

Test Report

Report No. : FCC2024-00018

Company : ZEROWELL Inc.

Representative : SangJin Kim

Address : 102ho, 106ho, 17-31, Cheondamwagi-ro 280beon-gil, Buk-gu, Gwangju, South Korea

1. Product Name : Humidified air purifier
- Type and Model : ZWAH-800WIU
2. Use of Report : Evaluation of EMC test
3. Date of Receipt : 2024-07-17
4. Date of test : 2024-07-17 ~ 2024-08-02
5. Testing Method : FCC 47 CFR Part 15 Subpart B
ANSI C 63.4-2014
6. Test Results : as stated in the annexed paper

Tested by : Jin Sung, Kim

Approved by : Sung Ryul, Kim

Jin - Sung, Kim

Sung Ryul Kim

1. This result of the above report are unrelated to KS Q ISO/IEC 17025 and KOLAS recognition and the result of testing with samples and sample names suggested by the client does not guarantee the quality of entire products
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It is only used for the purpose of the quality test.
3. The authenticity of the report is available on the website (www.ktc.re.kr).

2024-10-24



Korea Testing Certification institute

www.ktc.re.kr [15809] 22 Heungan-daero27beon-gil, Gunpo-si, Gyeonggi-Do, Korea
TEL : +82-1899-7654, FAX : +82-31-428-2926

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1. Testing Program Details

Testing procedure and testing location	
Testing Laboratory	KTC (Korea Testing Certification Institute)
Testing location / address	[15809] 22 Heungan-daero27beon-gil, Gunpo-si, Gyeonggi-Do, Republic of Korea
Tested by (name)	Jin Sung, Kim
Approved by (name)	Sung Ryul, Kim
Test item description	Humidified air purifier
Applicant	ZEROWELL Inc.
Applicant Address	102ho, 106ho, 17-31, Cheondamwagi-ro 280beon-gil, Buk-gu, Gwangju, South Korea
Manufacturer	ZEROWELL Inc.
Manufacturer Address	102ho, 106ho, 17-31, Cheondamwagi-ro 280beon-gil, Buk-gu, Gwangju, South Korea
Factory	ZEROWELL Inc.
Factory Address	102ho, 106ho, 17-31, Cheondamwagi-ro 280beon-gil, Buk-gu, Gwangju, South Korea
FCC ID	2BC63-ZWAH-800WIU
Model / Type reference	ZWAH-800WIU / ZWAH-820WIU
Input Power Range	24 Vdc
Clock frequencies	8 MHz
Hardware version	- Main PCB : ZWAH-U800W Main Ver 0.3A - Power PCB : 800WIS-Power-V0.6A - Sub PCB : ZWAH-800AWI PWR RX V0.2 & ZWAH-800AWI PWR TX V0.2 - Snesor PCB : HD-2020W SENSOR V0.31
Firmware version	- ZWAH-800WIU_V1.01 - ZWH-820WIU_V1.01
Test site MRA or registration number	KR0006

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Possible test case verdicts	
- test case does not apply to test object	N/A
- test object does meet requirement	P (Pass)
- test object does not meet requirement	F (Fail)
Testing	
Date of receipt of test item	2024-07-17
Date(s) of performance of tests	2024-07-17 ~ 2024-08-02

General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

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1.1 Applicant Information

Name	ZEROWELL Inc.
Address	102ho, 106ho, 17-31, Cheondamwagi-ro 280beon-gil, Buk-gu, Gwangju, South Korea
FCC ID	2BC63-ZWAH-800WIU

1.2 Supporting Equipment Used During Test

Use	Product Type	Manufacturer	Model	Comments
EUT	Humidified air purifier	ZEROWELL Inc.	ZWAH-800WIU	-
EUT	I.T.E. POWER SUPPLY	W&T ELECTRONICS CO.,LTD.	W&T-AD1824B240100U	24V DC Power Supply

Supplementary information: EUT = Equipment Under Test, AE = Auxiliary / Associated Equipment, SIM = Simulator (Not Subjected to Test).

1.3 Input / Output Ports

Port No.	Name	Type	Cable Max. > 3 m	Cable Shielded	Comments
1	DC 24 V	DC	1.5	N	24V DC Power Supply output

Supplementary information: AC = AC Power Port, DC = DC Power Port, N/E = Non-Electrical, TP = Telecommunication Ports,
I/O = Signal Input or Output Port (Not Involved in Process Control).

