

# FCC Test Report

Report No.: AGC15705240565FR01

**FCC ID** : 2BCZRWEFONE1T

**APPLICATION PURPOSE** : Original Equipment

**PRODUCT DESIGNATION** : Quadcopter

**BRAND NAME** : WEFONE

**MODEL NAME** : WF31, WF10, WF11, WF12, WF13, WF14, WF15, WF16, WF17, WF18, WF19, WF20, WF21, WF22, WF23, WF24, WF25, WF26, WF27, WF28, WF29, WF30, WF32, WF33, WF34, WF35, WF36, WF37, WF38, WF39, WF40, WF41, WF42, WF43, WF44, WF45, WF46, WF47, WF48, WF49, WF50, WF51, WF52, WF53, WF54, WF55, WF56, WF57, WF58, WF59, WF60, WF61, WF62, WF63, WF64, WF65, WF66, WF67, WF68, WF69, WF70, WF71, WF72, WF73, WF74, WF75, WF76, WF77, WF78, WF79

**APPLICANT** : Xiamen HolyOcean Trading Co., Ltd

**DATE OF ISSUE** : Jun. 19, 2024

**STANDARD(S)** : FCC Part 15 Subpart C §15.249

**REPORT VERSION** : V1.0



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**Report Revise Record**

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jun. 19, 2024	Valid	Initial Release

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## 1. General Information

Applicant	Xiamen HolyOcean Trading Co., Ltd
Address	Unit 431-H, BLDG C, Xiamen Intl Shipping CTR, No.93 Xiangyu Rd, Xiamen, China
Manufacturer	Xiamen HolyOcean Trading Co., Ltd
Address	Unit 431-H, BLDG C, Xiamen Intl Shipping CTR, No.93 Xiangyu Rd, Xiamen, China
Factory	Xiamen HolyOcean Trading Co., Ltd
Address	Unit 431-H, BLDG C, Xiamen Intl Shipping CTR, No.93 Xiangyu Rd, Xiamen, China
Product Designation	Quadcopter
Brand Name	WEFONE
Test Model	WF31
Series Model(s)	WF10, WF11, WF12, WF13, WF14, WF15, WF16, WF17, WF18, WF19, WF20, WF21, WF22, WF23, WF24, WF25, WF26, WF27, WF28, WF29, WF30, WF32, WF33, WF34, WF35, WF36, WF37, WF38, WF39, WF40, WF41, WF42, WF43, WF44, WF45, WF46, WF47, WF48, WF49, WF50, WF51, WF52, WF53, WF54, WF55, WF56, WF57, WF58, WF59, WF60, WF61, WF62, WF63, WF64, WF65, WF66, WF67, WF68, WF69, WF70, WF71, WF72, WF73, WF74, WF75, WF76, WF77, WF78, WF79
Difference Description	All the series models are the same as the test model except for the model names.
Date of receipt of test item	May 30, 2024
Date of Test	May 30, 2024 –Jun. 19, 2024
Deviation from Standard	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Test Report Form No	AGCER-FCC-NTX-V1

Note: The test results of this report relate only to the tested sample identified in this report.

Prepared By



Cici Li

(Project Engineer)

Jun. 19, 2024

Reviewed By



Calvin Liu

(Reviewer)

Jun. 19, 2024

Approved By



Max Zhang

Authorized Officer

Jun. 19, 2024

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## 2. Product Information

### 2.1 Product Technical Description

Equipment Specification	Low Power Short Range Equipment
Frequency Band	2400MHz-2483.5MHz
Operation Frequency Range	2408MHz-2472MHz
Modulation Type	GFSK
Number of channels	65
Channel Separation	1MHz
Field Strength of Fundamental	93.56dB $\mu$ V/m (Peak)
Hardware Version	SM-227-BKT -V1
Software Version	V1.0
Antenna Designation	Monopole Antenna
Antenna Gain	-0.1823dBi
Power Supply	DC 3.7V by battery or DC 5V by adapter
Adapter Information	N/A

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## 2.2 Test Frequency List

Channel No.	Frequency (GHz)	Channel No.	Frequency (GHz)	Channel No.	Frequency (GHz)
01	2.408	23	2.430	45	2.452
02	2.409	24	2.431	46	2.453
03	2.410	25	2.432	47	2.454
04	2.411	26	2.433	48	2.455
05	2.412	27	2.434	49	2.456
06	2.413	28	2.435	50	2.457
07	2.414	29	2.436	51	2.458
08	2.415	30	2.437	52	2.459
09	2.416	31	2.438	53	2.460
10	2.417	32	2.439	54	2.461
11	2.418	33	2.440	55	2.462
12	2.419	34	2.441	56	2.463
13	2.420	35	2.442	57	2.464
14	2.421	36	2.443	58	2.465
15	2.422	37	2.444	59	2.466
16	2.423	38	2.445	60	2.467
17	2.424	39	2.446	61	2.468
18	2.425	40	2.447	62	2.469
19	2.426	41	2.448	63	2.470
20	2.427	42	2.449	64	2.471
21	2.428	43	2.450	65	2.472
22	2.429	44	2.451		

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## 2.3 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: 2BCZRWEFONE1T, filing to comply with Part 2, Part 15 of the Federal Communication Commission rules.

## 2.4 Test Methodology

The tests were performed according to following standards:

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

## 2.5 Antenna Requirement

Standard Requirement
<b>15.203 requirement:</b> 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, 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.
<b>EUT Antenna:</b> The non-detachable antenna inside the device cannot be replaced by the user at will. The gain of the antenna is -0.1823dBi.

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### 3. Test Environment

#### 3.1 Address of the Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

#### 3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

##### **CNAS-Lab Code: L5488**

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories).

##### **A2LA-Lab Cert. No.: 5054.02**

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

##### **FCC-Registration No.: 975832**

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

##### **IC-Registration No.: 24842 (CAB identifier: CN0063)**

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.



### 3.3 Environmental Conditions

	Normal Conditions
Temperature range (°C)	15 - 35
Relative humidity range	20 % - 75 %
Pressure range (kPa)	86 - 106
Power supply	DC 3.7V by battery or DC 5V by adapter

### 3.4 Measurement Uncertainty

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%.

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	$U_c = \pm 2.9 \text{ dB}$
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 3.9 \text{ dB}$
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.9 \text{ dB}$
Uncertainty of total RF power, conducted	$U_c = \pm 0.8 \text{ dB}$
Uncertainty of RF power density, conducted	$U_c = \pm 2.6 \text{ dB}$
Uncertainty of spurious emissions, conducted	$U_c = \pm 2 \%$
Uncertainty of Occupied Channel Bandwidth	$U_c = \pm 2 \%$

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### 3.5 List of Equipment Use

● RF Conducted Test System							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
<input checked="" type="checkbox"/>	AGC-ER-E036	Spectrum Analyzer	Agilent	N9020A	MY49100060	2024-05-24	2025-05-23
<input checked="" type="checkbox"/>	AGC-ER-E062	Power Sensor	Agilent	U2021XA	MY54110007	2024-02-01	2025-01-31
<input checked="" type="checkbox"/>	AGC-ER-E063	Power Sensor	Agilent	U2021XA	MY54110009	2024-02-01	2025-01-31
<input checked="" type="checkbox"/>	AGC-ER-A001	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-09-21	2025-09-20
<input checked="" type="checkbox"/>	AGC-ER-E083	Signal Generator	Agilent	E4421B	US39340815	2024-05-23	2025-05-22
<input checked="" type="checkbox"/>	N/A	RF Connection Cable	N/A	1#	N/A	Each time	N/A
<input checked="" type="checkbox"/>	N/A	RF Connection Cable	N/A	2#	N/A	Each time	N/A

● Radiated Spurious Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
<input type="checkbox"/>	AGC-EM-E046	EMI Test Receiver	R&S	ESCI	10096	2024-02-01	2025-01-31
<input checked="" type="checkbox"/>	AGC-EM-E116	EMI Test Receiver	R&S	ESCI	100034	2024-05-24	2025-05-23
<input checked="" type="checkbox"/>	AGC-EM-E061	Spectrum Analyzer	Agilent	N9010A	MY53470504	2024-05-28	2025-05-27
<input checked="" type="checkbox"/>	AGC-EM-E086	Loop Antenna	ZHINAN	ZN30900C	18051	2024-03-05	2026-03-04
<input checked="" type="checkbox"/>	AGC-EM-E001	Wideband Antenna	SCHWARZBECK	VULB9168	D69250	2023-05-11	2025-05-10
<input checked="" type="checkbox"/>	AGC-EM-E029	Broadband Ridged Horn Antenna	ETS	3117	00034609	2024-03-31	2025-03-30
<input checked="" type="checkbox"/>	AGC-EM-E082	Horn Antenna	SCHWARZBECK	BBHA 9170	#768	2023-09-24	2025-09-23
<input checked="" type="checkbox"/>	AGC-EM-E146	Pre-amplifier	ETS	3117-PA	00246148	2022-08-04	2024-08-03
<input checked="" type="checkbox"/>	AGC-EM-A119	2.4G Filter	SongYi	N/A	N/A	2024-05-23	2025-05-22
<input checked="" type="checkbox"/>	AGC-EM-A138	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2025-06-08
<input type="checkbox"/>	AGC-EM-A139	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2025-06-08

