

TEST REPORT

Report No.: SHE23020075-02DE

Date: 2023-03-15

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Applicant : DewertOkin Technology Group Co., Ltd.
Address of Applicant : Room 247, Floor 6, Jiaxing Photovoltaic Science and Innovation Park, 1288 Kanghe Road Xiuzhou District, Jiaxing City, Zhejiang Province China

Product Name : CONTROL BOX
Brand Name : N/A
Model No. : CB4620
Sample acquisition Method : Sent by Client
Sample No. : E23020075-01#02
E23020075-01#03
FCC ID : 2AVJ8-CB4620
ISED Number : 25804-CB4620

Standards : FCC CFR47 Part 15, Subpart C Section 15.249
RSS-Gen (Issue 5, Amd.2-Feb 2021)
RSS-210 (Issue 10, Amendment-Apr 2020)

Date of Receipt : 2023-02-23
Date of Test : 2023-02-24 ~ 2023-03-14
Date of Issue : 2023-03-15

Remark:

This report details the results of the testing carried out on one sample, the results contained in this report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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1 General Information

1.1 Testing Laboratory

ISED CAB identifier #	CN0081
Company Name	ICAS Testing Technology Service (Shanghai) Co., Ltd.
Address	No.1298 Pingan Rd, Minhang District, Shanghai, China
Telephone	0086 21-51682999
Fax	0086 21-54711112
Homepage	www.icasiso.com

1.2 Details of Application

Applicant Company Name	DewertOkin Technology Group Co., Ltd.
Address	Room 247, Floor 6, Jiaxing Photovoltaic Science and Innovation Park, 1288 Kanghe Road Xiuzhou District, Jiaxing City, Zhejiang Province China
Contact Person	Mia Ye
Telephone	+86-573-82281072
Email	Mia.Ye@refinedchina.com
Manufacturer Company Name	DewertOkin Technology Group Co., Ltd.
Address	Room 247, Floor 6, Jiaxing Photovoltaic Science and Innovation Park, 1288 Kanghe Road Xiuzhou District, Jiaxing City, Zhejiang Province China
Factory Company Name	DewertOkin Technology Group Co., Ltd.
Address	No.1507, Taoyuan Road, Gaozhao Street, Xiuzhou District, Jiaxing City, Zhejiang Province, China.

1.3 Details of EUT

Product Name	CONTROL BOX
Brand Name	N/A
Test Model No.	CB4620
FCC ID	2AVJ8-CB4620
ISED Number	25804-CB4620
Operation Frequency	2403MHz ~ 2480MHz
Maximum Field Strength	80.05dBuV/m(peak)@3m
Number of Channels	78
Modulation Type	GFSK
Antenna Type	PCB Antenna
Antenna Gain	1.225dBi
Extreme Temperature Range	-10℃~ +40℃
Test Voltage	DC 29V supply by adapter
Hardware Version	R6.210.00.2423AA

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Software Version	V1.0
Test SW Version	BL410_R; BL410_E
RF power setting in TEST SW	Enter the fixed frequency mode by pressing the key_Default power

Note:

1. The above information was declared by the manufacture.
2. For more details, please refer to the User's manual of the EUT.

Channel List

Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2.403GHz	28	2.430GHz	55	2.457GHz
2	2.404GHz	29	2.431GHz	56	2.458GHz
3	2.405GHz	30	2.432GHz	57	2.459GHz
4	2.406GHz	31	2.433GHz	58	2.460GHz
5	2.407GHz	32	2.434GHz	59	2.461GHz
6	2.408GHz	33	2.435GHz	60	2.462GHz
7	2.409GHz	34	2.436GHz	61	2.463GHz
8	2.410GHz	35	2.437GHz	62	2.464GHz
9	2.411GHz	36	2.438GHz	63	2.465GHz
10	2.412GHz	37	2.439GHz	64	2.466GHz
11	2.413GHz	38	2.440GHz	65	2.467GHz
12	2.414GHz	39	2.441GHz	66	2.468GHz
13	2.415GHz	40	2.442GHz	67	2.469GHz
14	2.416GHz	41	2.443GHz	68	2.470GHz
15	2.417GHz	42	2.444GHz	69	2.471GHz
16	2.418GHz	43	2.445GHz	70	2.472GHz
17	2.419GHz	44	2.446GHz	71	2.473GHz
18	2.420GHz	45	2.447GHz	72	2.474GHz
19	2.421GHz	46	2.448GHz	73	2.475GHz
20	2.422GHz	47	2.449GHz	74	2.476GHz
21	2.423GHz	48	2.450GHz	75	2.477GHz
22	2.424GHz	49	2.451GHz	76	2.478GHz
23	2.425GHz	50	2.452GHz	77	2.479GHz
24	2.426GHz	51	2.453GHz	78	2.480GHz
25	2.427GHz	52	2.454GHz		
26	2.428GHz	53	2.455GHz		
27	2.429GHz	54	2.456GHz		

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1.4 Test Methodology

47 CFR Part 15, Subpart C	Telecommunication-Radio Frequency Devices-Intentional Radiators
RSS-Gen (Issue 5, Amd.2-Feb 2021)	General Requirements for Compliance of Radio Apparatus
RSS-210 (Issue 10, Amendment-Apr 2020)	Licence-Exempt Radio Apparatus: Category I Equipment
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Note(s):

All test items were verified and recorded according to the standards and without any addition/deviation/exclusion during the test.

1.5 Test Summary

Test Item	FCC Rules	ISED Rules	Result
Antenna Requirement	Part 15.203	RSS-GEN 6.8	PASS
Radiated Emission	FCC Part 15.249(a), 15.209	RSS-210 B.10(a) RSS-GEN 8.9	PASS
Band Edge	FCC Part 15.249(d), 15.209	RSS-210 B.10(b) RSS-GEN 8.10	PASS
20dB Bandwidth and 99% Bandwidth	FCC Part 15.215(c)	RSS-GEN 6.7	PASS
Conducted Emission on AC Mains	FCC Part 15.207(a)	RSS-Gen 8.8	PASS

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2 Test Condition

2.1 Environmental conditions

Temperature (°C)	18-25
Humidity (%RH)	40-65
Barometric Pressure (mbar)	960-1060

2.2 Equipment List

Name of Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	Keysight	N9020B	MY59260184	2022-08-02	2023-08-01
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2022-06-10	2023-06-09
Signal Generator	Rohde & Schwarz	SMR27	100184	2022-08-02	2023-08-01
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2022-06-10	2023-06-09
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2022-06-10	2023-06-09
V-network	SCHWARZBECK	NSLK8127	8127-902	2022-06-10	2023-06-09
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2021-06-08	2023-06-07
Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1775	2021-06-08	2023-06-07
Loop Antenna	SCHWARZBECK	FMZB 1513	/	2022-06-10	2023-06-09
Broadband Preamplifier	SCHWARZBECK	BBV 9718	346	2022-06-10	2023-06-09
EMC chamber 9*6*6 (L*W*H)	CHANGNING	966	N/A	2022-06-10	2023-06-09
Shielded Enclosure 8*5*4 (L*W*H)	CHANGNING	854	N/A	2022-06-10	2023-06-09
Test Software	BL	BL410_E	Version:1.0.0.117	N/A	N/A
Test Software	BL	BL410_R	Version:2.1.1.409	N/A	N/A

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2.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI. The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95.45%.

Parameter		Uncertainty
Antenna Port Conducted Emission	< 1GHz	± 1.5 dB
	> 1GHz	± 1.5 dB
Radiated Emission	9KHz – 30MHz	± 3.42 dB
	30 MHz – 1GHz	± 5.00 dB
	> 1GHz	± 4.88 dB
Conducted Emission on AC Mains	150kHz-30MHz	± 2.68 dB
Occupied Channel Bandwidth		± 5 %

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3 Test Set-up and Operation Modes

3.1 Details of Test Mode

Enter the fixed frequency mode by pressing the key was control EUT work in continuous transmitter and receiver mode.
Select test channel as below:

Channel	Frequency
The lowest channel(CH1)	2403MHz
The middle channel(CH40)	2442MHz
The Highest channel(CH78)	2480MHz

- The basic operation modes are:
- A. Transmitting
 - i. Low Channel
 - ii. Middle Channel
 - iii. High Channel

3.2 Special Accessories and Auxiliary Equipment

Description	Manufacturer	Model No.	Serial No.
Adapter	ZBPOWER	ZB-H290030-G	680028594H2230910301

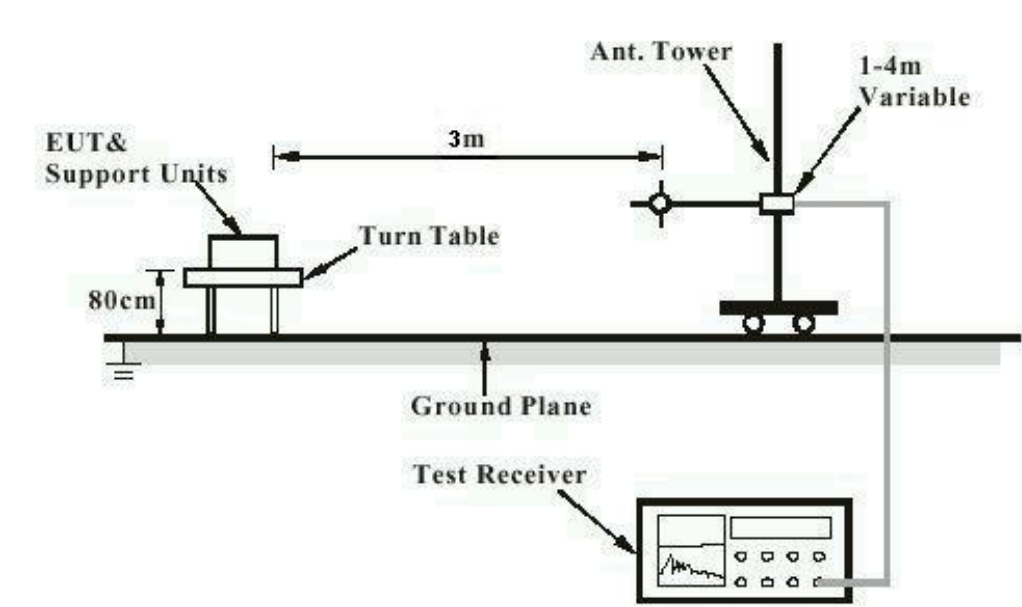
3.3 Support Software

Description	Manufacturer	Software Name
N/A	N/A	N/A

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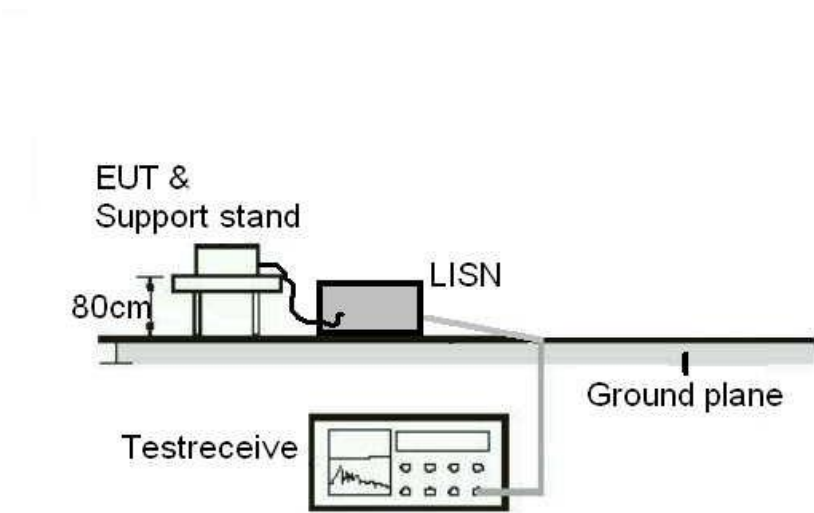
3.4 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



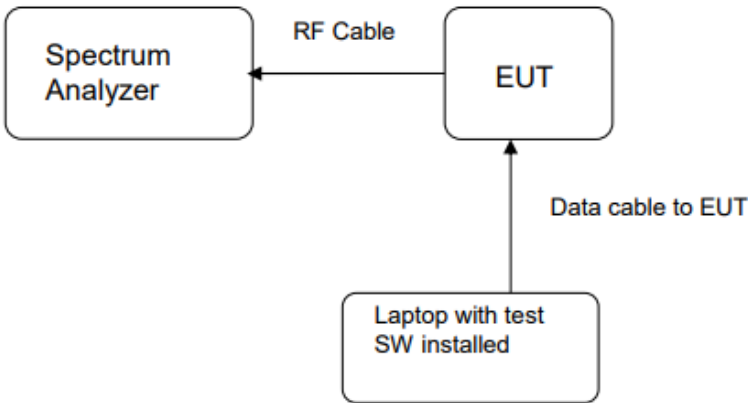
Note: Measurements above 1GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Configuration for Conduction Test



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Diagram of Measurement Configuration for Transmitter Test



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4 Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Antenna Requirement

RESULT:

PASS

Test standard	: Part 15.203, RSS-GEN 6.8
Requirement	: 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 use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 1.225dBi. The antenna is pcb antenna with no possibility of replacement with a non-approved antenna by the end-user.

Therefore, the EUT is considered to comply with this provision.

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4.1.2 Radiated Emission

RESULT:

PASS

Test standard	: FCC Part 15.249(a), 15.209 RSS-210 B.10(a), RSS-GEN 8.9
Requirement	: ANSI C63.10-2013
Kind of test site	: 3m Semi-Anechoic Chamber

Test setup

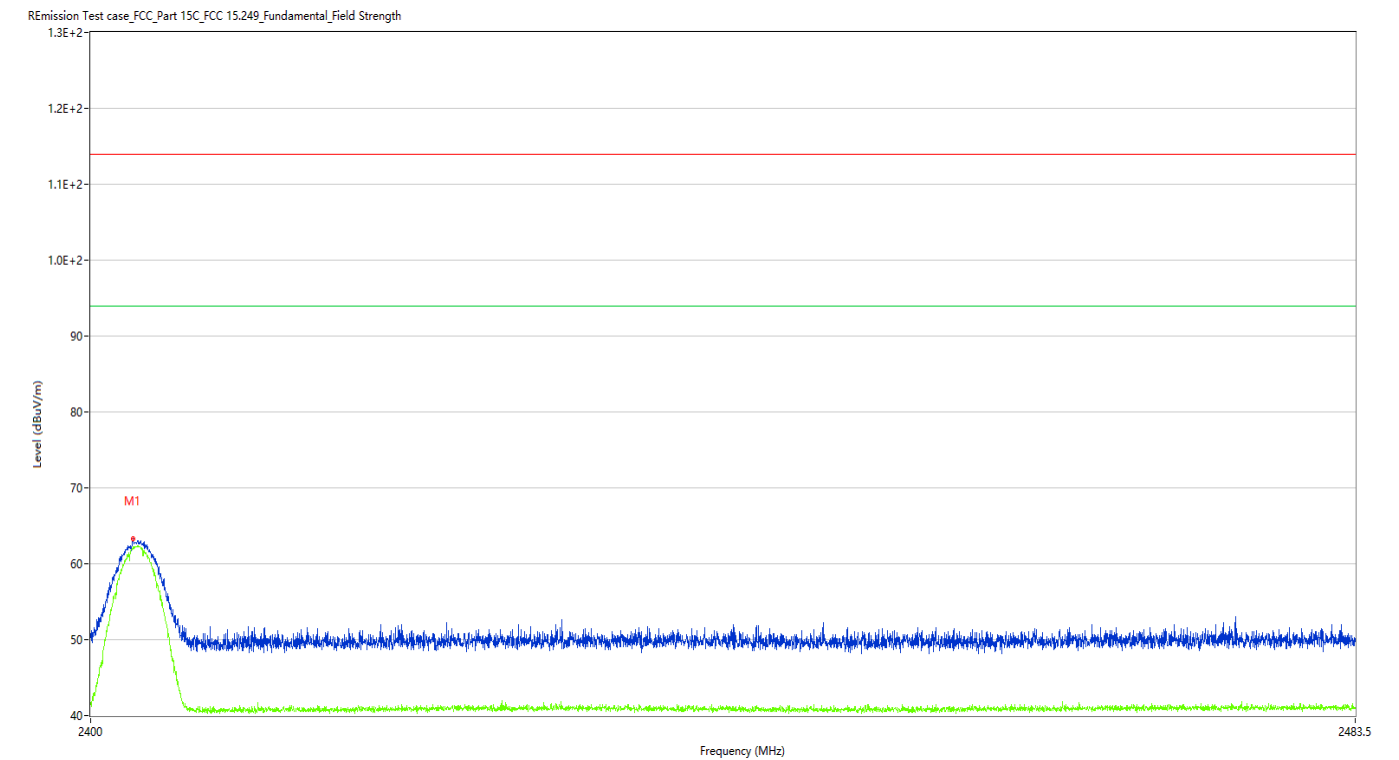
Test Channel	: Low/Middle/High
Operation Mode	: A.i/ii/iii
Ambient temperature	: 22.1°C
Relative humidity	: 47%

Notes

1. For 9 kHz ~ 30 MHz, the amplitude of spurious emissions that are attenuated by more than 20dB below the permissible. The value has no need to be reported.
2. The spurious above 18GHz is noise only and 20dB below the limit. The value has no need to be reported.
3. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

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Figure 1: Test plots of Field strength of fundamental, 2403MHz, Horizontal polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2402.756	63.25	-9.82	114.0	50.75	Peak	266.90	100	Horizontal	Pass
1**	2402.756	62.02	-9.82	94.0	31.98	AV	266.90	100	Horizontal	Pass

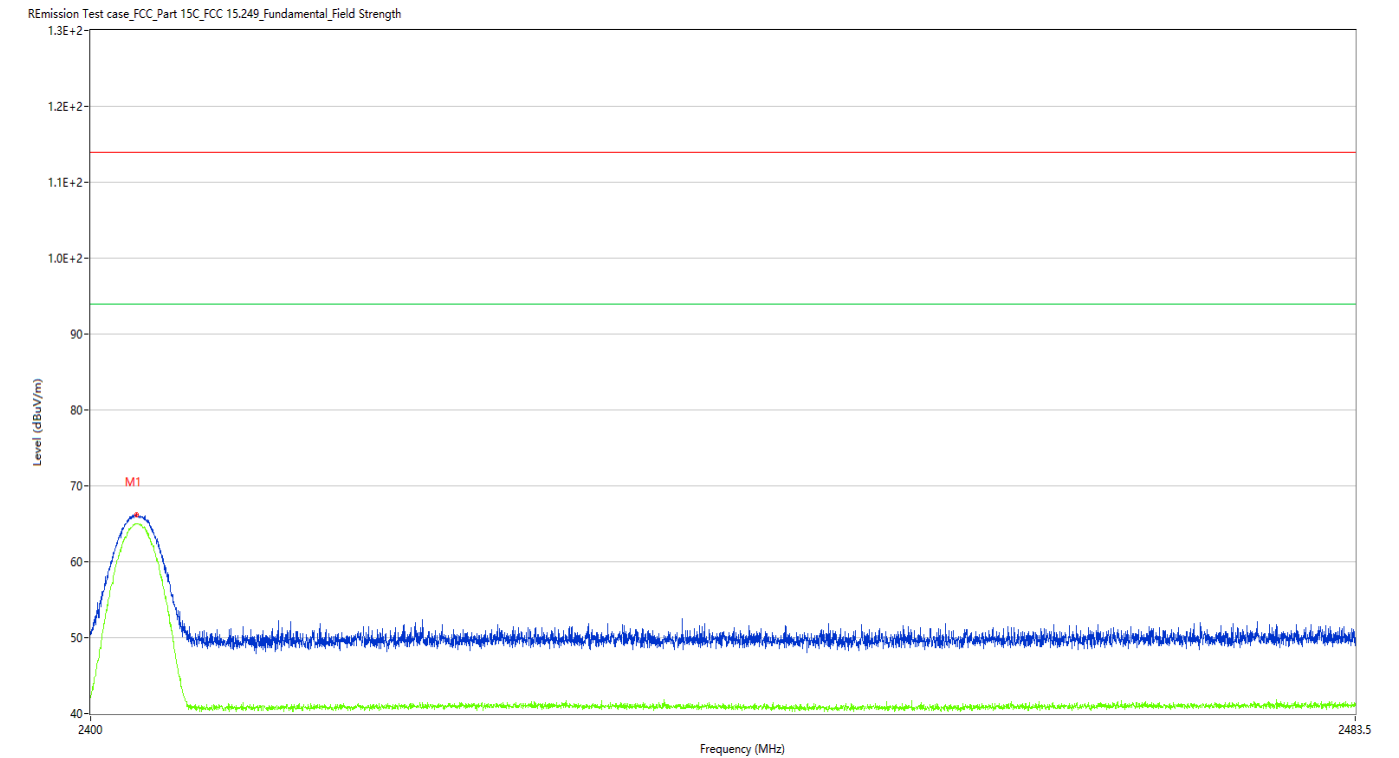
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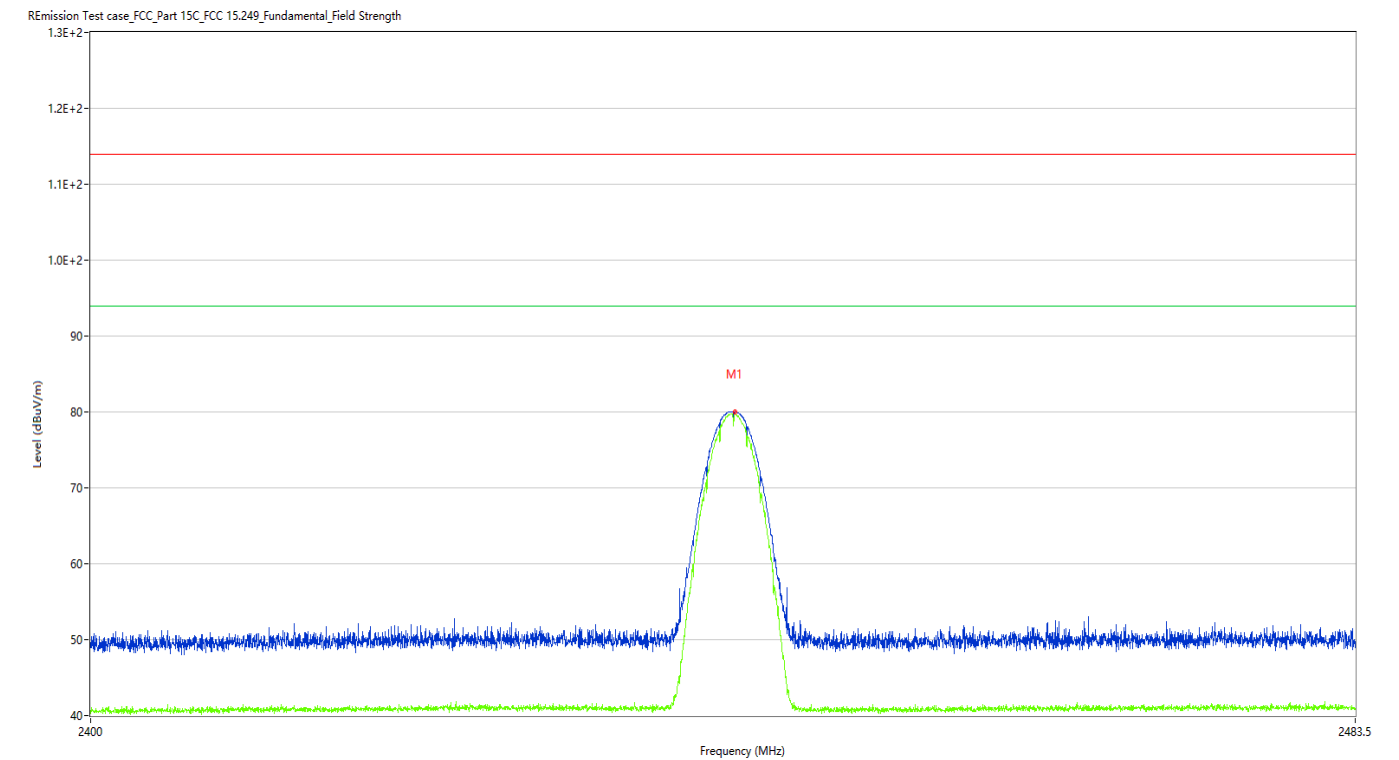
Figure 2: Test plots of Field strength of fundamental, 2403MHz, Vertical polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2402.985	66.25	-9.82	114.0	47.75	Peak	305.20	100	Vertical	Pass
1**	2402.985	65.00	-9.82	94.0	29.00	AV	305.20	100	Vertical	Pass

