

Prüfbericht-Nr.: <i>Test report no.:</i>	CN213P60 001	Auftrags-Nr.: <i>Order no.:</i>	168331846	Seite 1 von 12 Page 1 of 12
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2021-08-30	
Auftraggeber: <i>Client:</i>	IBBX INOVAÇÃO EM SISTEMAS DE SOFTWARE E HARDWARE LTDA Rua Elizabeta Armelin Rossi, 69, 13360-000, Capivari - SP, Brazil			
Prüfgegenstand: <i>Test item:</i>	IBBX G 2.0 GATEWAY			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	IBBX G 2.0 GATEWAY			
Auftrags-Inhalt: <i>Order content:</i>	Testing Report			
Prüfgrundlage: <i>Test specification:</i>	FCC CFR 47 Part 15: Subpart B			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2021-09-01	Refer to Photo Document		
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003111324 001			
Prüfzeitraum: <i>Testing period:</i>	2021-08-30 to 2021-09-09			
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	Hardy <i>Suo</i>		genehmigt von: <i>authorized by:</i>	Lin Lin
Datum: <i>Date:</i>	2021-09-13		Ausstellungsdatum: <i>Issue date:</i>	2021-09-13
Stellung / Position:	Sachverständige(r)/Expert		Stellung / Position:	Sachverständige(r)/Expert
Sonstiges / Other:	FCC ID: 2A244-IBBX-GWRX-001			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory F(ail) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable
5 = mangelhaft N/T = nicht getestet 5 = poor N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

Prüfbericht - Nr.: CN213P60 001
Test Report No.:

Seite 2 von 12
Page 2 of 12

TEST SUMMARY

5.1.1 CONDUCTED EMISSION ON AC MAINS

RESULT: Pass

5.1.2 RADIATED EMISSION

RESULT: Pass

TABLE OF CONTENTS

1.	GENERAL REMARKS	4
1.1	COMPLEMENTARY MATERIALS	4
2.	TEST SITES	5
2.1	TEST FACILITIES	5
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS.....	5
2.3	TRACEABILITY	5
2.4	CALIBRATION	5
2.5	UNCERTAINTY OF MEASUREMENT.....	5
2.6	LOCATION OF ORIGINAL DATA.....	6
2.7	STATUS OF FACILITY USED FOR TESTING.....	6
3.	GENERAL PRODUCT INFORMATION	7
3.1	PRODUCT FUNCTION AND INTENDED USE	7
3.2	RATINGS AND SYSTEM DETAILS	7
3.3	INDEPENDENT OPERATION MODES	7
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS	7
3.5	SUBMITTED DOCUMENTS.....	7
4.	TEST SET-UP AND OPERATION MODES	8
4.1	PRINCIPLE OF CONFIGURATION SELECTION.....	8
4.2	TEST OPERATION	8
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	8
4.4	COUNTERMEASURES TO ACHIEVE ERM COMPLIANCE	8
4.5	TEST SETUP DIAGRAM	9
5.	TEST RESULTS	10
5.1.1	Conducted Emission on AC Mains.....	10
5.1.2	Radiated Emission	11
6.	LIST OF TABLES	12

Prüfbericht - Nr.: CN213P60 001
Test Report No.:

Seite 4 von 12
Page 4 of 12

1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendixes:
Appendix A: Photographs of the Test Set-up
Appendix B: Test data

2. Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, People's Republic of China

FCC Accreditation Designation No.: CN1260

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Conducted Emission on AC Mains					
Equip. No.	Equipment	Manufacturer	M/N	S/N	Calibrated until
GC-SZ 001009	EMI Test Receiver	R&S	ESR3	102428	2022-08-10
GC-SZ 001010	Artificial Mains Network	R&S	ENV216	102333	2022-08-10
G1825090	EMC32 test software	R&S	EMC32(Ver.10.50.00)	N/A	N/A
Radiated Emission					
Equip. No.	Equipment	Manufacturer	M/N	S/N	Calibrated until
GC-SZ 001007	3m SAC	ETS-Lindgren	SAC3	CT001632-Q1362	2024-04-26
GC-SZ 004576	EMI Test Receiver	R&S	ESR7	102111	2021-12-16
GC-SZ 004488	Horn Antenna	R&S	HF907	102706	2022-08-07
GC-SZ 004484	Preamplifier (1-18GHz)	FIT	SCU-18F	180077	2022-08-13
GC-SZ 004574	Trilog-Broadband antenna	SCHWARZBECK	VULB9168	0945	2022-12-12
G1825090	EMC32 test software	R&S	EMC32(Ver.10.50.00)	N/A	N/A