● AC Power Line Conducted Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
<input checked="" type="checkbox"/>	AGC-EM-E045	EMI Test Receiver	R&S	ESPI	101206	2024-05-28	2025-05-27
<input checked="" type="checkbox"/>	AGC-EM-A130	6dB Attenuator	Eeatsheep	LM-XX-6-5W	DC-6GZ	2023-06-09	2025-06-08
<input checked="" type="checkbox"/>	AGC-EM-E023	AMN	R&S	100086	ESH2-Z5	2024-05-28	2025-05-27

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● Test Software					
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Version Information
<input checked="" type="checkbox"/>	AGC-EM-S001	CE Test System	R&S	ES-K1	V1.71
<input checked="" type="checkbox"/>	AGC-EM-S003	RE Test System	FARA	EZ-EMC	VRA-03A
<input checked="" type="checkbox"/>	AGC-ER-S012	BT/WIFI Test System	Tonscend	JS1120-2	2.6
<input checked="" type="checkbox"/>	AGC-EM-S011	RSE Test System	Tonscend	TS+-Ver2.1(JS36-RSE)	4.0.0.0

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## 4. System Test Configuration

### 4.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 4.2 EUT Exercise

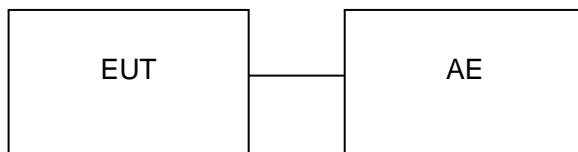
The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

### 4.3 Configuration of Tested System

Radiated Emission Configure:



Conducted Emission Configure:



### 4.4 Equipment Used In Tested System

The following peripheral devices and interface cables were connected during the measurement:

☒ Test Accessories Come From The Laboratory

No.	Equipment	Manufacturer	Model No.	Specification Information	Cable
1	Control Box	--	USB-TTL	--	--
2	Adapter	Huawei	HW-200440C00	--	--

☐ Test Accessories Come From The Manufacturer

No.	Equipment	Manufacturer	Model No.	Specification Information	Cable
1	--	--	--	--	--

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#### 4.5 Summary of Test Results

Item	FCC Rules	Description of Test	Result
1	§15.203	Antenna Equipment	Pass
2	§15.249(a)	Field Strength of Fundamental	Pass
3	§15.209&§15.249(d)	Radiated Emission& Band Edge	Pass
4	§15.205	Restricted Bands of Operation	Pass
5	§15.215	20dB Bandwidth	Pass
6	§15.207	AC Power Line Conducted Emission	Pass

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## 5. Description of Test Modes

Summary Table of Test Cases	
Test Item	Equipment type / Modulation
	Short Distance and Low Power Consumption/ GFSK
Radiated & Conducted Test Cases	Mode 1: Normal Transmission on channel 01 (Battery powered or AC/DC adapter)
	Mode 2: Normal Transmission on channel 35 (Battery powered or AC/DC adapter)
	Mode 2: Normal Transmission on channel 65 (Battery powered or AC/DC adapter)
AC Conducted Emission	N/A

**Note:**

1. Only the result of the worst case was recorded in the report, if no other cases.
2. The battery is full-charged during the test.
3. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
4. For Conducted Test method, a temporary antenna connector is provided by the manufacture.
5. The fixed-frequency transmission of the prototype is debugged through the buttons or software declared by the manufacturer.

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## 6. Duty Cycle Measurement

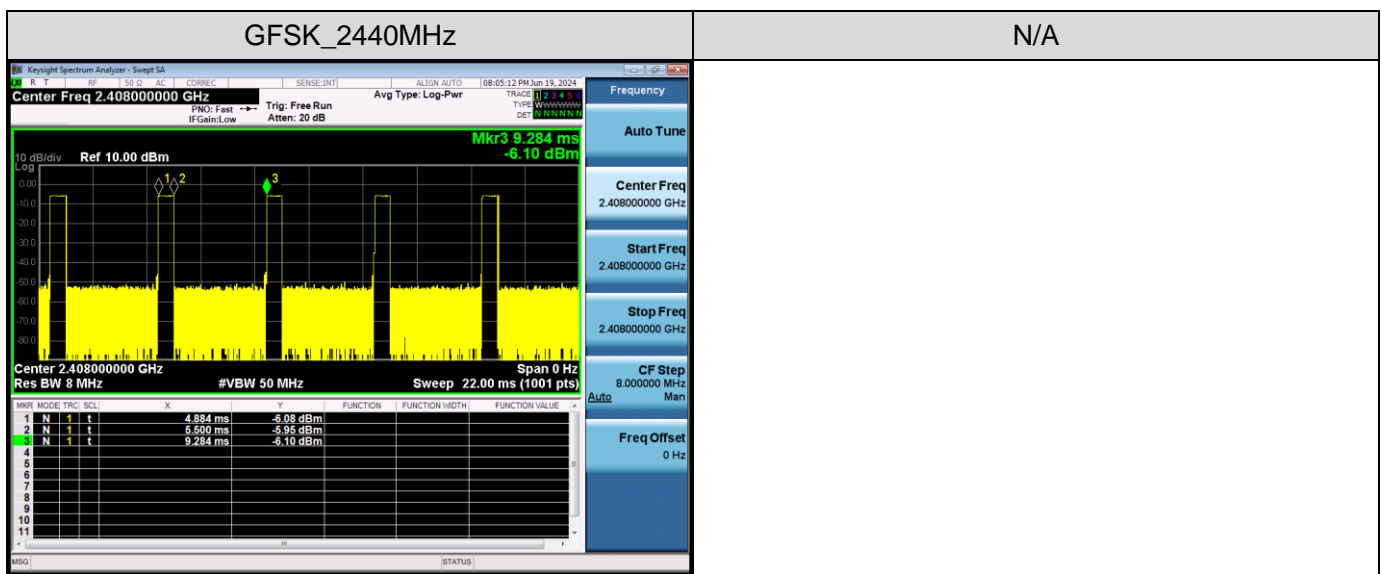
The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = Peak. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Operating mode	T(μs)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)
GFSK_2408MHz	616	14.00	8.54	1.62

Remark:

1. Duty Cycle factor =  $10 * \log (1/ \text{Duty cycle})$

The test plots as follows:



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## 7. 20dB Bandwidth Measurement

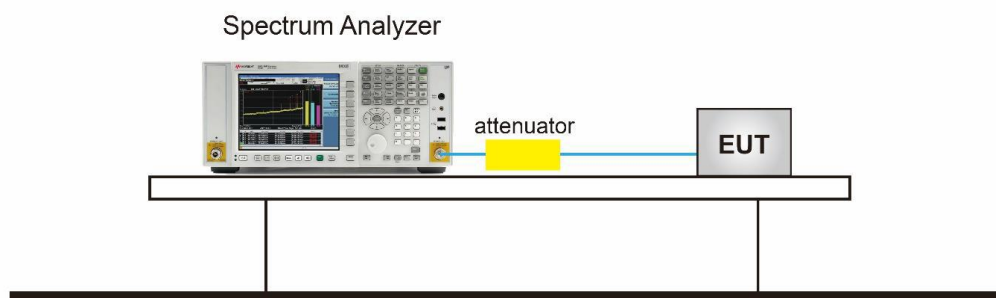
### 7.1 Provisions Applicable

N/A

### 7.2 Measurement Procedure

1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 30 kHz. Set the Video bandwidth (VBW) = 100 kHz. In order to make an accurate measurement.
4. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the emission bandwidth and set the Video bandwidth (VBW)  $\geq 3 * \text{RBW}$ .
5. Measure and record the results in the test report.