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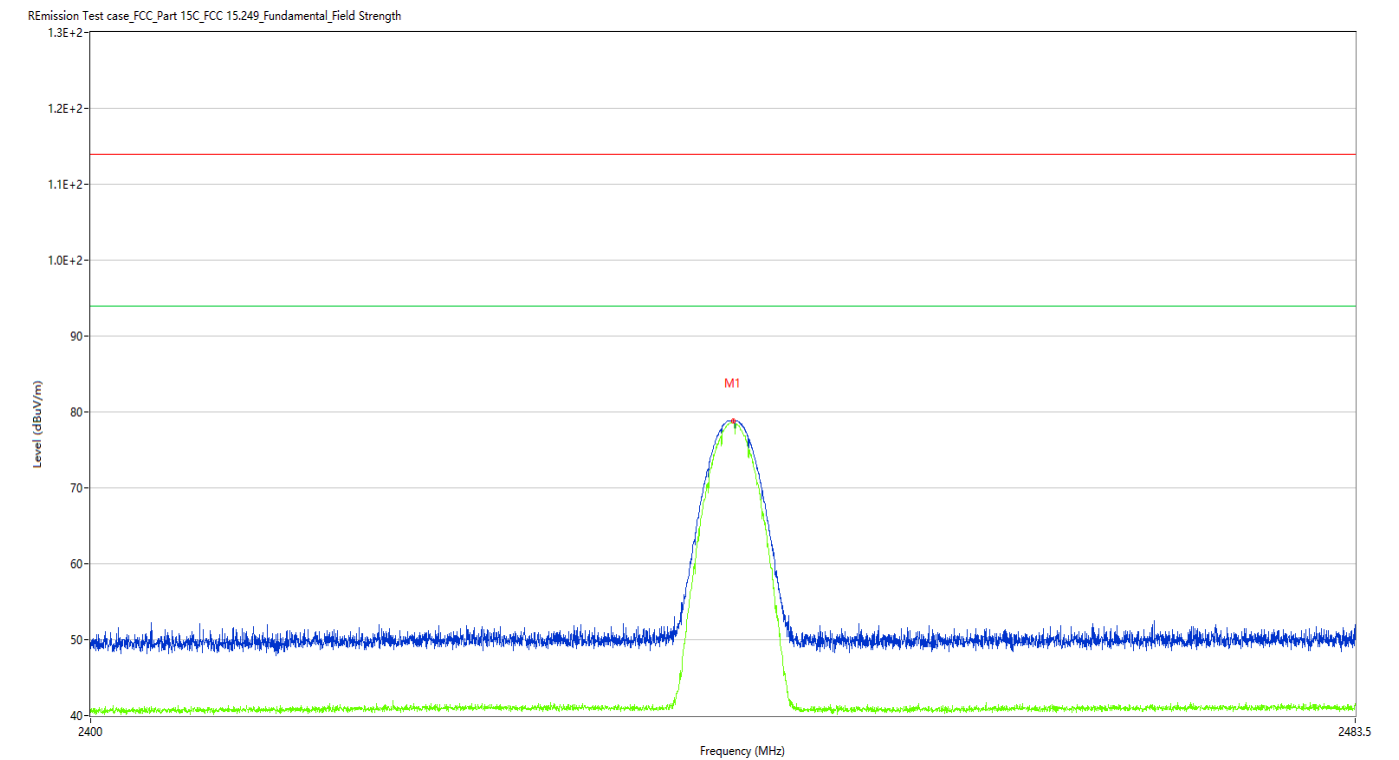
Figure 3: Test plots of Field strength of fundamental, 2442MHz, Horizontal polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2442.189	80.05	-9.62	114.0	33.95	Peak	198.30	100	Horizontal	Pass
1**	2442.189	79.76	-9.62	94.0	14.24	AV	198.30	100	Horizontal	Pass

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Figure 4: Test plots of Field strength of fundamental, 2442MHz, Vertical polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2442.063	78.79	-9.62	114.0	35.21	Peak	157.60	100	Vertical	Pass
1**	2442.063	78.60	-9.62	94.0	15.40	AV	157.60	100	Vertical	Pass

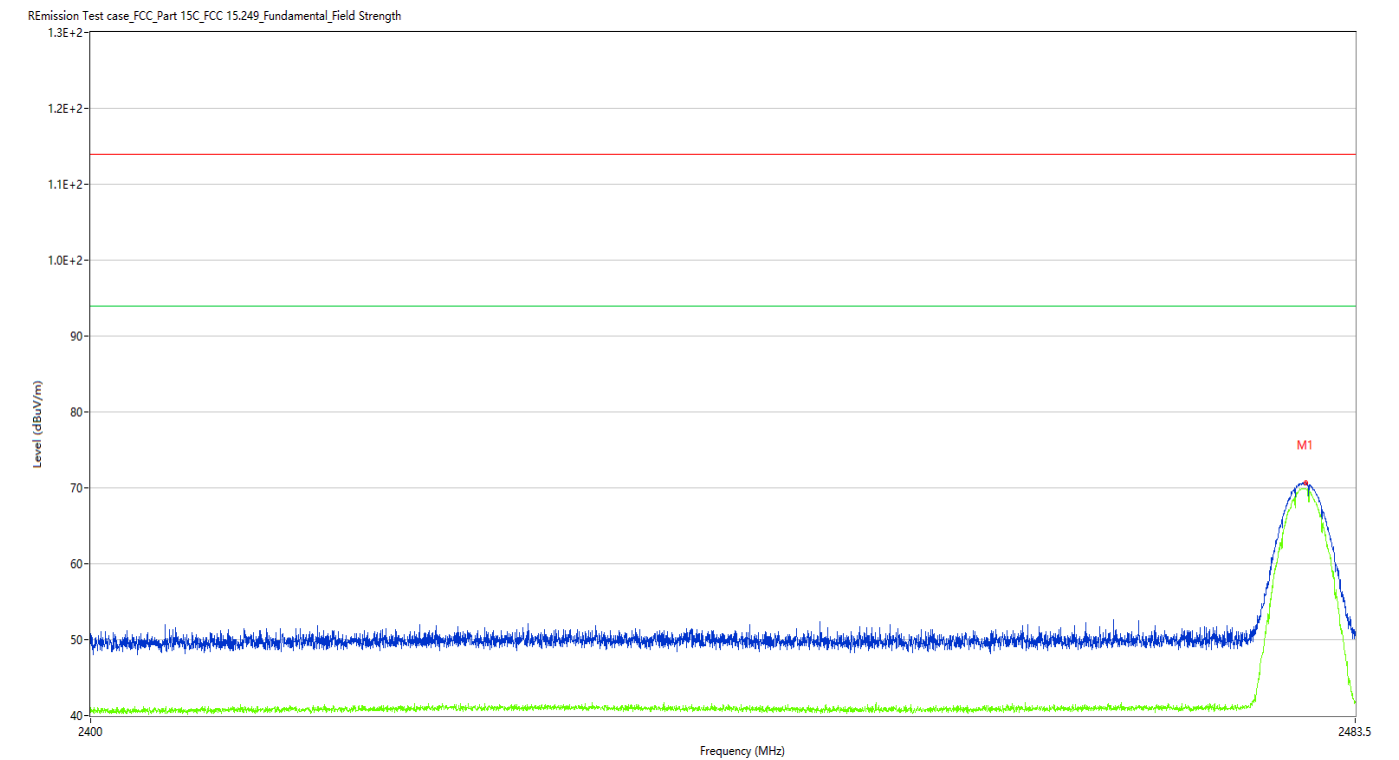
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Figure 5: Test plots of Field strength of fundamental, 2480MHz, Horizontal polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2480.202	70.68	-9.48	114.0	43.32	Peak	303.30	100	Horizontal	Pass
1**	2480.202	69.86	-9.48	94.0	24.14	AV	303.30	100	Horizontal	Pass

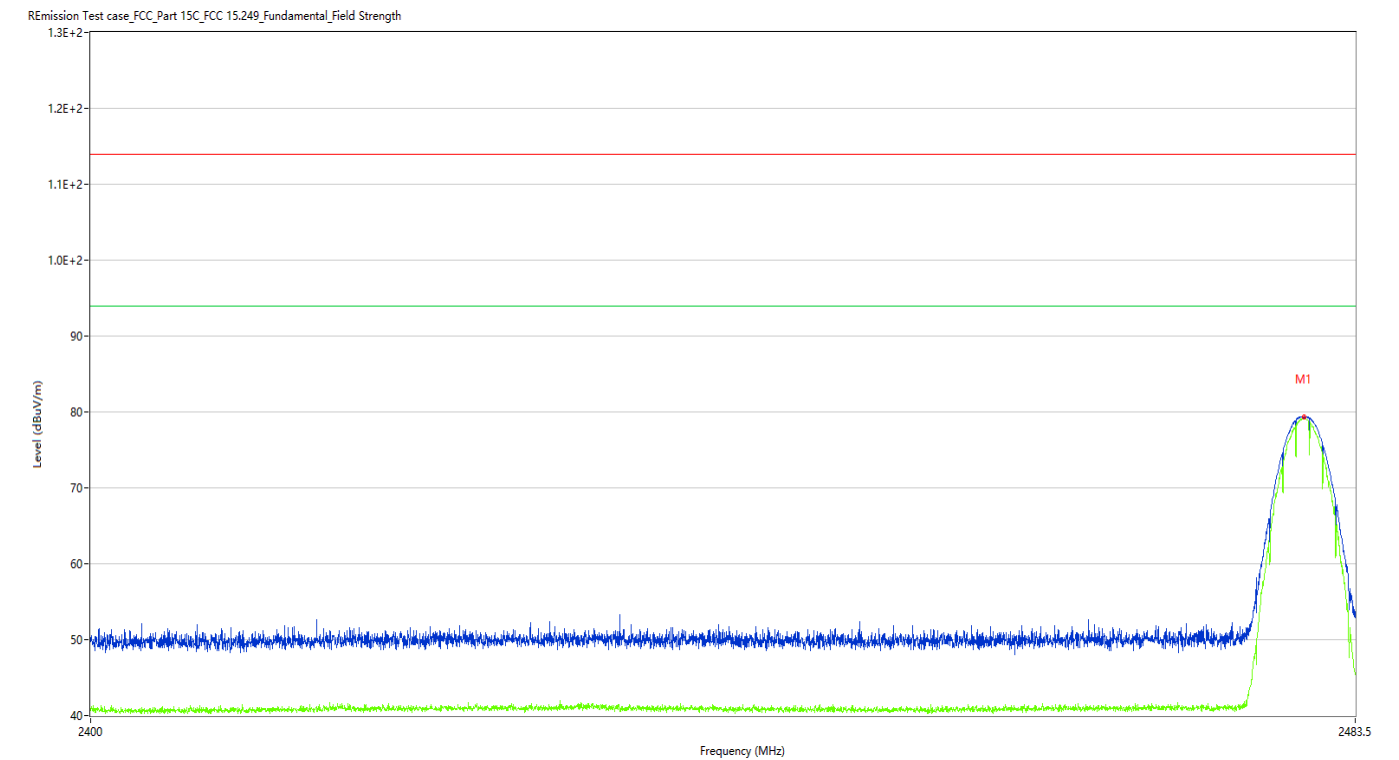
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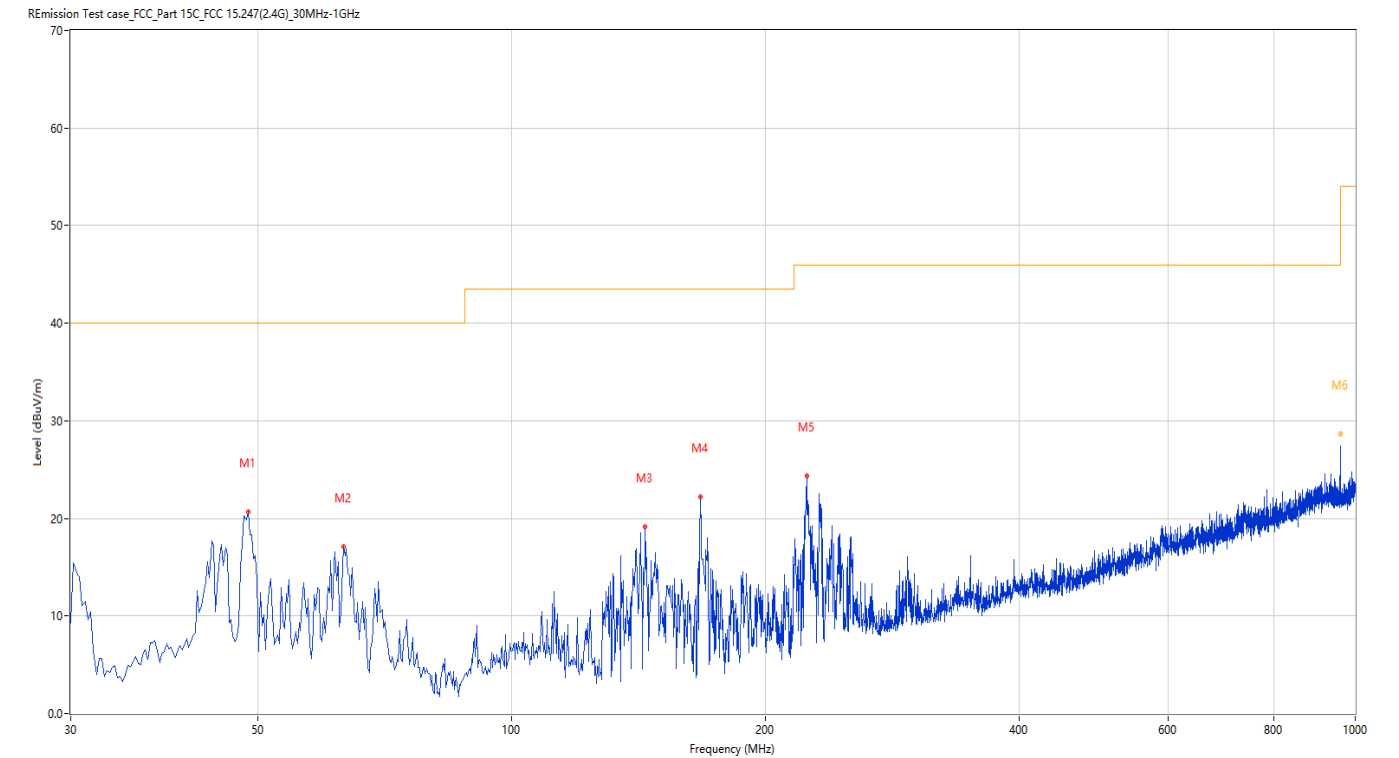
Figure 6: Test plots of Field strength of fundamental, 2480MHz, Vertical polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2480.056	79.33	-9.48	114.0	34.67	Peak	97.10	100	Vertical	Pass
1**	2480.056	79.10	-9.48	94.0	14.90	AV	97.10	100	Vertical	Pass

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Figure 7: Test plots of Field strength of harmonics, 2403MHz, 30MHz-1GHz, Horizontal polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	48.668	20.71	-25.07	40.0	19.29	Peak	356.50	100	Horizontal	Pass
2	63.214	17.10	-27.11	40.0	22.90	Peak	165.70	100	Horizontal	Pass
3	143.947	19.15	-30.00	43.5	24.35	Peak	360.00	100	Horizontal	Pass
4	167.221	22.20	-29.10	43.5	21.30	Peak	341.50	100	Horizontal	Pass
5	223.709	24.32	-26.23	46.0	21.68	Peak	341.50	100	Horizontal	Pass
6	959.757	34.07	-9.31	46.0	11.93	Peak	251.00	290	Horizontal	Pass
6*	959.757	28.70	-9.31	46.0	17.30	QP	251.00	290	Horizontal	Pass