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Uncertainty of Measurement

The value of the measurement uncertainty of each parameter is listed as below:

Table 2: Measurement Uncertainty

Parameter	Uncertainty
Conducted Emission, (9kHz to 150kHz)/(150kHz to 30MHz)	± 3.70 dB / ± 3.30 dB

Prüfbericht - Nr.: CN213P60 001

Test Report No.:

Seite 6 von 12

Page 6 of 12

Radiated Emission (3m SAC), 30MHz to 1000MHz	± 4.52 dB
Radiated Emission (3m SAC), above 1000MHz	± 4.37 dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, People's Republic of China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3. General Product Information

3.1 Product Function and Intended Use

The EUT is an IBBX G 2.0 GATEWAY.

For details refer to user manual and circuit diagram.

3.2 Ratings and System Details

Table 3: Technical Specification

General Information of EUT	Value
Kind of Equipment	IBBX G 2.0 GATEWAY
Type Designation	IBBX G 2.0 GATEWAY
Operating Voltage	Powered by DC 5V (USB Port).
FCC ID	2A244-IBBX-GWRX-001
Operating Frequency	169MHz (Receiver only)

3.3 Independent Operation Modes

The basic operation modes are:

- A. Normal Operation
- B. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Application Form

- User Manual

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.4:2014.

4.3 Special Accessories and Auxiliary Equipment

Table 4: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N
Sensor	IBBX INOVACAO EM SISTEMAS DE SOFTWARE E HARDWARE LTDA.	SENSOR IBBX G 1.0	--
AC/DC Adapter (for sensor)	LG ELECTRONICS DO BRASIL LTDA.	MCS-V01BR	--
Portable Laptop	Lenovo	ThinkPad T480	10Q67059

4.4 Countermeasures to Achieve ERM Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF). No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

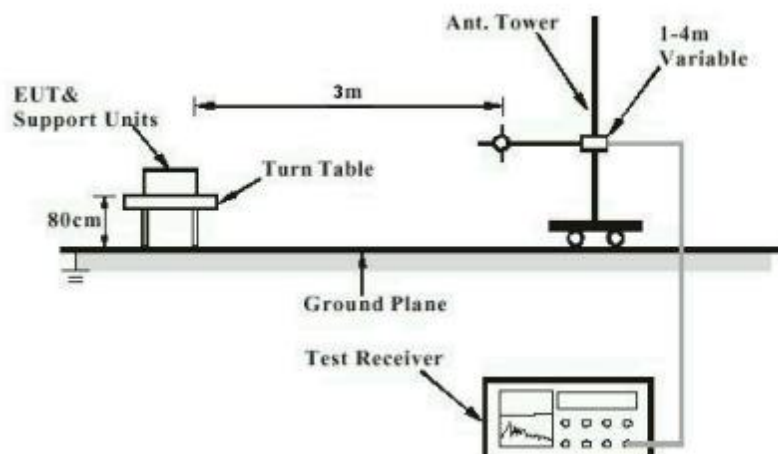


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

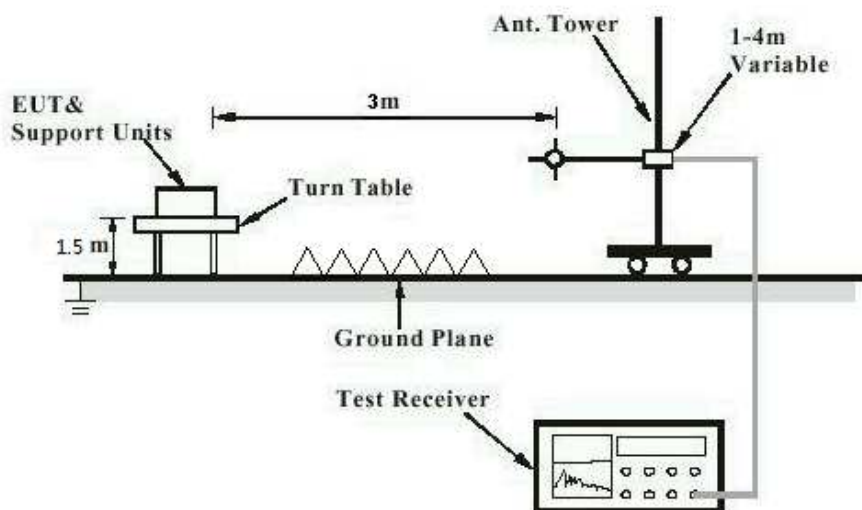
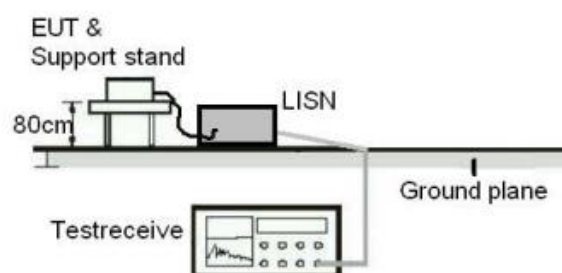