### 7.3 Measurement Setup (Block Diagram of Configuration)



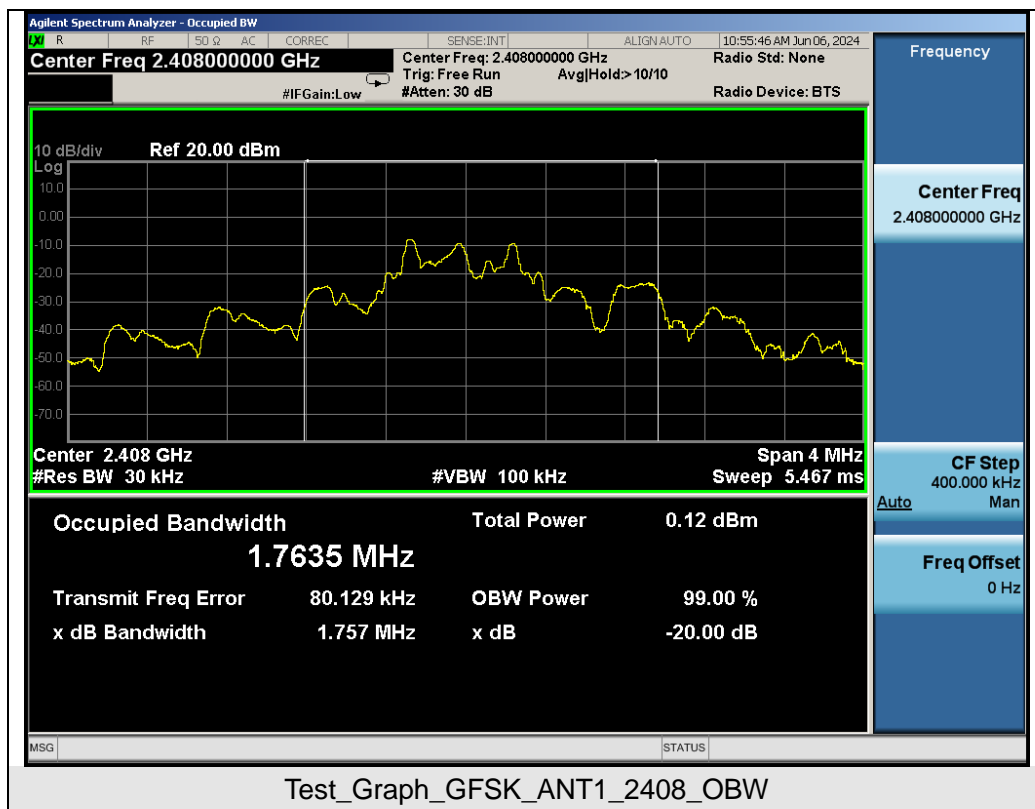
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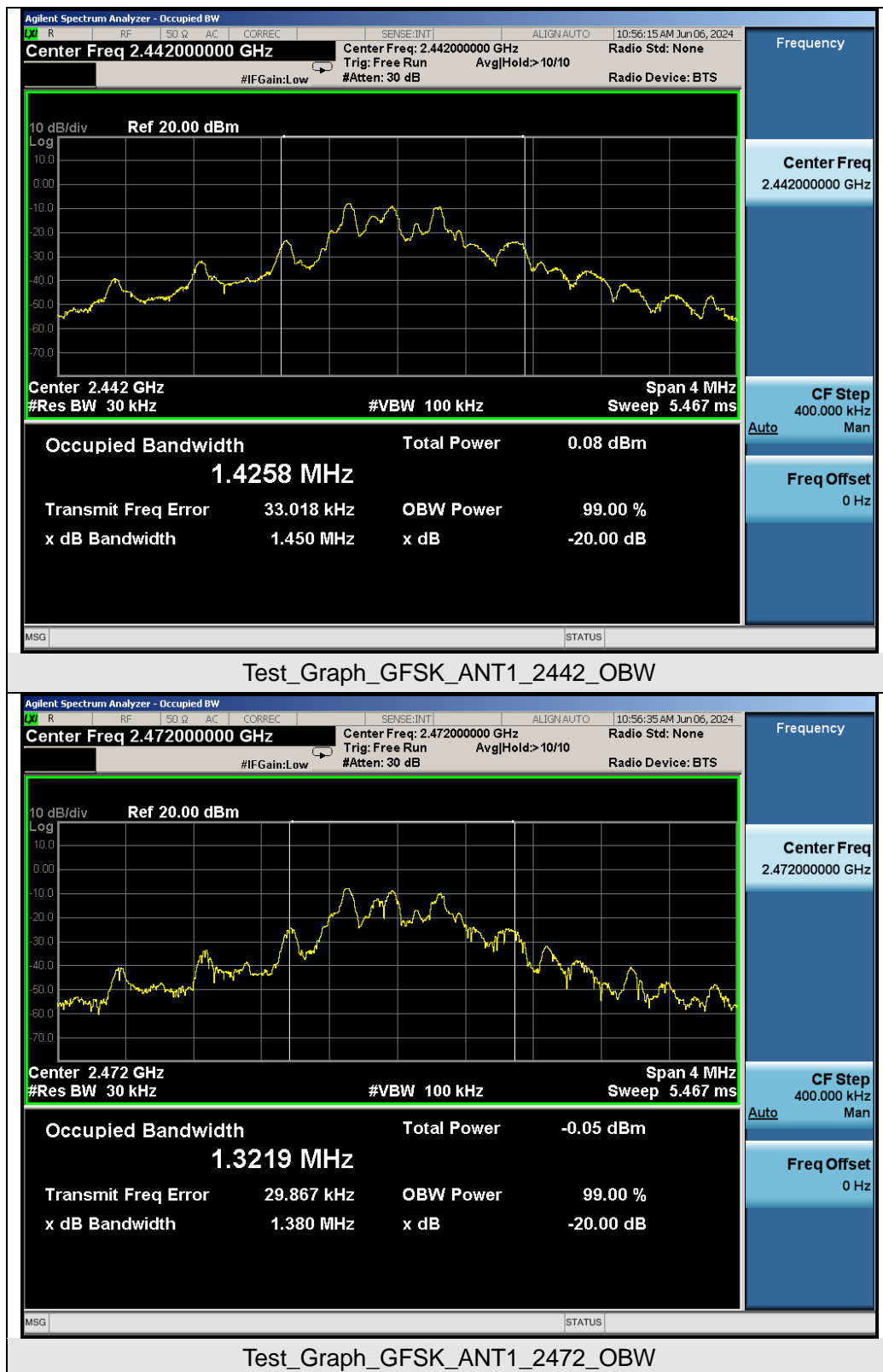
## 7.4 Measurement Results

Test Data of Occupied Bandwidth and -20dB Bandwidth					
Test Mode	Test Frequency (MHz)	Occupied Bandwidth (MHz)	-20dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
GFSK	2408	1.7635	1.757	N/A	Pass
	2442	1.4258	1.450	N/A	Pass
	2472	1.3219	1.380	N/A	Pass

## Test Graphs of Occupied Bandwidth and -20 Bandwidth



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## 8. Field Strength of Fundamental and Radiated Spurious Emission

### 8.1 Measurement Limit

15.249 Limit in the below table has to be followed:

Frequency Range	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
900-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

15.209 Limit in the below table has to be followed:

Frequency Range (MHz)	Distance Meters	Field Strengths Limit	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB( $\mu\text{V}$ )/m (Peak) 54.0 dB( $\mu\text{V}$ )/m (Average)	

Remark:

- 1) Emission level  $\text{dB}\mu\text{V} = 20 \log$  Emission level  $\mu\text{V}/\text{m}$ .
- 2) The smaller limit shall apply at the cross point between two frequency bands.
- 3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

## 8.2 Measurement Procedure

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

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- The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9kHz~150kHz/RB 200Hz for QP
Start ~Stop Frequency	150kHz~30MHz/RB 9kHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120kHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average

Receiver Parameter	Setting
Start ~Stop Frequency	9kHz~150kHz/RB 200Hz for QP
Start ~Stop Frequency	150kHz~30MHz/RB 9kHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120kHz for QP

- The following is the test setup of Field Strength of Fundamental:
- Peak detection: RBW is greater than the main frequency OBW, VBW=50MHz / Sweep=AUTO
  - Average detection: RBW is greater than the main frequency OBW, VBW=50MHz / Sweep=AUTO

- The following is the test setup of Band Edge:

The EUT operates at transmitting mode. The operate channel is tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.

- Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - Peak detection: RBW=1MHz, VBW=3MHz / Sweep=AUTO
  - Average detection: RBW=1MHz; VBW=1/T / Sweep=AUTO (Duty cycle is less than 98%)
  - Average detection: RBW=1MHz; VBW=3M / Sweep=AUTO
  - Other procedures refer to clause 7.2.

