TCP Dr. Genz (HK) Co., Ltd.

Test Report

FCC RULES 47CFR PART 15 / SUBPART C (Section 15.231)

Test report no.: H1M20808-7018-P-15

FCC ID: WMD60644

Accredited Laboratory by:

ACCREDITED
Testing Cert #2762.01

TCP Dr. Genz (HK) Co., Ltd.
26/F., Tamson Plaza, 161 Wai Yip Street
Kwun Tong, Kowloon, Hong Kong

Phone +852 2389 2200
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TEST REPORT

Summary | **FCC RULES 47CFR PART 15 / SUBPART C**

Test Report No. ..... :	H1M20808-7018-P-15
Date of issue ..... :	18.11.2008
Testing Laboratory name .... :	TCP Dr. Genz (HK) Co., Ltd.
Address ..... :	26/F., Tamson Plaza, 161 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong
Applicant's name..... :	GRANDTECH INDUSTRIAL LTD.
Address ..... :	KWAI CHUNG, N.T., HONG KONG
Manufacturer's name ..... :	GRANDTECH INDUSTRIAL LTD.
Address ..... :	KWAI CHUNG, N.T., HONG KONG
Test specification	
Standard(s) applied..... :	FCC Rules 47 CFR Part15 Subpart C (Section 15.231)
..... :	
Test item description ..... :	Digital Camera Controller
Brand Name ..... :	MINOX
Model and/or type reference ... :	60644
Rating(s) ..... :	3VDC (CR 2032 cell)

Summary of Test Results **Pass**

The Summary of Test Results based on a technical opinion belongs to the applied standard(s).

Disclaimer

Further details of testing are provided in particular chapters of this Test Report.
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Emphasized conditions or project related conditions:
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1. General Information

1.1 Tester

Operator:

18.11.2008	Mr. Karl Lau	
Date	Test Engineer	Signature

Approved by:

18.11.2008	Mr. F. Schulz	
Date	Laboratory Manager	Signature

1.2 Testing laboratory

Name	: TCP Dr. Genz (HK) Co., Ltd.
Street	: 26/F., Tamson Plaza, 161 Wai Yip Street
Town	: Kwun Tong, Kowloon
Country	: Hong Kong
Telephone	: +852 2389 2200
Fax	: +852 2389 3073

Note: Test environment and test equipment available in accordance to ISO/IEC/EN 17025 requirements. Accreditation certificates for confirmation can be shown on request.

A2LA Accredited Testing Laboratory
Testing Cert# 2762.01

Name	: Hong Kong Productivity Council
Street	: EMC Centre, LG1, HKPC Building, 78 Tat Chee Avenue
Town	: Kowloon
Country	: Hong Kong

Note: Test environment and test equipment available in accordance to ISO/IEC/EN 17025 requirements. Accreditation certificates for confirmation can be shown on request.

The Hong Kong Laboratory Accreditation Scheme (HOKLAS)

Reg. No.082

FCC registered measurement facility
Reg. No.90656

1.3 Details of applicant

Name : : GRANDTECH INDUSTRIAL LTD.
Street : : FLAT A1-2, 11/F., BLK. A, YEE LIM INDUSTRIAL CENTRE, 2-28 KWAI LOK STREET

Town : KWAI CHUNG, N.T.
Country : HONG KONG
Telephone : +852 2612 1893
Fax : +852 2615 2236
E-mail : --

Contact : MR. ALEX NG
Telephone : +852 2612 1893

1.4 Application details

Date of receipt of application : 13.08.2008
Date of receipt of test item : 13.08.2008
Date of test : 13.08.2008 – 18.11.2008

1.5 Manufacturer (if different from applicant in point 1.3)

Name :
Street :
Town :
Country :

1.6 Test item

Description of test item

Description of test item	Digital Camera Controller
Type identification	60644
Brand Name	MINOX
Operation Frequency	433.92 MHz
Operation frequency drift	± 200 kHz
Operation mode	simplex
Type of modulation	A1D
Type of antenna	integral
Power supply	3VDC (CR2032 cell)

2 Technical test

2.1 Summary of test results

Following conclusion has to be considered as technical opinion belongs to the applied standard(s).

No deviations from the technical specification(s) were ascertained in the course of the tests performed. ☒

or

The deviations as specified in 2.4 were ascertained in the course of the tests performed. ☐

2.2 Test environment

Temperature : 23 ± 2°C

Relative humidity content : 50 ± 2 %

Air pressure : 990 ± 5 hPa

No.	Test equipment	Type	Manufacturer
G003	Humidity/Temperature Meter	TES-1364	TES
E016	Air pressure meter	Standard	Raumklima

2.3 Test equipment utilized

Test Equipment list (Hong Kong Productivity Council**,** registration number: 90656)

Test equipment	Type	S/N	Manufacturer	Cal Due Date
Semi-anechoic Chamber	Nil	Nil	Frankonia	28 Mai 09
Test Reciever	ESU 26	100050	Rohde & Schwarz	06 Aug 09
Bi-conical Antenna	HK116	841489/016	Rohde & Schwarz	08 Mar 09
Log.-Periodic Antenna	HL223	841516/020	Rohde & Schwarz	28 Feb 09
Horn Antenna	3115	9002-3351	EMCO	27 Feb 10
Active Loop Antenna	6502	9107-2651	EMCO	20 Dec 09

2.4 Test procedure

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-2003 6.4 using a spectrum analyzer. The bandwidth of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was the 100 kHz and the video bandwidth was 300 kHz.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBµV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB.

Example:

Freq (MHz)	METER READING + ACF + CABLE LOSS (to the receiver) = FS
	20 dBµV + 10.36 dB + 6 dB = 36.36 dBµV/m @3m

ANSI STANDARD C63.4-2003 6.2.1 MEASUREMENT PROCEDURES: The UUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m (non metallic table). The UUT was placed in the center of the table. The table used for radiated measurements is capable of continuous rotation. The spectrums were scanned from 9 kHz to 30 MHz and 30 MHz to 10^{th} harmonic of the fundamental.