Diagram of Measurement Configuration for Mains Conduction Measurement



5. Test Results

5.1.1 Conducted Emission on AC Mains

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.107(a)
Basic standard	: ANSI C63.4: 2014
Frequency range	: 0.15 – 30MHz
Limits	: FCC Part 15.107(a)
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2021-08-30 to 2021-09-09
Input voltage	: AC 120V@60Hz
Operation mode	: A
Earthing	: Not connected
Ambient temperature	: 24 °C
Relative humidity	: 53 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix B.

5.1.2 Radiated Emission

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.109(a)
Basic standard	: ANSI C63.4:2014
Frequency range	: 30 - 6000MHz
Classification	: Class B
Limits	: FCC Part 15.109(a)
Kind of test site	: 3m Semi-anechoic Chamber

Test Setup

Date of testing	: 2021-08-30 to 2021-09-09
Input voltage	: AC 120V@60Hz
Operation mode	: A
Earthing	: Not connected
Ambient temperature	: 23.6 °C
Relative humidity	: 52.7 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix B.

6. List of Tables

Table 1: List of Test and Measurement Equipment.....	5
Table 2: Measurement Uncertainty.....	5
Table 3: Technical Specification	7
Table 4: List of Accessories and Auxiliary Equipment	8

Appendix B: Test Results of FCC 15B

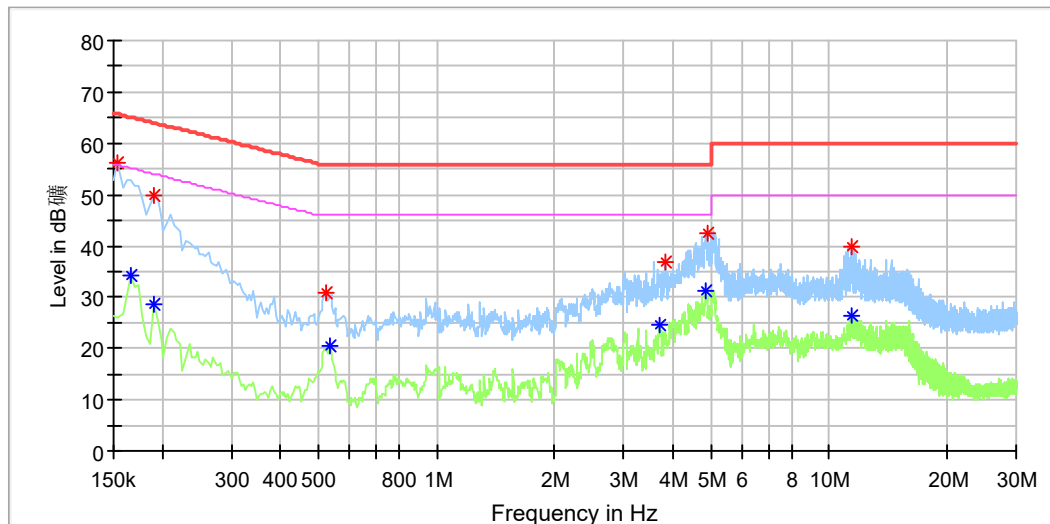
APPENDIX B: TEST RESULTS OF FCC 15B	1
APPENDIX B.1: TEST PLOTS OF CONDUCTED EMISSION ON AC MAINS	2
APPENDIX B.2: TEST PLOTS OF RADIATED EMISSION, BELOW 1GHz	4
APPENDIX B.3: TEST PLOTS OF RADIATED EMISSION, ABOVE 1GHz	6