● **Quasi-Peak Measurements below 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as shown in the table above
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

● **Peak Measurements above 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

● **Average Measurements above 1GHz (Method VB)**

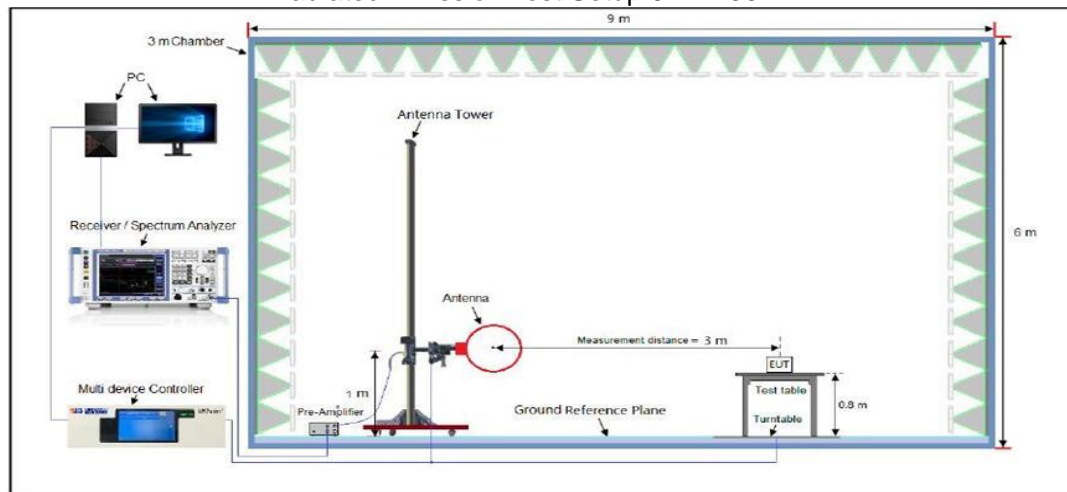
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW setting requirements are as follows:
4. If the EUT is configured to transmit with duty cycle  $\geq 98\%$ , set VBW = 10 Hz.
5. If the EUT duty cycle is  $< 98\%$ , set VBW  $\geq 1/T$ . T is the minimum transmission duration.
6. Detector = Peak
7. Sweep time = auto
8. Trace mode = max hold
8. Trace was allowed to stabilize

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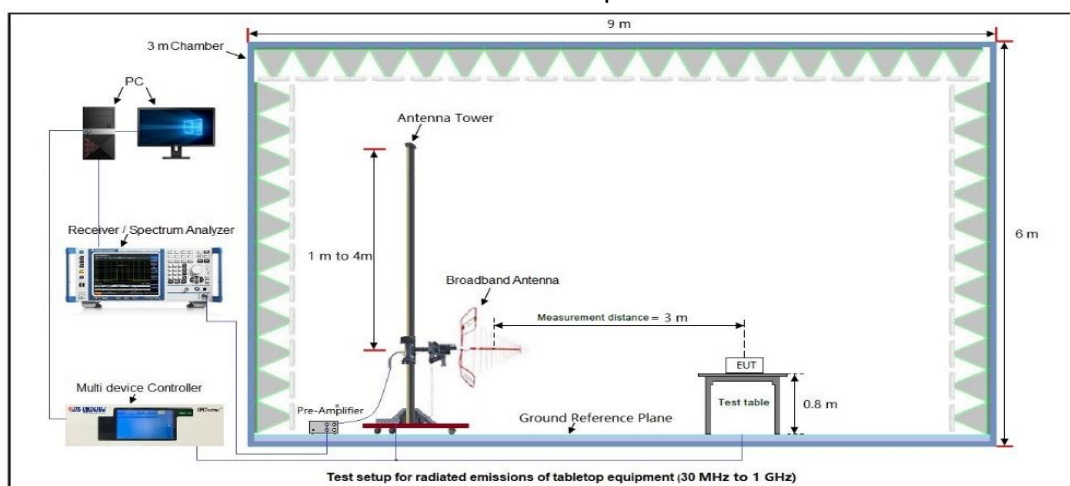


### 8.3 Measurement Setup (Block Diagram of Configuration)

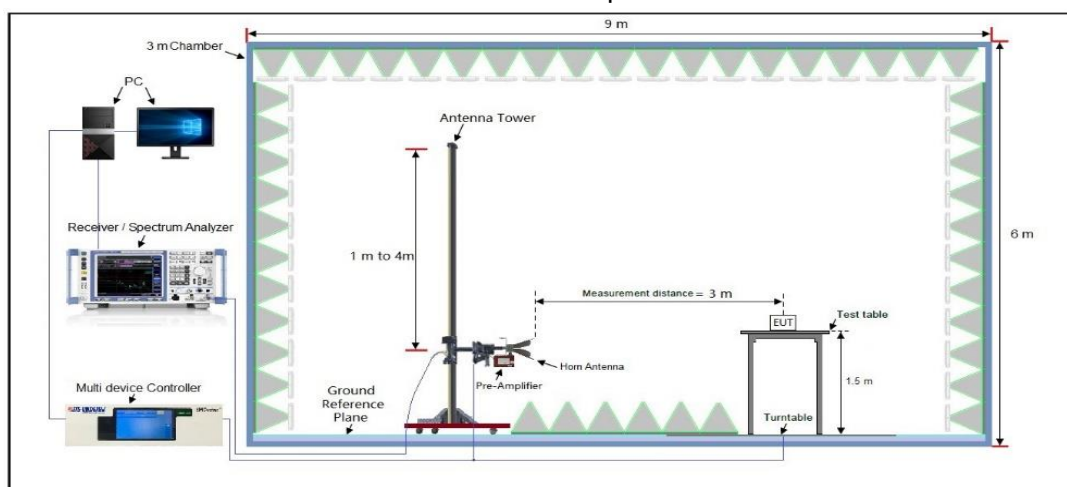
Radiated Emission Test Setup 9KHz-30MHz



Radiated Emission Test Setup 30MHz-1000MHz



Radiated Emission Test Setup Above 1000MHz



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## 8.4 Measurement Result

### Field Strength of Fundamental

EUT Name		Quadcopter		Model Name		DR- STE51B	
Temperature		24.7℃		Relative Humidity		64.1 %	
Pressure		960hPa		Test Voltage		DC 3.7V by battery	
Test Mode		Mode 1		Antenna			
Peak Value							
Frequency (MHz)	Measured Level@3m (dBμV/m)		Correction Factor dB/m	Field Strength (dBμV/m)	Limit @3m (dBμV/m)		Polarity
2408	59.08		34.48	93.56	114.00		Horizontal
2408	54.39		34.48	88.87	114.00		Vertical
2442	56.10		34.54	90.64	114.00		Horizontal
2442	47.43		34.54	81.97	114.00		Vertical
2472	54.50		34.64	89.14	114.00		Horizontal
2472	46.05		34.64	80.69	114.00		Vertical
Average Value							
Frequency (MHz)	Measured Level@3m (dBμV/m)		Correction Factor dB/m	Field Strength (dBμV/m)	Limit @3m (dBμV/m)		Polarity
2408	52.81		34.48	87.29	94.00		Horizontal
2408	44.76		34.48	79.24	94.00		Vertical
2442	52.17		34.54	86.71	94.00		Horizontal
2442	42.38		34.54	76.82	94.00		Vertical
2472	51.04		34.64	85.68	94.00		Horizontal
2472	40.24		34.64	74.88	94.00		Vertical

### **RESULT: Pass**

**Note:** Corr. Factor= Antenna Factor (dB/m) + Cable Loss (dB)

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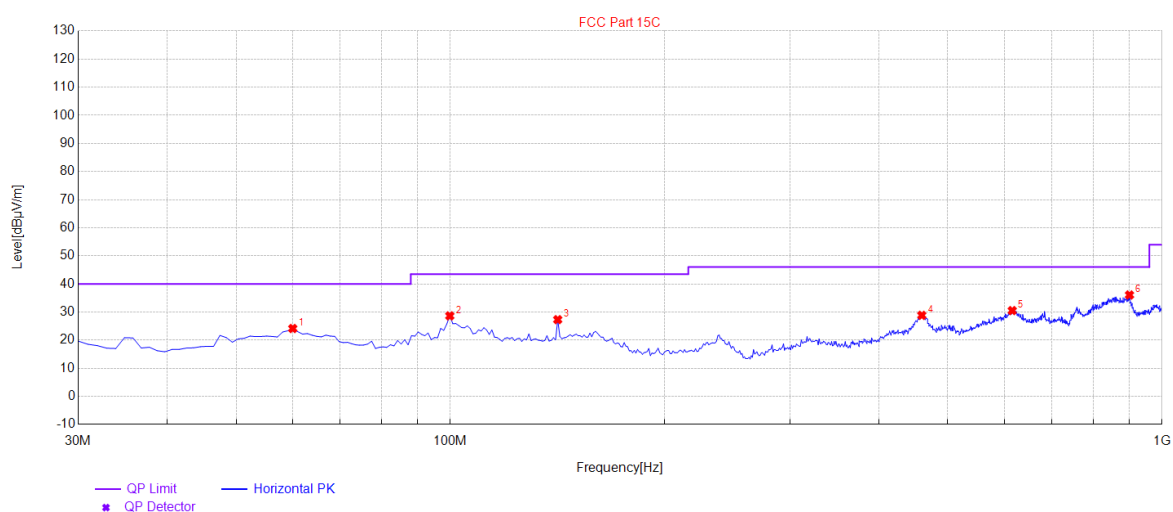


### Radiated Emission Below 30MHz

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20dB below the permissible value need not be reported.

