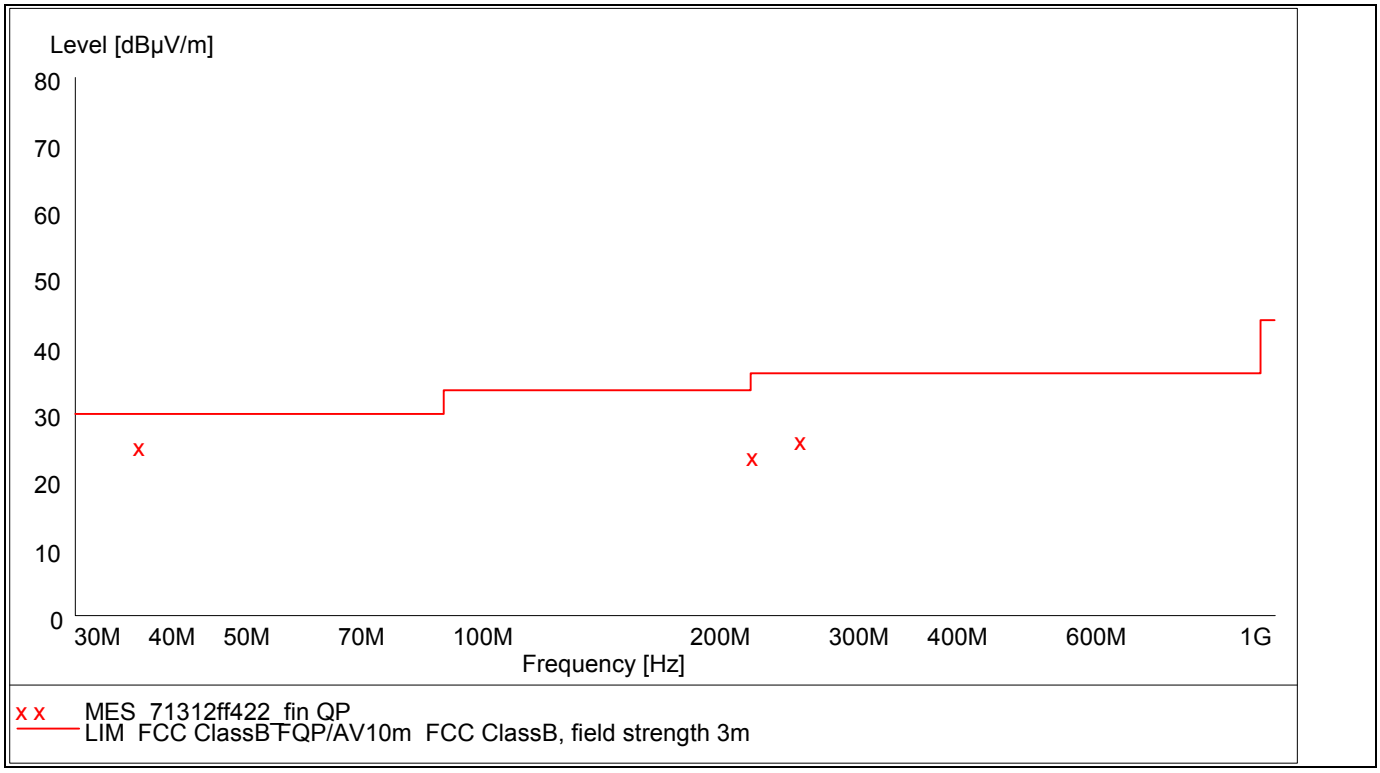
(These values are marked in the above diagram by x)

Frequency MHz	Level dBµV/m	Transducer dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
213.180000	19.90	10.1	33.5	13.6	120.0	1.00	VERTICAL
213.648000	17.70	10.1	33.5	15.8	350.0	249.00	HORIZONTAL
249.204000	25.80	13.6	36.0	10.2	100.0	6.00	VERTICAL
253.072000	26.30	14.1	36.0	9.7	325.0	250.00	HORIZONTAL

Data record name: 71312ff232_fin QP of 26.07.2007

Title:	final measurement on 10m open area test site according to CFR47 Part 15.109
EUT:	FL WLAN SPA
Manufacturer:	connectBlue
Operating Condition:	**RS422 mode**
Test site:	PHOENIX TESTLAB Blomberg; open area test site M6
Operator:	D. Sütthoff
Test Specification:	power supply: 24 V DC
Comment:	

The measured points and the limit line in the following diagram refer to the standard measurement of the emitted interference in compliance with the above mentioned standard. The measured points marked with x are the measured results of the standard subsequent measurement on the open area test site.



Data record name: 71312ff422 of 26.07.2007

The results of the standard subsequent measurement on the open area test site are indicated in the table below. The limits as well as the measured results (levels) refer to the above mentioned standard while taking account of the specified requirements for a 10 m measuring distance.