Peak readings were taken in three (3) orthogonal planes and the highest readings. Measurements were made by Hong Kong Productivity Council at the registered test site located at EMC Centre, LG1, HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong. The registration number is 90656.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

2.5 Test results Overview

Report-No. : H1M20808-7018–P-15
Test item : Digital Camera Controller
Model No. : 60644
Brand Name : MINOX

☒ 1st test ☐ test after modification ☐ production test

Standard	Description	Remarks	Verdict
FCC Rules 47CFR PART 15.231			
Section 15.231	Field strength of the Fundamental Wave		P
Section 15.231, 15.209	Radiated spurious emission		P
Section 15.231(c)	Emission bandwidth		P
Section 15.231(a)	Automatically deactivation		P

Test case verdicts

P - Pass *Test item does meet the requirement*
F - Fail *Test item does not meet the requirement*
N.A. - Not Applicable *Test case does not apply to the test object*

3 Transmitter parameter

3.1 Field Strength of the Fundamental Wave

Test results

Calculation of test results:
Such factors like antenna factor and cable loss are already included in the provided measurement results. All results measured with peak detector.

Frequency [MHz]	Antenna Polarization	Result [dBµV/m]	Limit [dBµV/m]	Margin (dB)
433.826	Vertical	78.12	80.83	2.71
433.830	Horizontal	72.66	80.83	8.17

Note: The limit is met. For the diagrams see Appendix B.

Limit 15.231(b)

Fundamental Frequency [MHz]	Limit	
433.920	[µV/m]	[dBµV/m]
	10,995	80.83

Fundamental Frequency [MHz]	Field strength of fundamental limit [µV/m]
40,66 – 40,70	2,250
70 - 130	1.250
130 - 174	1,250 to 3,750**
174 - 260	3.750
260 - 470	3,750 to 12,000**
Above 470	12,000

According to section 15.35(b), When average radiated emission measurements are specified, including emission measurement below 1000MHz, there also is limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated.

3.2 Radiated Spurious Emissions

(a) Measurement up to 30 MHz

Note: No Relevant emissions are expected in the frequency range 9 kHz to 30 MHz. Nevertheless a check using a near field probe was performed. No relevant emissions have been observed. Consequently no final measurement was performed.

(b) Measurement above 30 MHz

Calculation of test results:
Such factors like antenna factor and cable loss are already included in the provided measurement results. All results measured with peak detector.

Frequency [MHz]	Antenna Polarization	Result [dBµV/m]	Limit [dBµV/m]	Margin (dB)
868.5370	Vertical	31.88	60.83	28.95
868.5370	Horizontal	34.28	60.83	26.55
*1300.60	Vertical	34.33	54	19.67
*1300.60	Horizontal	35.50	54	18.60

* This frequency fall into the restricted band.

Note: The limit is met. The measurement was performed up to the 10th harmonic.
No (further) spurious emissions in the range 20 dB below the limit found.
The measurement was performed up to the 10th harmonic. For the diagram see appendix C.

Limits for Spurious Emission:

1. Limit 15.231(b)

Fundamental Frequency [MHz]	Limit [dBµV/m]
433.920	60.83

Fundamental Frequency [MHz]	Field strength of Spurious Emission limit [µV/m]
40,66 – 40,70	225
70 - 130	125
130 - 174	125 to 375**
174 - 260	375
260 - 470	375 to 1,250**
Above 470	1,250

According to section 15.35(b), When average radiated emission measurements are specified, including emission measurement below 1000MHz, there also is limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated.

2. A radiated emission test applies to harmonic/spurs that fall in the restricted bands as listed in § 15.205(a). The maximum permitted QP (< 1GHz) and average (> 1GHz) field strength is listed in § 15.209(a).

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
10.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	
13.36-13.41			

3. FCC Part 15, Subpart C, §15.209, Radiated Emission Limits

Frequency of Emission [MHz]	Field strength [µV/m]	Field Strength [dBµV/m]
30 – 88	100	40.0
88 – 216	150	43.5
216 – 960	200	46.0
Above 960	500	54.0

3.3 Emission Bandwidth

Limit

The bandwidth of the emission shall be no wider than 0.25% of the centre frequency for devices operating above 70 MHz and below 900MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

Test result

Measurement of Necessary Bandwidth (BN)

Used Frequency	Measured Bandwidth	Limit	Passed
433.92 MHz	7.51 kHz	1084.8 kHz	☒
Measurement uncertainty	<10Hz		

Note: The limit is met. For the diagram see appendix D.

3.4 Automatically Deactivation

This transmitter is activated manually by a switch and is deactivated automatically within 5 seconds after release the switch as confirmed by testing engineer.
It fulfills all requirements according Section 15.231(a).

4 Disclaimer

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The test results of this test report relate exclusively to the item tested as specified in clause 1.6 of this report. The test report may only be reproduced or published in full.

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5 Normative references

/1/ FCC Rules 47 CFR PART 15: 2008
Radio Frequency Devises

/2/ CISPR 22:2005
Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment

/3/ ANSI C63.4-2003
Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

Appendix

A Pictures
B Field Strength of the Fundamental Wave
C Radiated Spurious Emissions
D Emission Bandwidth