#### Radiated Emission Test Results at 30MHz-1GHz

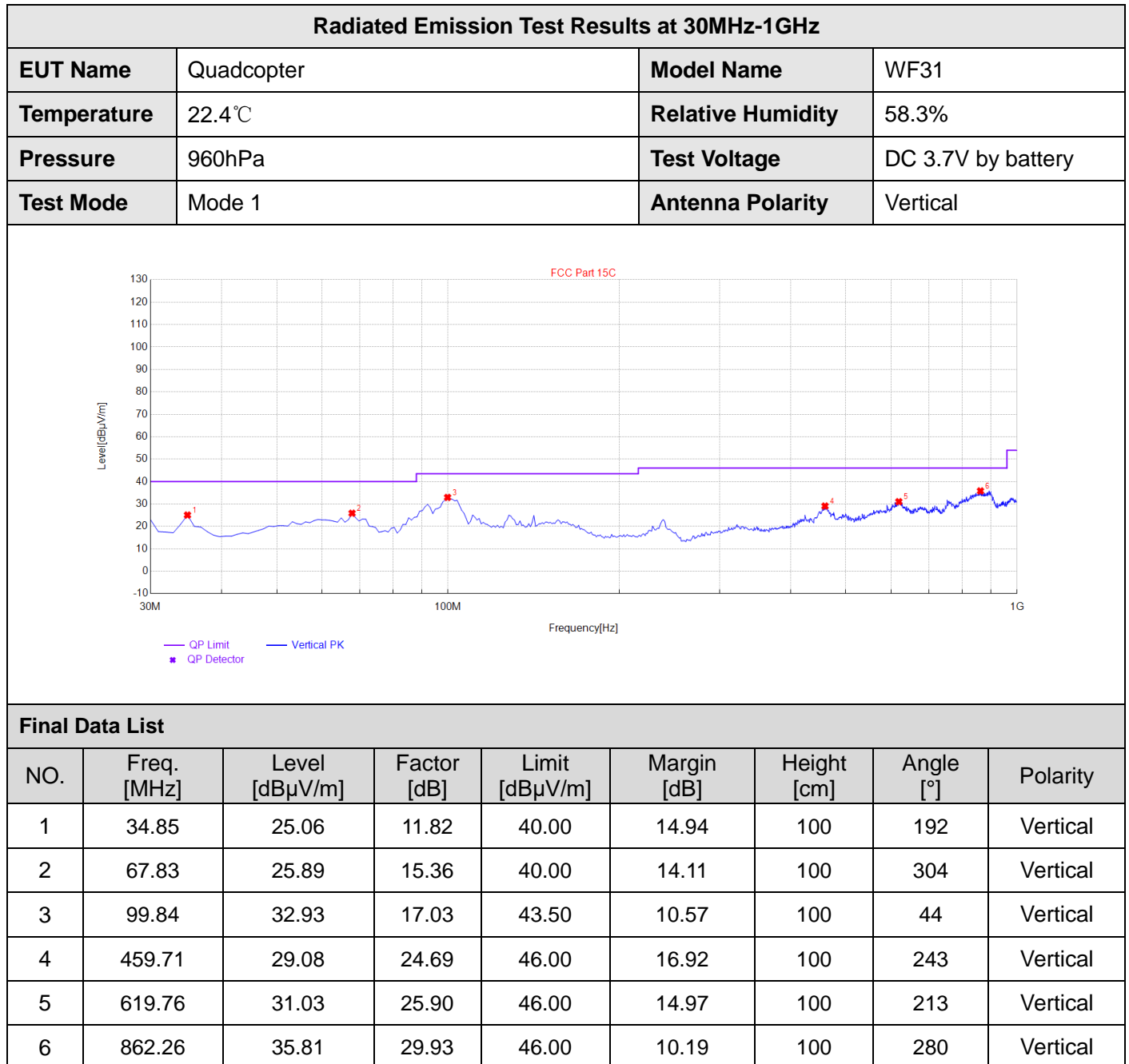
EUT Name	Quadcopter	Model Name	WF31
Temperature	22.4℃	Relative Humidity	58.3%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 1	Antenna Polarity	Horizontal



#### Final Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	60.07	24.15	17.86	40.00	15.85	100	316	Horizontal
2	99.84	28.65	17.03	43.50	14.85	100	75	Horizontal
3	141.55	27.31	16.13	43.50	16.19	100	34	Horizontal
4	459.71	28.84	24.69	46.00	17.16	100	25	Horizontal
5	615.88	30.53	25.47	46.00	15.47	100	46	Horizontal
6	900.09	36.08	30.27	46.00	9.92	100	212	Horizontal

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### RESULT: Pass

**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

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### Radiated Emissions Test Results for Above 1GHz

<b>EUT Name</b>	Quadcopter	<b>Model Name</b>	WF31
<b>Temperature</b>	22.4℃	<b>Relative Humidity</b>	58.3%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.7V by battery
<b>Test Mode</b>	Mode 1	<b>Antenna Polarity</b>	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4816.000	48.61	0.08	48.69	74	-25.31	peak
4816.000	37.52	0.08	37.6	54	-16.4	AVG
7224.000	42.34	2.21	44.55	74	-29.45	peak
7224.000	31.89	2.21	34.1	54	-19.9	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT Name</b>	Quadcopter	<b>Model Name</b>	WF31
<b>Temperature</b>	22.4℃	<b>Relative Humidity</b>	58.3%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.7V by battery
<b>Test Mode</b>	Mode 1	<b>Antenna Polarity</b>	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4816.000	47.94	0.08	48.02	74	-25.98	peak
4816.000	38.54	0.08	38.62	54	-15.38	AVG
7224.000	41.67	2.21	43.88	74	-30.12	peak
7224.000	32.25	2.21	34.46	54	-19.54	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

### RESULT: Pass

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### Radiated Emissions Test Results for Above 1GHz

<b>EUT Name</b>	Quadcopter	<b>Model Name</b>	WF31
<b>Temperature</b>	22.4℃	<b>Relative Humidity</b>	58.3%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.7V by battery
<b>Test Mode</b>	Mode 2	<b>Antenna Polarity</b>	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4884.000	48.61	0.14	48.75	74	-25.25	peak
4884.000	37.91	0.14	38.05	54	-15.95	AVG
7326.000	42.55	2.36	44.91	74	-29.09	peak
7326.000	31.37	2.36	33.73	54	-20.27	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT Name</b>	Quadcopter	<b>Model Name</b>	WF31
<b>Temperature</b>	22.4℃	<b>Relative Humidity</b>	58.3%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.7V by battery
<b>Test Mode</b>	Mode 2	<b>Antenna Polarity</b>	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4884.000	47.96	0.14	48.1	74	-25.9	peak
4884.000	38.54	0.14	38.68	54	-15.32	AVG
7326.000	41.26	2.36	43.62	74	-30.38	peak
7326.000	32.54	2.36	34.9	54	-19.1	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

### RESULT: Pass

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### Radiated Emissions Test Results for Above 1GHz

<b>EUT Name</b>	Quadcopter	<b>Model Name</b>	WF31
<b>Temperature</b>	22.4℃	<b>Relative Humidity</b>	58.3%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.7V by battery
<b>Test Mode</b>	Mode 3	<b>Antenna Polarity</b>	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4944.000	48.22	0.22	48.44	74	-25.56	peak
4944.000	38.14	0.22	38.36	54	-15.64	AVG
7416.000	42.26	2.64	44.9	74	-29.1	peak
7416.000	32.64	2.64	35.28	54	-18.72	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT Name</b>	Quadcopter	<b>Model Name</b>	WF31
<b>Temperature</b>	22.4℃	<b>Relative Humidity</b>	58.3%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.7V by battery
<b>Test Mode</b>	Mode 3	<b>Antenna Polarity</b>	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4944.000	47.63	0.22	47.85	74	-26.15	peak
4944.000	37.52	0.22	37.74	54	-16.26	AVG
7416.000	42.19	2.64	44.83	74	-29.17	peak
7416.000	31.24	2.64	33.88	54	-20.12	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

### RESULT: Pass

#### Note:

- The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.
- Factor = Antenna Factor + Cable loss – Pre-amplifier gain, Margin = Emission Level - Limit.
- The "Factor" value can be calculated automatically by software of measurement system.

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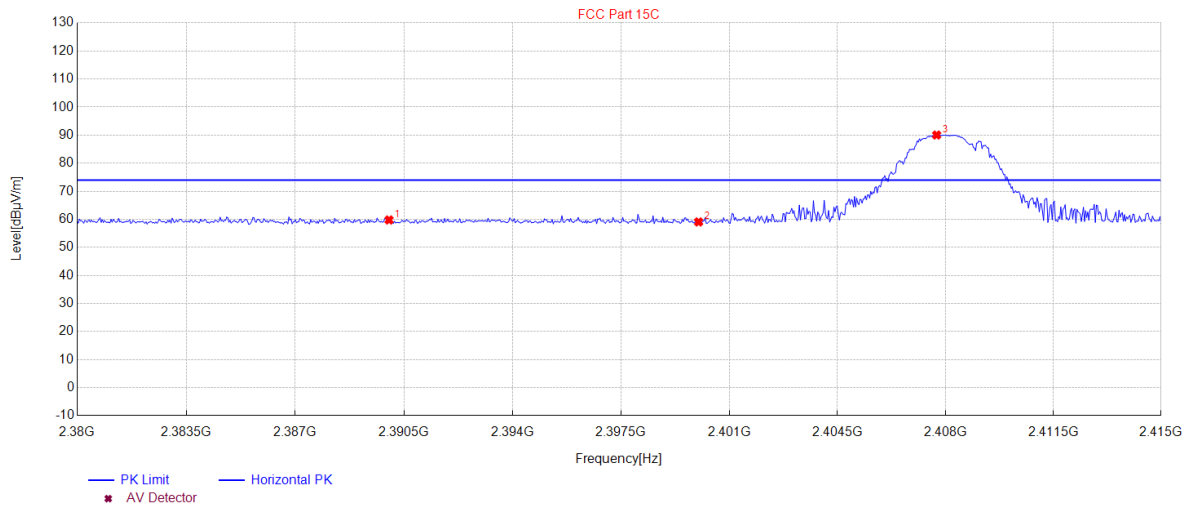
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### Band Edge Emission Test Results for Restricted Bands