Result measured with the quasipeak detector:

(These values are marked in the above diagram by x)

Frequency MHz	Level dBµV/m	Transducer dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
36.516000	25.50	15.2	30.0	4.5	250.0	136.00	VERTICAL
220.236000	24.10	10.3	36.0	11.9	114.0	1.00	VERTICAL
252.592000	26.20	14.0	36.0	9.8	292.0	248.00	HORIZONTAL

Data record name: 71312ff422_fin QP of 26.07.2007

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
14 – 20

7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

Emission measurement at AC mains and DC in / out ports at M4					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
1	Shielded chamber M4	-	Siemens	B83117S1-X158	480088
2	Measuring receiver	ESAI	Rohde & Schwarz	831953/001 833181/018	480025 480026
3	LISN	NSLK8128	Schwarzbeck	8128155	480058
4	DC-filter	B84266-A21-E13	Siemens	940164525	480099
5	AC-filter	B84299-D87-E3	Siemens	930262292	480097
6	EMI-Software	ES-K1	Rohde & Schwarz	-	480111

Radiated emission measurement at M5					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
7	Fully anechoic chamber M5	-	Siemens	B83177-S1-X156	480073
8	Measuring receiver	ESCS 30	Rohde & Schwarz	828985/014	480270
9	Controller	HD100	Deisel	100/324	480067
10	Antenna support	MA240	Deisel	228/314	480069
11	Turntable	DS412	Deisel	412/317	480070
12	Antenna	CBL6112C	Chase	2689	480327
13	EMI Software	ES-K1	Rohde & Schwarz	-	480111

Radiated emission measurement at M6					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
14	Open area test site	-	Phoenix Test-Lab	-	480085
15	Measuring receiver	ESCS 30	Rohde & Schwarz	828985/014	480270
16	Controller	HD100	Deisel	100/670	480139
17	Turntable	DS420HE	Deisel	420/620/80	480087
18	Antenna support	AS615P	Deisel	615/310	480086
19	Antenna	CBL6111 A	Chase	1643	480147
20	EMI Software	ES-K1	Rohde & Schwarz	-	480111

Radiated emission measurement at M8					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
21	Fully anechoic chamber M8	-	Siemens	B83117-E7019-T231	480190
22	Measuring receiver	ESMI	Rohde & Schwarz	843977/001 843530/018	480179 480180
23	Measuring receiver	ESCS 30	Rohde & Schwarz	828985/014	480270
24	Controller	HD100	Deisel	100/427	480181
25	Turntable	DS420	Deisel	420/435/97	480186
26	Antenna support	AS615P	Deisel	615/310	480187
27	Antenna	CBL6112 A	Chase	2034	480185
28	EMI Software	ES-K1	Rohde & Schwarz	-	480111

Radiated emission measurement at M20					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
29	Fully anechoic chamber M20	-	Albatross Projects	B83107-E2439-T232	480303
30	Measuring receiver	ESMI	Rohde & Schwarz	843977/001 843530/018	480179 480180
31	Measuring receiver	ESI 40	Rohde & Schwarz	100064	480355
32	Controller	HD100	Deisel	100/670	480326
33	Turntable	DS420HE	Deisel	420/620/80	480315
34	Antenna support	AS615P	Deisel	615/310	480187
35	Antenna	CBL6112 B	Chase	2688	480328
36	Antenna	3115 A	EMCO	9609-4918	480183
37	Standard Gain Horn 11.9 GHz – 18 GHz	18240-20	Flann Microwave	483	480294
38	Standard Gain Horn 11.9 GHz – 18 GHz	18240-20	Flann Microwave	482	480295
39	Standard Gain Horn 17.9 GHz – 26.7 GHz	20240-20	Flann Microwave	411	480297
40	Standard Gain Horn 17.9 GHz – 26.7 GHz	20240-20	Flann Microwave	410	480296
41	Standard Gain Horn 26.4 GHz – 40.1 GHz	22240-20	Flann Microwave	469	480299

No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
42	Standard Gain Horn 26.4 GHz – 40.1 GHz	22240-20	Flann Microwave	468	480298
43	RF-cable No. 30	RTK 081	Rosenberger	-	410141
44	RF-cable No. 31	RTK 081	Rosenberger	-	410142
45	RF-cable 1m	KPS-1533-400-KPS	Insulated Wire	-	480300
46	RF-cable 1m	KPS-1533-400-KPS	Insulated Wire	-	480301
47	RF-cable 2m	KPS-1533-400-KPS	Insulated Wire	-	480302
48	RF-cable No. 5	RTK 081	Rosenberger		410097
49	Preamplifier	JS3-00101200-23-5A	Miteq	681851	480337
50	Preamplifier	JS3-12001800-16-5A	Miteq	571667	480343
51	Preamplifier	JS3-18002600-20-5A	Miteq	658697	480342
52	Preamplifier	JS3-26004000-25-5A	Miteq	563593	480344
53	EMI Software	ES-K1	Rohde & Schwarz	-	480111

Ancillary equipment used for testing					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
54	Power supply	TOE 8852	Toellner	51712	480233
55	Peak Power Sensor	NRV-Z32	Rohde & Schwarz	849745/016	480551
56	Outdoor test site	-	Phoenix Test-Lab	-	480293
57	Measuring receiver	ESPC	Rohde & Schwarz	843756/006	480150
58	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059

All used measurement equipment was calibrated (if necessary). The calibration intervals and the calibration history will be given out on request.

8 LIST OF ANNEXES

ANNEX A	**INTERNAL PHOTOGRAPHS OF THE TEST SAMPLE**:	**5 pages**
	Main board rear view	71312EUT232.JPG
	Main board front view	71312PCB2.JPG
	Main board front view, Radio board disassembled	71312PCB3.JPG
	Radio board front view	71312PCB4.JPG
	Radio board rear view	71312PCB5.JPG
ANNEX B	**EXTERNAL PHOTOGRAPHS OF THE TEST SAMPLE**:	**2 pages**
	EUT front view, with used antenna	71312EUT1.jpg
	EUT rear view	71312EUT2.jpg
ANNEX C	**PHOTOGRAPHS OF THE TEST SET-UPS**:	**5 pages**
	Test set-up conducted emission measurement	71312AC232_2.jpg
	Test set-up conducted emission measurement	71312AC485_2.jpg
	Test set-up preliminary emission measurement	71312EMI9.JPG
	Test set-up preliminary emission measurement	71312EMI_8.JPG
	Test set-up final emission measurement	71312FF232_1.JPG