

FCC TEST REPORT

For

NFC Android Reader

Model Number: FX205F

FCC ID: 2AGQIFX205

Report Number : WT198003465

Test Laboratory : Shenzhen Academy of Metrology and Quality
Inspection

Site Location : NETC Building, No.4 Tongfa Rd., Xili, Nanshan,
Shenzhen, China

Tel : 0086-755-86928965

Fax : 0086-755-86009898-31396

Web : www.smq.com.cn

E-mail : emcrf@smq.com.cn

TEST REPORT DECLARATION

Applicant : FAMOCO SAS
Address : 59 avenue Victor Hugo Paris, France
Manufacturer : FAMOCO SAS
Address : 59 avenue Victor Hugo Paris, France
EUT Description : NFC Android Reader
Model No : FX205F
Trade mark : FAMOCO
Serial Number : /
FCC ID : 2AGQIFX205

Test Standards:

FCC Part 15 15.207, 15.209, 15.225 (2018)

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with FCC Rules Part 15.207, 15.209, 15.225 .

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

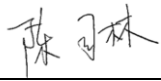
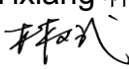
Project Engineer:	 (Chen Silin 陈司林)	Date:	<u>Jul.08, 2019</u>
Checked by:	 (Lin Yixiang 林奕翔)	Date:	<u>Jul.08, 2019</u>
Approved by:	 (Lin Bin 林斌)	Date:	<u>Jul.08, 2019</u>

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1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	FCC Rules	Test Results
Occupied Bandwidth	2.1049	Pass
In-Band Emission	15.225(a)(b)(c)	Pass
Out-of-Band Emission	15.209 15.225(d)	Pass
Conducted emission test for AC power port	15.207	Pass
Frequency Stability Tolerance	15.225(e)	Pass
Antenna Requirement	15.203	Pass

Remark: "N/A" means "Not applicable."

2. GENERAL INFORMATION

2.1. Report information

This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.

The sample/s mentioned in this report is/are supplied by Applicant, SMQ therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through SMQ, unless the applicant has authorized SMQ in writing to do so.

2.2. Laboratory Accreditation and Relationship to Customer

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at NETC Building, No.4 Tongfa Rd., Xili, Nanshan, Shenzhen, China. At the time of testing, Laboratory is accredited by the following organizations:

China National Accreditation Service for Conformity Assessment (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579.

The Laboratory is Accredited Testing Laboratory of FCC with Designation number CN1165 and Site registration number 582918.

The Laboratory is registered to perform emission tests with Innovation, Science and Economic Development (ISED), and the registration number is 11177A.

2.3.Measurement Uncertainty

Conducted Emission

9kHz~30MHz 3.5dB

Radiated Emission

30MHz~1000MHz 4.5dB

1GHz~26.5GHz 4.6dB

3. PRODUCT DESCRIPTION

3.1.EUT Description

Description : NFC Android Reader

Manufacturer : FAMOCO SAS

Model Number : FX205F

Operate : 13.56MHz
Frequency
Modulation : ASK

Antenna : Integral antenna
Designation

Remark:

3.2.Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **2AGQIFX205**, filing to comply with Section 15.207, 15.209 and 15.225 of the FCC Part 15 Subpart C Rules.

3.3.Block Diagram of EUT Configuration

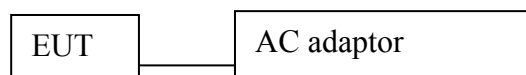


Figure 1 EUT setup

3.4.Operating Condition of EUT

The Radiated spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission (X plane).

3.5.Support Equipment List

Table 2 Support Equipment List

Name	Model No	S/N	Manufacturer
Adapter 1 for EUT	HJ528-0500200	--	Good Fortune (Dongguan) Electronics & Technology Co., Ltd.
Adapter 2 for EUT	HJ-0500200W2-US	--	Shenzhen Huajin Electronics Co., LTD.
Lithium polymer battery for EUT	FX205 Series	--	FAMOCO SAS

3.6. Test Conditions

Date of test : Jun.20, 2019 - Jul.15, 2019

Date of EUT Receive : Jun.20, 2019

Temperature: 20 ~ 25 °C

Relative Humidity: 42-56%

3.7.Special Accessories

Not available for this EUT intended for grant.

3.8.Equipment Modifications

Not available for this EUT intended for grant.

4. TEST EQUIPMENT USED

Table 3 Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB2603	EMI Test Receiver	Rohde & Schwarz	ESCS30	Feb.20, 2019	1 Year
SB2604	AMN	Rohde & Schwarz	ESH2-Z5	Feb.20, 2019	1 Year
SB9054/04	EMI Test Receiver	Rohde & Schwarz	ESU8	Sep.03, 2018	1 Year
SB8501/04	Bilog Antenna	Schwarzbeck	VULB9163	Jun.01, 2019	1 Year
SB12724/11	Loop Antenna	Rohde & Schwarz	HFH2-Z2	Jun.26, 2019	1 Year
SB9721/02	Signal Analyzer	Agilent	N9020A	Nov.26, 2018	1 Year
SB9721/07	DC Source	Agilent	66319D	--	--
SB11818	Temperature & Humidity Test chamber	Espec	EH-010U	Mar.25, 2019	1 Year
--	Radiated Test Software	Rohde & Schwarz	EMC 32 8.50.0	--	--
--	AC Line Conducted Test Software	Rohde & Schwarz	ES-K1 V1.71	--	--