<b>EUT Name</b>	Quadcopter	<b>Model Name</b>	WF31
<b>Temperature</b>	24.7°C	<b>Relative Humidity</b>	64.1 %
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.7V by battery
<b>Test Mode</b>	Mode 1	<b>Antenna Polarity</b>	Horizontal

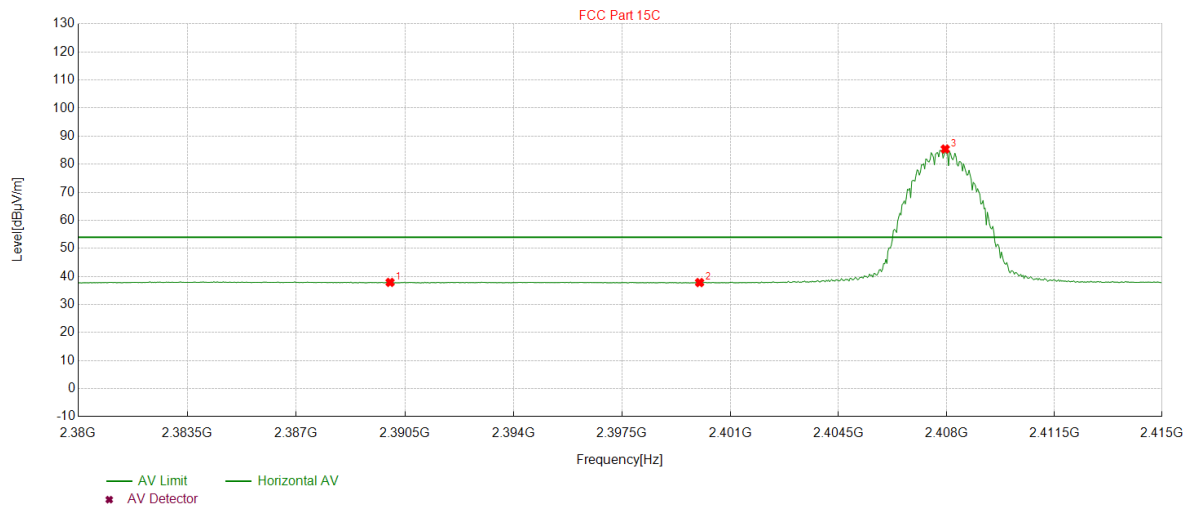
Test Graph for Peak Measurement



NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2390.02	59.77	34.40	74.00	14.23	150	1	Horizontal
2	2400.005	59.06	34.43	74.00	14.94	150	1	Horizontal
3	2407.7127	90.05	34.45	74.00	-16.05	150	250	Horizontal

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### Test Graph for Average Measurement



NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2390.02	37.88	34.40	54.00	16.12	150	140	Horizontal
2	2400.005	37.81	34.43	54.00	16.19	150	258	Horizontal
3	2407.958	85.41	34.45	54.00	-31.41	150	254	Horizontal

**RESULT: Pass**

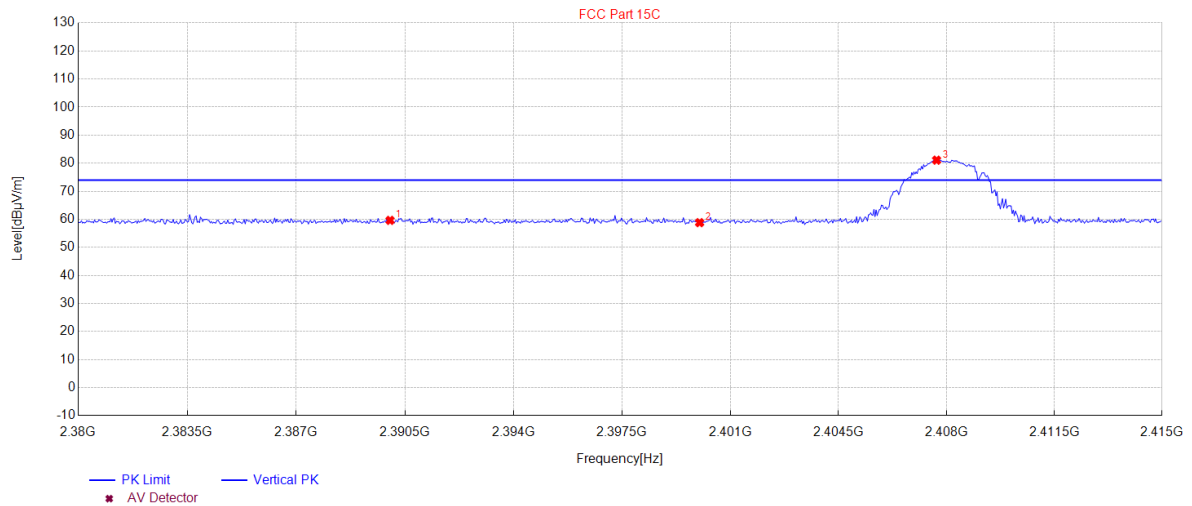
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### Band Edge Emission Test Results for Restricted Bands

EUT Name	Quadcopter	Model Name	WF31
Temperature	24.7°C	Relative Humidity	64.1 %
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 1	Antenna Polarity	Vertical

Test Graph for Peak Measurement

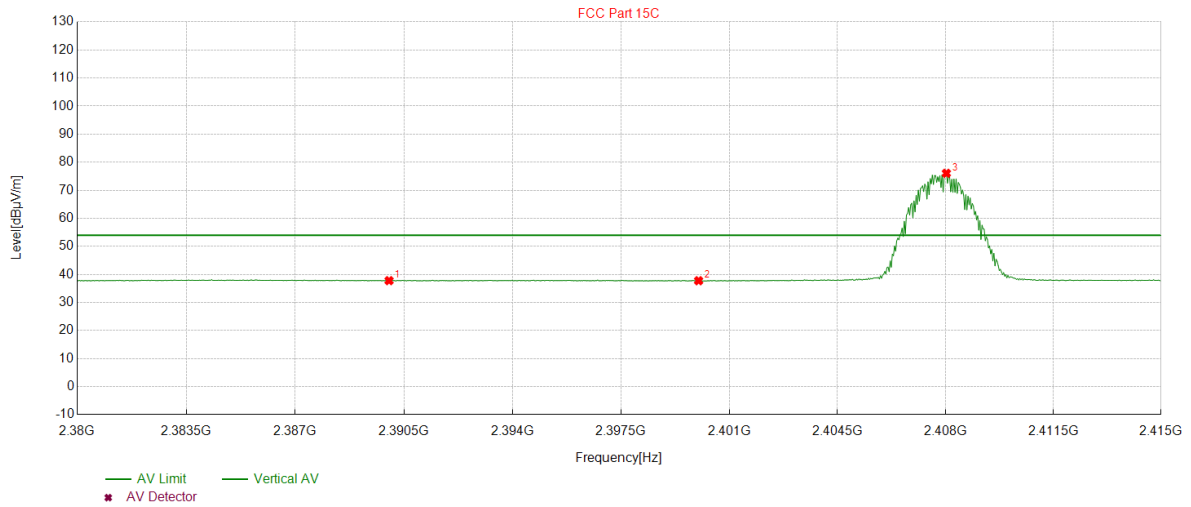


NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2390.02	59.64	34.40	74.00	14.36	150	67	Vertical
2	2400.005	58.82	34.43	74.00	15.18	150	226	Vertical
3	2407.6777	81.09	34.45	74.00	-7.09	150	154	Vertical

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### Test Graph for Average Measurement



NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2390.02	37.79	34.40	54.00	16.21	150	39	Vertical
2	2400.005	37.76	34.43	54.00	16.24	150	0	Vertical
3	2408.028	76.06	34.45	54.00	-22.06	150	151	Vertical