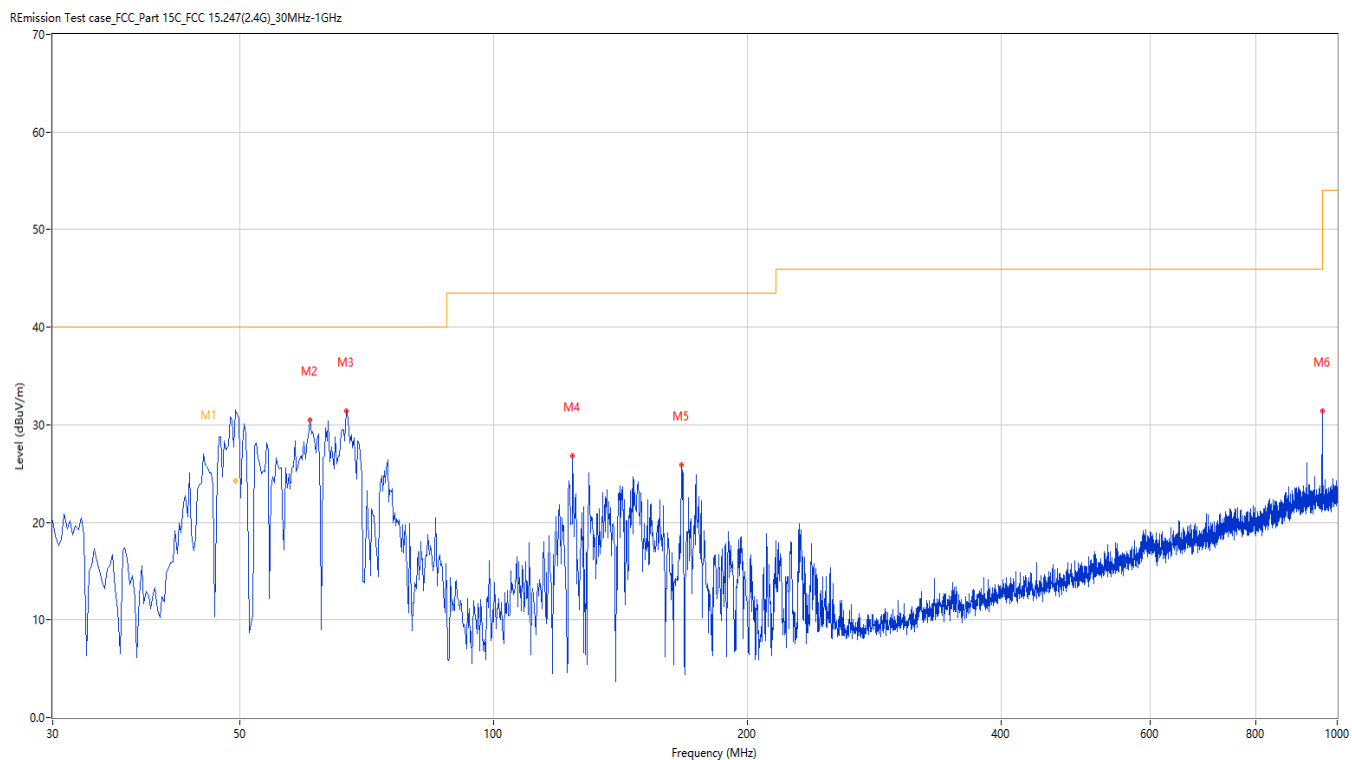
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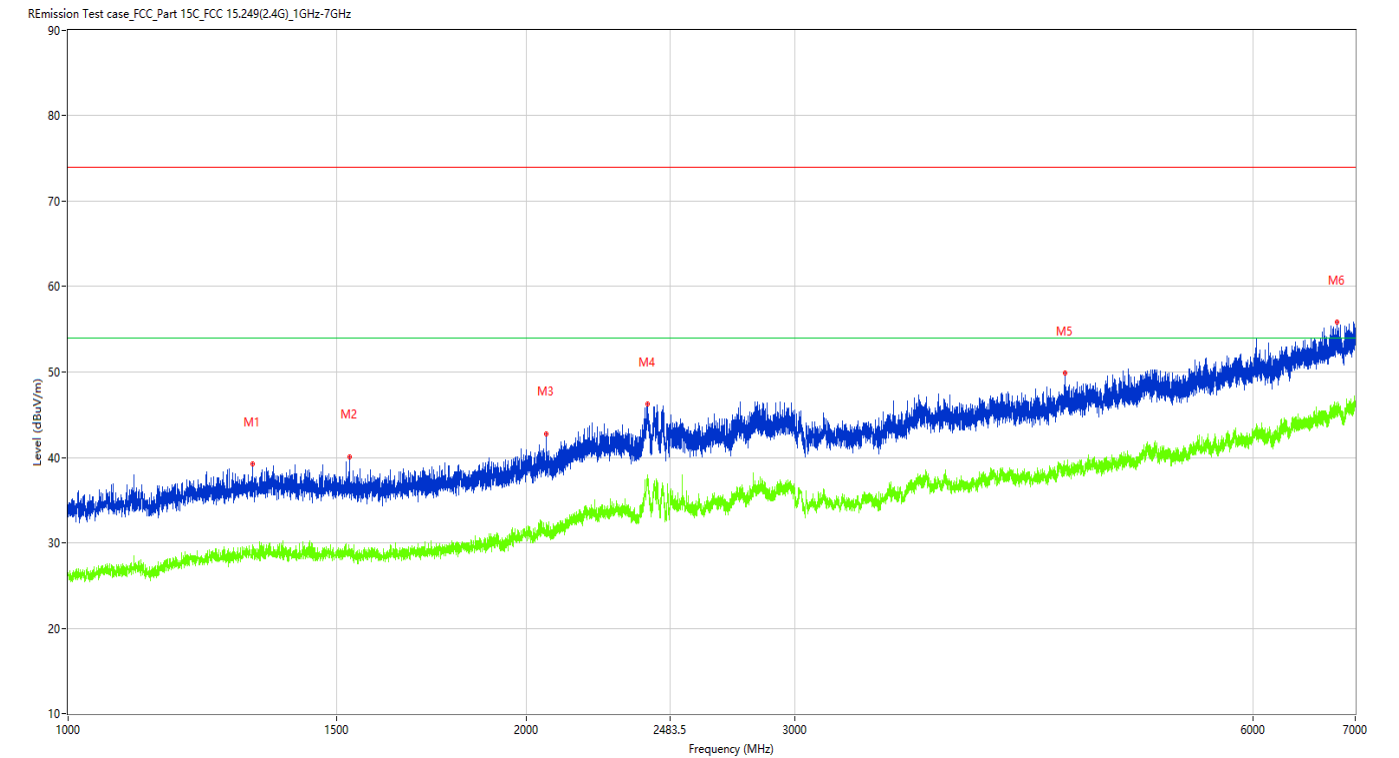
Figure 8: Test plots of Field strength of harmonics, 2403MHz, 30MHz-1GHz, Vertical polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	49.433	31.08	-25.04	40.0	8.92	Peak	222.90	102	Vertical	Pass
1*	49.433	24.23	-25.04	40.0	15.77	QP	222.90	102	Vertical	Pass
2	60.547	30.48	-26.42	40.0	9.52	Peak	56.60	100	Vertical	Pass
3	66.851	31.46	-28.25	40.0	8.54	Peak	35.20	100	Vertical	Pass
4	124.066	26.79	-28.88	43.5	16.71	Peak	307.80	100	Vertical	Pass
5	166.978	25.87	-29.11	43.5	17.63	Peak	121.70	100	Vertical	Pass
6	959.513	31.44	-9.31	46.0	14.56	Peak	221.10	100	Vertical	Pass

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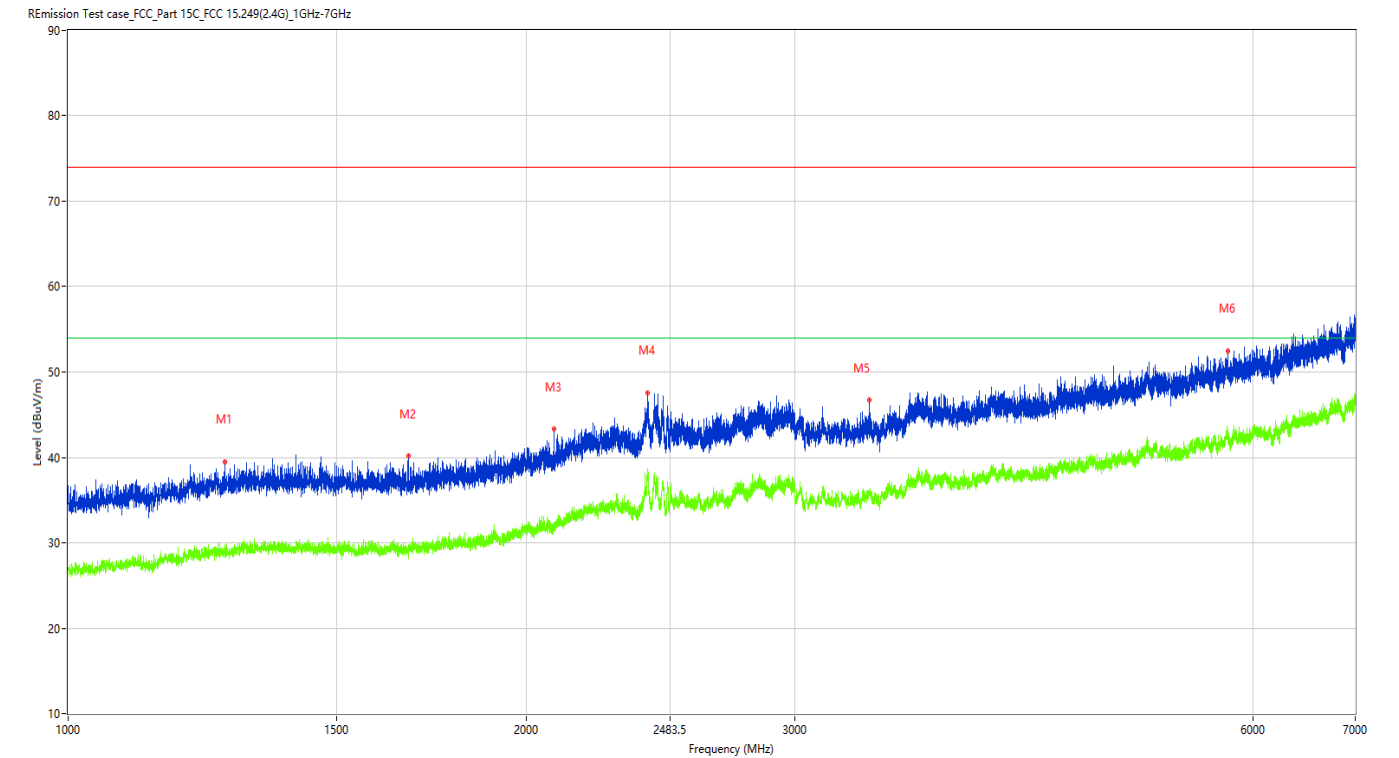
Figure 9: Test plots of Field strength of harmonics, 2403MHz, 1GHz-7GHz, Horizontal polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1322.250	39.21	-12.94	74.0	34.79	Peak	151.20	100	Horizontal	Pass
1**	1322.250	28.81	-12.94	54.0	25.19	AV	151.20	100	Horizontal	Pass
2	1530.500	40.06	-13.01	74.0	33.94	Peak	165.40	100	Horizontal	Pass
2**	1530.500	28.44	-13.01	54.0	25.56	AV	165.40	100	Horizontal	Pass
3	2059.250	42.78	-10.03	74.0	31.22	Peak	273.80	100	Horizontal	Pass
3**	2059.250	30.97	-10.03	54.0	23.03	AV	273.80	100	Horizontal	Pass
4	2400.500	46.21	-4.42	74.0	27.79	Peak	273.80	100	Horizontal	Pass
4**	2400.500	37.61	-4.42	54.0	16.39	AV	273.80	100	Horizontal	Pass
5	4515.500	49.84	-0.10	74.0	24.16	Peak	65.00	100	Horizontal	Pass
5**	4515.500	38.06	-0.10	54.0	15.94	AV	65.00	100	Horizontal	Pass
6	6814.500	55.80	5.12	74.0	18.20	Peak	224.10	100	Horizontal	Pass
6**	6814.500	44.96	5.12	54.0	9.04	AV	224.10	100	Horizontal	Pass

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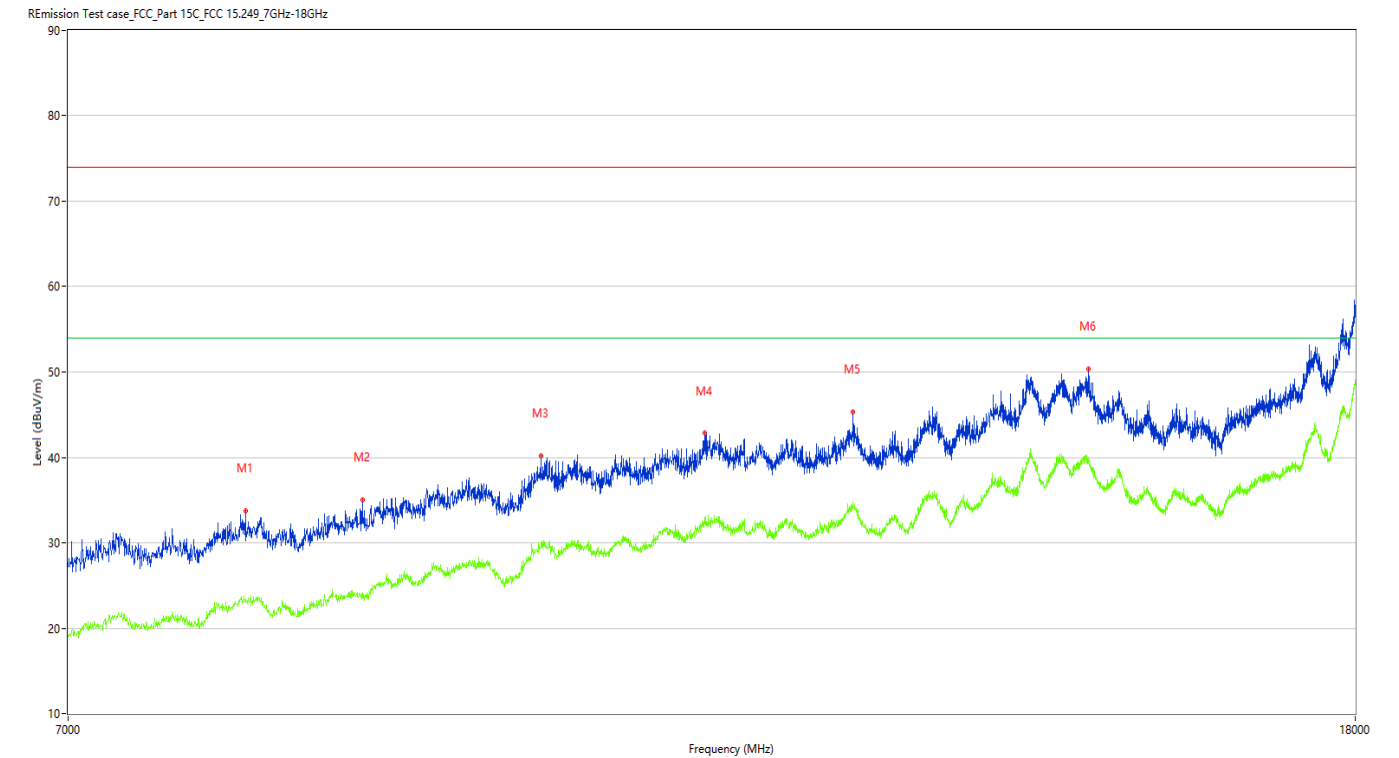
Figure 10: Test plots of Field strength of harmonics, 2403MHz, 1GHz-7GHz, Vertical polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1266.750	39.50	-13.08	74.0	34.50	Peak	131.70	100	Vertical	Pass
1**	1266.750	29.19	-13.08	54.0	24.81	AV	131.70	100	Vertical	Pass
2	1672.000	40.12	-13.06	74.0	33.88	Peak	22.70	100	Vertical	Pass
2**	1672.000	29.09	-13.06	54.0	24.91	AV	22.70	100	Vertical	Pass
3	2085.250	43.38	-9.43	74.0	30.62	Peak	0.80	100	Vertical	Pass
3**	2085.250	31.42	-9.43	54.0	22.58	AV	0.80	100	Vertical	Pass
4	2402.000	47.59	-4.45	74.0	26.41	Peak	0.80	100	Vertical	Pass
4**	2402.000	38.56	-4.45	54.0	15.44	AV	0.80	100	Vertical	Pass
5	3358.000	46.72	-4.12	74.0	27.28	Peak	64.10	100	Vertical	Pass
5**	3358.000	35.70	-4.12	54.0	18.30	AV	64.10	100	Vertical	Pass
6	5772.000	52.50	2.31	74.0	21.50	Peak	209.30	100	Vertical	Pass
6**	5772.000	42.87	2.31	54.0	11.13	AV	209.30	100	Vertical	Pass

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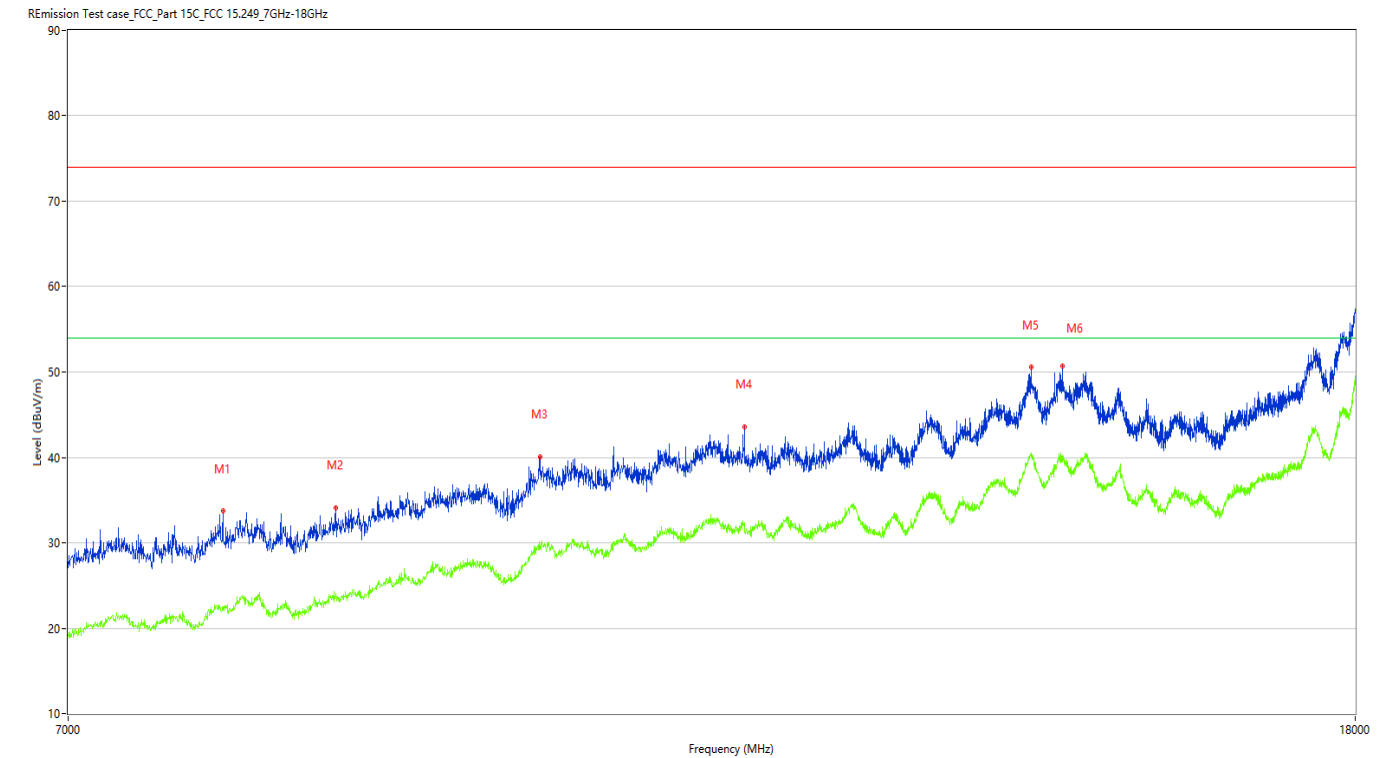
Figure 11: Test plots of Field strength of harmonics, 2403MHz, 7GHz-18GHz, Horizontal polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	7973.500	33.77	3.60	74.0	40.23	Peak	0.00	100	Horizontal	Pass
1**	7973.500	23.28	3.60	54.0	30.72	AV	0.00	100	Horizontal	Pass
2	8688.500	35.07	4.68	74.0	38.93	Peak	358.10	100	Horizontal	Pass
2**	8688.500	23.60	4.68	54.0	30.40	AV	358.10	100	Horizontal	Pass
3	9901.250	40.16	9.72	74.0	33.84	Peak	3.30	100	Horizontal	Pass
3**	9901.250	29.40	9.72	54.0	24.60	AV	3.30	100	Horizontal	Pass
4	11166.250	42.83	10.98	74.0	31.17	Peak	53.20	100	Horizontal	Pass
4**	11166.250	32.93	10.98	54.0	21.07	AV	53.20	100	Horizontal	Pass
5	12450.500	45.36	12.51	74.0	28.64	Peak	358.10	100	Horizontal	Pass
5**	12450.500	34.43	12.51	54.0	19.57	AV	358.10	100	Horizontal	Pass
6	14804.500	50.40	18.24	74.0	23.60	Peak	318.50	100	Horizontal	Pass
6**	14804.500	39.90	18.24	54.0	14.10	AV	318.50	100	Horizontal	Pass

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Figure 12: Test plots of Field strength of harmonics, 2403MHz, 7GHz-18GHz, Vertical polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	7841.500	33.76	2.63	74.0	40.24	Peak	127.30	100	Vertical	Pass
1**	7841.500	22.19	2.63	54.0	31.81	AV	127.30	100	Vertical	Pass
2	8518.000	34.06	3.85	74.0	39.94	Peak	192.20	100	Vertical	Pass
2**	8518.000	23.75	3.85	54.0	30.25	AV	192.20	100	Vertical	Pass
3	9895.750	40.11	9.63	74.0	33.89	Peak	204.80	100	Vertical	Pass
3**	9895.750	29.25	9.63	54.0	24.75	AV	204.80	100	Vertical	Pass
4	11499.000	43.52	11.93	74.0	30.48	Peak	204.80	100	Vertical	Pass
4**	11499.000	32.20	11.93	54.0	21.80	AV	204.80	100	Vertical	Pass
5	14188.500	50.61	19.75	74.0	23.39	Peak	254.30	100	Vertical	Pass
5**	14188.500	40.20	19.75	54.0	13.80	AV	254.30	100	Vertical	Pass
6	14515.750	50.67	17.59	74.0	23.33	Peak	356.90	100	Vertical	Pass
6**	14515.750	40.16	17.59	54.0	13.84	AV	356.90	100	Vertical	Pass