Appendix B

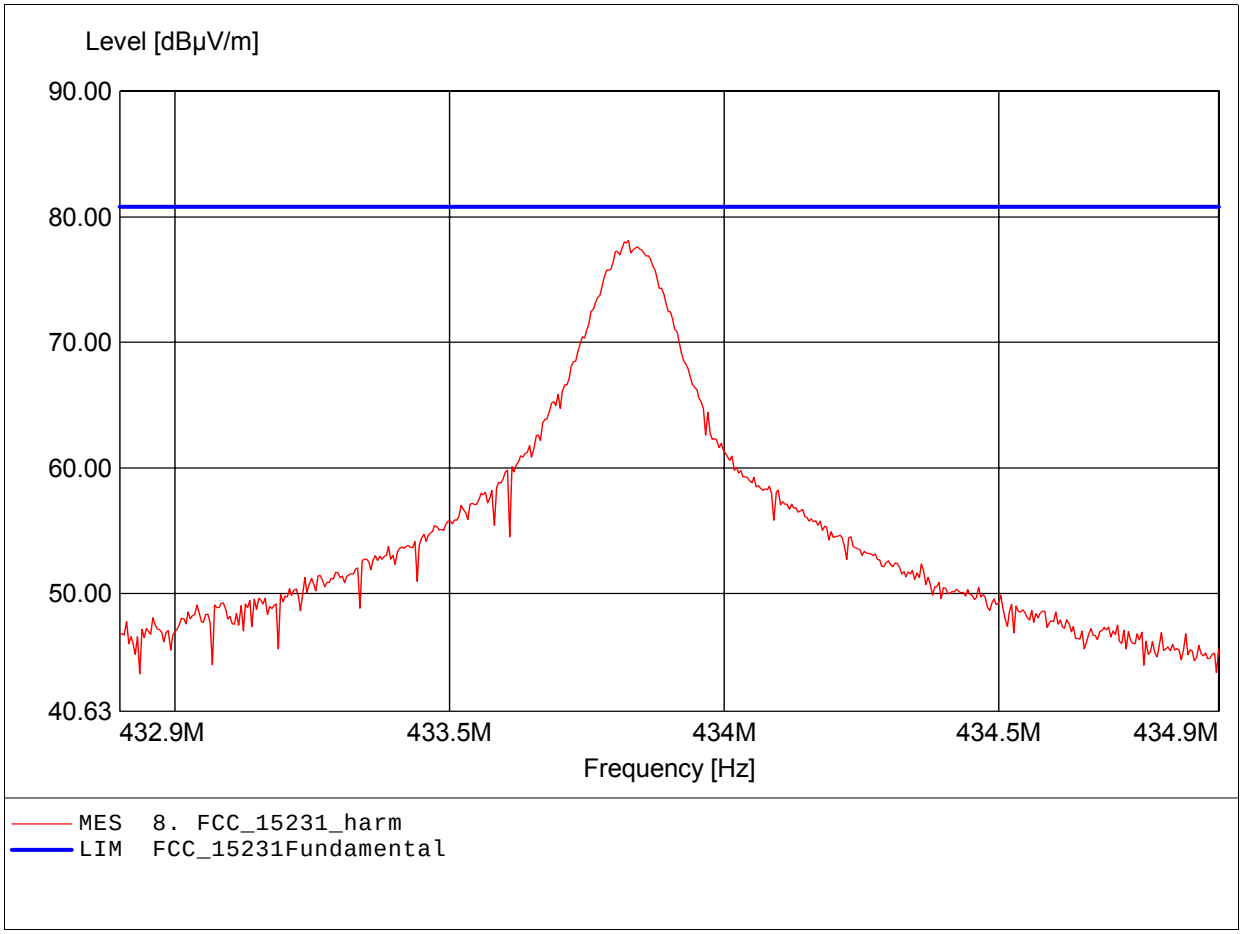
Field Strength of the Fundamental Wave

Field Strength of Fundamental

FCC RULES PART 15, SUBPART C

Project No.: H1M20808-7018
Detector: Peak

Test Site / Operator: HKPC / Mr. Scott Li
Temperature/Voltage: Temp.: 23°C/ Unom.: 3V (CR2032 cell)
Test Specification: according to Section15.231
Comment 1: Dist.: 3m, Ant.: HL223
Freq: 433.826MHz, Emax: 78.12dBµV/m, RBW: 100kHz