5. 20DB BANDWIDTH MEASUREMENT

5.1. Test Standard

5.1.1. Test Standard

FCC part 2.1049

5.2. TEST PROCEDURE

The 20dB bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode

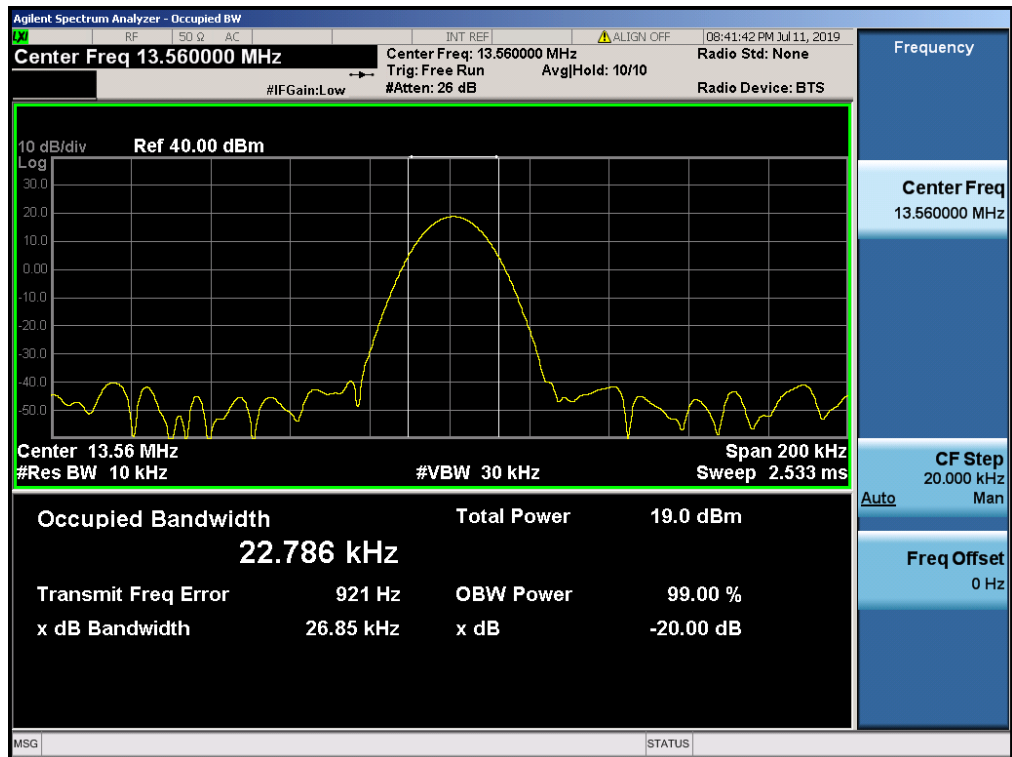
5.3. TEST SETUP



5.4. Test Data

Table 4 20dB Bandwidth Test Data

FREQUENCY (MHz)	20dB BANDWIDTH (kHz)	99% BANDWIDTH (kHz)
13.56	26.85	22.786



6. IN-BAND RADIATED SPURIOUS EMISSION MEASUREMENTS

6.1. Test Standard

6.1.1. Test Standard

FCC part 15.225(a)(b)(c)

6.2. TEST PROCEDURE

Radiated emission testing was performed in the band 13.110 – 14.010 MHz.

1. All measurements were performed using a loop antenna. The antenna was positioned in three orthogonal positions (X front, Y side, Z top) and the position with the highest emission level was recorded.

2. The EUT was positioned in three orthogonal planes to determine the orientation resulting in the worst case emissions.

3. Measurements were performed at 3m and the data was extrapolated to the specified measurement distance of 30m using the square of an inverse linear distance extrapolation factor (40 dB/decade) as specified in §15.31(f)(2).
Extrapolation Factor = $20 \log_{10} (30/3)^2 = 40\text{dB}$.

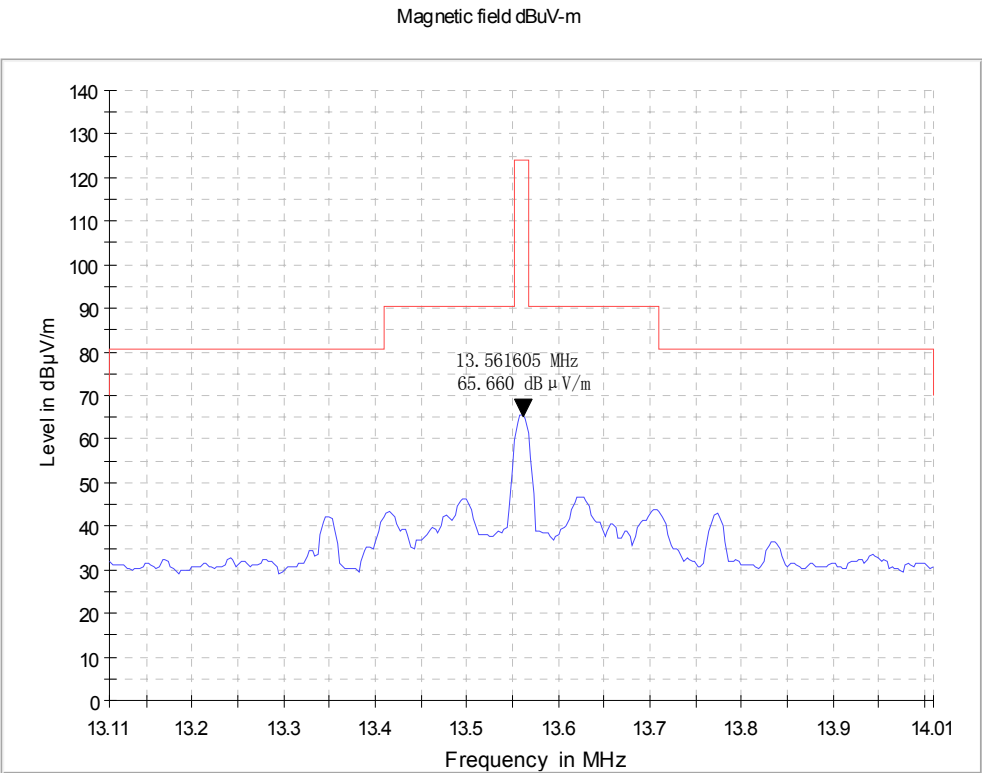
4. The spectrum was investigated from 9kHz up to 30MHz using the loop antenna. Only the emissions shown in the table above were found to be significant.