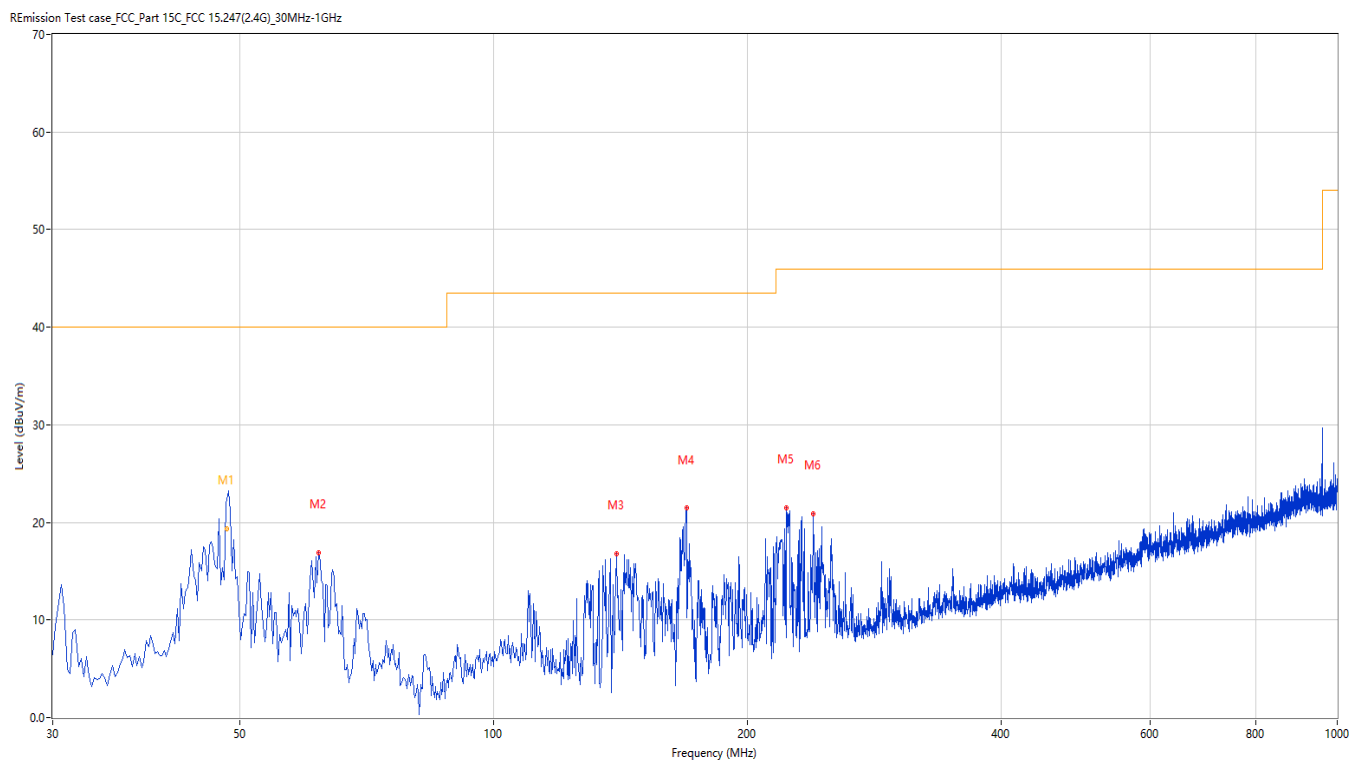
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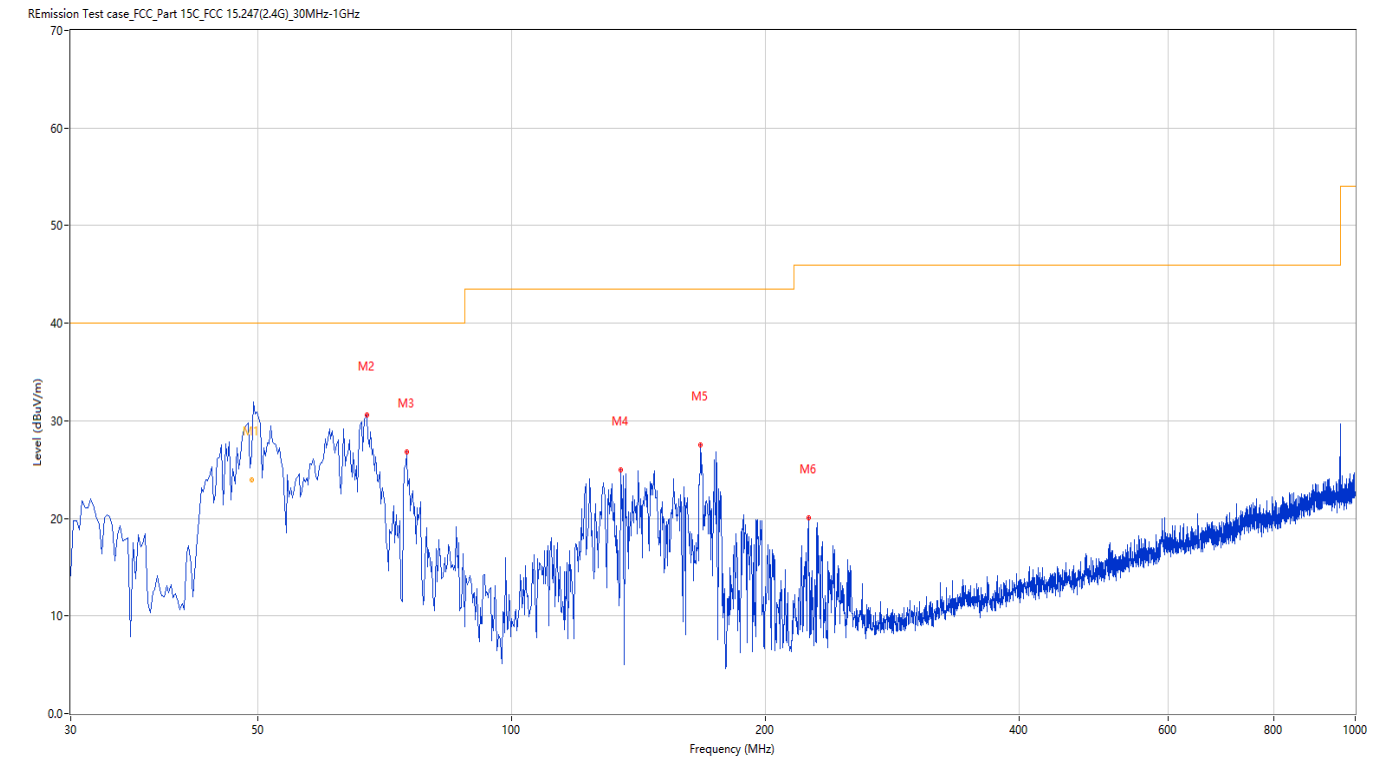
Figure 13: Test plots of Field strength of harmonics, 2442MHz, 30MHz-1GHz, Horizontal polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	48.232	26.70	-25.08	40.0	13.30	Peak	337.90	177	Horizontal	Pass
1*	48.232	19.35	-25.08	40.0	20.65	QP	337.90	177	Horizontal	Pass
2	62.002	16.90	-26.80	40.0	23.10	Peak	356.90	100	Horizontal	Pass
3	139.825	16.81	-29.96	43.5	26.69	Peak	360.00	100	Horizontal	Pass
4	169.160	21.45	-29.00	43.5	22.05	Peak	313.40	100	Horizontal	Pass
5	222.497	21.54	-26.30	46.0	24.46	Peak	150.10	100	Horizontal	Pass
6	239.225	20.91	-25.25	46.0	25.09	Peak	3.70	100	Horizontal	Pass

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Figure 14: Test plots of Field strength of harmonics, 2442MHz, 30MHz-1GHz, Vertical polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	49.145	30.92	-25.04	40.0	9.08	Peak	258.30	100	Vertical	Pass
1*	49.145	23.99	-25.04	40.0	16.01	QP	258.30	100	Vertical	Pass
2	67.336	30.58	-28.42	40.0	9.42	Peak	6.20	100	Vertical	Pass
3	75.094	26.86	-31.01	40.0	13.14	Peak	27.80	100	Vertical	Pass
4	134.491	24.98	-29.82	43.5	18.52	Peak	246.80	100	Vertical	Pass
5	167.463	27.54	-29.09	43.5	15.96	Peak	112.80	100	Vertical	Pass
6	224.679	20.06	-26.16	46.0	25.94	Peak	356.40	100	Vertical	Pass

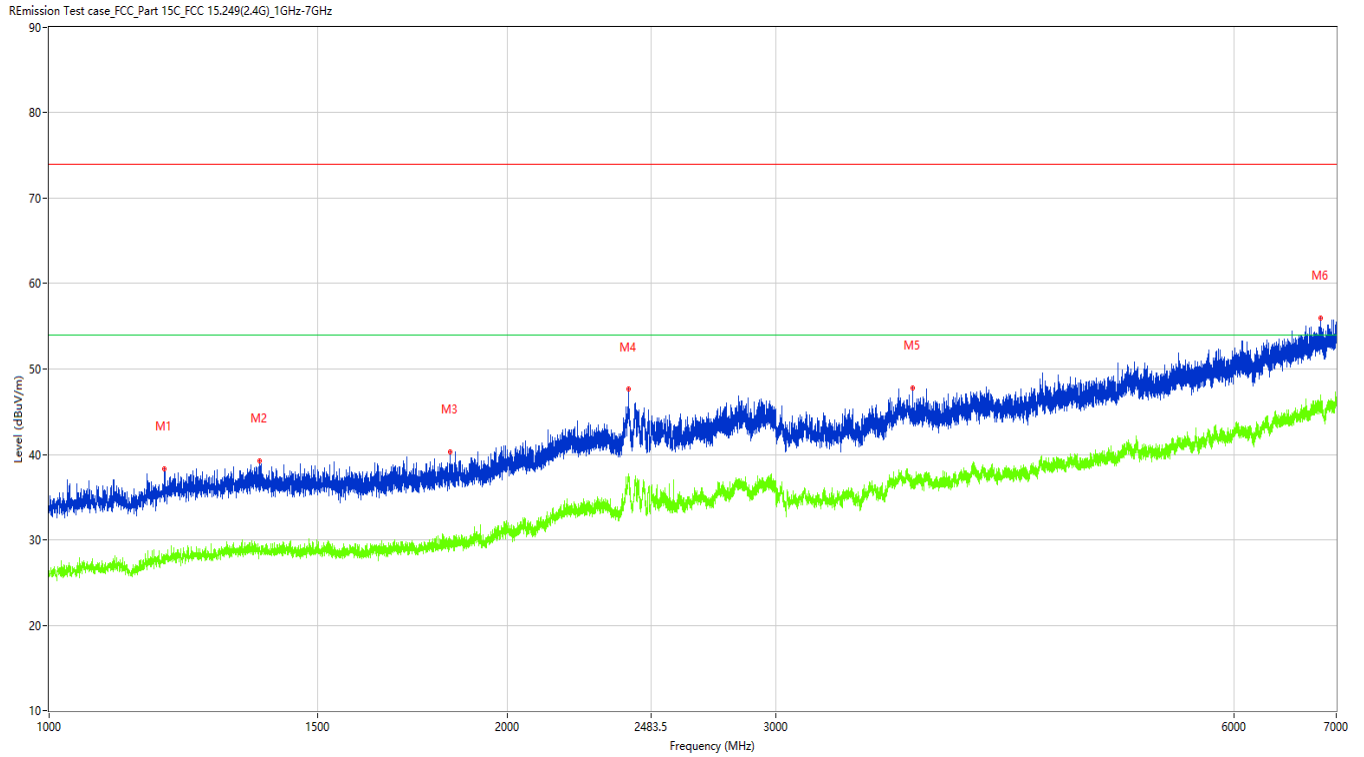
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Figure 15: Test plots of Field strength of harmonics, 2442MHz, 1GHz-7GHz, Horizontal polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1189.750	38.30	-13.54	74.0	35.70	Peak	293.60	100	Horizontal	Pass
1**	1189.750	28.29	-13.54	54.0	25.71	AV	293.60	100	Horizontal	Pass
2	1374.000	39.24	-12.78	74.0	34.76	Peak	114.10	100	Horizontal	Pass
2**	1374.000	29.18	-12.78	54.0	24.82	AV	114.10	100	Horizontal	Pass
3	1832.500	40.31	-12.36	74.0	33.69	Peak	318.90	100	Horizontal	Pass
3**	1832.500	30.03	-12.36	54.0	23.97	AV	318.90	100	Horizontal	Pass
4	2402.000	47.63	-4.45	74.0	26.37	Peak	1.20	100	Horizontal	Pass
4**	2402.000	36.96	-4.45	54.0	17.04	AV	1.20	100	Horizontal	Pass
5	3689.500	47.83	-2.08	74.0	26.17	Peak	36.30	100	Horizontal	Pass
5**	3689.500	36.07	-2.08	54.0	17.93	AV	36.30	100	Horizontal	Pass
6	6838.500	55.98	5.07	74.0	18.02	Peak	77.10	100	Horizontal	Pass
6**	6838.500	46.98	5.07	54.0	7.02	AV	77.10	100	Horizontal	Pass

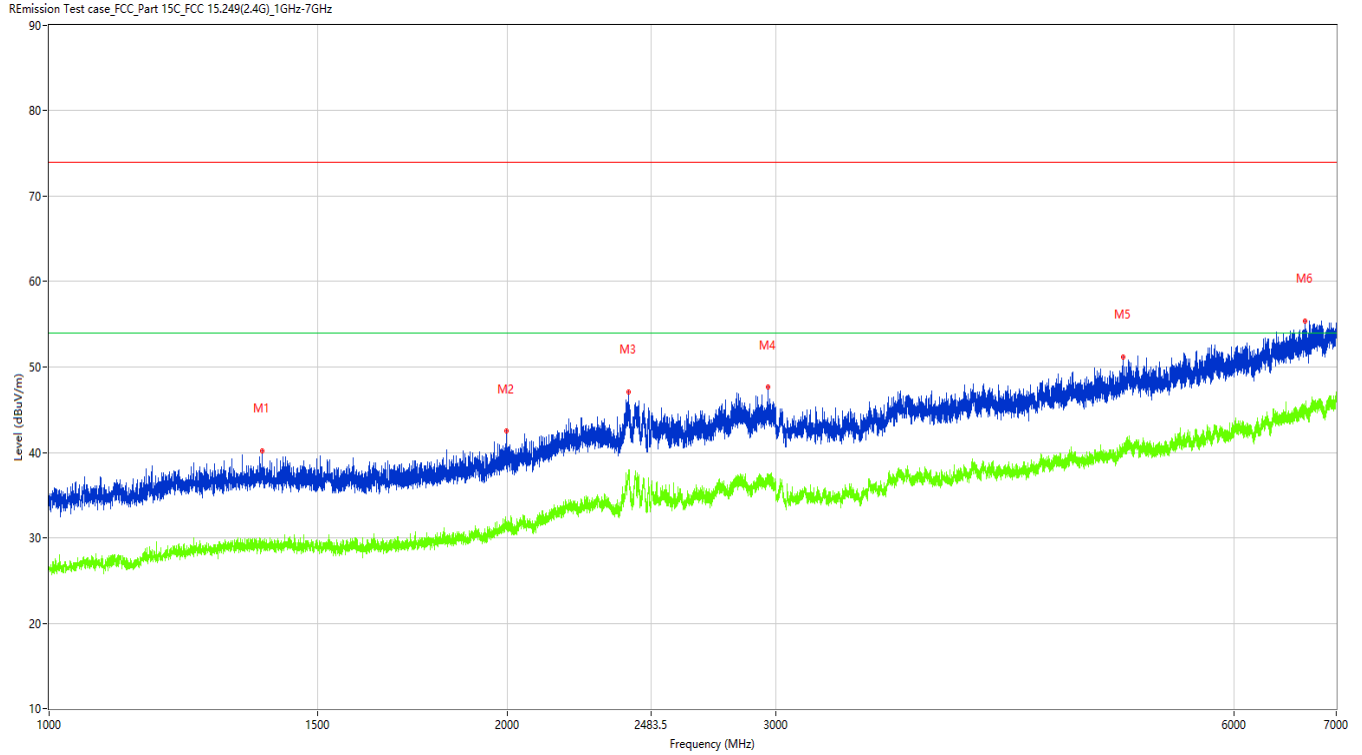
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Figure 16: Test plots of Field strength of harmonics, 2442MHz, 1GHz-7GHz, Vertical polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1380.250	40.21	-12.75	74.0	33.79	Peak	326.40	100	Vertical	Pass
1**	1380.250	29.19	-12.75	54.0	24.81	AV	326.40	100	Vertical	Pass
2	1996.500	42.51	-10.99	74.0	31.49	Peak	272.60	100	Vertical	Pass
2**	1996.500	30.95	-10.99	54.0	23.05	AV	272.60	100	Vertical	Pass
3	2401.250	47.06	-4.43	74.0	26.94	Peak	246.30	100	Vertical	Pass
3**	2401.250	37.18	-4.43	54.0	16.82	AV	246.30	100	Vertical	Pass
4	2964.000	47.63	-3.37	74.0	26.37	Peak	360.00	100	Vertical	Pass
4**	2964.000	36.55	-3.37	54.0	17.45	AV	360.00	100	Vertical	Pass
5	5074.500	51.15	0.98	74.0	22.85	Peak	303.00	100	Vertical	Pass
5**	5074.500	39.82	0.98	54.0	14.18	AV	303.00	100	Vertical	Pass
6	6681.500	55.36	4.50	74.0	18.64	Peak	250.80	100	Vertical	Pass
6**	6681.500	44.65	4.50	54.0	9.35	AV	250.80	100	Vertical	Pass

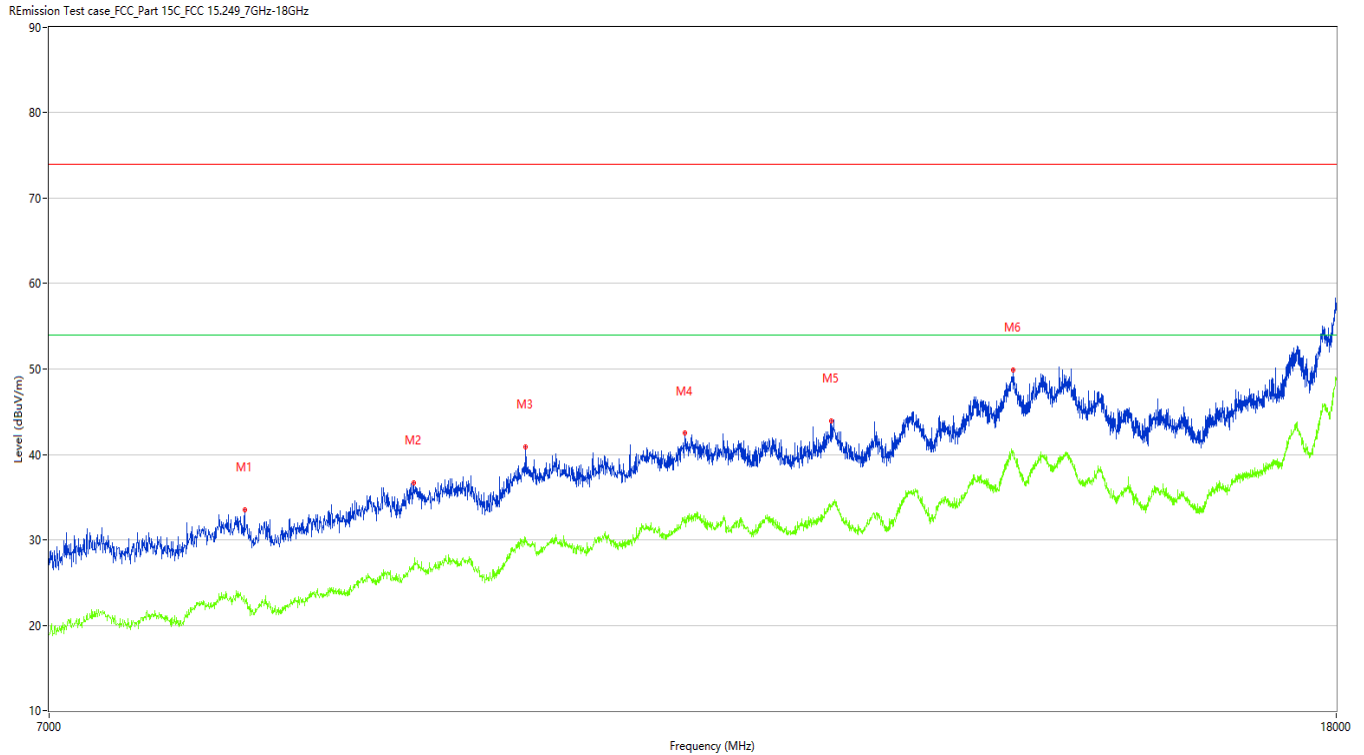
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Figure 17: Test plots of Field strength of harmonics, 2442MHz, 7GHz-18GHz, Horizontal polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	8080.750	33.48	3.88	74.0	40.52	Peak	0.00	100	Horizontal	Pass
1**	8080.750	22.50	3.88	54.0	31.50	AV	0.00	100	Horizontal	Pass
2	9145.000	36.67	7.24	74.0	37.33	Peak	319.50	100	Horizontal	Pass
2**	9145.000	26.99	7.24	54.0	27.01	AV	319.50	100	Horizontal	Pass
3	9931.500	40.87	9.82	74.0	33.13	Peak	0.00	100	Horizontal	Pass
3**	9931.500	30.23	9.82	54.0	23.77	AV	0.00	100	Horizontal	Pass
4	11158.000	42.48	10.92	74.0	31.52	Peak	319.50	100	Horizontal	Pass
4**	11158.000	32.75	10.92	54.0	21.25	AV	319.50	100	Horizontal	Pass
5	12428.500	43.96	12.40	74.0	30.04	Peak	198.30	100	Horizontal	Pass
5**	12428.500	34.00	12.40	54.0	20.00	AV	198.30	100	Horizontal	Pass
6	14199.500	49.89	19.51	74.0	24.11	Peak	319.50	100	Horizontal	Pass
6**	14199.500	40.39	19.51	54.0	13.61	AV	319.50	100	Horizontal	Pass