1.4 Power Interface

Mode No.	Voltage (V)	Current (A)	Power (W)	Frequency (Hz)	Phases (No.)	Comments
1	120	-	-	60	1	24V DC Power Supply Input

Supplementary information : -

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1.5 EUT Operation Modes

Mode No.	Description
1	Humidification Mode
2	Air purification Mode

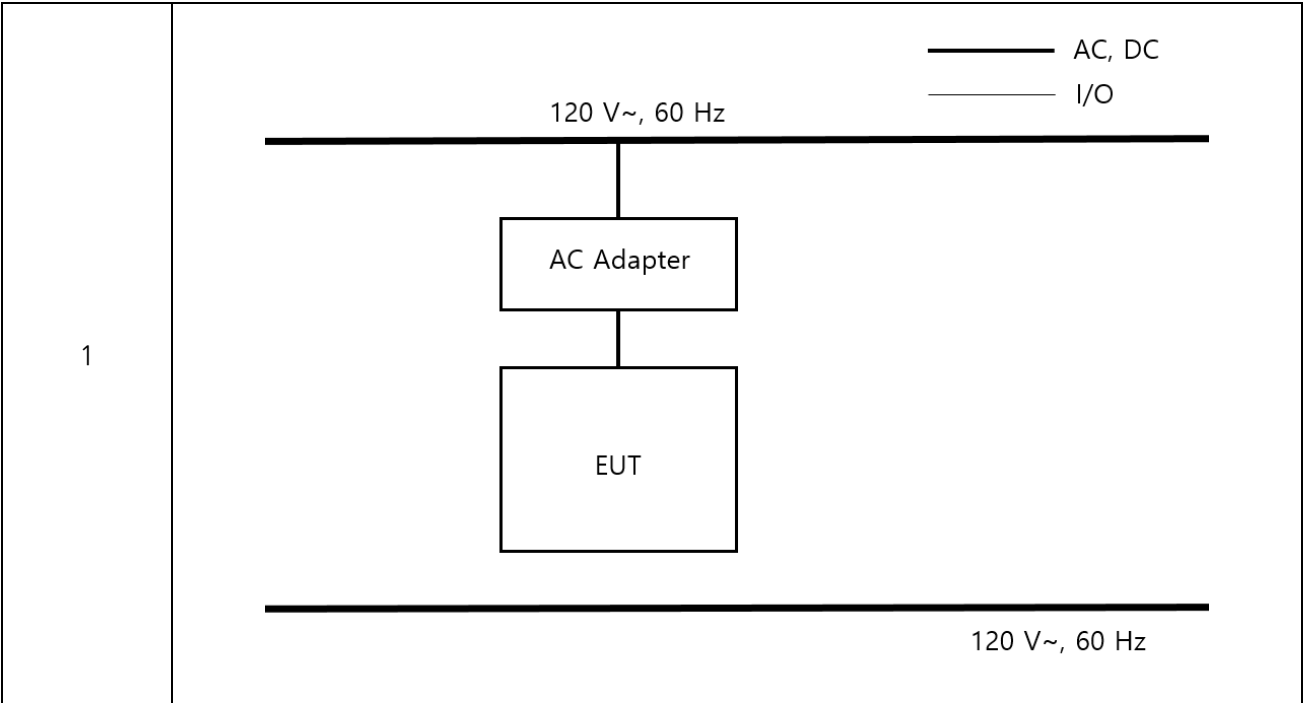
1.6 EUT Configuration Modes

Mode No.	Description
1	The EUT was supplied with 12 V power and tested with the settings as follows. Humidification Mode, Wind speed : Turbo Mood : ON Timer : 6 H
2	The EUT was supplied with 12 V power and tested with the settings as follows. Air purification Mode Wind speed : Turbo Mood : ON Timer : 6 H

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1.7 Test System Layout



1.8 Applicable Standards for Testing

Standards	Status	Deviation
FCC 47 CFR Part 15 Subpart B ANSI C 63.4-2014	Applicable	No Deviation

1.9 Summary of Test Results

Requirement - Test	Result	Remark
Conducted Emission	P	-
Radiated Emissions(Below 1GHz)	P	-
Radiated Emissions(Above 1GHz)	P	-

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1.10 Series Models

Except for the following, the circuit and component layout are identical between the basic model and the variant model.