5. All measurements were recorded using a spectrum analyzer employing a quasi-peak detector.

6.3. TEST DATA

Emission level(dBuV)=Read Value(dBuV/m) + Antenna Factor(dB)+ Cable Loss + pre amp(dB)

The emissions don’ t show in above result tables are more than 20dB below the limits



Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (deg)	Corr. (dB)
13.561	66.64	124	57.36	0	20

7. RADIATED SPURIOUS EMISSION MEASUREMENTS, OUT-OF-BAND

7.1. Test Standard and Limit

7.1.1. Test Standard

FCC part 15.205, 15.209 & 15.225(d)

7.1.2. Test Limit

FCC Part 15.209

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Fieldstrength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.

Formula for converting the field strength from $\mu\text{V/m}$ to $\text{dB}\mu\text{V/m}$ is:

$$\text{dB}\mu\text{V/m} = 20\log_{10}(\mu\text{V/m})$$

7.2. TEST PROCEDURE

The EUT was tested from 9kHz up to the 1GHz excluding the band 13.110 – 14.010 MHz. All measurement up to 960MHz were recorded with a spectrum analyzer employing a quasi-peak detector. All out-of-band emissions must not exceed the limits shown in Table 8-5 per Section 15.209. A loop antenna was used to investigate emissions below 30MHz

7.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

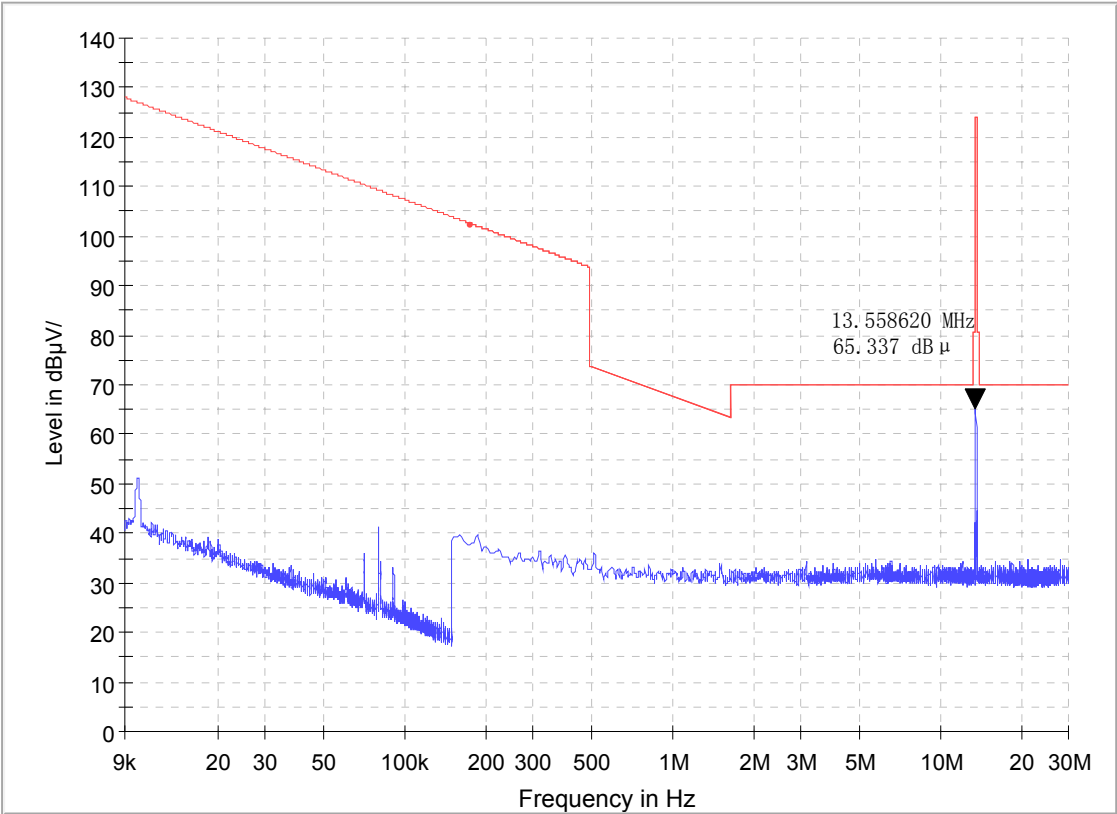
7.4. TEST DATA

The emissions don't show in following result tables are more than 20dB below the limits, the test curves are shown in the next page.