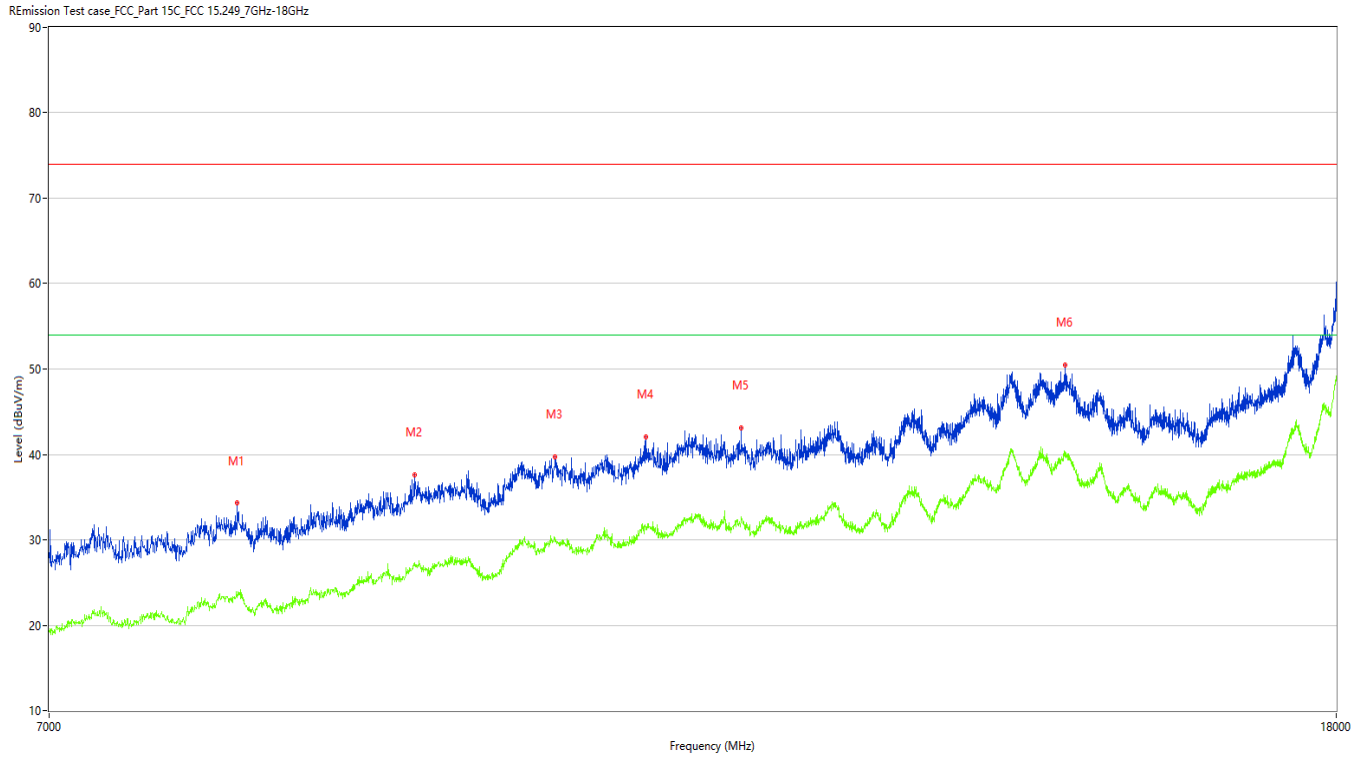
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Figure 18: Test plots of Field strength of harmonics, 2442MHz, 7GHz-18GHz, Vertical polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	8036.750	34.31	4.44	74.0	39.69	Peak	360.00	100	Vertical	Pass
1**	8036.750	23.55	4.44	54.0	30.45	AV	360.00	100	Vertical	Pass
2	9156.000	37.56	7.43	74.0	36.44	Peak	0.00	100	Vertical	Pass
2**	9156.000	27.29	7.43	54.0	26.71	AV	0.00	100	Vertical	Pass
3	10148.750	39.74	9.25	74.0	34.26	Peak	92.20	100	Vertical	Pass
3**	10148.750	30.19	9.25	54.0	23.81	AV	92.20	100	Vertical	Pass
4	10847.250	42.05	11.11	74.0	31.95	Peak	291.50	100	Vertical	Pass
4**	10847.250	31.57	11.11	54.0	22.43	AV	291.50	100	Vertical	Pass
5	11631.000	43.08	11.11	74.0	30.92	Peak	277.90	100	Vertical	Pass
5**	11631.000	32.42	11.11	54.0	21.58	AV	277.90	100	Vertical	Pass
6	14749.500	50.44	18.71	74.0	23.56	Peak	291.50	100	Vertical	Pass
6**	14749.500	39.75	18.71	54.0	14.25	AV	291.50	100	Vertical	Pass

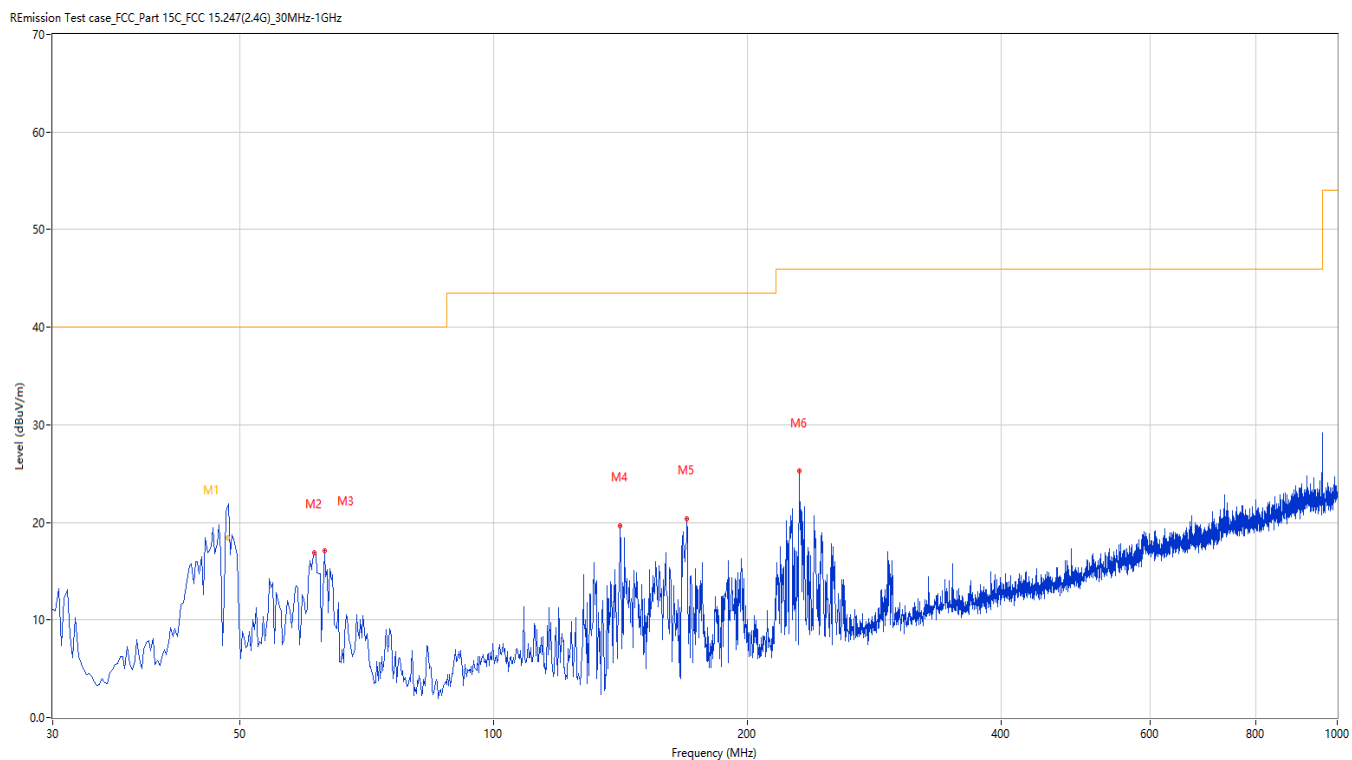
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Figure 19: Test plots of Field strength of harmonics, 2480MHz, 30MHz-1GHz, Horizontal polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	48.358	25.41	-25.08	40.0	14.59	Peak	339.00	203	Horizontal	Pass
1*	48.358	18.45	-25.08	40.0	21.55	QP	339.00	203	Horizontal	Pass
2	61.275	16.84	-26.60	40.0	23.16	Peak	30.20	100	Horizontal	Pass
3	62.972	17.07	-27.03	40.0	22.93	Peak	132.10	100	Horizontal	Pass
4	141.280	19.64	-29.97	43.5	23.86	Peak	3.10	100	Horizontal	Pass
5	169.403	20.42	-28.99	43.5	23.08	Peak	307.20	100	Horizontal	Pass
6	230.255	25.24	-25.75	46.0	20.76	Peak	335.60	100	Horizontal	Pass

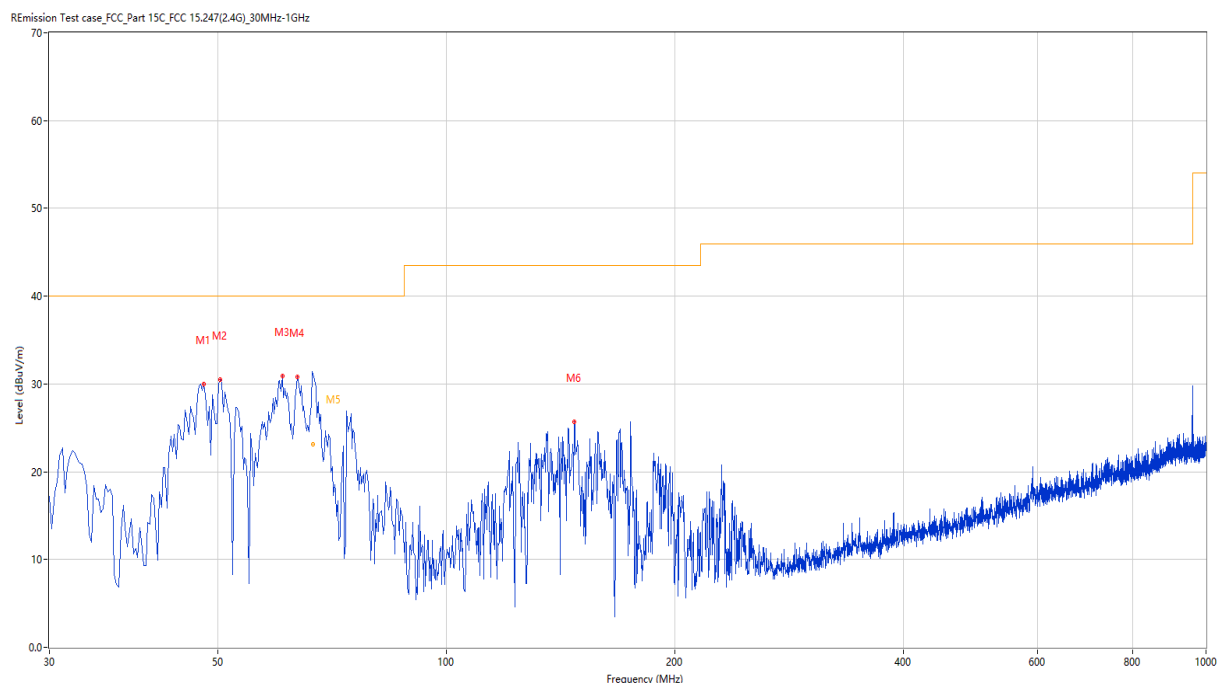
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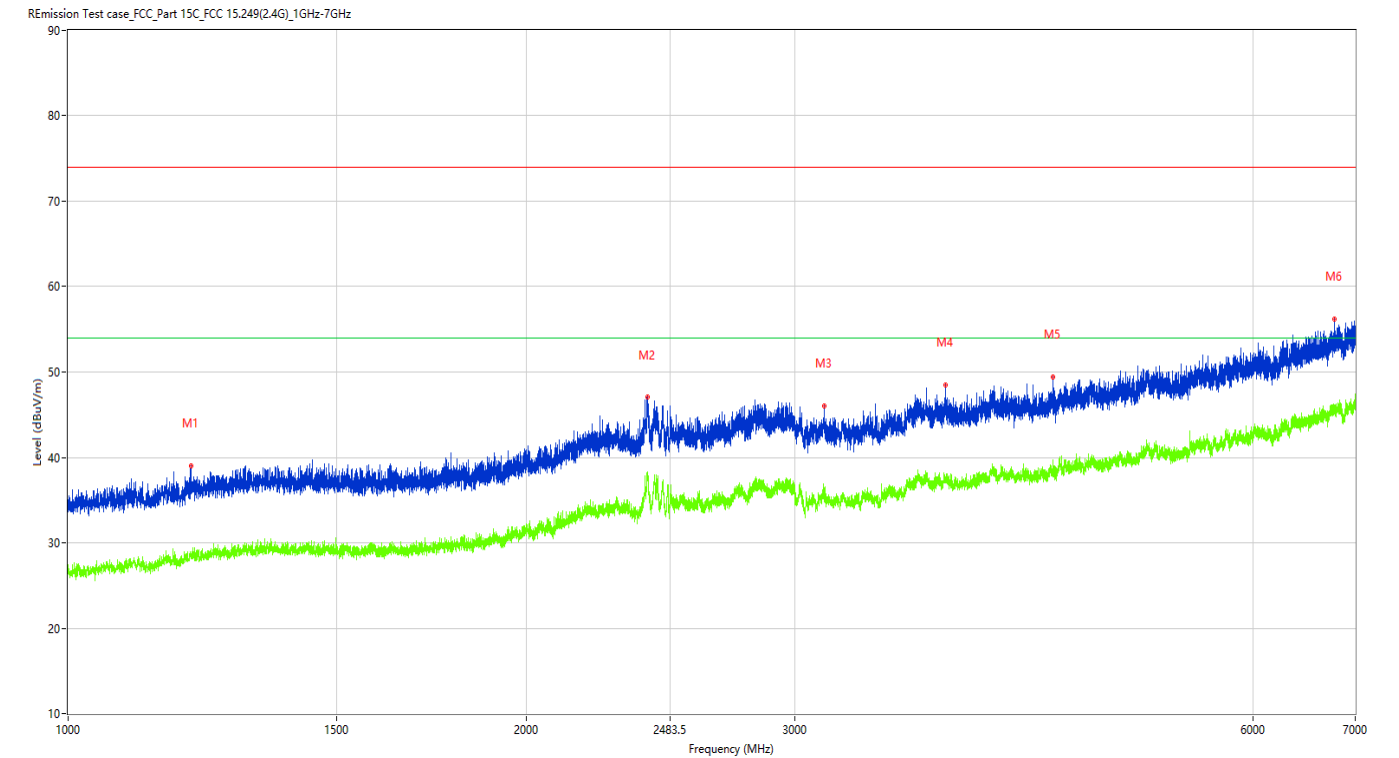
Figure 20: Test plots of Field strength of harmonics, 2480MHz, 30MHz-1GHz, Vertical polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	47.941	30.01	-25.11	40.0	9.99	Peak	200.40	100	Vertical	Pass
2	50.365	30.54	-25.02	40.0	9.46	Peak	191.10	100	Vertical	Pass
3	60.790	30.93	-26.48	40.0	9.07	Peak	223.60	100	Vertical	Pass
4	63.699	30.77	-27.26	40.0	9.23	Peak	354.70	100	Vertical	Pass
5	66.713	29.75	-28.18	40.0	10.25	Peak	5.00	102	Vertical	Pass
5*	66.713	23.14	-28.18	40.0	16.86	QP	5.00	102	Vertical	Pass
6	147.341	25.69	-29.99	43.5	17.81	Peak	32.10	100	Vertical	Pass

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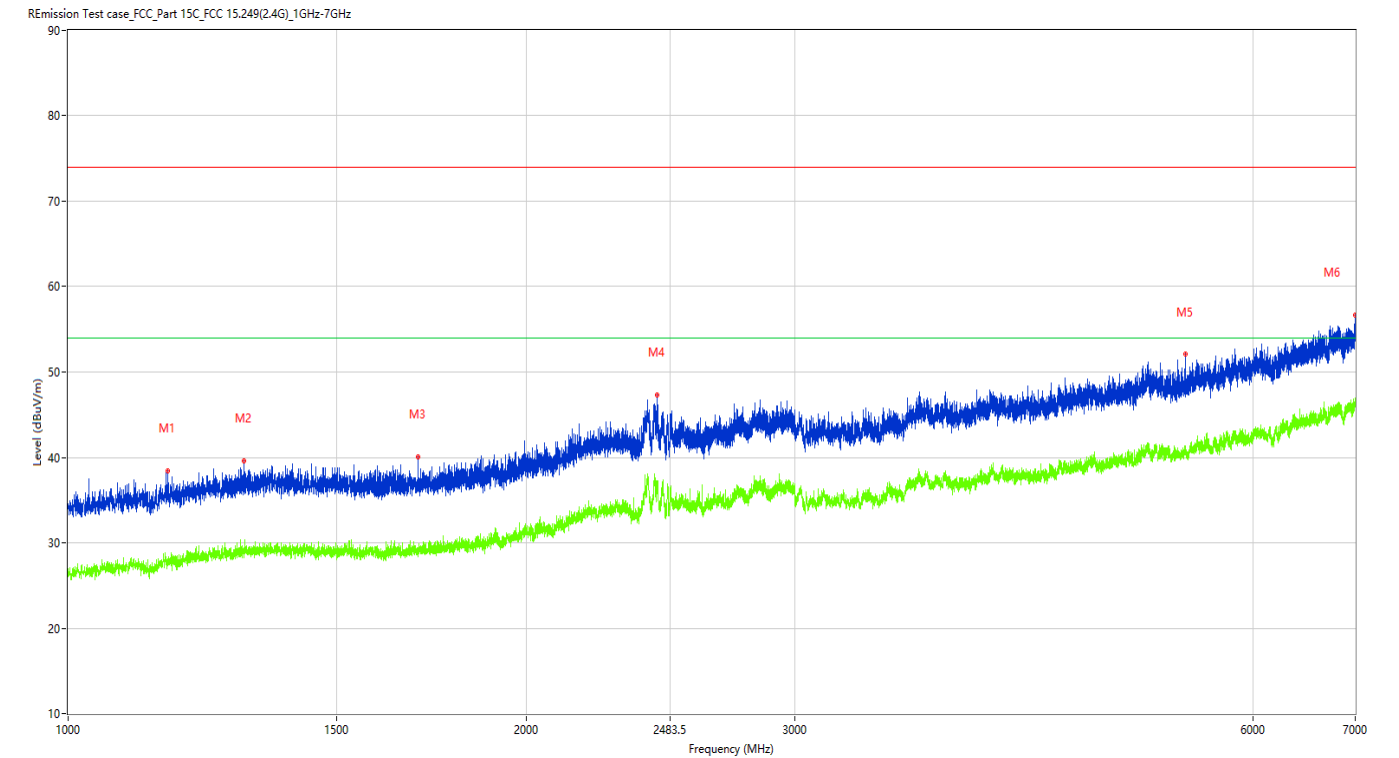
Figure 21: Test plots of Field strength of harmonics, 2480MHz, 1GHz-7GHz, Horizontal polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1204.500	39.06	-13.58	74.0	34.94	Peak	191.00	100	Horizontal	Pass
1**	1204.500	28.26	-13.58	54.0	25.74	AV	191.00	100	Horizontal	Pass
2	2401.000	47.05	-4.43	74.0	26.95	Peak	204.00	100	Horizontal	Pass
2**	2401.000	37.64	-4.43	54.0	16.36	AV	204.00	100	Horizontal	Pass
3	3136.000	45.97	-4.87	74.0	28.03	Peak	289.60	100	Horizontal	Pass
3**	3136.000	36.39	-4.87	54.0	17.61	AV	289.60	100	Horizontal	Pass
4	3768.000	48.54	-1.78	74.0	25.46	Peak	58.60	100	Horizontal	Pass
4**	3768.000	37.73	-1.78	54.0	16.27	AV	58.60	100	Horizontal	Pass
5	4435.000	49.40	-0.93	74.0	24.60	Peak	360.00	100	Horizontal	Pass
5**	4435.000	38.39	-0.93	54.0	15.61	AV	360.00	100	Horizontal	Pass
6	6787.500	56.23	5.20	74.0	17.77	Peak	0.00	100	Horizontal	Pass
6**	6787.500	46.18	5.20	54.0	7.82	AV	0.00	100	Horizontal	Pass