	Paricle Sensor	Air Filter
ZWAH-800WIU(Basic Model)	Used	Used
ZWH-820WIU(Variant Model)	Not Used	Not Used

1. 11 Measurement uncertainty

Measurement	Uncertainty	
Conducted Emission	± 2.60 dB	
Radiated Emissions(30 MHz - 1 GHz)	H	± 3.38 dB
	V	± 3.96 dB
Radiated Emissions(1 GHz - 6 GHz)	H	± 6.66 dB
	V	± 6.04 dB
-This uncertainly represents an expanded uncertainty expressed at approximately 95% confidence level using a coverage factor of k=2.		

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2. Conducted Emission

The initial preliminary exploratory scans were performed over the measuring frequency range(0.15 MHz to 30 MHz) using a max hold mode incorporating a Peak detector and Average detector and using the software of EP5/CE (Version 5.4.12 from TOYO). The final test data was measured using a Quasi-Peak detector and Average detector.

2.1 Limits of conducted emission measurement

Frequency of emission (MHz)	Conducted limit (dBμV)		Class
	Quasi-peak	Average	
0.15 - 0.5	66 to 56	56 to 46	B
0.5 - 5	56	46	
5 - 30	60	50	

2.2 Environment Conditions

Temperature	(22 ± 2) °C
Humidity	(43 ± 5) % R.H.
Atmospheric Pressure	(101.5 ± 0.5) kPa

2.3 Test Site

Conducted Test Room in KTC Laboratory

2.4 Test Equipment List

Equipment	Model	Manufacturer	Series No.	Cal. Date	Cal. Due
EMI Test Receiver	N9038A	Agilent	MY53290038	2023-12-27	2024-12-27
LISN	ENV216	Rohde & Schwarz	101550	2023-12-26	2024-12-26

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2.5 Test Results

Test Date	2024-07-30		
Test Rating	120 V~, 60 Hz	EUT Operation Modes	1

<<Conducted Emission>>

30 July, 2024 09:44
FCC2024-00018_CE.dat

Model : ZWAH-800WIU
Serial : -
Operator : KIM JIN SUNG
AC Power : 120 V~, 60 Hz
Temp.Humidity : -

Standard : FCC Part.15 B Class B
Remark1 : Wind speed: Turbo
Remark2 : Mood: ON
Remark3 : Humidification MODE
Remark4 : Timer: 6 H

Level

[dB(uV)]

100
90
80
70
60
50
40
30
20
10
0

0.150 0.500 1.000 5.000 10.000 30.000

Frequency [MHz]

<KS C 9832 B>
Limit (QP)
Limit (AV)
<FCC2024-00018_CE>
Spectrum (N,AV)
Spectrum (N,PK)
Spectrum (L1,AV)
Spectrum (L1,PK)
Suspected Item(N)
Suspected Item(L1)
Final Item-QP(N)
Final Item-AV(N)
Final Item-QP(L1)
Final Item-AV(L1)

Final Result

--- N Phase ---

No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV	Remark
	[MHz]	[dB(uV)]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB]	[dB]	
1	0.16297	36.4	21.3	9.6	46.0	30.9	65.3	55.3	19.3	24.4	
2	0.38675	25.1	15.7	9.7	34.8	25.4	58.1	48.1	23.3	22.7	
3	0.82413	19.7	11.9	9.7	29.4	21.6	56.0	46.0	26.6	24.4	
4	1.66179	16.1	7.4	9.7	25.8	17.1	56.0	46.0	30.2	28.9	
5	2.14573	15.8	7.6	9.7	25.5	17.3	56.0	46.0	30.5	28.7	
6	19.92536	16.8	5.7	10.4	27.2	16.1	60.0	50.0	32.8	33.9	

--- L1 Phase ---

No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV	Remark
	[MHz]	[dB(uV)]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB]	[dB]	
1	0.18497	34.3	29.0	9.6	43.9	38.6	64.3	54.3	20.4	15.7	
2	0.37425	26.3	18.1	9.7	36.0	27.8	58.4	48.4	22.4	20.6	
3	0.79013	20.5	10.7	9.7	30.2	20.4	56.0	46.0	25.8	25.6	
4	1.29344	16.3	6.7	9.7	26.0	16.4	56.0	46.0	30.0	29.6	
5	1.86171	15.3	6.7	9.7	25.0	16.4	56.0	46.0	31.0	29.6	
6	16.8957	20.0	10.4	10.2	30.2	20.6	60.0	50.0	29.8	29.4	