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

9kHz-30MHz

Magnetic field dBuV-m



30MHz-1GHz

Adaptor: 1#

Table 5 Radiated Emission Test Data 30MHz-1GHz

Frequency (MHz)	Cable Loss +preamp (dB)	Antenna Factor (dB)	Readings (dBμV/m)	Level (dBμV/m)	Polarity (H/V)	Limits (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (Degs)
30.582	0.6	12.3	7.6	20.5	H	40.0	19.5	100	328
40.67	0.7	13.6	5.4	19.7	H	40.0	20.3	100	164
59.294	0.9	13.0	6.1	20	H	40.0	20.0	100	177
101.683	1.1	13.2	6.1	20.4	H	43.5	23.1	100	89
156.973	1.4	8.3	9.1	18.8	H	43.5	24.7	100	36
276.671	1.9	12.1	8.8	22.8	H	46.0	23.2	100	354
38.516	0.7	12.3	9.3	22.3	V	40	17.7	100	267
40.676	0.7	13.6	15.5	29.8	V	40	10.2	100	13
68.806	0.9	10.7	10.8	22.4	V	40	17.6	100	354
82.768	1.0	8.5	17.3	26.8	V	40	13.2	100	283
92.177	1.1	11.9	10.5	23.5	V	43.5	20.0	100	360
162.502	1.5	8.7	11.6	21.8	V	43.5	21.7	100	70

Remark: Emission level (dBuV)=Read Value(dBuV/m) + Antenna Factor(dB)+ Cable Loss +preamp(dB)

Adaptor: 2#

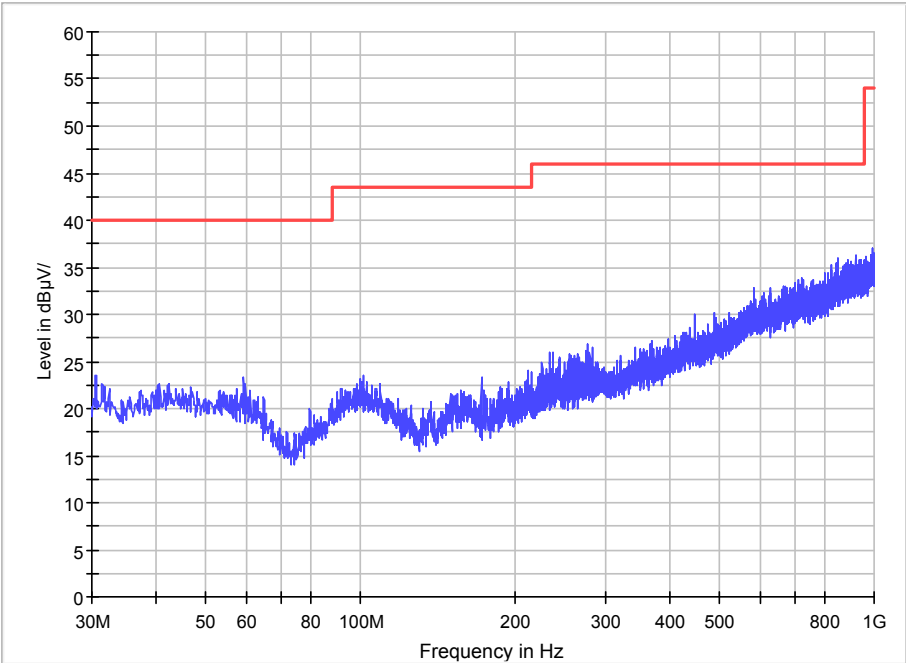
Table 6 Radiated Emission Test Data 30MHz-1GHz

Frequency (MHz)	Cable Loss +preamp (dB)	Antenna Factor (dB)	Readings (dBμV/m)	Level (dBμV/m)	Polarity (H/V)	Limits (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (Degs)
46.878	0.8	13.6	1.6	16	H	40.0	24.0	100	40
99.161	1.1	12.8	3.1	17	H	43.5	26.5	130	50
150.668	1.4	8.3	13.5	23.2	H	43.5	20.3	180	180
241.169	1.9	12.1	11.3	25.3	H	46.0	20.7	200	170
275.895	1.9	12.1	12.1	26.1	H	46.0	19.9	260	160
566.604	2.9	16.6	1.9	21.4	H	46.0	24.6	100	180
30.097	0.6	12.3	11.8	24.7	V	40	15.3	100	0
39.991	0.7	12.3	11.5	24.5	V	40	15.5	100	0
160.562	1.4	8.7	16.7	26.8	V	43.5	16.7	100	180
171.717	1.5	9.0	16.9	27.4	V	43.5	16.1	100	30
196.646	1.7	10.6	17.5	29.8	V	43.5	13.7	100	210
729.079	3.3	18.8	0.4	22.5	V	46	23.5	100	0

Remark: Emission level (dBuV)=Read Value(dBuV/m) + Antenna Factor(dB)+ Cable Loss +preamp(dB)