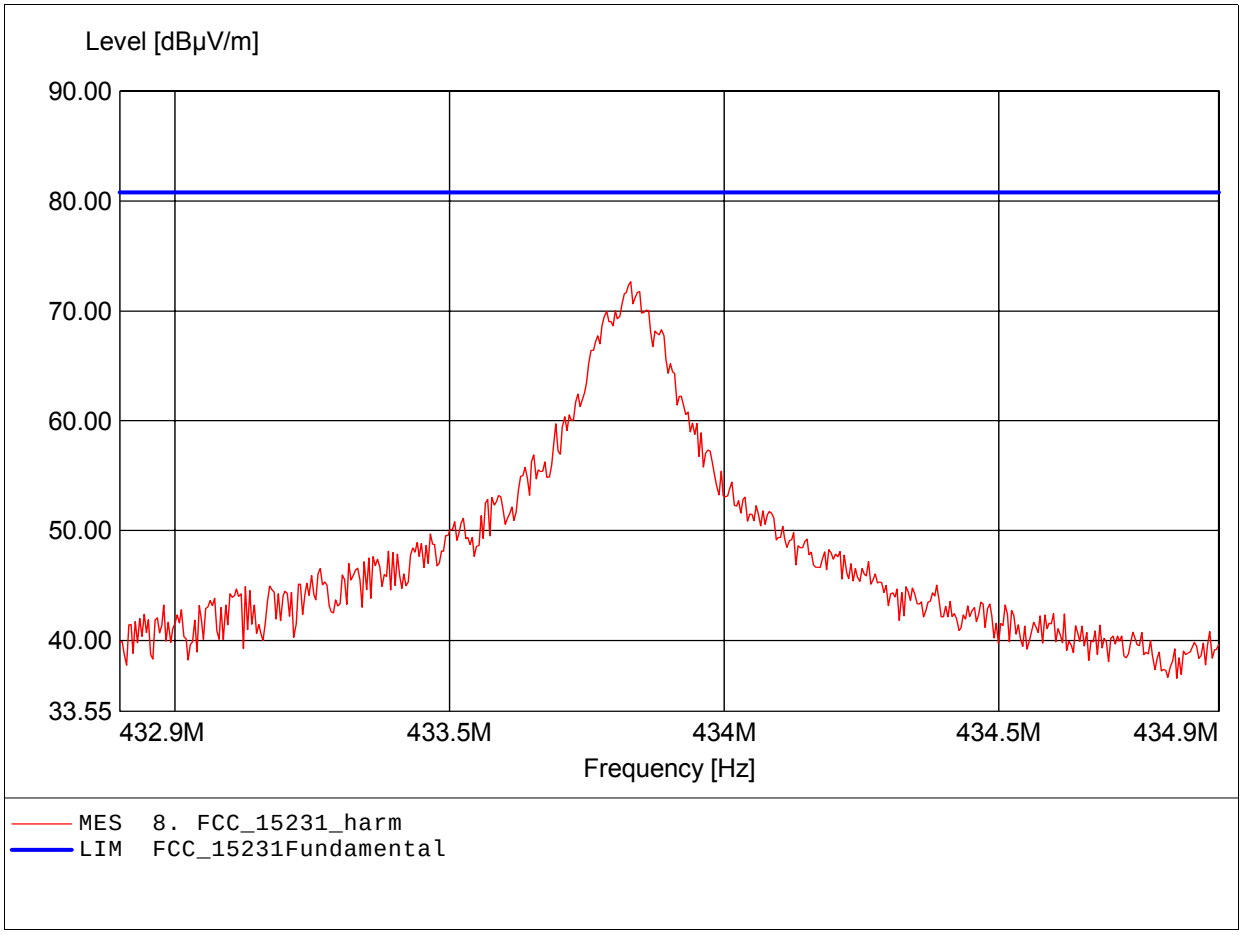
Overview / Antenna vertical

Field Strength of Fundamental

FCC RULES PART 15, SUBPART C

Project No.: H1M20808-7018
Detector: Peak

Test Site / Operator: HKPC / Mr. Scott Li
Temperature/Voltage: Temp.: 23°C/ Unom.: 3V (CR2032 cell)
Test Specification: according to Section15.231
Comment 1: Dist.: 3m, Ant.: HL223
Freq: 433.830MHz, Emax: 72.66dBµV/m, RBW: 100kHz



Overview / Antenna horizontal

Appendix C

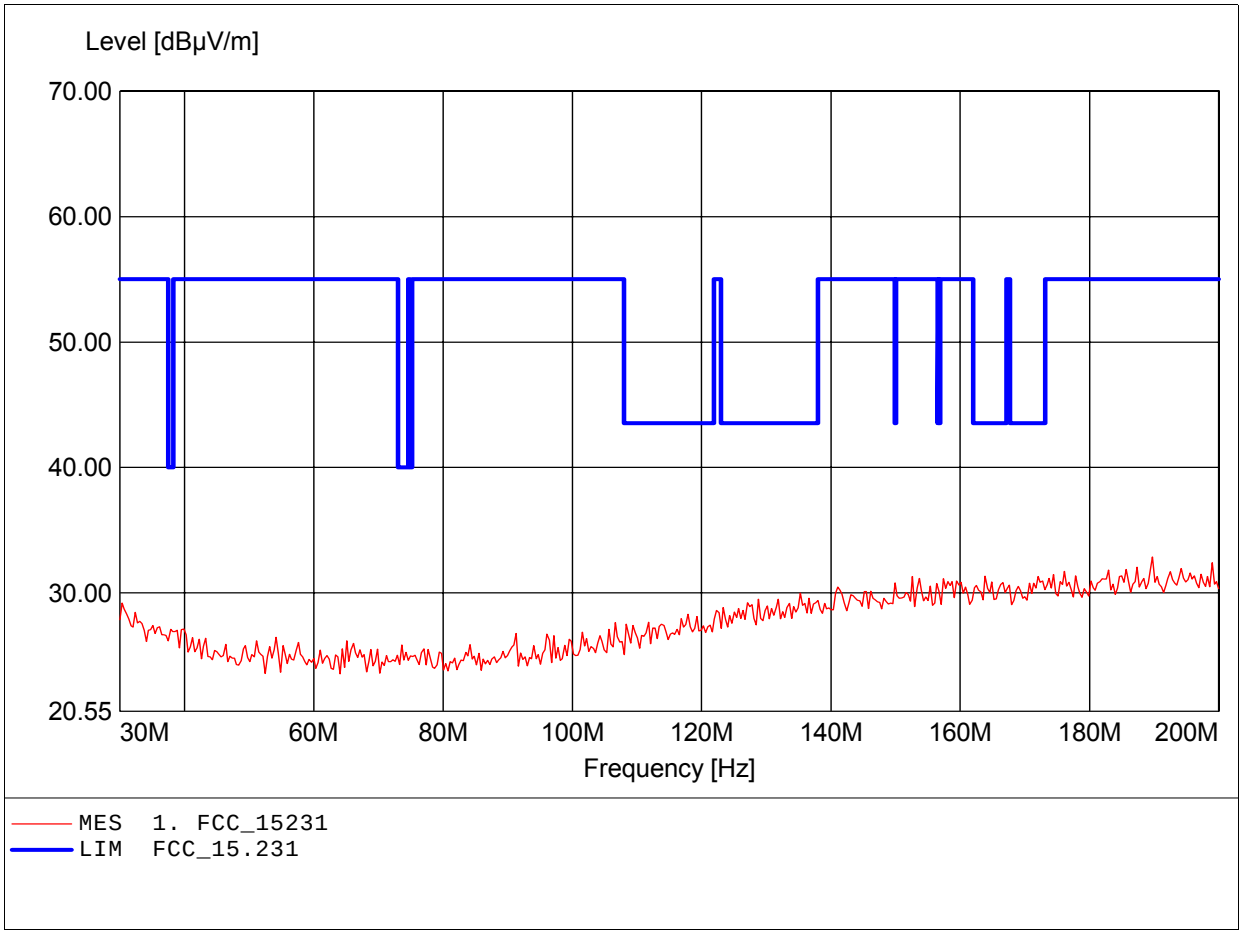
Radiated Spurious Emissions

Spurious emissions Field Strength

FCC RULES PART 15, SUBPART C

Project No.: H1M20808-7018
Detector: Peak

Test Site / Operator: HKPC / Mr. Scott Li
Temperature/Voltage: Temp.: 23°C/ Unom.: 3V (CR2032 cell)
Test Specification: according to Section15.231
Comment 1: Dist.: 3m, Ant.: HK 116
Freq: 189.780MHz, Emax: 32.86dBµV/m, RBW: 100kHz