Note : • c.f = Cable Loss + LISN Factor • Result = Reading + c.f • Margin = Limit - Result

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Test Result

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Test Date	2024-07-30		
Test Rating	120 V~, 60 Hz	EUT Operation Modes	2

<<Conducted Emission>>

30 July,2024 10:03
FCC2024-00018_CE_2.dat

Model : ZWAH-800WIU
Serial : -
Operator : KIM JIN SUNG
AC Power : 120 V~, 60 Hz
Temp, Humidity : -

Standard : FCC Part.15 B Class B
Remark1 : Wind speed: Turbo
Remark2 : Mood: ON
Remark3 : Air purification mode
Remark4 : Timer: 6 H

Level

100
90
80
70
60
50
40
30
20
10
0

0.1500.5001.0005.00010.00030.000

Frequency [MHz]

<KS C 9832 B>
Limit (QP)
Limit (AV)
<FCC2024-00018_CE_2>
Spectrum (N,AV)
Spectrum (N,PK)
Spectrum (L1,AV)
Spectrum (L1,PK)
Suspected Item(N)
Suspected Item(L1)
Final Item-QP(N)
Final Item-AV(N)
Final Item-QP(L1)
Final Item-AV(L1)

Final Result

--- N Phase ---

No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV	Remark
	[MHz]	[dB(uV)]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB]	[dB]	
1	0.1502	39.4	21.1	9.7	49.1	30.8	66.0	56.0	16.9	25.2	
2	0.48876	27.0	18.8	9.7	36.7	28.5	56.2	46.2	19.5	17.7	
3	1.13218	18.8	10.4	9.7	28.5	20.1	56.0	46.0	27.5	25.9	
4	2.13596	17.0	9.2	9.7	26.7	18.9	56.0	46.0	29.3	27.1	
5	4.30519	14.0	6.1	9.8	23.8	15.9	56.0	46.0	32.2	30.1	
6	19.84305	16.0	5.1	10.4	26.4	15.5	60.0	50.0	33.6	34.5	

--- L1 Phase ---

No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV	Remark
	[MHz]	[dB(uV)]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB]	[dB]	
1	0.15428	33.1	18.5	9.6	42.7	28.1	65.8	55.8	23.1	27.7	
2	0.48891	24.5	16.1	9.7	34.2	25.8	56.2	46.2	22.0	20.4	
3	0.93617	18.2	10.0	9.7	27.9	19.7	56.0	46.0	28.1	26.3	
4	3.48477	14.1	5.1	9.8	23.9	14.9	56.0	46.0	32.1	31.1	
5	16.7891	20.3	10.9	10.2	30.5	21.1	60.0	50.0	29.5	28.9	
6	8.7327	15.7	7.4	9.9	25.6	17.3	60.0	50.0	34.4	32.7	

Note : • c.f = Cable Loss + LISN Factor • Result = Reading + c.f • Margin = Limit - Result

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3. Radiated Emission

The initial preliminary exploratory scans were performed over the measuring frequency range(30 MHz to 6 GHz) using a max hold mode incorporating a Peak detector and using the software of Radiated Emission Measurement Software EP5/RE(Version 6.0.10 from TOYO). The final test data was measured using a Quasi-Peak detector below 1 GHz and a Peak and Average detector above 1 GHz. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency.

3.1 Limits of radiated emission measurement

- Below 1 GHz

Frequency of emission (MHz)	Limits ($\mu\text{V}/\text{m}$)	Measuring Distance (m)	Class
	Quasi-peak		
30 - 88	100	3	B
88 - 216	150		
216 - 960	200		
960 - 1 000	500		

- Above 1 GHz

Frequency of emission (GHz)	Detector type	Limits (dB($\mu\text{V}/\text{m}$))	Measuring Distance (m)	Class
1 ~ 6	Average	54	3	B
1 ~ 6	Peak	74		

3.2 Environment Conditions

- Below 1 GHz

Temperature	(22 $\pm$ 2) °C
Humidity	(43 $\pm$ 5) % R.H.
Atmospheric Pressure	(101.5 $\pm$ 0.5) kPa

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- Above 1 GHz

Temperature	(22 ± 2) °C
Humidity	(43 ± 5) % R.H.
Atmospheric Pressure	(101.5 ± 0.5) kPa