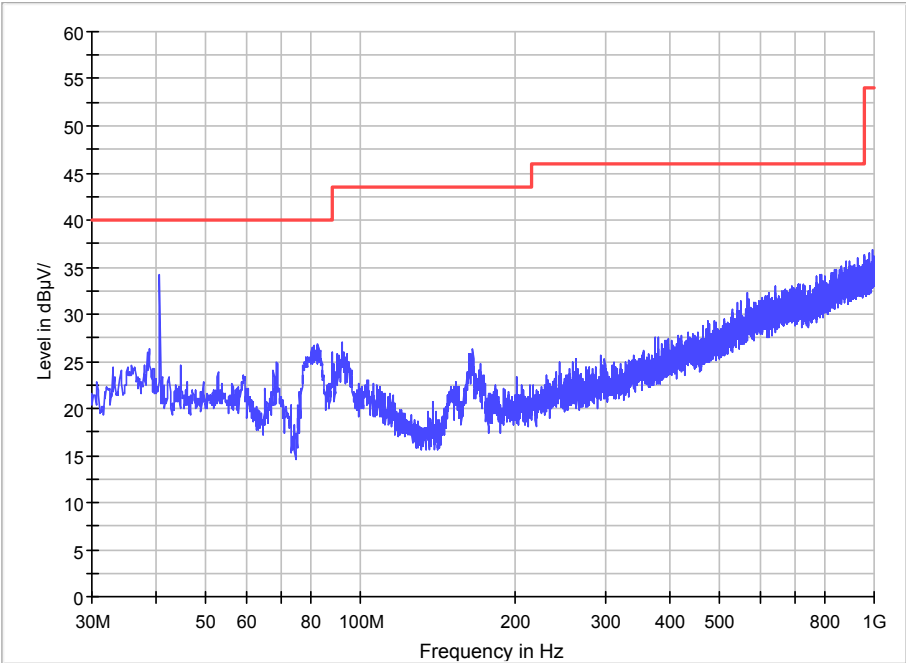
Adapter: 1#

Field strength 30M-1GHz 1F 3m chamber



(Horizontal)

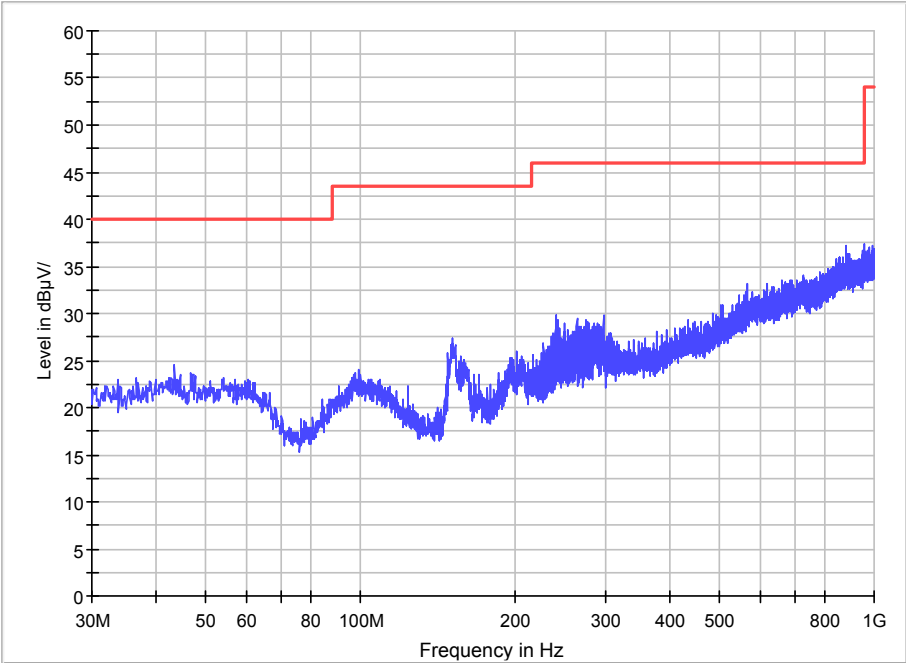
Field strength 30M-1GHz 1F 3m chamber



(Vertical)

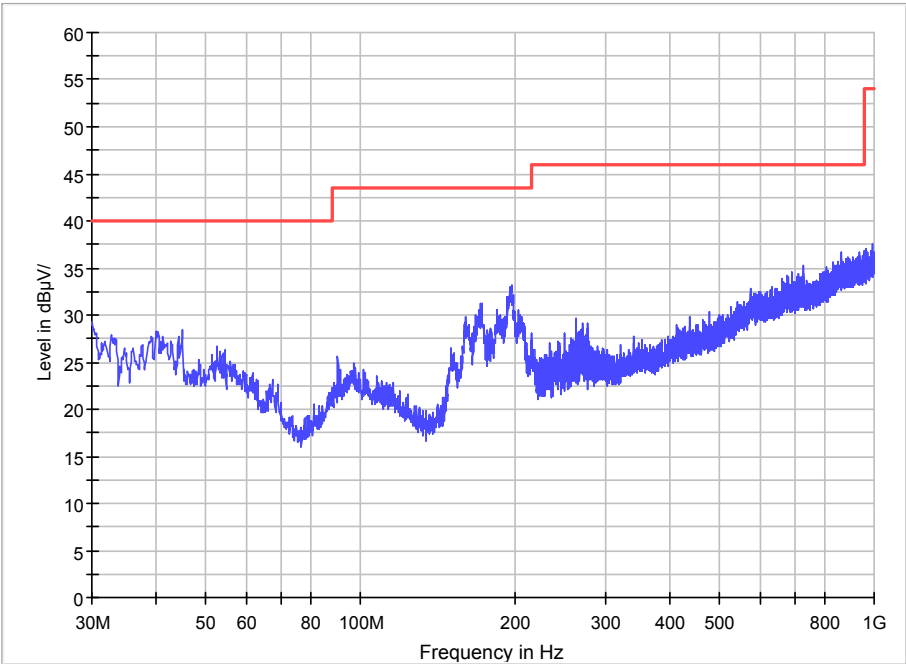
Adapter: 2#

Field strength 30M-1GHz 1F 3m chamber



(Horizontal)