Appendix B.1: Test Plots of Conducted Emission on AC Mains

EMC32 Report

EUT Information

EUT Name:	IBBX G 2.0 GATEWAY
Order No:	168331846
Model:	IBBX G 2.0 GATEWAY
Test mode:	Normal Operating
Test Voltage:	AC 120V, 60Hz
Test By:	Shower Dai
Review By:	Gary Chen
Remark:	SR2



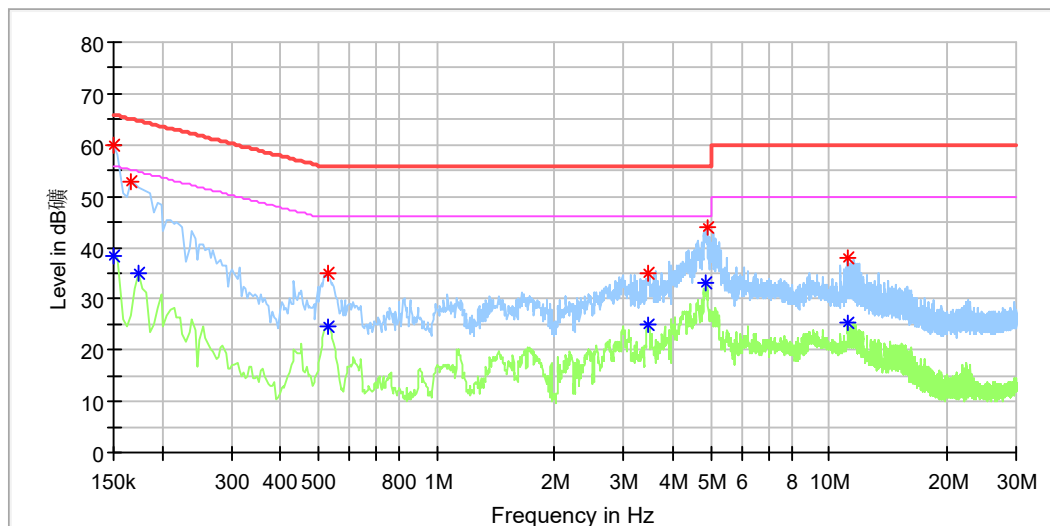
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.154000	56.30	---	65.78	9.49	L1	9.9
0.166000	---	34.21	55.16	20.95	L1	9.9
0.190000	---	28.60	54.04	25.43	L1	9.9
0.190000	49.94	---	64.04	14.10	L1	9.9
0.522000	30.88	---	56.00	25.12	L1	10.0
0.534000	---	20.48	46.00	25.52	L1	10.0
3.698000	---	24.49	46.00	21.51	L1	10.2
3.814000	36.86	---	56.00	19.14	L1	10.2
4.854000	---	31.22	46.00	14.78	L1	10.2
4.930000	42.59	---	56.00	13.41	L1	10.2
11.390000	---	26.58	50.00	23.42	L1	10.3
11.390000	39.93	---	60.00	20.07	L1	10.3

EMC32 Report

EUT Information

EUT Name: IBBX G 2.0 GATEWAY
 Order No: 168331846
 Model: IBBX G 2.0 GATEWAY
 Test mode: Normal Operating
 Test Voltage: AC 120V, 60Hz
 Test By: Shower Dai
 Review By: Gary Chen
 Remark: SR2



Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.150000	---	38.49	56.00	17.51	N	9.8
0.150000	60.00	---	66.00	6.00	N	9.8
0.166000	52.91	---	65.16	12.25	N	9.8
0.174000	---	34.88	54.77	19.89	N	9.8
0.526000	35.00	---	56.00	21.00	N	9.8
0.530000	---	24.47	46.00	21.53	N	9.8
3.454000	---	25.07	46.00	20.93	N	9.9
3.454000	34.83	---	56.00	21.17	N	9.9
4.874000	---	33.26	46.00	12.74	N	9.9
4.878000	43.93	---	56.00	12.07	N	9.9
11.134000	37.91	---	60.00	22.09	N	10.0
11.158000	---	25.39	50.00	24.61	N	10.0