3.3 Test Site

10 m Semi-Anechoic Chamber in KTC Laboratory

3.4 Test Equipment List

- Below 1GHz

Equipment	Model	Manufacturer	Series No.	Cal. Date	Cal. Due
EMI Test Receiver	ESR 7	Rohde & Schwarz	101368	2024-07-08	2025-07-08
EMI Test Receiver	ESR 7	Rohde & Schwarz	102656	2024-07-08	2025-07-08
Bilog Antenna	VULB9168	Schwarzbeck	1043	2023-08-21	2025-08-21
Bilog Antenna	VULB9168	Schwarzbeck	1044	2023-09-05	2025-09-05
Pre Amplifier	310N	SONOMA	340214	2023-12-26	2024-12-26
Pre Amplifier	310N	SONOMA	340215	2023-12-26	2024-12-26
Antenna Master	innco systems	MA 4640-XP-ET-0800	7150519	-	-
Antenna Master	innco systems	MA 4640-XP-ET-0800	7160519	-	-
Turn Table	innco systems	DT3000-3t	-	-	-

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- Above 1 GHz

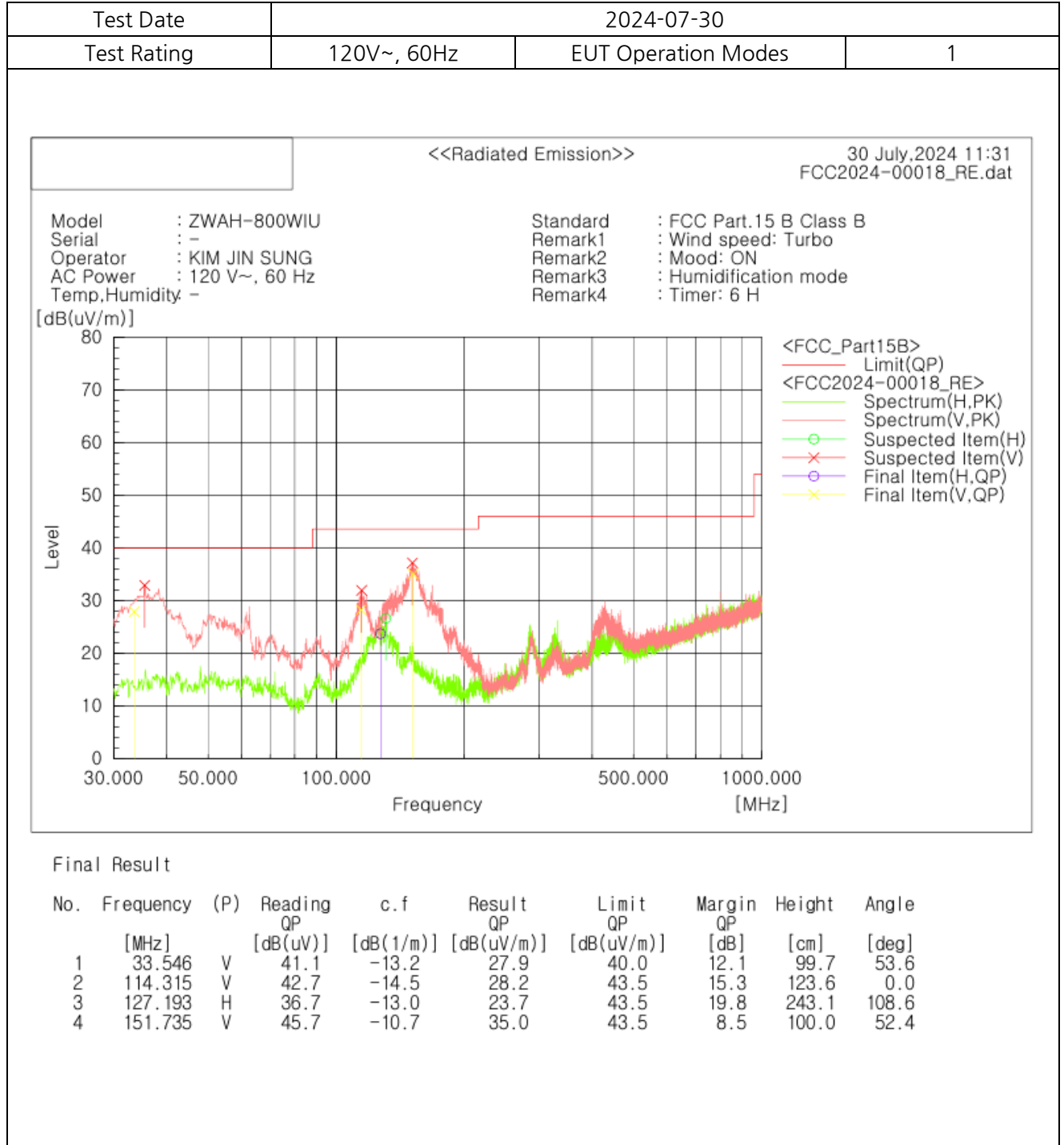
Equipment	Model	Manufacturer	Series No.	Cal. Date	Cal. Due
EMI Test Receiver	ESR 7	Rohde & Schwarz	101368	2024-07-08	2025-07-08
RF Amplifier	SCU-18	Rohde & Schwarz	10142	2024-07-08	2025-07-08
Horn Antenna	BBHA9120D	Schwarzbeck	918	2023-12-28	2024-12-28
Antenna Master	AM2.0	Maturo GmbH	-	-	-
Turn Table	DT3000-3t	innco systems	-	-	-