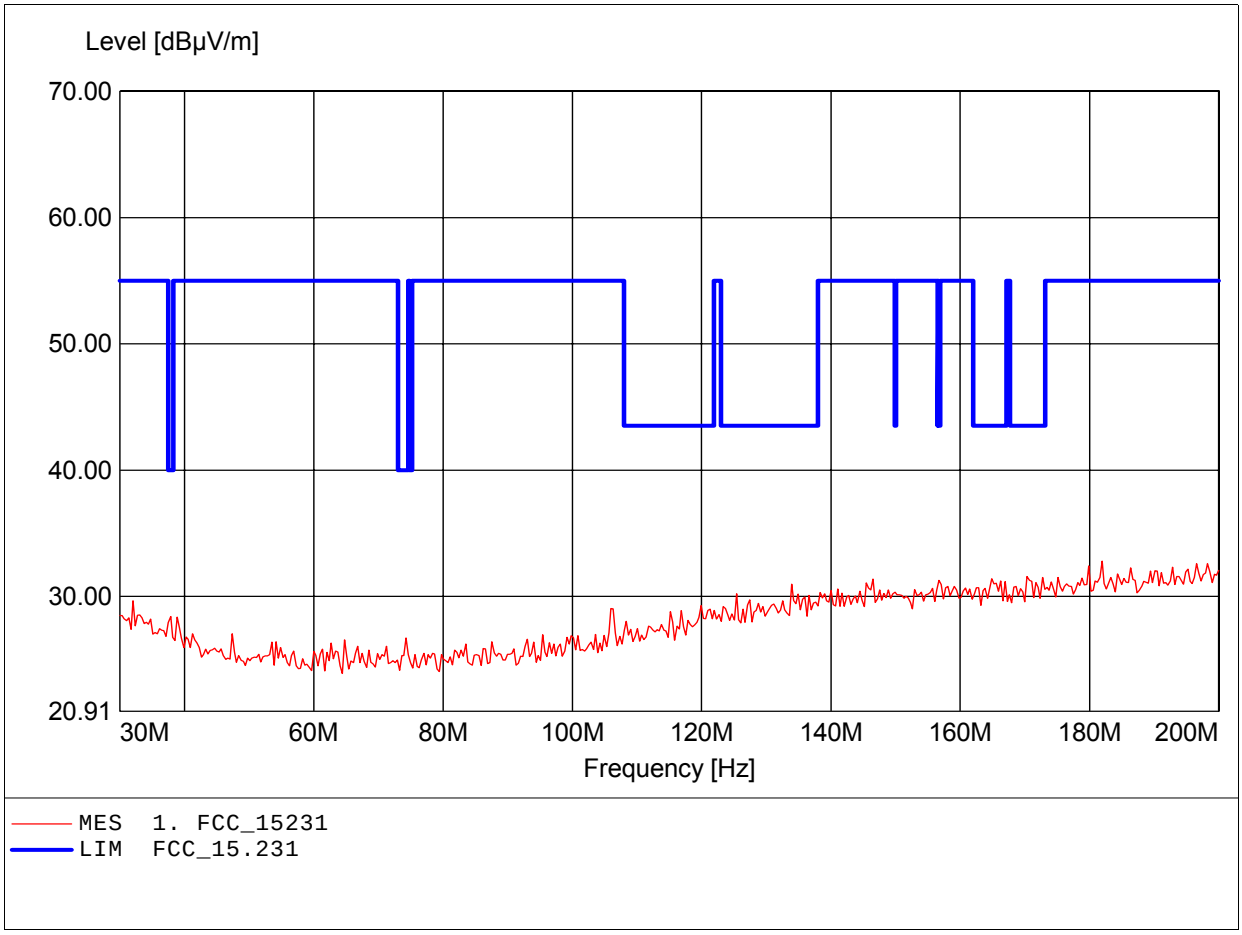
Overview / Antenna vertical

Spurious emissions Field Strength

FCC RULES PART 15, SUBPART C

Project No.: H1M20808-7018
Detector: Peak

Test Site / Operator: HKPC / Mr. Scott Li
Temperature/Voltage: Temp.: 23°C/ Unom.: 3V (CR2032 cell)
Test Specification: according to Section15.231
Comment 1: Dist.: 3m, Ant.: HK 116
Freq: 181.944MHz, Emax: 32.80dBµV/m, RBW: 100kHz