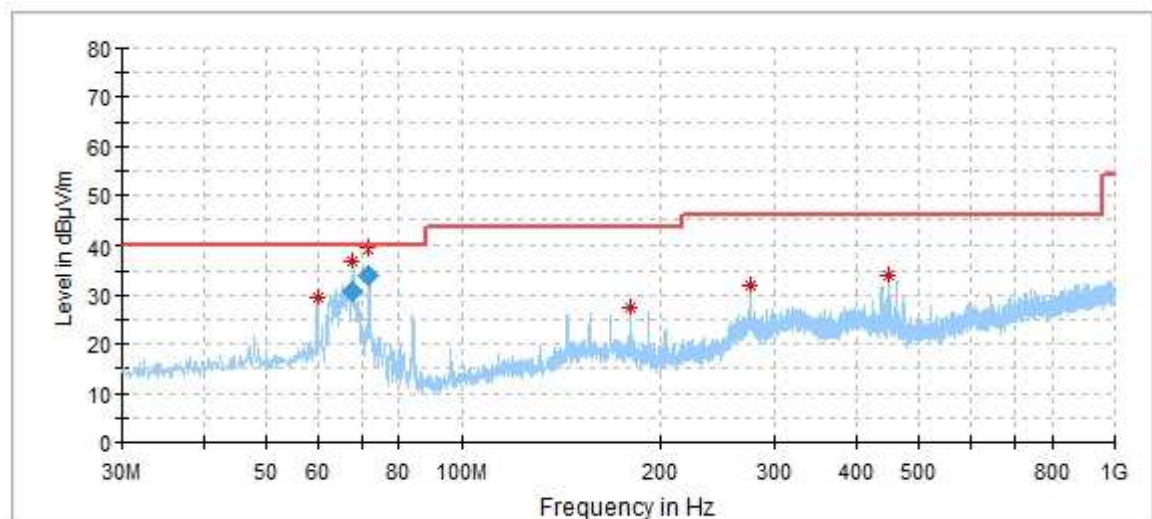
Appendix B.2: Test Plots of Radiated Emission, Below 1GHz

Note: The following illustration shows the limit that meet the FCC requirements, and these measured value also comply with IC requirements.

EMC32 Report

EUT Information

EUT Name:	IBBX G 2.0 GATEWAY
Order No:	168331846
Model:	IBBX G 2.0 GATEWAY
Test Mode:	Normal Operating
Test Voltage:	AC 120V, 60Hz
Test By:	Shower Dai
Review By:	Gary Chen
Remark:	3m Chamber



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
59.973000	29.52	40.00	10.48	100.0	H	194.0	20.91
67.964000	36.73	40.00	4.59	100.0	H	174.0	19.06
71.924000	39.32	40.00	5.94	100.0	H	172.0	17.76
179.962000	27.68	43.50	15.82	100.0	H	49.0	19.37
275.895000	32.18	46.00	13.82	200.0	H	176.0	20.30
450.398000	34.12	46.00	11.88	300.0	H	0.0	24.65

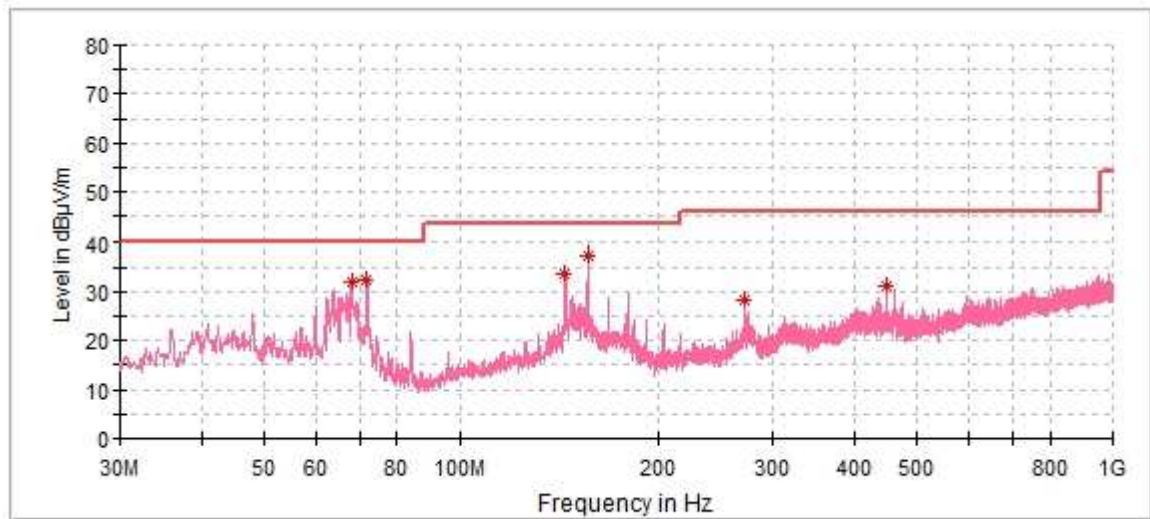
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
67.964000	30.82	40.00	9.18	1000.0	120.000	100.0	H	174.0	19.08
71.924000	34.04	40.00	5.96	1000.0	120.000	100.0	H	172.0	17.76