### RESULT: Pass

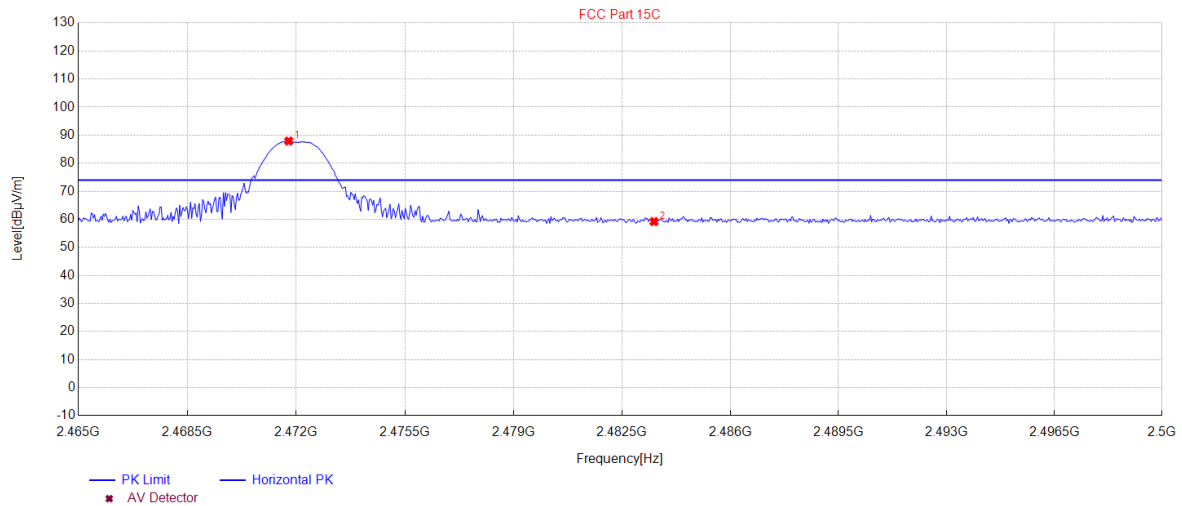
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### Band Edge Emission Test Results for Restricted Bands

EUT Name	Quadcopter	Model Name	WF31
Temperature	24.7°C	Relative Humidity	64.1 %
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 3	Antenna Polarity	Horizontal

Test Graph for Peak Measurement

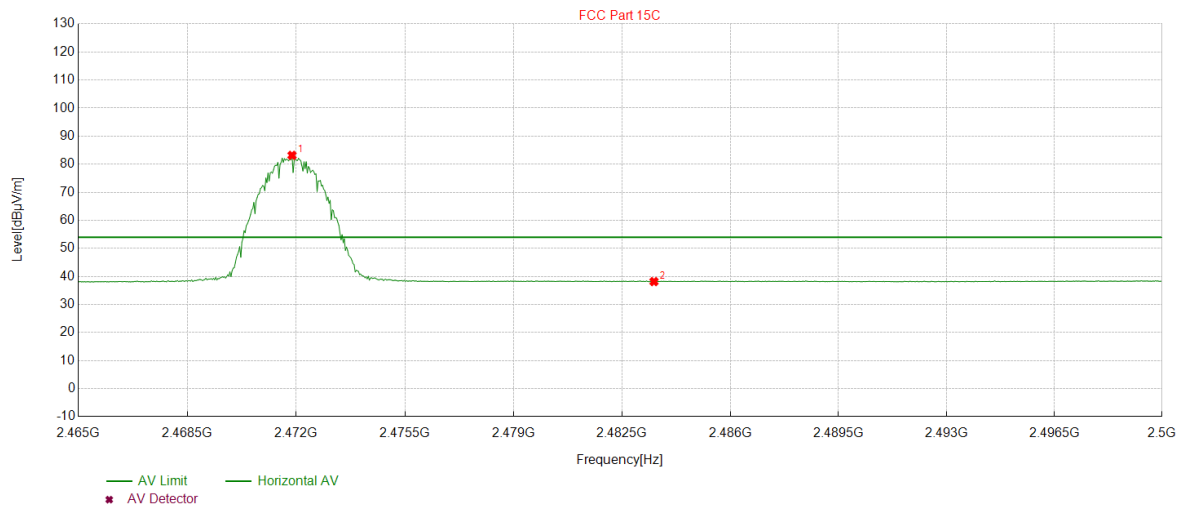


NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2471.7618	87.90	34.63	74.00	-13.90	150	235	Horizontal
2	2483.5335	59.20	34.66	74.00	14.80	150	302	Horizontal

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### Test Graph for Average Measurement



NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2471.8669	83.17	34.63	54.00	-29.17	150	240	Horizontal
2	2483.5335	38.16	34.66	54.00	15.84	150	249	Horizontal

### RESULT: Pass

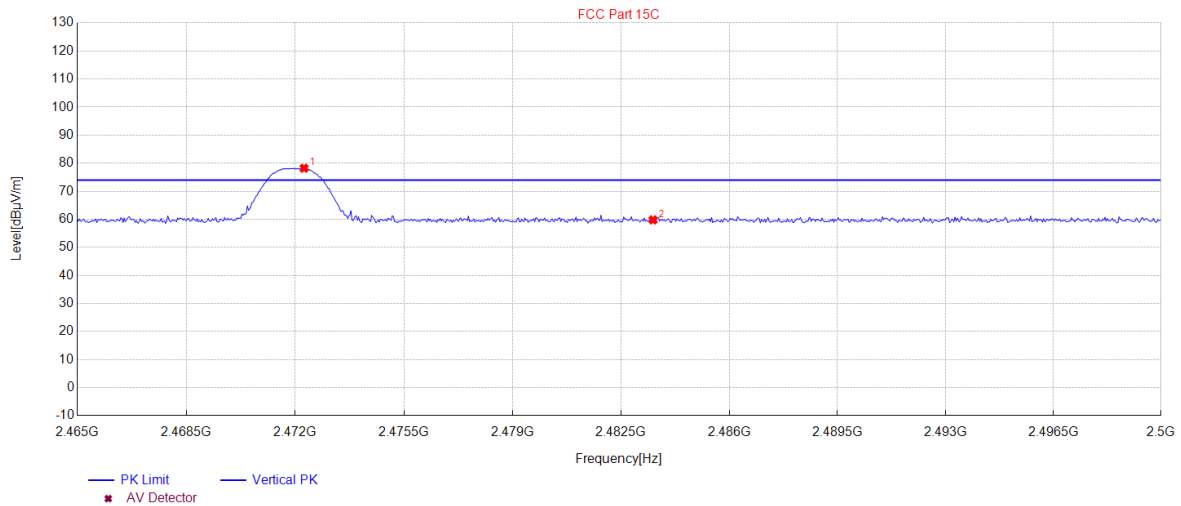
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### Band Edge Emission Test Results for Restricted Bands

<b>EUT Name</b>	Quadcopter	<b>Model Name</b>	WF31
<b>Temperature</b>	24.7°C	<b>Relative Humidity</b>	64.1 %
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.7V by battery
<b>Test Mode</b>	Mode 3	<b>Antenna Polarity</b>	Vertical

Test Graph for Peak Measurement

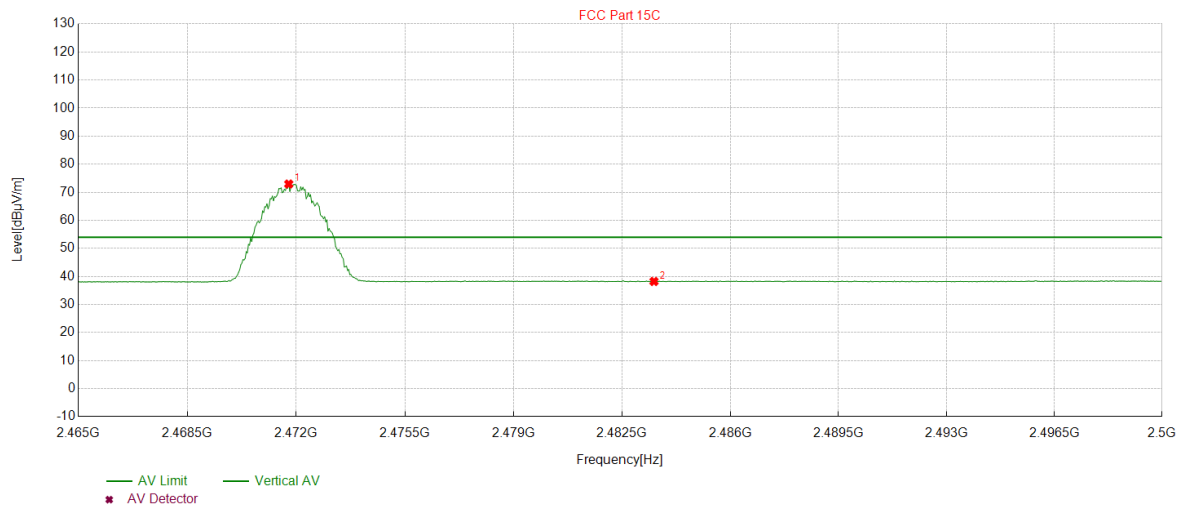


NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2472.2873	78.21	34.63	74.00	-4.21	150	288	Vertical
2	2483.5335	59.80	34.66	74.00	14.20	150	346	Vertical

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### Test Graph for Average Measurement



NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2471.7618	72.95	34.63	54.00	-18.95	150	279	Vertical
2	2483.5335	38.21	34.66	54.00	15.79	150	357	Vertical

### RESULT: Pass

Note:

- Factor=Antenna Factor + Cable loss - Amplifier gain. Field Strength=Factor + Reading level
- The factor had been edited in the "Input Correction" of the Spectrum Analyzer. So the Amplitude of test plots is equal to Reading level plus the Factor in dB. Use the A dB(μV) to represent the Amplitude. Use the F dB(μV/m) to represent the Field Strength. So A=F.