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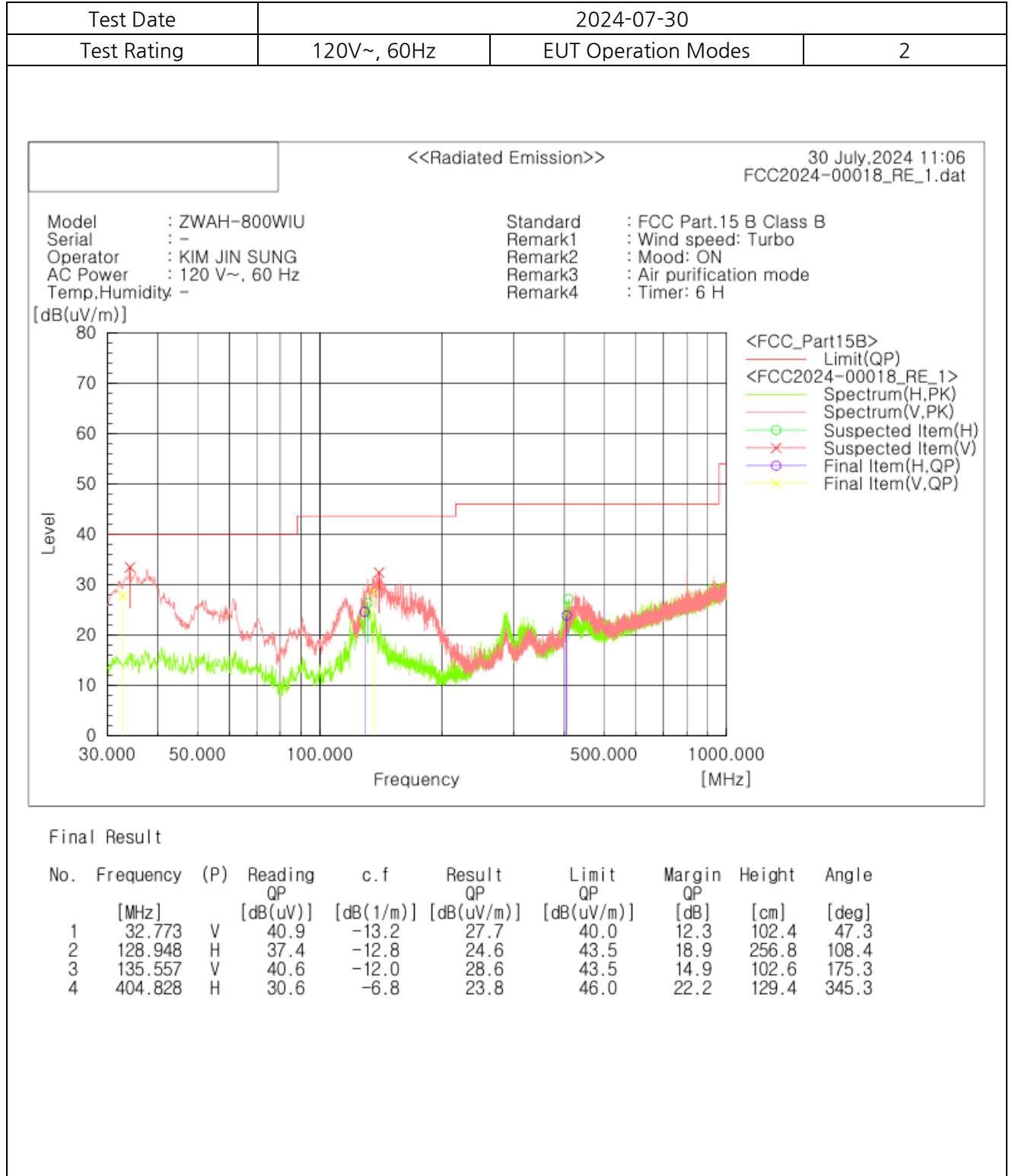
3.5 Test Results