Field strength 30M-1GHz 1F 3m chamber



(Vertical)

8. CONDUCTED EMISSION TEST FOR AC POWER PORT MEASUREMENT

8.1. Test Standard and Limit

8.1.1. Test Standard

FCC Part 15.207

8.1.2. Test Limit

Table 7 Conducted Disturbance Test Limit

Frequency	Maximum RF Line Voltage (dB μ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

* Decreasing linearly with logarithm of the frequency

* The lower limit shall apply at the transition frequency.

8.2. Test Procedure

The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI test receiver (R&S Test Receiver ESCS30) is used to test the emissions form both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

The bandwidth of EMI test receiver is set at 9kHz.

8.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

8.4. Test Data

The emissions don't show in below are too low against the limits. Refer to the test curves.

Adapter: 1#

Table 8 Conducted Disturbance Test Data

	Frequency (MHz)	Correction Factor (dB)	Quasi-Peak			Average		
			Reading (dB μ V)	Emission Level (dB μ V)	Limits (dB μ V)	Reading (dB μ V)	Emission Level (dB μ V)	Limits (dB μ V)
Line	0.154	9.7	29.4	39.1	65.8	13.4	23.1	55.8
	0.194	9.7	29.9	39.6	63.9	13.7	23.4	53.9
	0.506	9.8	39.0	48.8	56	28.3	38.1	46
	0.574	9.8	38.9	48.7	56	28.5	38.3	46
	9.72	10.0	32.1	42.1	60	15.4	25.4	50
	13.556	9.9	66.5	76.4	60	28.6	38.5	50
Neutral	0.474	9.7	29.0	38.7	56.4	16.4	26.1	46.4
	0.546	9.8	36.9	46.7	56	20.6	30.4	46
	0.578	9.8	34.1	43.9	56	16.6	26.4	46
	1.158	9.8	30.9	40.7	56	14.4	24.2	46
	8.984	10.0	30.1	40.1	60	22.1	32.1	50
	13.556	9.9	64.5	74.4	60	51.3	61.2	50

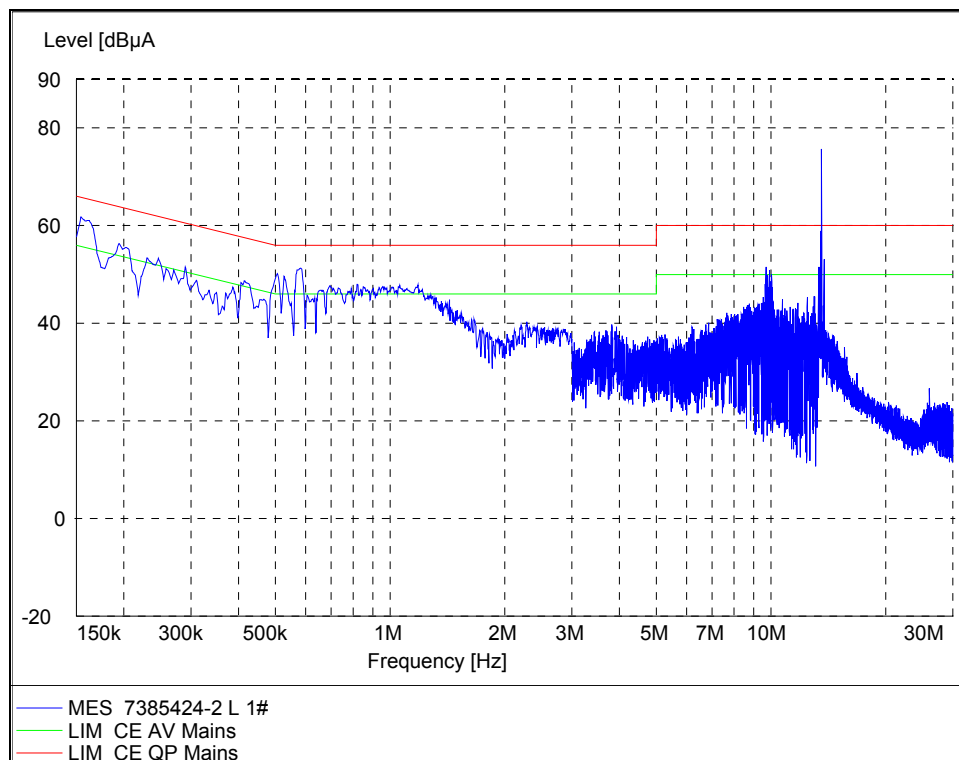
REMARKS: 1. Emission level (dB μ V)=Read Value (dB μ V) + Correction Factor(dB)