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## 9. AC Power Line Conducted Emission

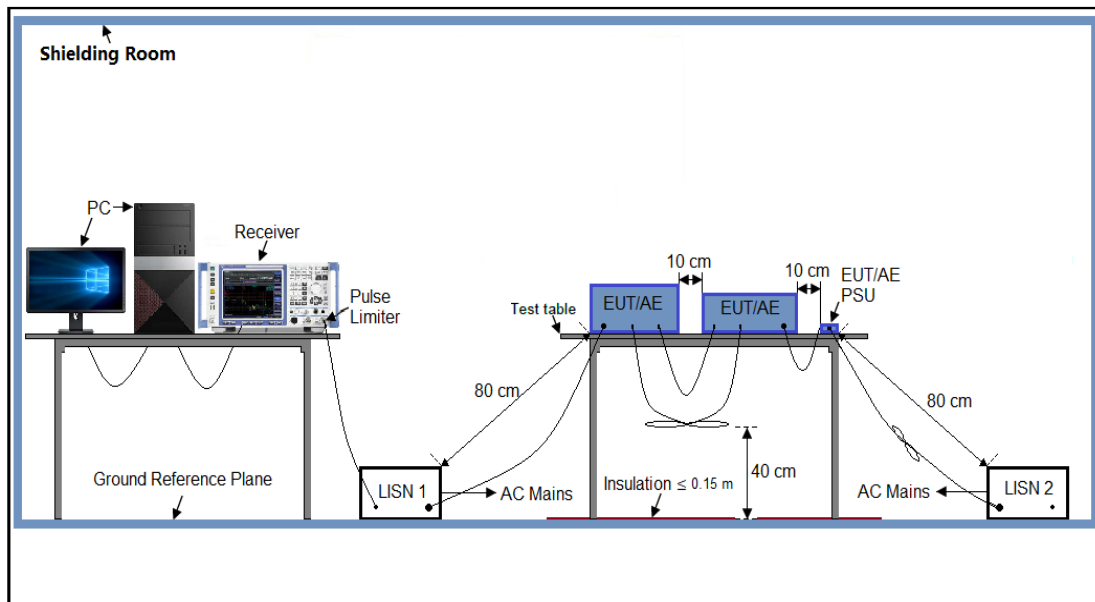
### 9.1 Measurement Limit

Frequency	Maximum RF Line Voltage	
	Q.P. (dBμV)	Average (dBμV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz

### 9.2 Measurement Setup (Block Diagram of Configuration)



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### 9.3 Preliminary Procedure of Line Conducted Emission Test

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipment received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC 5V power from adapter which received AC120V/60Hz power from a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

### 9.4 Final Procedure of Line Conducted Emission Test

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less – 2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

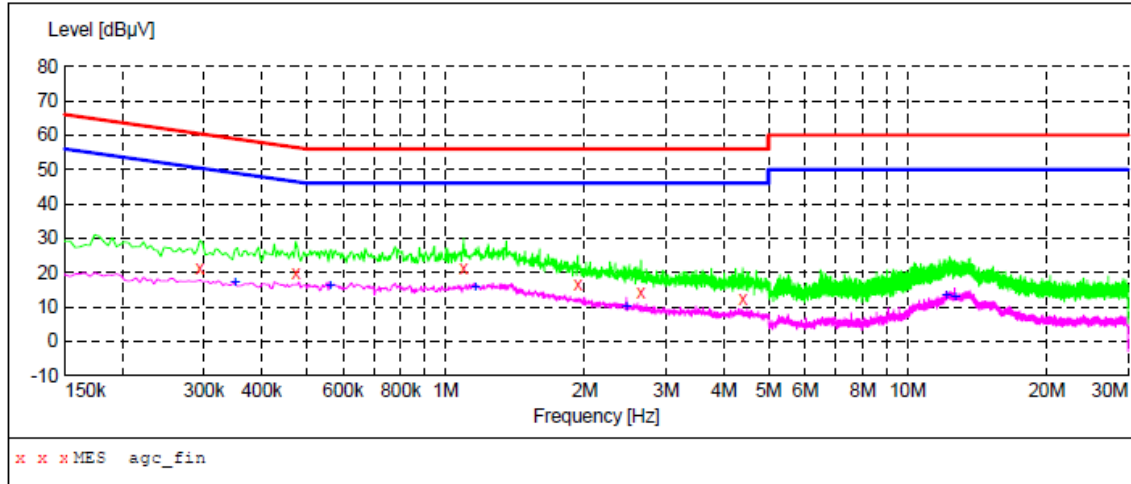
### 9.5 Measurement Result

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### AC Power Line Conducted Emission

Test Mode	Mode 1	LISN Line	Hot Side
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#### MEASUREMENT RESULT: "agc\_fin"

2024/6/5 20:09

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.294000	21.50	6.1	60	38.9	QP	L1
0.474000	20.00	6.1	56	36.4	QP	L1
1.094000	21.10	6.2	56	34.9	QP	L1
1.934000	16.50	6.2	56	39.5	QP	L1
2.650000	14.20	6.3	56	41.8	QP	L1
4.394000	12.60	6.3	56	43.4	QP	L1

#### MEASUREMENT RESULT: "agc\_fin2"

2024/6/5 20:09

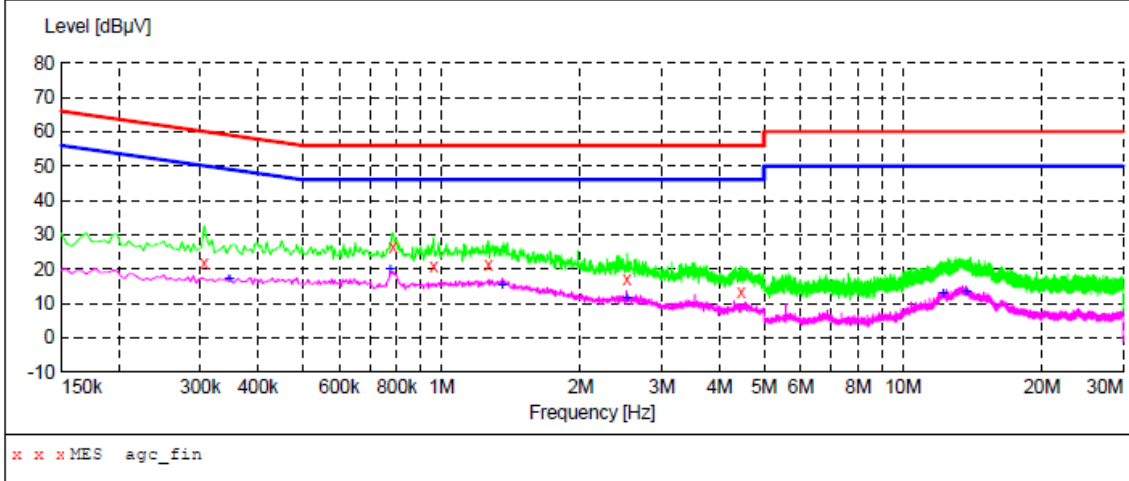
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.350000	16.90	6.1	49	32.1	AV	L1
0.562000	15.90	6.2	46	30.1	AV	L1
1.158000	15.80	6.2	46	30.2	AV	L1
2.462000	10.10	6.3	46	35.9	AV	L1
12.134000	13.20	6.8	50	36.8	AV	L1
12.642000	12.70	6.8	50	37.3	AV	L1

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### AC Power Line Conducted Emission

Test Mode	Mode 1	LISN Line	Neutral Side
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#### MEASUREMENT RESULT: "agc\_fin"

2024/6/5 20:12

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.306000	21.60	6.1	60	38.5	QP	N
0.786000	26.60	6.2	56	29.4	QP	N
0.962000	20.70	6.2	56	35.3	QP	N
1.262000	21.50	6.2	56	34.5	QP	N
2.526000	16.90	6.3	56	39.1	QP	N
4.458000	13.50	6.3	56	42.5	QP	N

#### MEASUREMENT RESULT: "agc\_fin2"

2024/6/5 20:12

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.346000	16.80	6.1	49	32.3	AV	N
0.774000	19.90	6.2	46	26.1	AV	N
1.354000	15.20	6.2	46	30.8	AV	N
2.518000	11.30	6.3	46	34.7	AV	N
12.214000	12.70	6.8	50	37.3	AV	N
13.722000	13.50	6.8	50	36.5	AV	N

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### **Appendix I: Photographs of Test Setup**

Refer to the Report No.: AGC15705240565AP01

### **Appendix II: Photographs of Test EUT**

Refer to the Report No.: AGC15705240565AP02

**-----End of Report-----**

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3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
7. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.
9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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