- Below 1GHz



Test Result

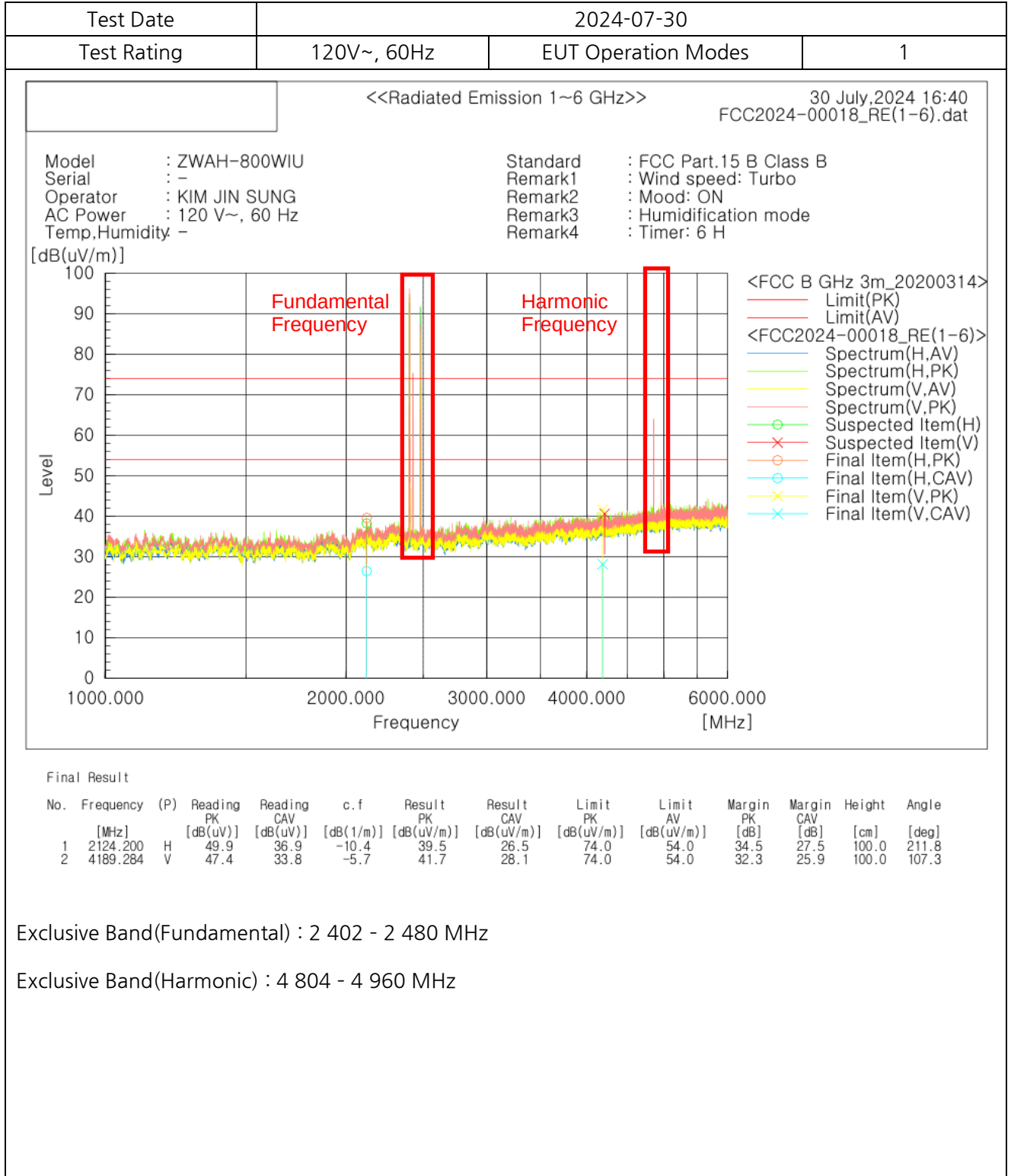
Report No. : FCC2024-00018



Test Result

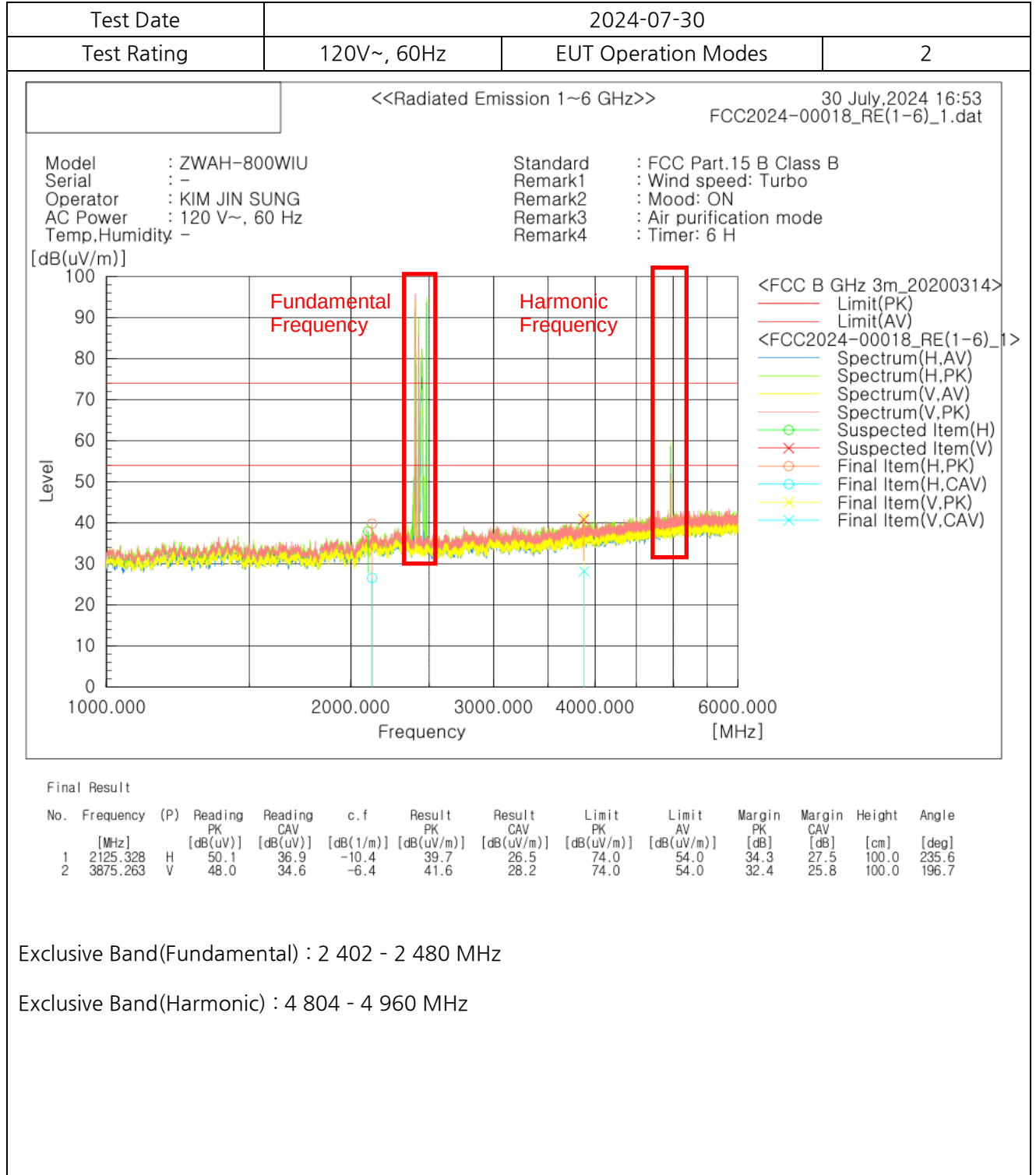
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- Above 1GHz



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- End of the Test Report -