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Figure 22: Test plots of Field strength of harmonics, 2480MHz, 1GHz-7GHz, Vertical polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1162.750	38.44	-13.65	74.0	35.56	Peak	318.90	100	Vertical	Pass
1**	1162.750	27.74	-13.65	54.0	26.26	AV	318.90	100	Vertical	Pass
2	1304.750	39.59	-12.67	74.0	34.41	Peak	216.60	100	Vertical	Pass
2**	1304.750	28.30	-12.67	54.0	25.70	AV	216.60	100	Vertical	Pass
3	1697.250	40.08	-12.94	74.0	33.92	Peak	216.60	100	Vertical	Pass
3**	1697.250	29.12	-12.94	54.0	24.88	AV	216.60	100	Vertical	Pass
4	2437.750	47.34	-5.11	74.0	26.66	Peak	8.70	100	Vertical	Pass
4**	2437.750	36.95	-5.11	54.0	17.05	AV	8.70	100	Vertical	Pass
5	5412.500	52.07	0.62	74.0	21.93	Peak	109.70	100	Vertical	Pass
5**	5412.500	41.09	0.62	54.0	12.91	AV	109.70	100	Vertical	Pass
6	6997.000	56.61	5.69	74.0	17.39	Peak	186.00	100	Vertical	Pass
6**	6997.000	46.18	5.69	54.0	7.82	AV	186.00	100	Vertical	Pass

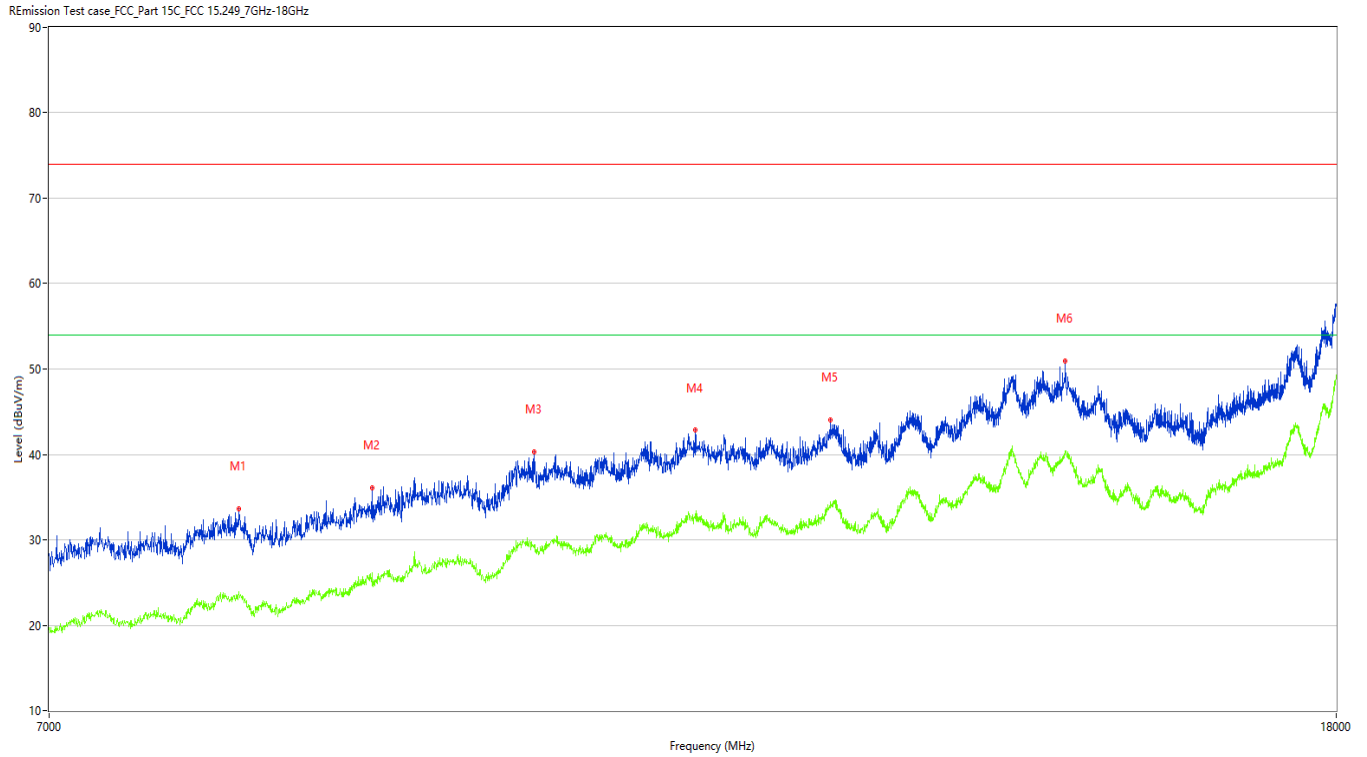
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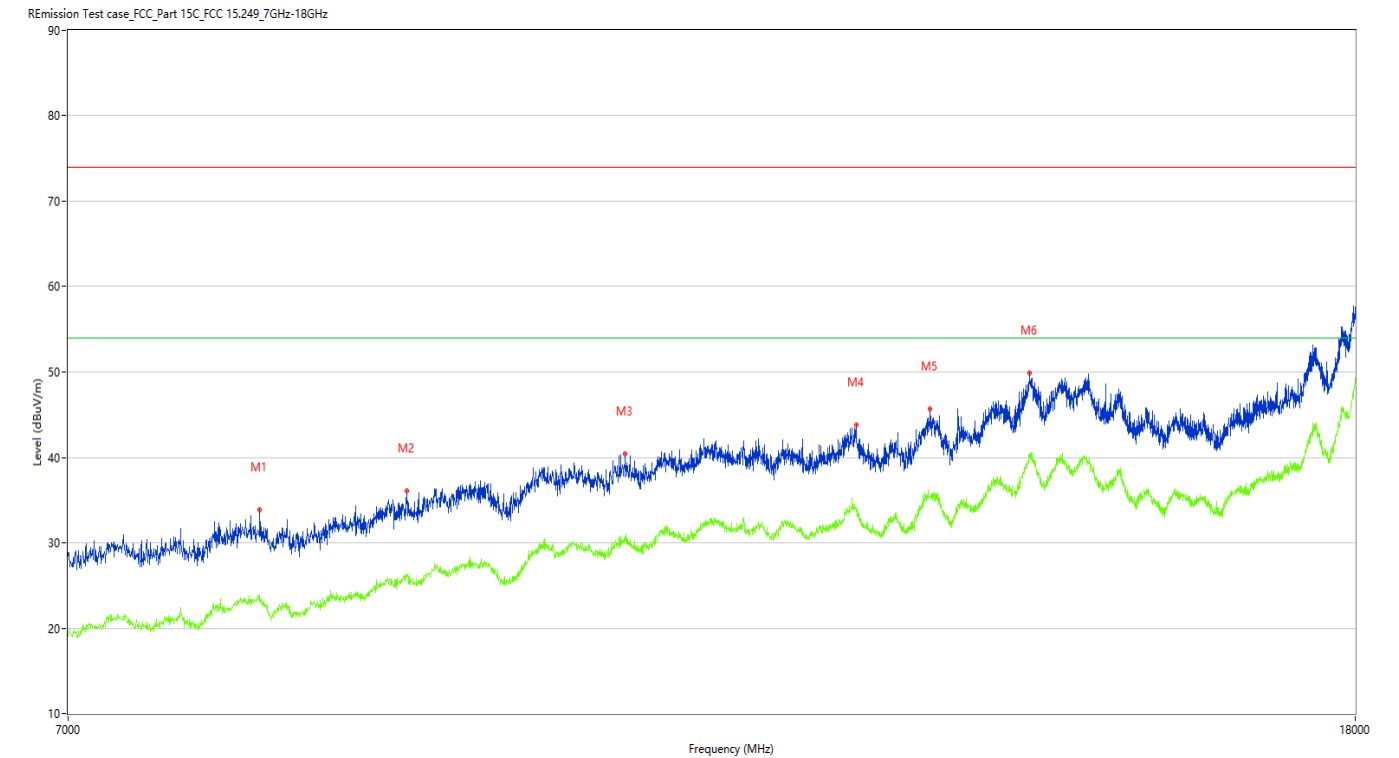
Figure 23: Test plots of Field strength of harmonics, 2480MHz, 7GHz-18GHz, Horizontal polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	8047.750	33.59	4.55	74.0	40.41	Peak	257.60	100	Horizontal	Pass
1**	8047.750	23.81	4.55	54.0	30.19	AV	257.60	100	Horizontal	Pass
2	8870.000	36.06	5.35	74.0	37.94	Peak	323.00	100	Horizontal	Pass
2**	8870.000	26.09	5.35	54.0	27.91	AV	323.00	100	Horizontal	Pass
3	9991.999	40.34	9.29	74.0	33.66	Peak	205.70	100	Horizontal	Pass
3**	9991.999	29.45	9.29	54.0	24.55	AV	205.70	100	Horizontal	Pass
4	11248.750	42.83	11.88	74.0	31.17	Peak	112.70	100	Horizontal	Pass
4**	11248.750	32.64	11.88	54.0	21.36	AV	112.70	100	Horizontal	Pass
5	12417.500	44.08	12.34	74.0	29.92	Peak	112.70	100	Horizontal	Pass
5**	12417.500	34.40	12.34	54.0	19.60	AV	112.70	100	Horizontal	Pass
6	14755.000	50.93	18.77	74.0	23.07	Peak	42.90	100	Horizontal	Pass
6**	14755.000	40.10	18.77	54.0	13.90	AV	42.90	100	Horizontal	Pass

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Figure 24: Test plots of Field strength of harmonics, 2480MHz, 7GHz-18GHz, Vertical polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	8056.000	33.91	4.38	74.0	40.09	Peak	127.50	100	Vertical	Pass
1**	8056.000	23.94	4.38	54.0	30.06	AV	127.50	100	Vertical	Pass
2	8977.250	36.13	8.04	74.0	37.87	Peak	38.80	100	Vertical	Pass
2**	8977.250	26.01	8.04	54.0	27.99	AV	38.80	100	Vertical	Pass
3	10533.750	40.40	10.26	74.0	33.60	Peak	0.00	100	Vertical	Pass
3**	10533.750	30.36	10.26	54.0	23.64	AV	0.00	100	Vertical	Pass
4	12478.000	43.83	12.27	74.0	30.17	Peak	276.80	100	Vertical	Pass
4**	12478.000	33.80	12.27	54.0	20.20	AV	276.80	100	Vertical	Pass
5	13173.750	45.70	14.03	74.0	28.30	Peak	0.00	100	Vertical	Pass
5**	13173.750	35.39	14.03	54.0	18.61	AV	0.00	100	Vertical	Pass
6	14174.750	49.89	19.34	74.0	24.11	Peak	222.70	100	Vertical	Pass
6**	14174.750	40.09	19.34	54.0	13.91	AV	222.70	100	Vertical	Pass

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4.1.3 Band Edge

RESULT:

PASS

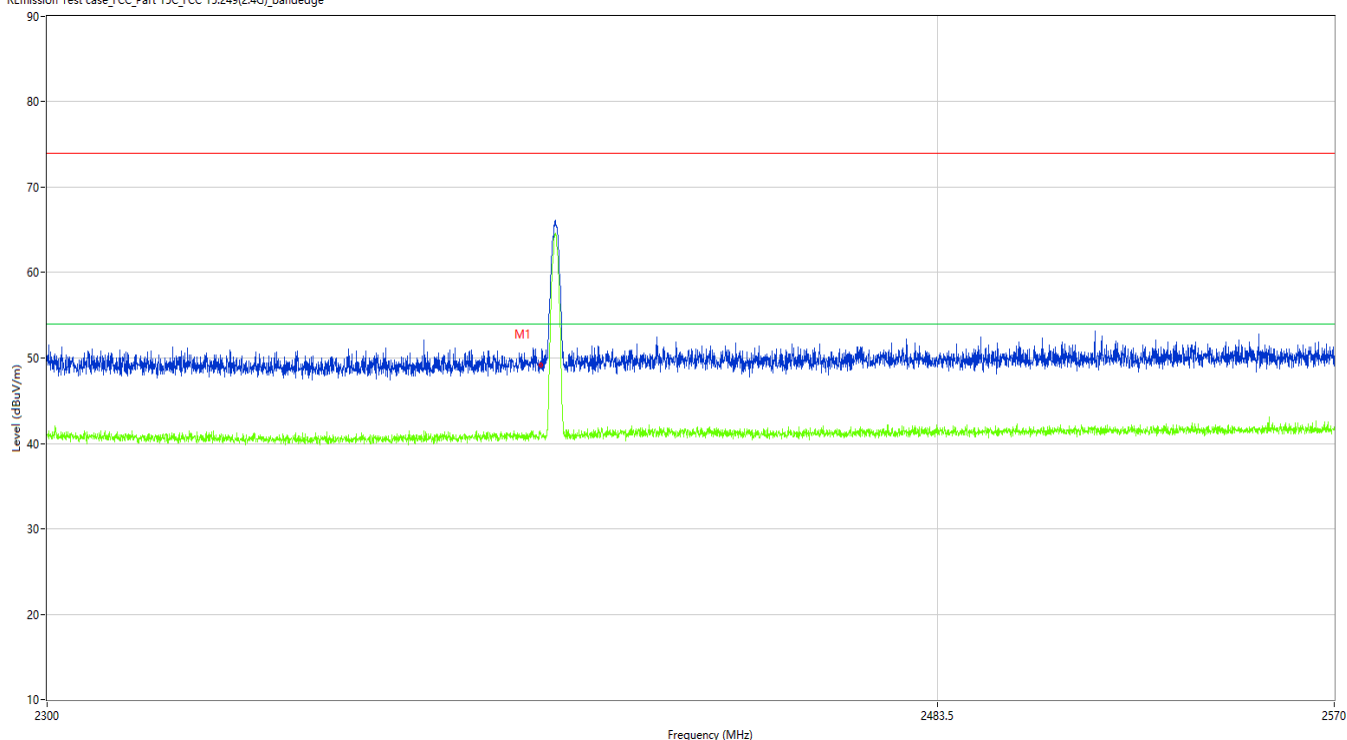
Test standard : FCC Part 15.249(d), 15.209
RSS-210 B.10(b), RSS-GEN 8.10
Requirement : ANSI C63.10-2013
Kind of test site : 3m Semi-Anechoic Chamber

Test setup

Test Channel : Low/High
Operation Mode : A.i/iii
Ambient temperature : 22.5°C
Relative humidity : 48%

Figure 25: Test plots of Band Edge, 2403MHz, Horizontal polarization

REmission Test case_FCC_Part 15C_FCC 15.249(2.4G)_bandedge



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2400.000	49.26	-9.87	74.0	24.74	Peak	83.15	100	Horizontal	Pass
1**	2400.000	41.19	-9.87	54.0	12.81	AV	83.15	100	Horizontal	Pass

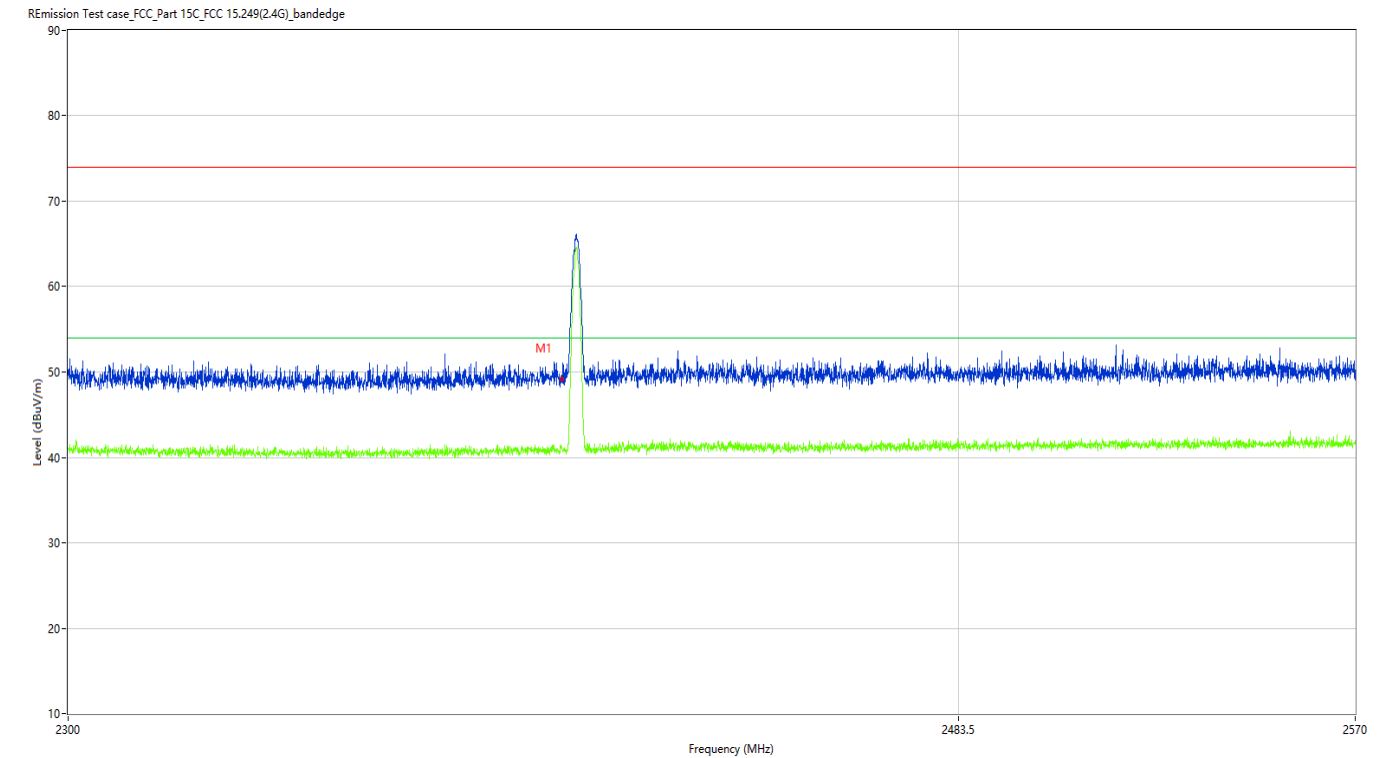
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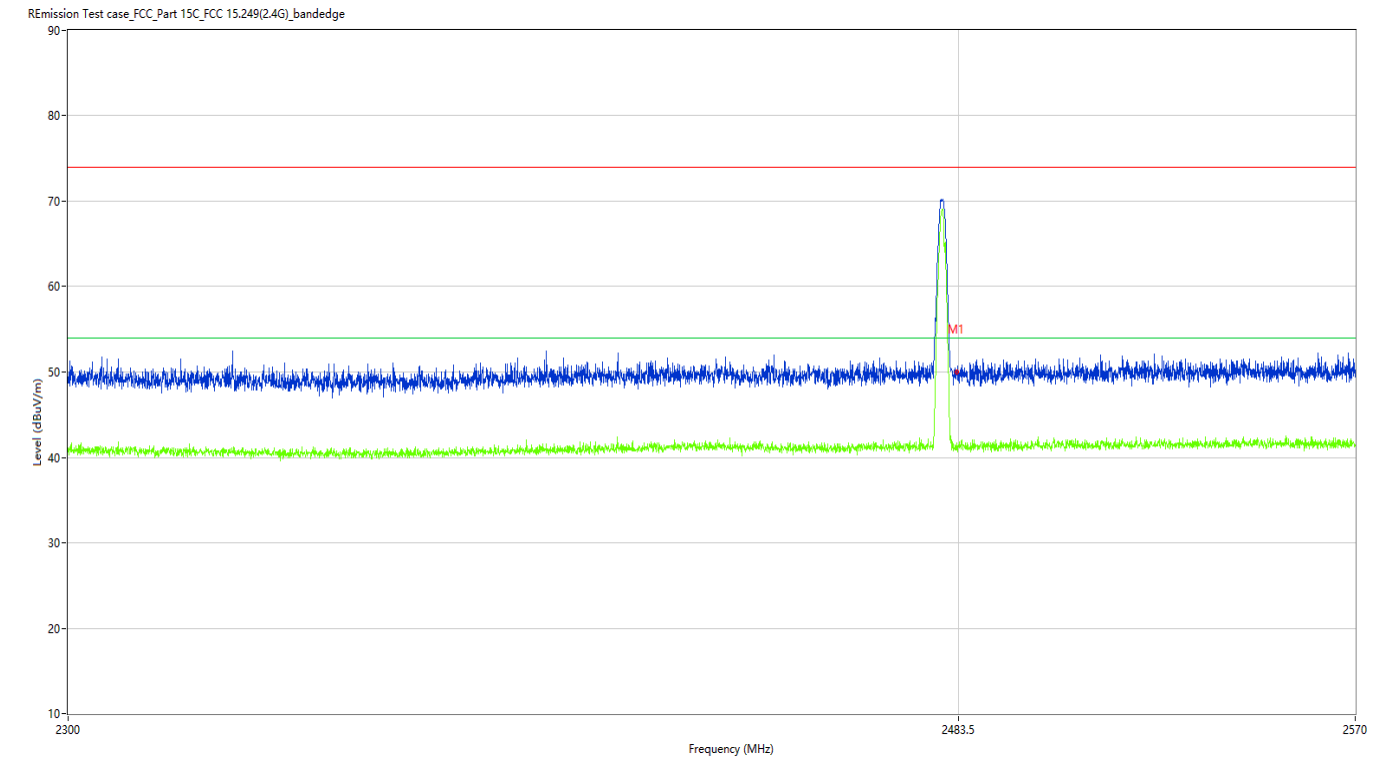
Figure 26: Test plots of Band Edge, 2403MHz, Vertical polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2400.000	49.21	-9.87	74.0	24.79	Peak	83.15	100	Vertical	Pass
1**	2400.000	41.16	-9.87	54.0	12.84	AV	83.15	100	Vertical	Pass