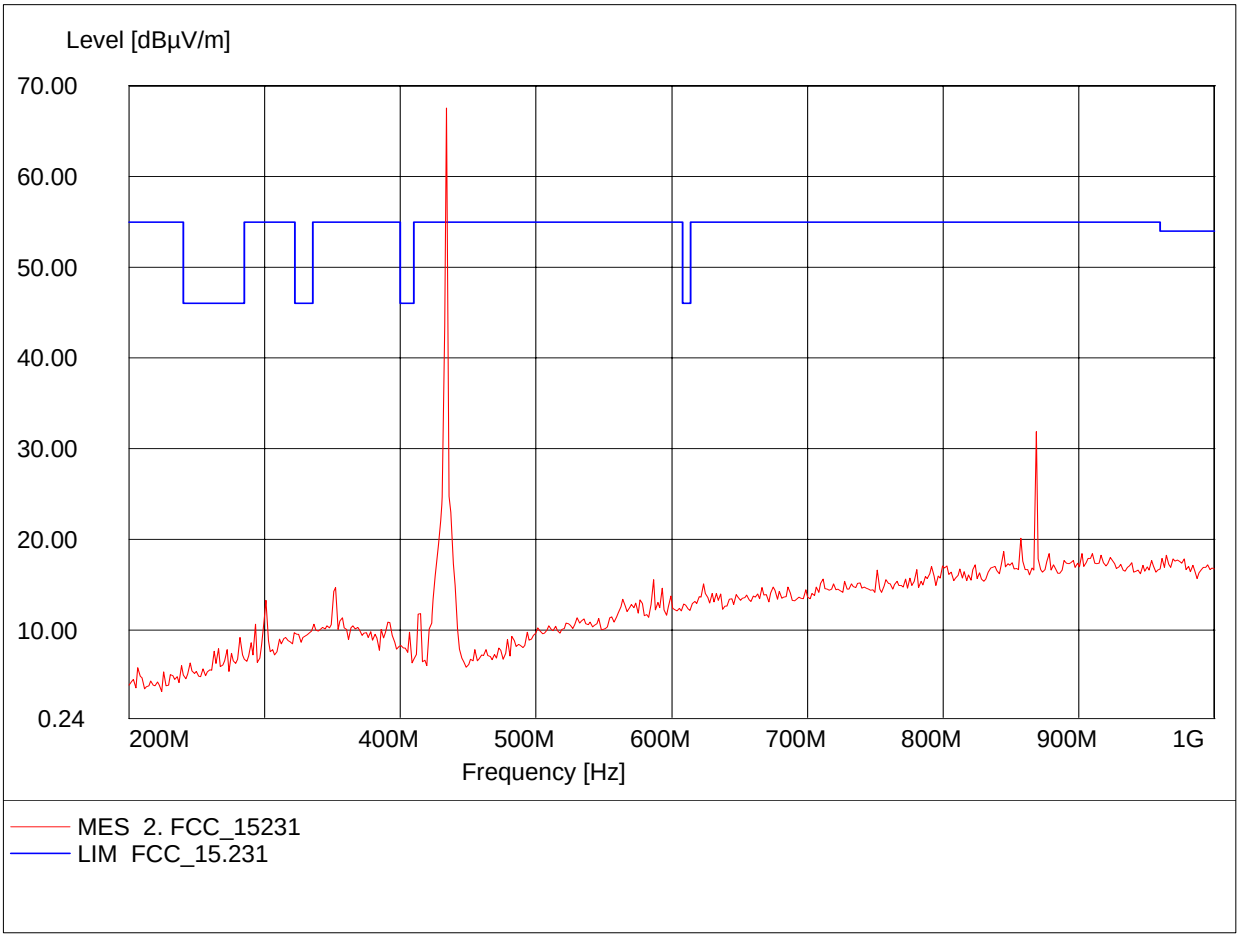
Overview / Antenna horizontal

Spurious emissions Field Strength

FCC RULES PART 15, SUBPART C

```
Project No.:          H1M20808-7018
Detector:             Peak

Test Site / Operator: HKPC / Mr. Scott Li
Temperature/Voltage:  Temp.: 23°C/ Unom.: 3V (CR2032 cell)
Test Specification:   according to Section15.231
Comment 1:            Dist.: 3m, Ant.: HL 223, amplif.
                      Freq: 434.068MHz, Emax: 67.55dBµV/m, RBW: 100kHz
```



MEASUREMENT RESULT: "2. FCC_15231"