EMC32 Report

EUT Information

EUT Name:	IBBX G 2.0 GATEWAY
Order No:	168331846
Model:	IBBX G 2.0 GATEWAY
Test Mode:	Normal Operating
Test Voltage:	AC 120V, 60Hz
Test By:	Shower Dai
Review By:	Gary Chen
Remark:	3m Chamber



Critical_Freqs

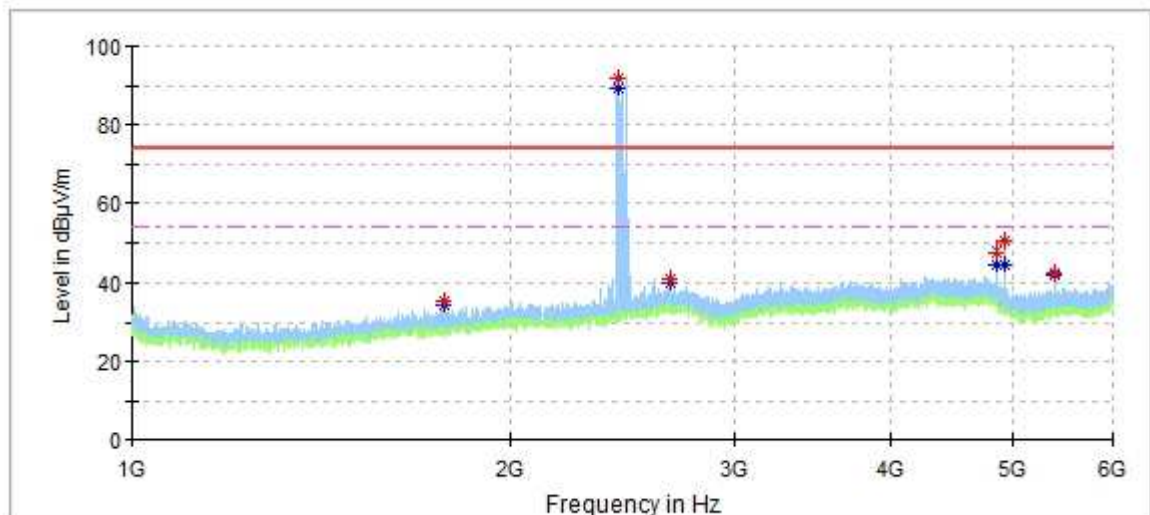
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
68.024000	31.96	40.00	8.04	100.0	V	124.0	19.06
71.904000	32.48	40.00	7.52	200.0	V	116.0	17.76
143.878000	33.58	43.50	9.92	200.0	V	116.0	20.21
156.003000	37.35	43.50	6.15	100.0	V	109.0	21.49
272.015000	28.36	46.00	17.64	300.0	V	109.0	20.40
450.398000	31.10	46.00	14.90	100.0	V	0.0	24.65

Appendix B.3: Test Plots of Radiated Emission, Above 1GHz

EMC32 Report

EUT Information

EUT Name:	IBBX G 2.0 GATEWAY
Order No:	168331846
Model:	IBBX G 2.0 GATEWAY
Test Mode:	Normal Operating
Test Voltage:	AC 120V, 60Hz
Test By:	Shower Dai
Review By:	Gary Chen
Remark:	3m Chamber



*remark: emissions above limit is the fundamental of 2.4GHz Wi-Fi which is emitted by supporting device.