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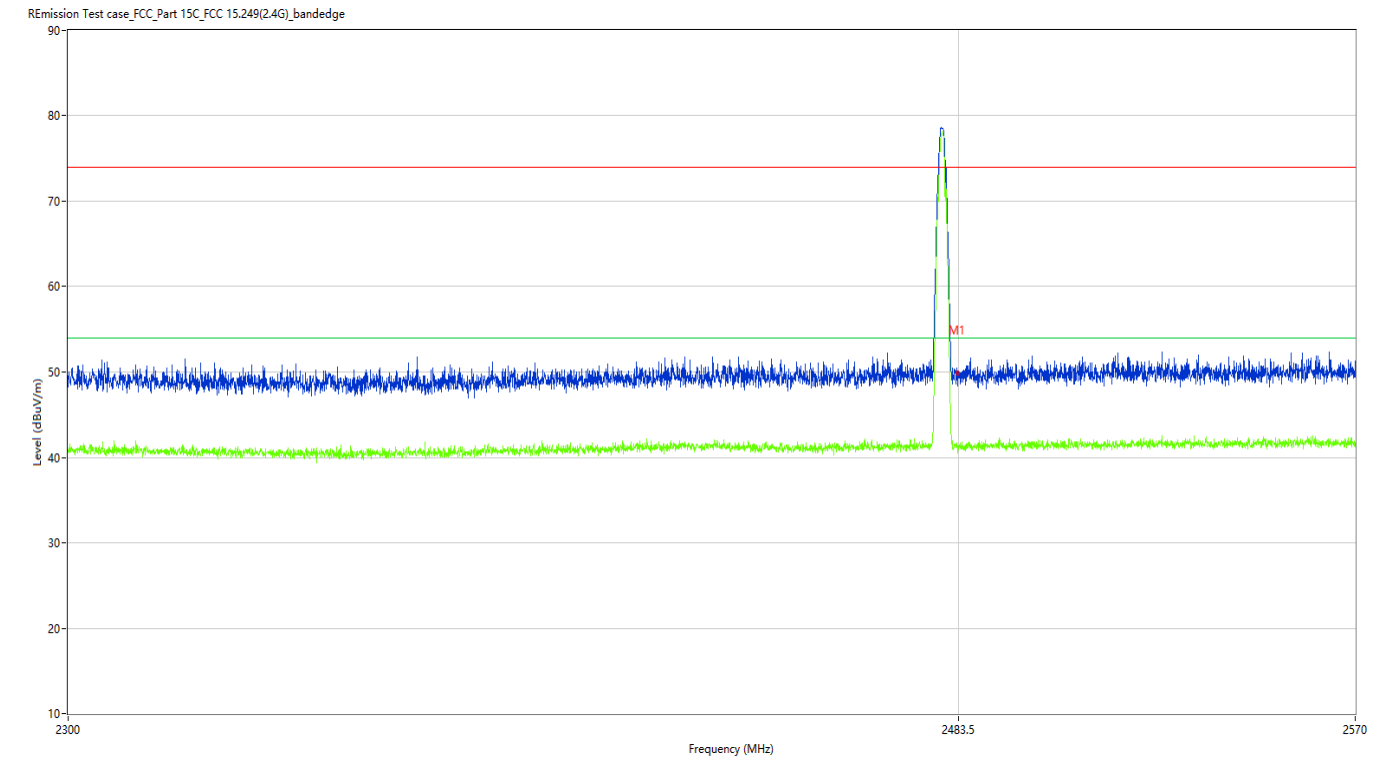
Figure 27: Test plots of Band Edge, 2480MHz, Horizontal polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	50.12	-9.51	74.0	23.88	Peak	321.70	100	Horizontal	Pass
1**	2483.500	41.27	-9.51	54.0	12.73	AV	321.70	100	Horizontal	Pass

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Figure 28: Test plots of Band Edge, 2480MHz, Vertical polarization



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	49.78	-9.51	74.0	24.22	Peak	331.97	100	Vertical	Pass
1**	2483.500	41.08	-9.51	54.0	12.92	AV	331.97	100	Vertical	Pass

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4.1.4 20dB Bandwidth and 99% Bandwidth

RESULT:

PASS

Test standard : FCC Part 15.215(c), RSS-GEN 6.7

Requirement : ANSI C63.10-2013

Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High

Operation Mode : A.i/ii/iii

Ambient temperature : 22.8°C

Relative humidity : 50%

Table 1: 20dB Bandwidth and 99% Bandwidth

Test Mode	Test Channel (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
GFSK	2403	1.029	0.932
	2442	0.974	0.905
	2480	1.022	0.939

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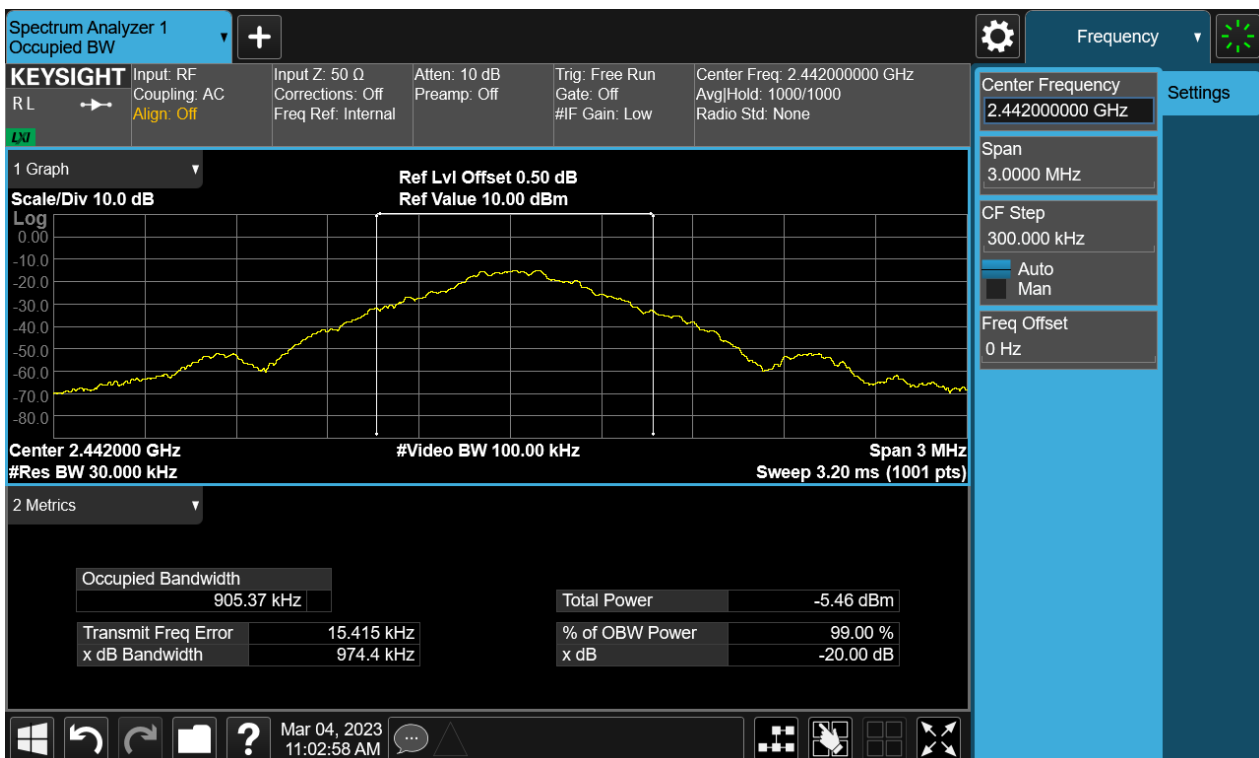
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Figure 29: The plots of 20dB Bandwidth and 99% Bandwidth, 2403MHz



Figure 30: The plots of 20dB Bandwidth and 99% Bandwidth, 2442MHz



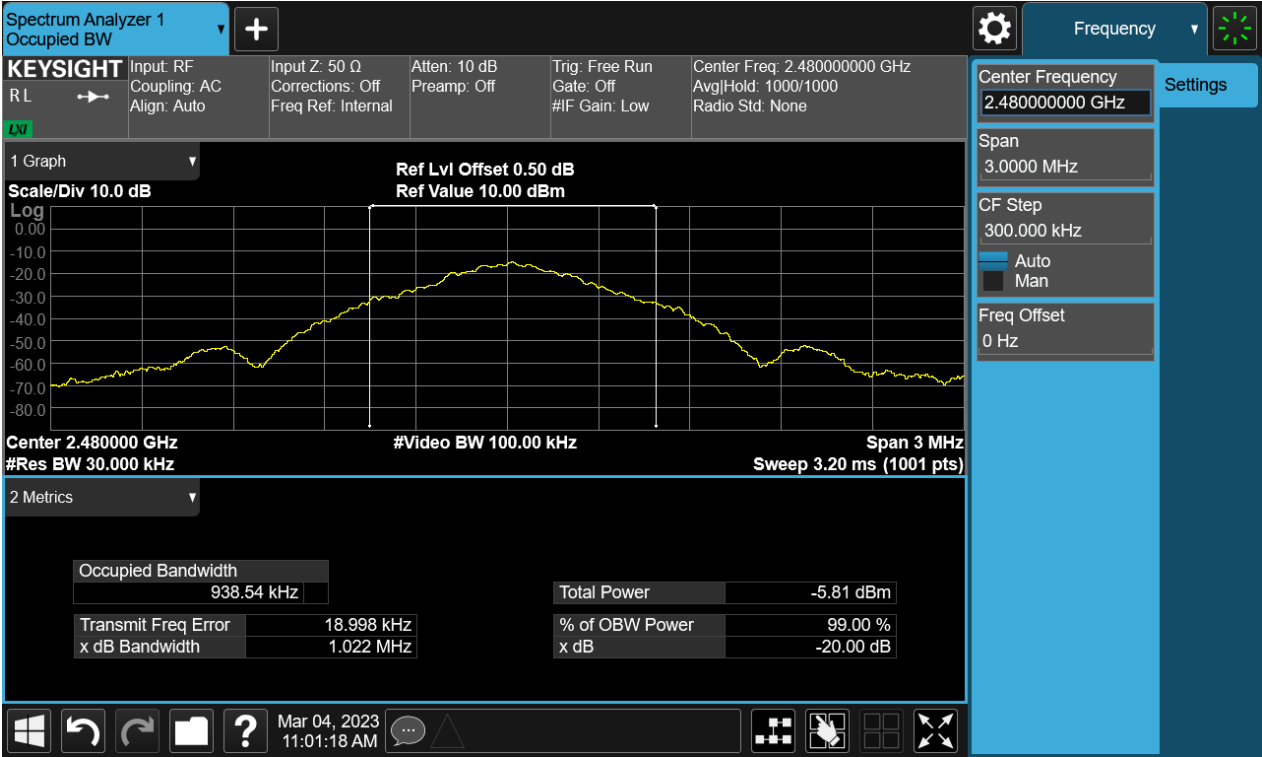
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Figure 31: The plots of 20dB Bandwidth and 99% Bandwidth, 2480MHz



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4.2 Mains Emissions

4.2.1 Conducted Emission on AC Mains

RESULT:

PASS

Test standard	: FCC Part 15.207(a), RSS-Gen 8.8
Requirement	: ANSI C63.10-2013 clause 6.2
Kind of test site	: Shielded room

Test setup

Input Voltage	: DC 29V supply by adapter (which received AC 120V, 60Hz)
Operation Mode	: A.i/ii/iii
Earthing	: Not Connected
Ambient temperature	: 25°C
Relative humidity	: 43%

For details refer to following test plot.

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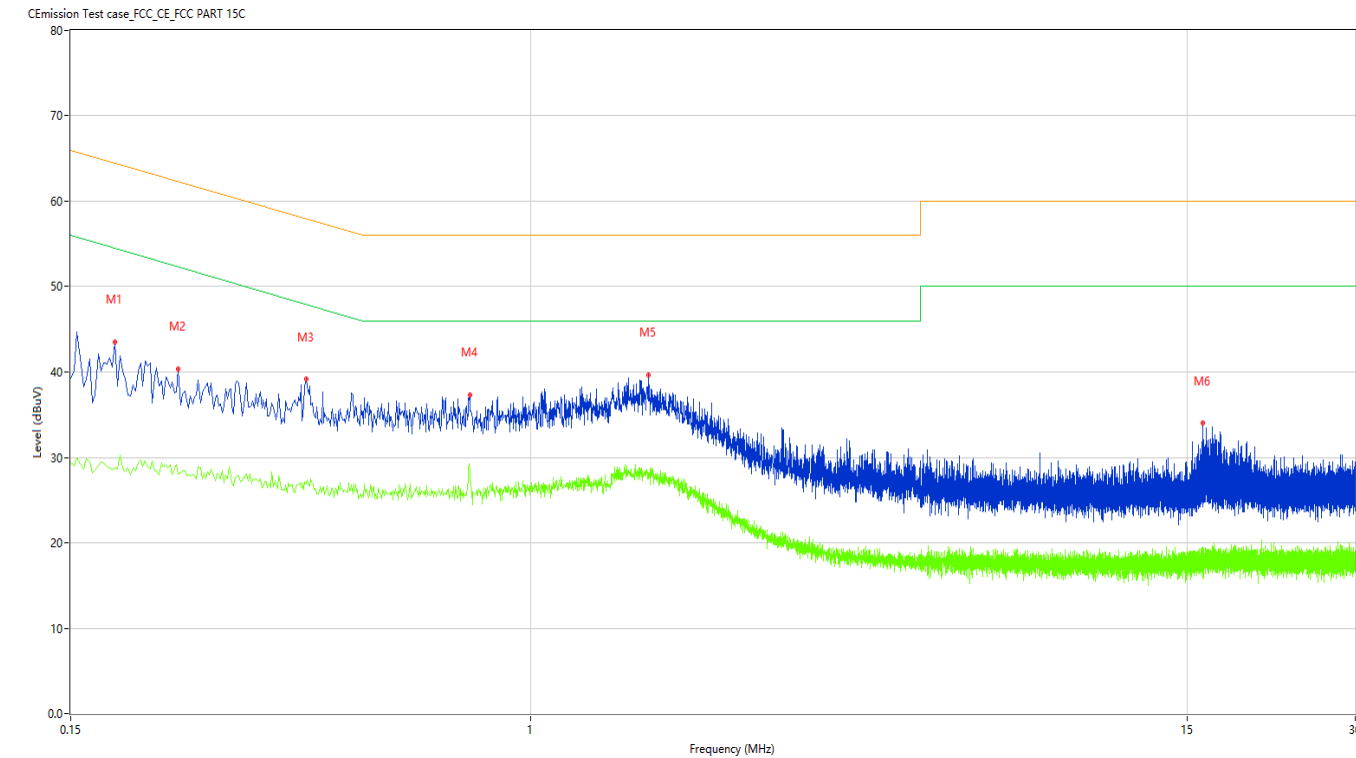
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Note: The all configurations were tested respectively, but only the worst configuration shown here.

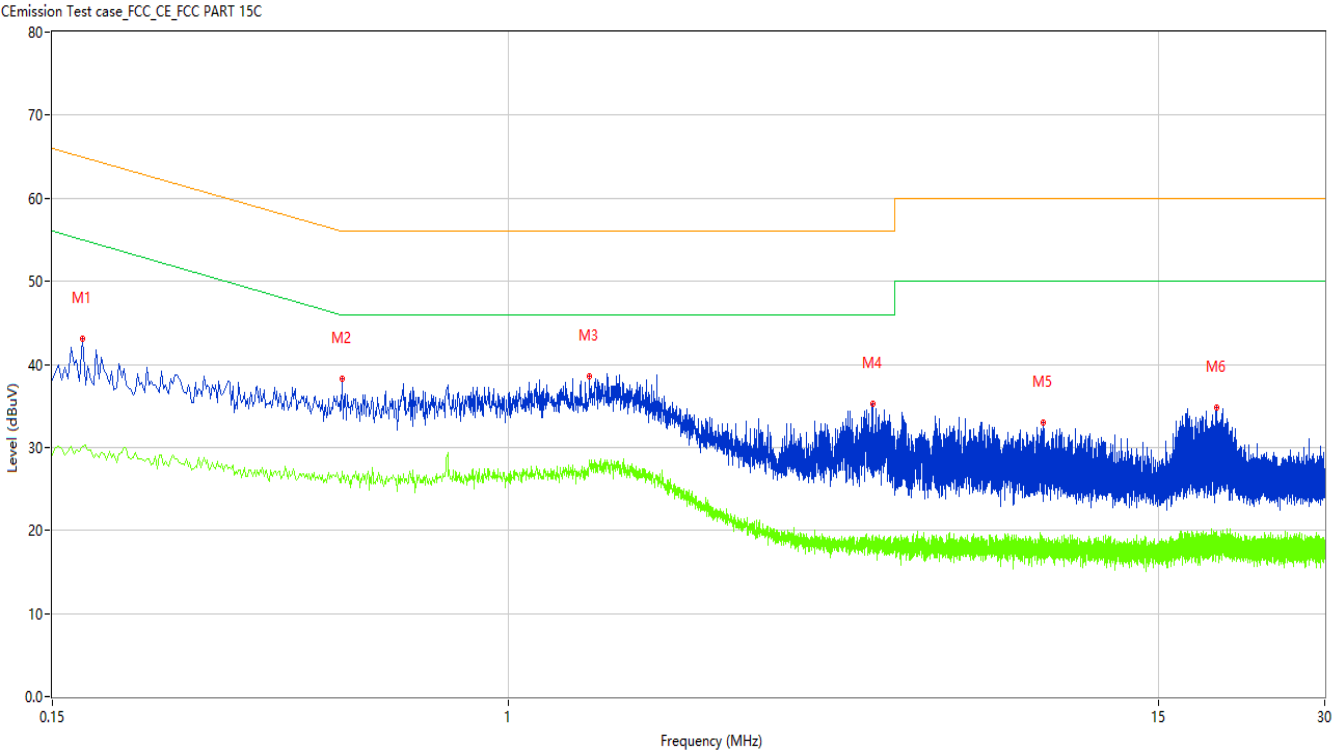
Figure 32: Conducted Emission on AC Mains, L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.180	43.49	10.18	64.49	21.00	Peak	L	Pass
1**	0.180	28.77	10.18	54.49	25.72	AV	L	Pass
2	0.234	40.34	10.21	62.31	21.97	Peak	L	Pass
2**	0.234	28.09	10.21	52.31	24.22	AV	L	Pass
3	0.396	39.13	10.23	57.94	18.81	Peak	L	Pass
3**	0.396	26.85	10.23	47.94	21.09	AV	L	Pass
4	0.778	37.31	10.19	56.00	18.69	Peak	L	Pass
4**	0.778	28.57	10.19	46.00	17.43	AV	L	Pass
5	1.624	39.68	10.15	56.00	16.32	Peak	L	Pass
5**	1.624	27.67	10.15	46.00	18.33	AV	L	Pass
6	15.978	33.99	10.79	60.00	26.01	Peak	L	Pass
6**	15.978	19.49	10.79	50.00	30.51	AV	L	Pass

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Figure 33: Conducted Emission on AC Mains, N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.170	43.03	10.28	64.96	21.93	Peak	N	Pass
1**	0.170	30.06	10.28	54.96	24.90	AV	N	Pass
2	0.502	38.25	10.32	56.00	17.75	Peak	N	Pass
2**	0.502	27.10	10.32	46.00	18.90	AV	N	Pass
3	1.404	38.49	10.21	56.00	17.51	Peak	N	Pass
3**	1.404	28.46	10.21	46.00	17.54	AV	N	Pass
4	4.562	35.19	10.26	56.00	20.81	Peak	N	Pass
4**	4.562	19.46	10.26	46.00	26.54	AV	N	Pass
5	9.294	32.95	10.39	60.00	27.05	Peak	N	Pass
5**	9.294	17.80	10.39	50.00	32.20	AV	N	Pass
6	19.106	34.78	10.89	60.00	25.22	Peak	N	Pass
6**	19.106	17.52	10.89	50.00	32.48	AV	N	Pass