Frequency MHz	Level dBµV/m
868.537074	31.88

Overview / Antenna vertical

Spurious emissions Field Strength

FCC RULES PART 15, SUBPART C

```
Project No.:          H1M20808-7018
Detector:             Peak

Test Site / Operator: HKPC / Mr. Scott Li
Temperature/Voltage:  Temp.: 23°C/ Unom.: 3V (CR2032 cell)
Test Specification:   according to Section15.231
Comment 1:            Dist.: 3m, Ant.: HL 223, amplif.
                      Freq: 434.068MHz, Emax: 58.55dBµV/m, RBW: 100kHz
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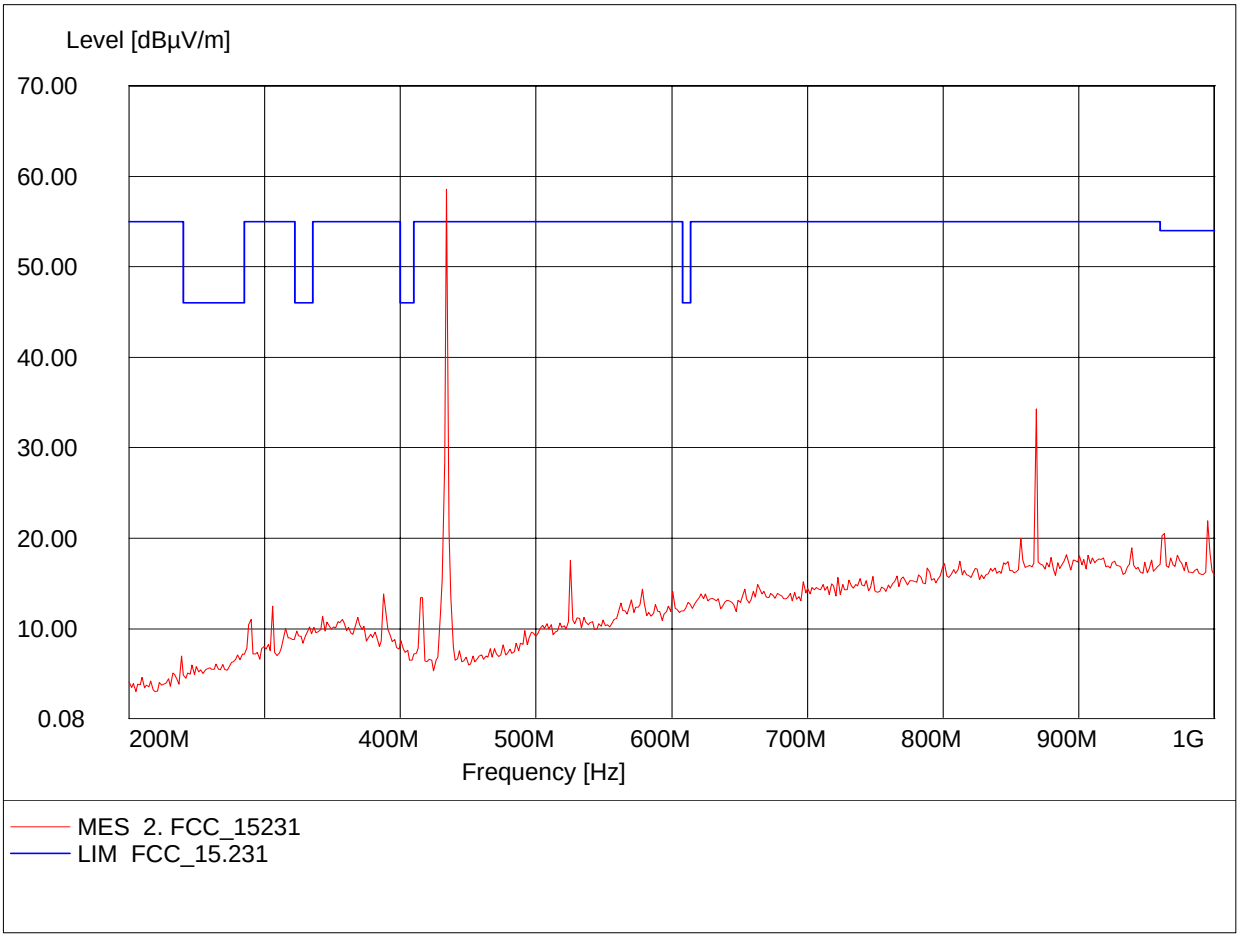


MEASUREMENT RESULT: "2. FCC_15231"

Frequency MHz	Level dBµV/m
525.450902	17.53
868.537074	34.28

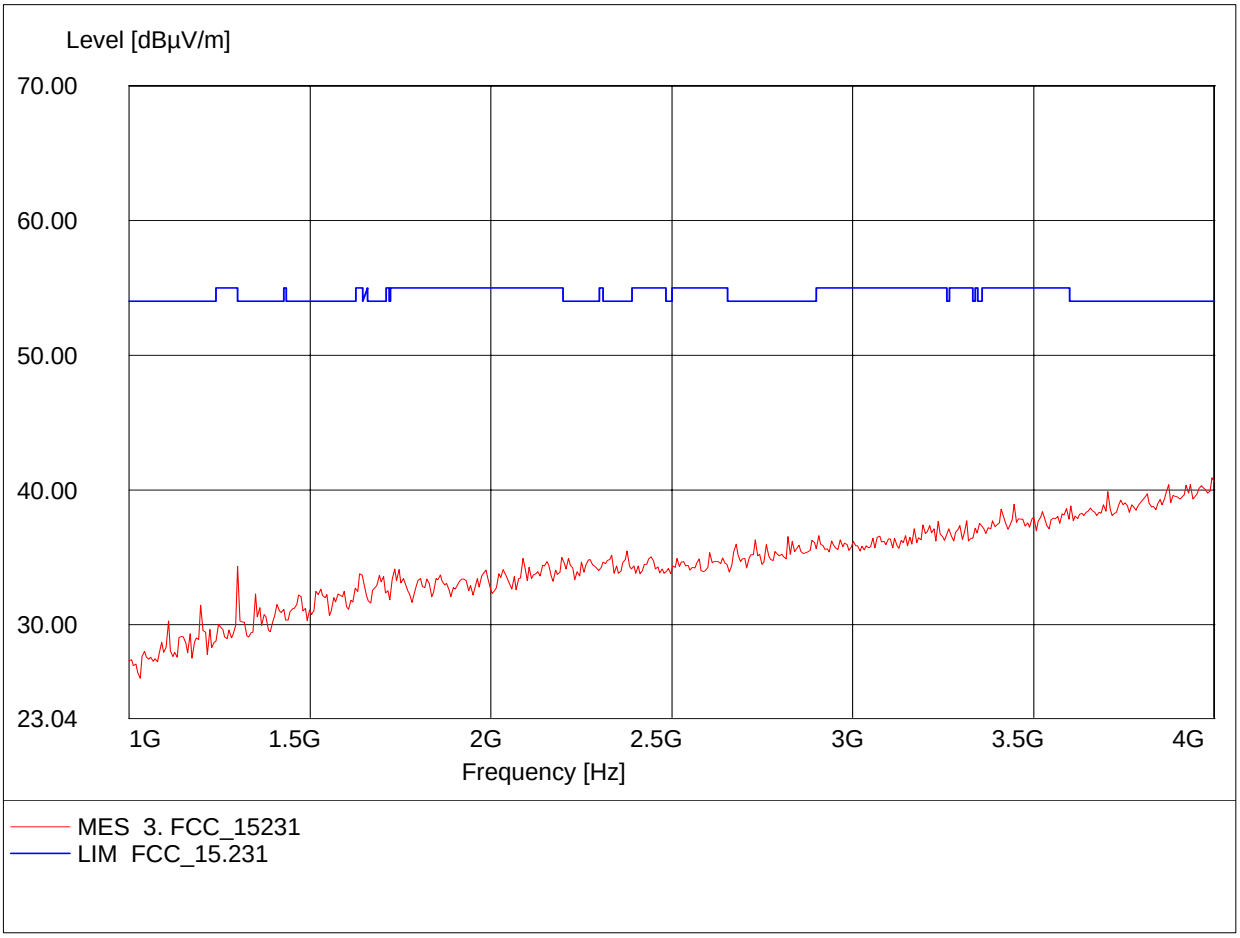
Overview / Antenna horizontal

Spurious emissions Field Strength

FCC RULES PART 15, SUBPART C