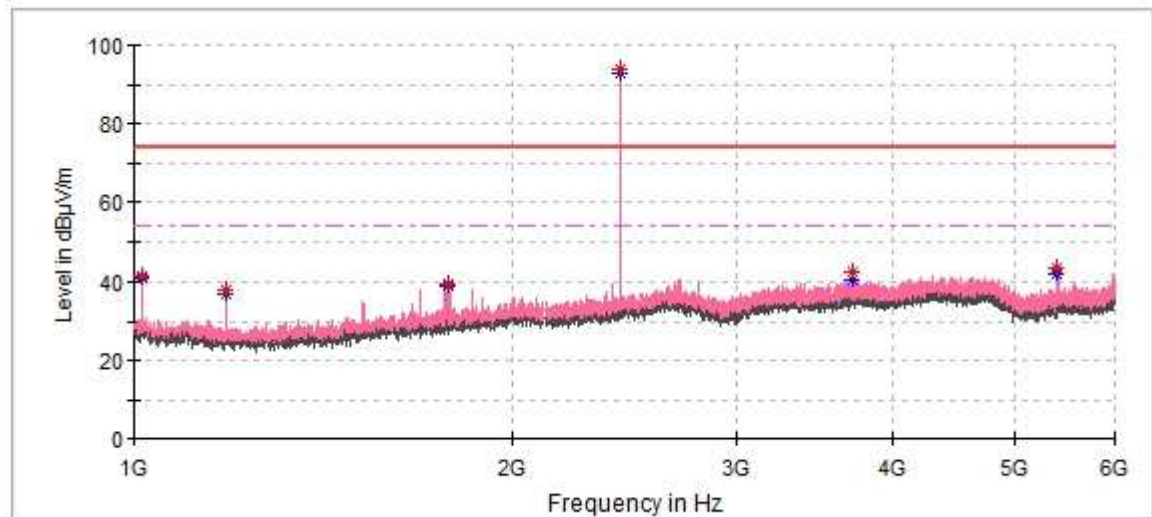
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1770.000000	---	34.18	54.00	19.82	100.0	H	172.0	-9.69
1770.000000	35.54	---	74.00	38.46	100.0	H	172.0	-9.69
2431.000000	---	89.37	---	---	100.0	H	120.0	-5.47
2431.000000	91.84	---	---	---	100.0	H	120.0	-5.47
2671.000000	---	39.90	54.00	14.10	100.0	H	117.0	-3.27
2671.000000	41.26	---	74.00	32.74	100.0	H	117.0	-3.27
4852.500000	---	44.50	54.00	9.50	100.0	H	298.0	1.59
4852.500000	47.49	---	74.00	26.51	100.0	H	298.0	1.59
4930.000000	---	44.81	54.00	9.19	100.0	H	237.0	0.58
4930.500000	50.03	---	74.00	23.97	100.0	H	237.0	0.57
5393.000000	---	42.04	54.00	11.96	100.0	H	0.0	0.47
5393.000000	42.54	---	74.00	31.46	100.0	H	0.0	0.47

EMC32 Report

EUT Information

EUT Name:	IBBX G 2.0 GATEWAY
Order No:	168331846
Model:	IBBX G 2.0 GATEWAY
Test Mode:	Normal Operating
Test Voltage:	AC 120V, 60Hz
Test By:	Shower Dai
Review By:	Gary Chen
Remark:	3m Chamber



*remark: emissions above limit is the fundamental of 2.4GHz Wi-Fi which is emitted by supporting device.

Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1014.000000	---	41.21	54.00	12.79	100.0	V	156.0	-12.73
1014.000000	41.69	---	74.00	32.31	100.0	V	156.0	-12.73
1183.000000	---	36.77	54.00	17.23	100.0	V	126.0	-13.84
1183.000000	37.89	---	74.00	36.11	100.0	V	126.0	-13.84
1775.500000	---	39.03	54.00	14.97	100.0	V	102.0	-9.61
1775.500000	39.57	---	74.00	34.43	100.0	V	102.0	-9.61
2426.500000	---	92.99	---	---	100.0	V	0.0	-5.55
2426.500000	93.77	---	---	---	100.0	V	0.0	-5.55
3717.500000	42.53	---	74.00	31.47	100.0	V	107.0	0.26
3718.000000	---	40.50	54.00	13.50	100.0	V	107.0	0.26
5393.000000	43.34	---	74.00	30.66	100.0	V	8.0	0.47
5393.000000	---	42.21	54.00	11.79	100.0	V	8.0	0.47