2. Correction Factor (dB) =LISN Factor (dB) + Cable Factor (dB)+Limiter Factor(dB)

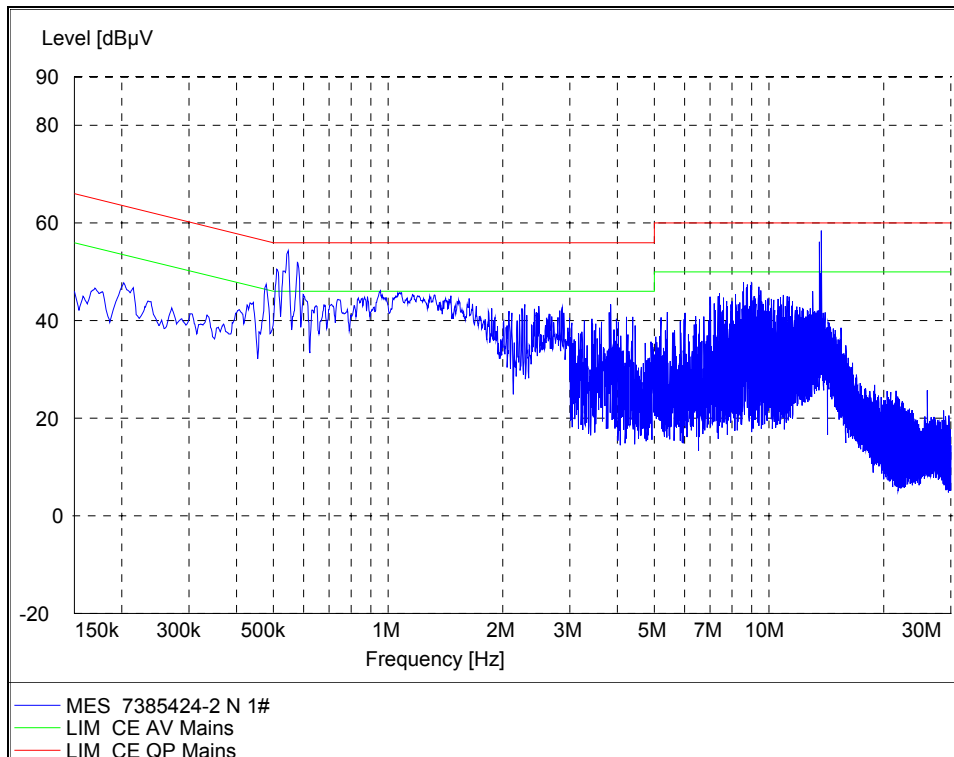
3. The other emission levels were very low against the limit.

4.13.56MHz is a fundamental frequency of the EUT

EUT: FX205F
Manufacturer:
Operating Condition: Charging and transmitter
Test Site:
Operator:
Test Specification: L
Comment: AC 120V/60Hz



EUT: FX205F
Manufacturer:
Operating Condition: Charging and transmitter
Test Site:
Operator:
Test Specification: N
Comment: AC 120V/60Hz