```
Project No.:          H1M20808-7018
Detector:             Peak

Test Site / Operator: HKPC / Mr. Scott Li
Temperature/Voltage:  Temp.: 23°C/ Unom.: 3V (CR2032 cell)
Test Specification:   according to Section 15.231, peak detector
Comment 1:            Dist.: 3m, Ant.: HL025, amplif.
                      Freq: 3.994GHz, Emax: 40.90dBµV/m, RBW: 1MHz
```



MEASUREMENT RESULT: "3. FCC_15231"

Frequency MHz	Level dBµV/m
1198.396794	31.47
1300.601202	34.33

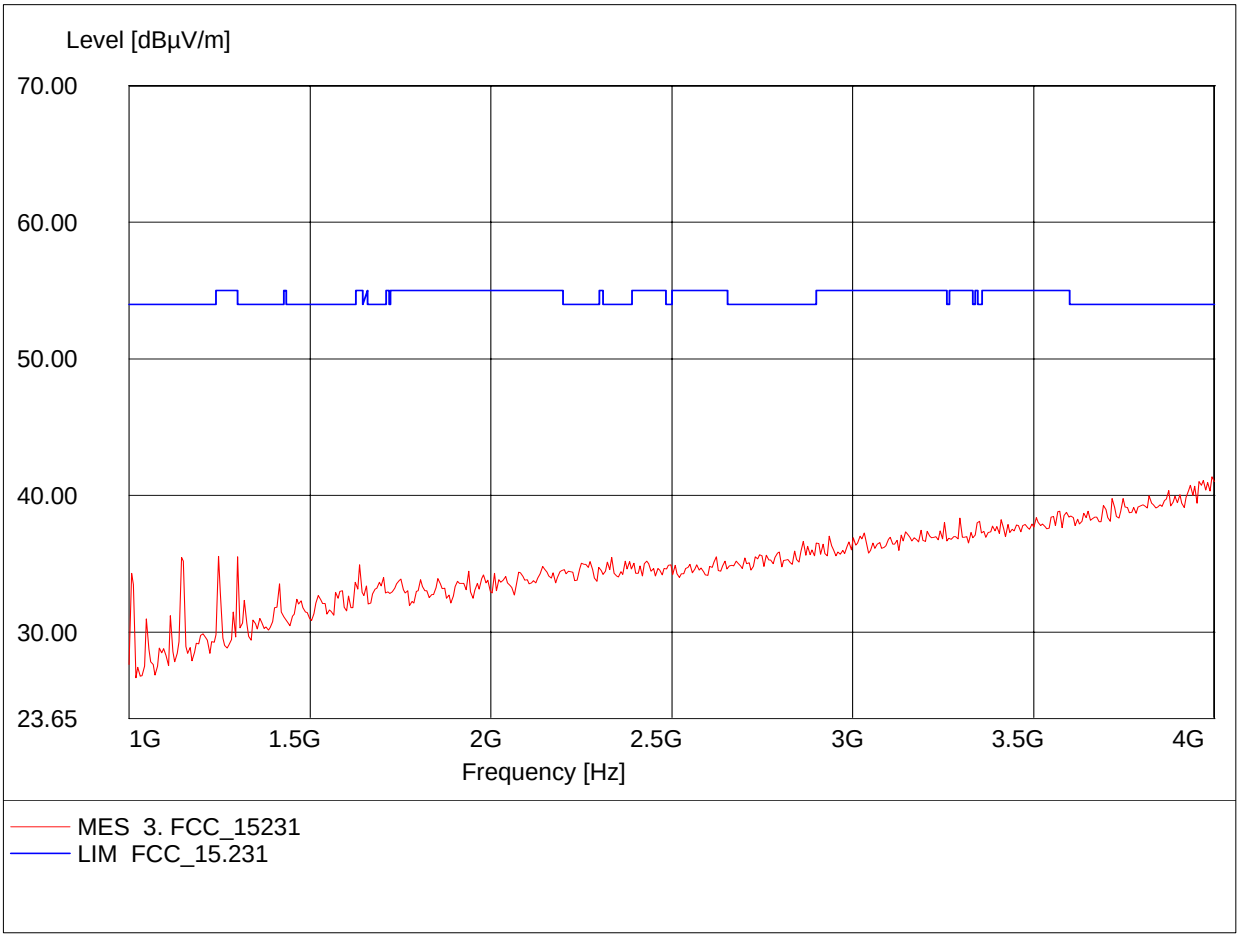
Overview / Antenna vertical

Spurious emissions Field Strength

FCC RULES PART 15, SUBPART C

```
Project No.:          H1M20808-7018
Detector:             Peak

Test Site / Operator: HKPC / Mr. Scott Li
Temperature/Voltage:  Temp.: 23°C/ Unom.: 3V (CR2032 cell)
Test Specification:   according to Section 15.231, peak detector
Comment 1:            Dist.: 3m, Ant.: HL025, amplif.
                      Freq: 3.994GHz, Emax: 41.38dBµV/m, RBW: 1MHz
```



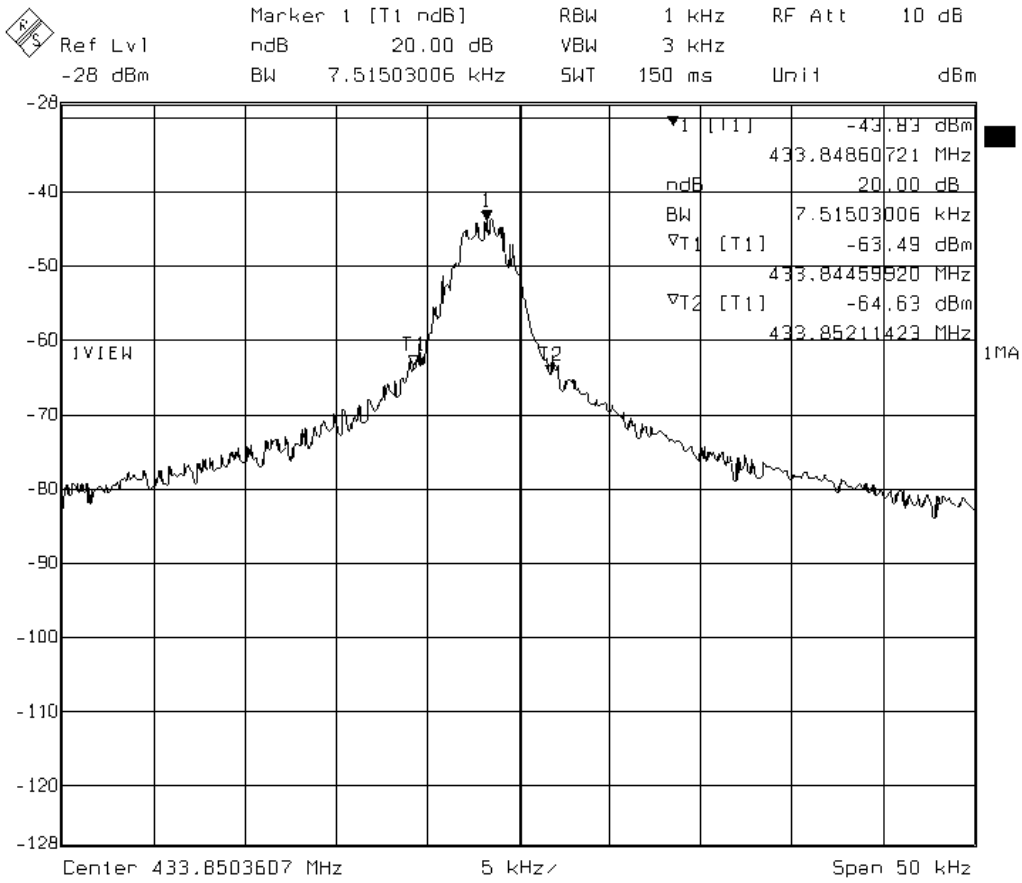
MEASUREMENT RESULT: "3. FCC_15231"

Frequency MHz	Level dBµV/m
1144.288577	35.47
1150.300601	35.20
1300.601202	35.50

Overview / Antenna horizontal

Appendix D

Emission Bandwidth



Occupied Bandwidth