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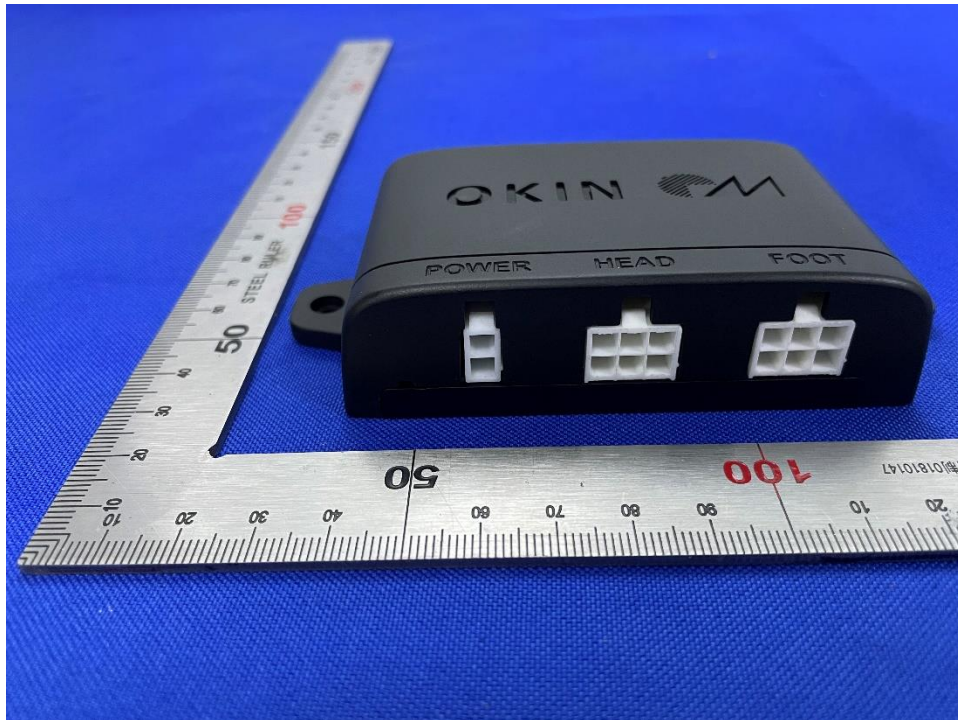
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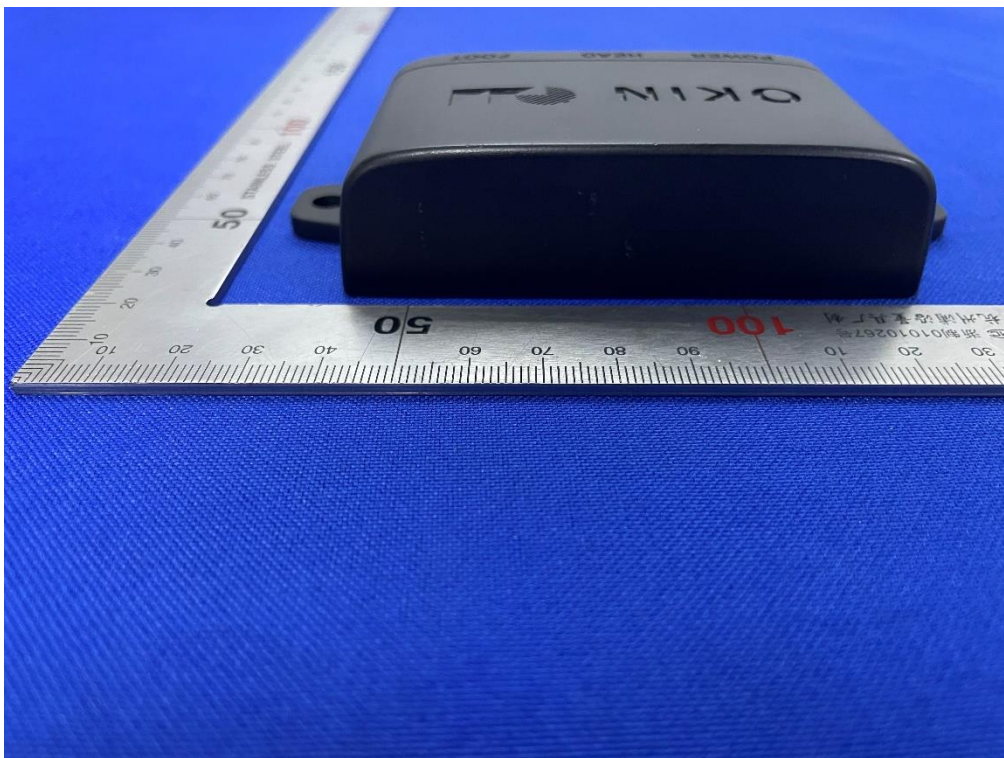
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5 Appendixes

5.1 Photographs of the Sample



Front of the sample



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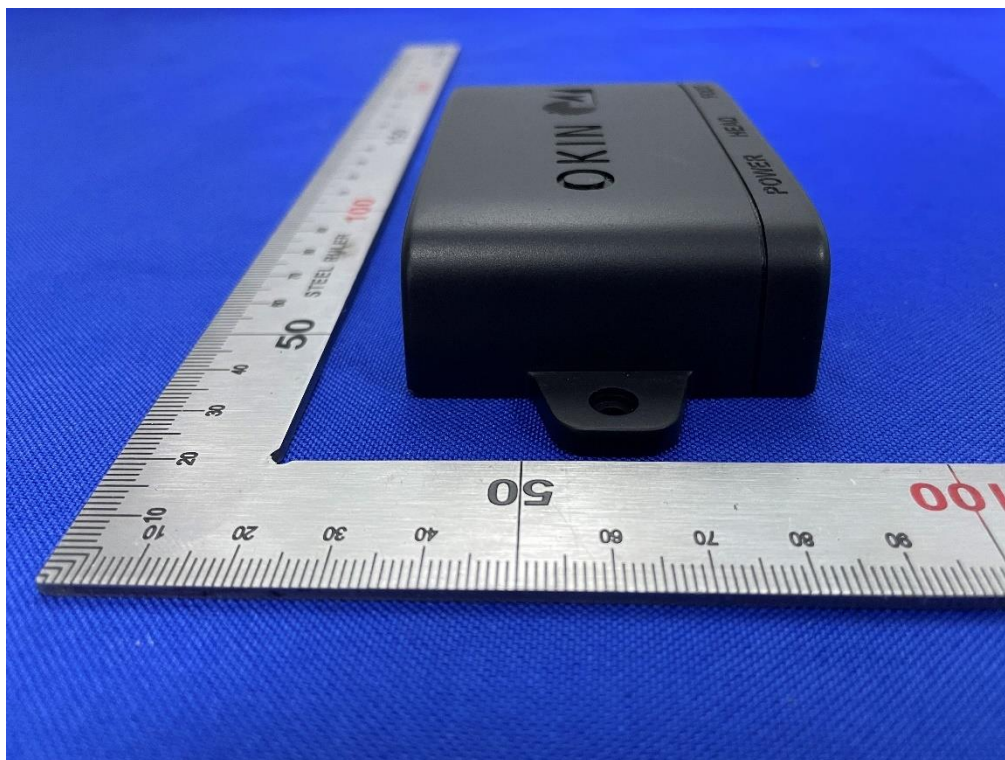
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Back of the sample



Left of the sample



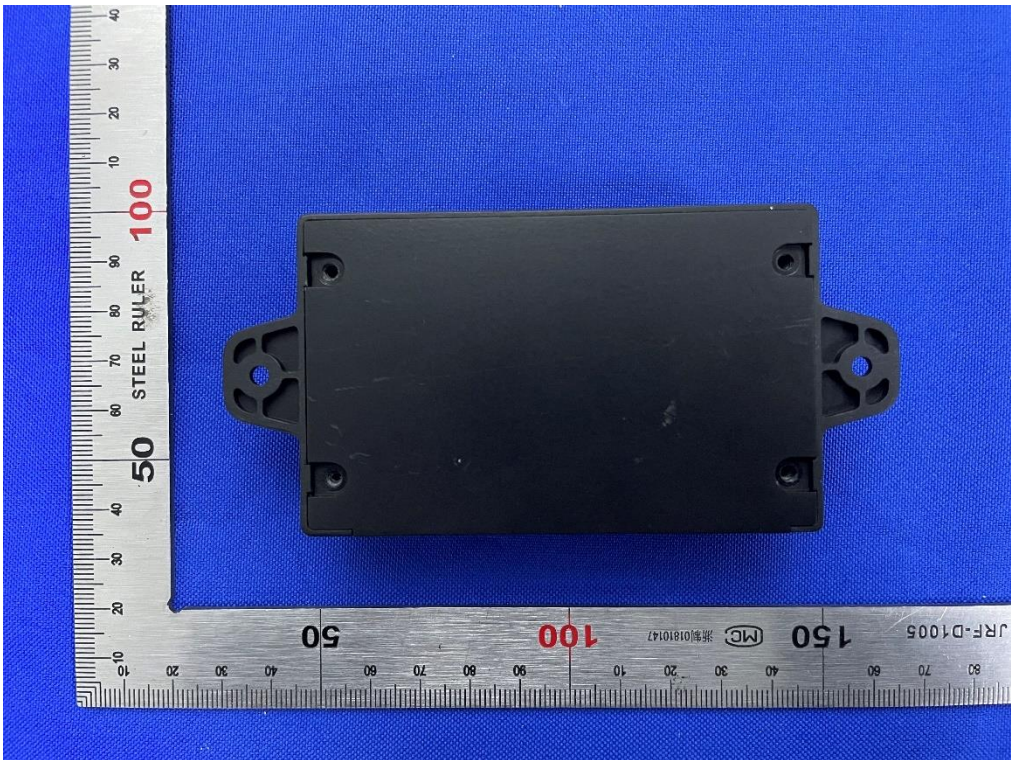
Right of the sample

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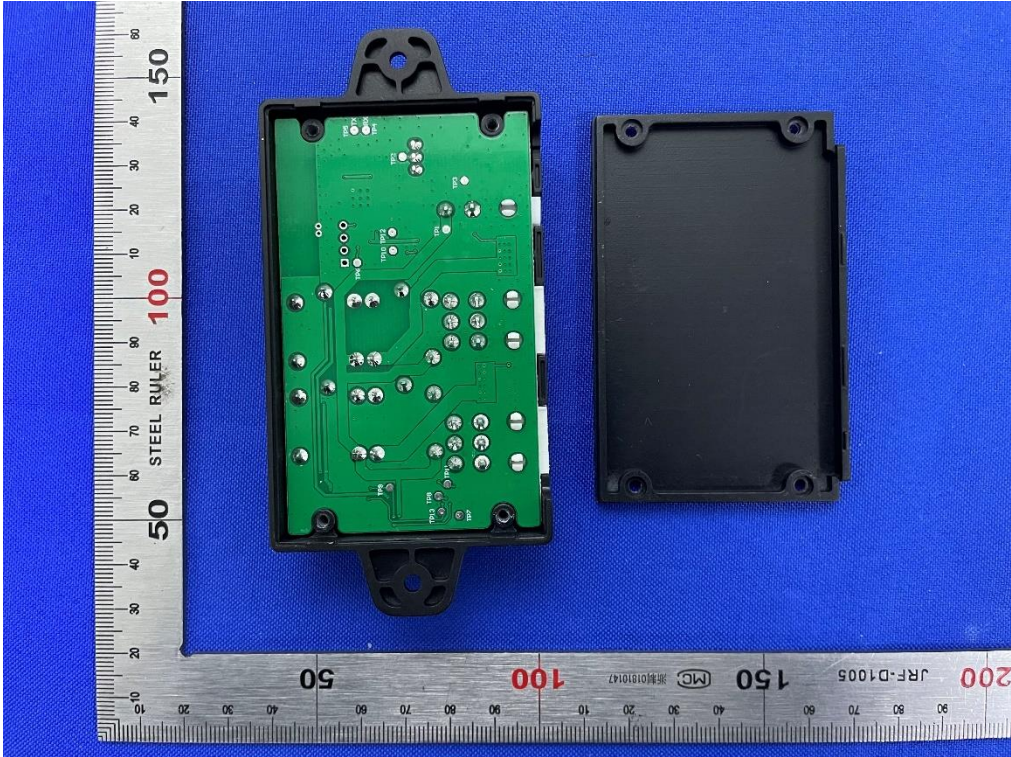


Top of the sample

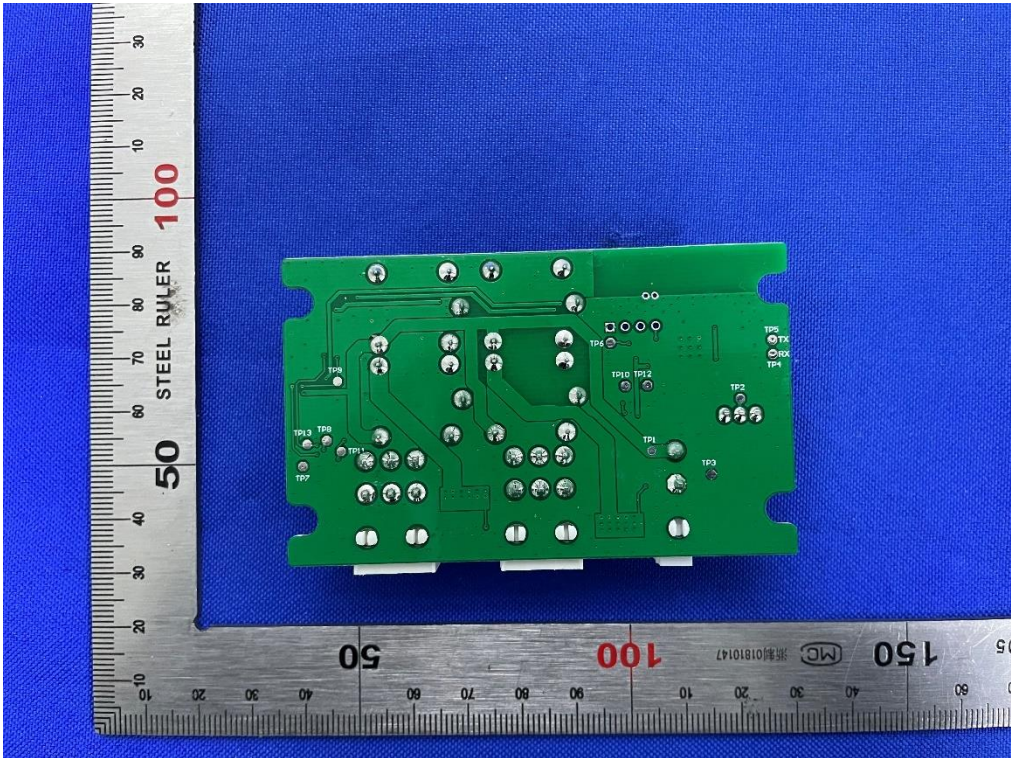


Bottom of the sample

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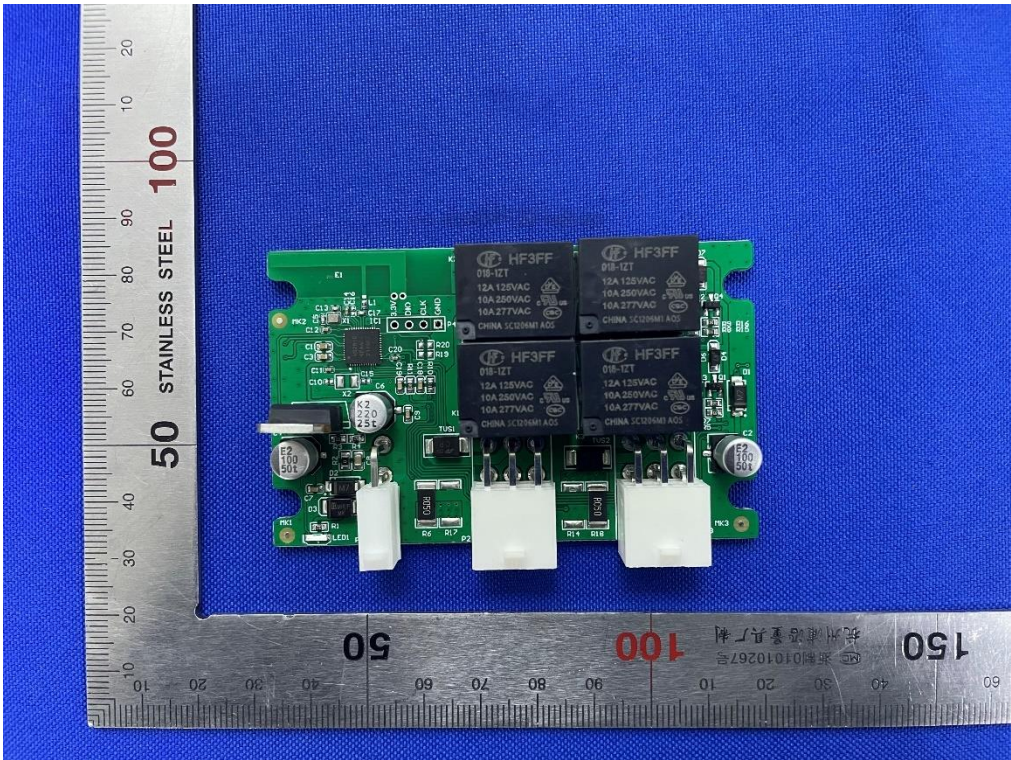


Open of the sample

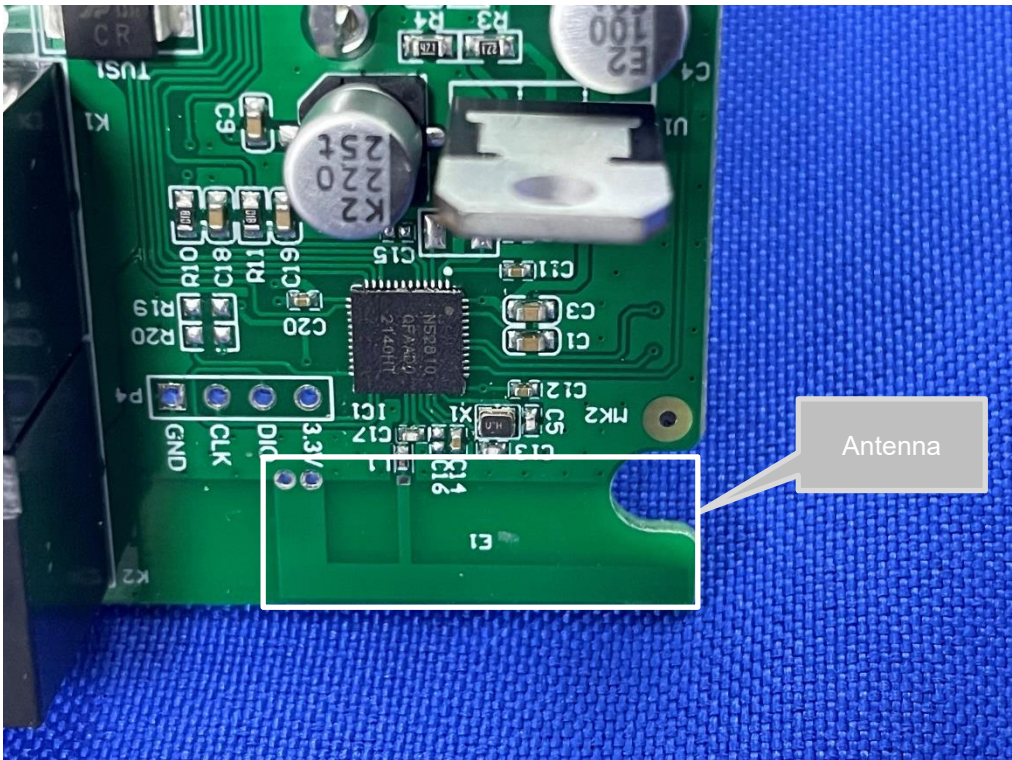


Internal-1 of the sample

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Internal-2 of the sample



Antenna position of the sample

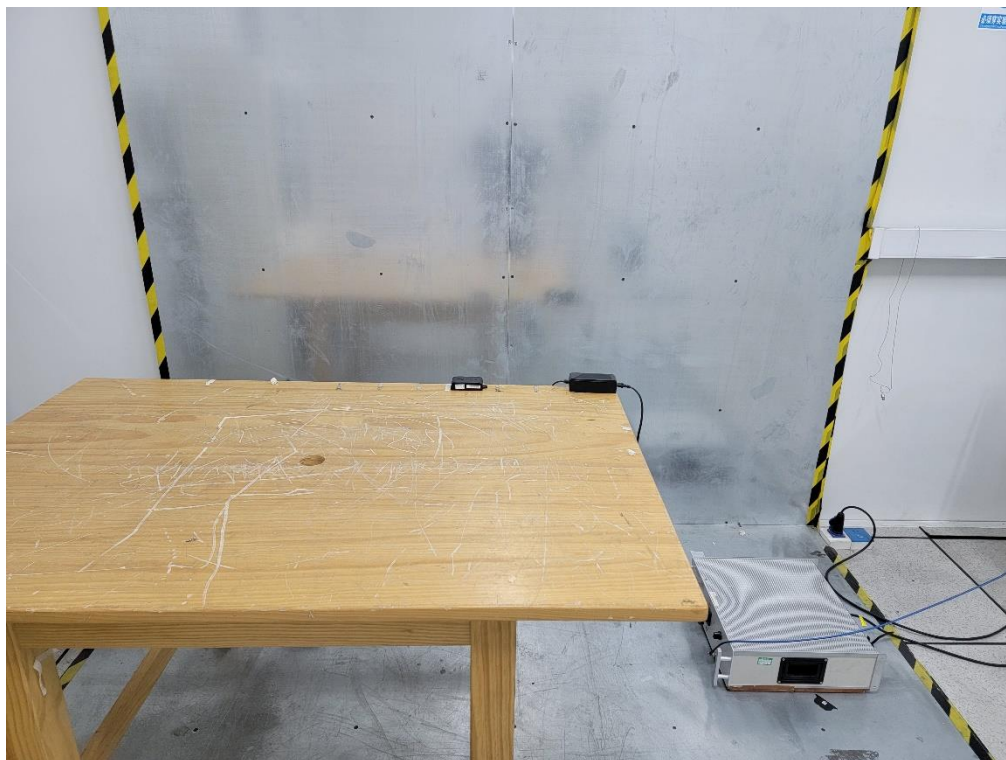
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5.2 Set-up for Conducted Emissions



5.3 Set-up for Spurious Emissions below 1GHz



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5.4 Set-up for Spurious Emissions above 1GHz



End of the report