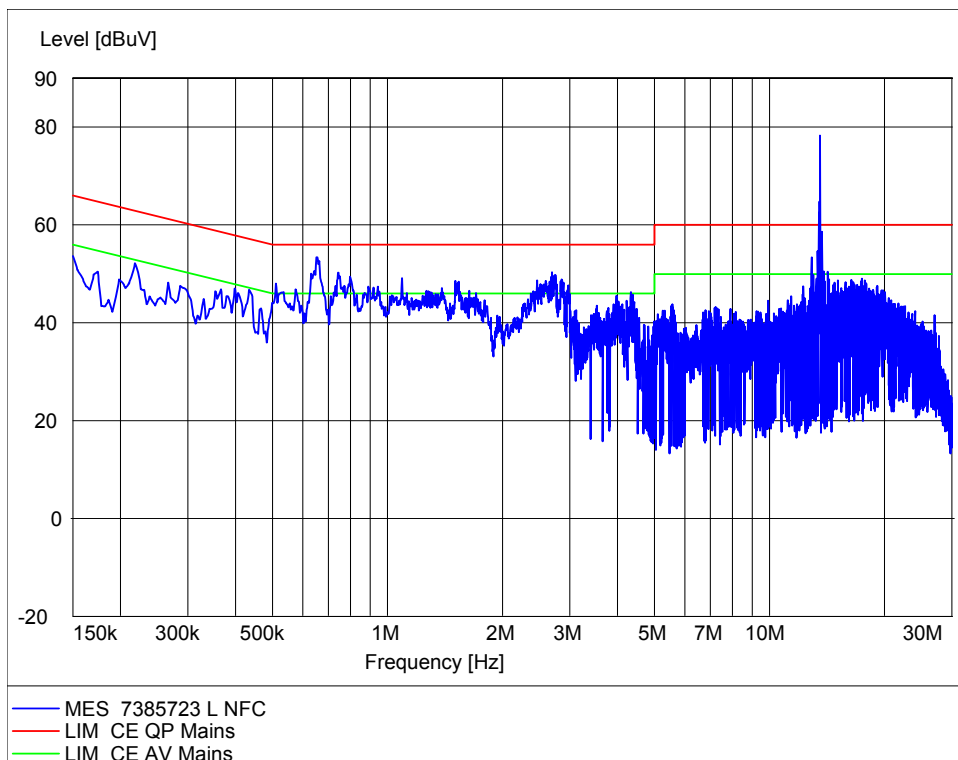
Adapter: 1#

Table 9 Conducted Disturbance Test Data

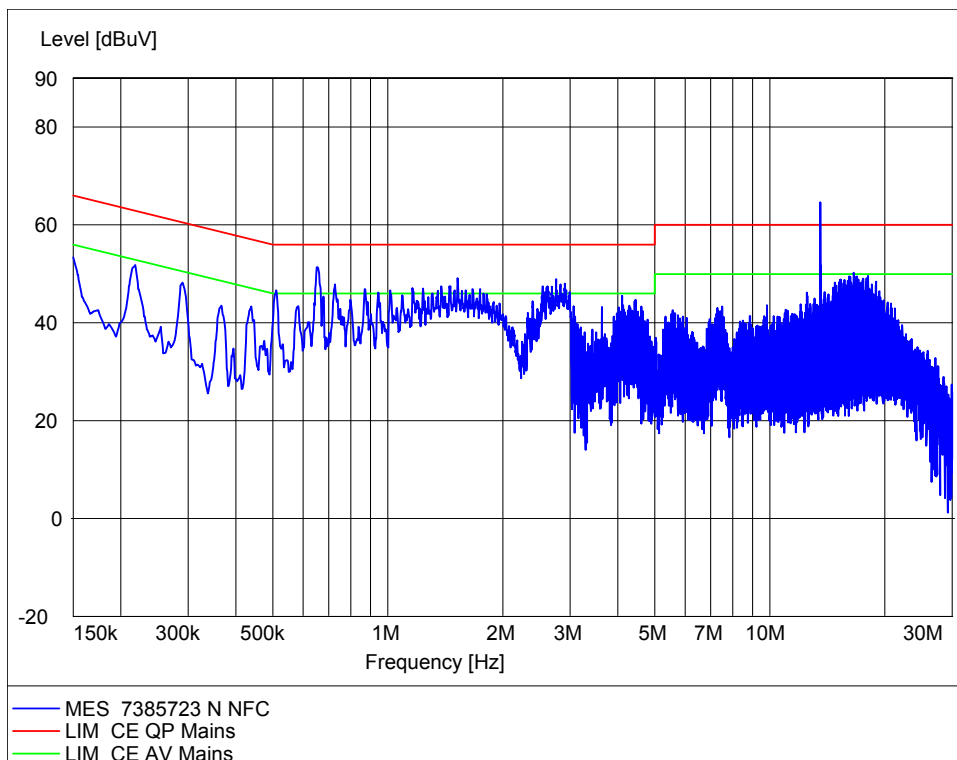
	Frequency (MHz)	Correction Factor (dB)	Quasi-Peak			Average		
			Reading (dB μ V)	Emission Level (dB μ V)	Limits (dB μ V)	Reading (dB μ V)	Emission Level (dB μ V)	Limits (dB μ V)
Line	0.15	9.7	36.6	46.3	66	20.7	30.4	56
	0.218	9.7	35.1	44.8	62.9	19.0	28.7	52.9
	0.65	9.8	36.6	46.4	56	24.9	34.7	46
	2.694	9.9	31.5	41.4	56	19.0	28.9	46
	12.892	9.9	34.5	44.4	60	18.5	28.4	50
	13.56	9.9	73.7	83.6	60	54.1	64	50
	17.42	9.9	31.8	41.7	60	20.6	30.5	50
Neutral	0.15	9.7	41.3	51	66	23.2	32.9	56
	0.215	9.7	40.1	49.8	63.0	25.1	34.8	53.0
	0.286	9.7	34.7	44.4	60.6	18.2	27.9	50.6
	0.65	9.8	33.9	43.7	56	24.3	34.1	46
	1.514	9.8	29.1	38.9	56	15.6	25.4	46
	13.560	9.9	75.3	85.2	60	59.2	69.1	50
	17.084	9.9	34.3	44.2	60	20.8	30.7	50

REMARKS: 1. Emission level (dB μ V)=Read Value (dB μ V) + Correction Factor(dB)
2. Correction Factor (dB) =LISN Factor (dB) + Cable Factor (dB)+Limiter Factor(dB)
3. The other emission levels were very low against the limit.
4.13.56MHz is a fundamental frequency of the EUT

EUT: FX205F
Manufacturer:
Operating Condition: Charging and transmitter
Test Site:
Operator:
Test Specification: L
Comment: AC 120V/60Hz



EUT: FX205F
Manufacturer:
Operating Condition: Charging and transmitter
Test Site:
Operator:
Test Specification: N
Comment: AC 120V/60Hz



9. FREQUENCY STABILITY TOLERANCE

9.1. Test Standard

9.1.1. Test Standard

FCC part 15.225(e)

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

9.2. TEST PROCEDURE

ANSI C63.10-2013 Clause 6.8

9.3. TEST DATA

Table 10 Frequency Stability Tolerance Test Data

Nominal Frequency (MHz)	Voltage (%)	Voltage (Vdc)	Temperature (°C)	Measured Frequency Error(Hz)	Limit (Hz)	Verdict
13.56	100%	3.8	-20	-18	1356	PASS
	100%	3.8	-10	-26	1356	PASS
	100%	3.8	0	87	1356	PASS
	100%	3.8	+10	127	1356	PASS
	100%	3.8	+20	51	1356	PASS
	100%	3.8	+30	-36	1356	PASS
	100%	3.8	+40	-72	1356	PASS
	100%	3.8	+50	-13	1356	PASS
	High	4.35	+20	71	1356	PASS
	End. Point	3.5	+20	-44	1356	PASS

10.ANTENNA REQUIREMENT

According to Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

The EUT has a built in antenna which is integrated inside the enclosure, this is permanently attached antenna and meets the requirements of this section.

END OF REPORT