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# FCC Test Report

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Report No.: AGC15798230670FE06

**FCC ID** : 2BBX7APLUS  
**APPLICATION PURPOSE** : Original Equipment  
**PRODUCT DESIGNATION** : Rc Quadcopter  
**BRAND NAME** : N/A  
**MODEL NAME** : X7 Ranger PLUS  
**APPLICANT** : Miami Labs, Inc.  
**DATE OF ISSUE** : Jul. 12, 2023  
**STANDARD(S)** : FCC Part 15 Subpart E §15.407  
**REPORT VERSION** : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd  
Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: <http://www.agccert.com/>



**REPORT REVISE RECORD**

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jul. 12, 2023	Valid	Initial Release

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## 1. VERIFICATION OF CONFORMITY

<b>Applicant</b>	Miami Labs, Inc.
<b>Address</b>	2916 N. Miami Ave, Suite 1100, Miami, FL 33127, USA
<b>Manufacturer</b>	Miami Labs, Inc.
<b>Address</b>	2916 N. Miami Ave, Suite 1100, Miami, FL 33127, USA
<b>Factory</b>	Miami Labs, Inc.
<b>Address</b>	2916 N. Miami Ave, Suite 1100, Miami, FL 33127, USA
<b>Product Designation</b>	Rc Quadcopter
<b>Brand Name</b>	N/A
<b>Test Model</b>	X7 Ranger PLUS
<b>Date of receipt of test item</b>	Jun. 30, 2023
<b>Date of test</b>	Jun. 30, 2023 to Jul. 12, 2023
<b>Deviation</b>	No any deviation from the test method
<b>Condition of Test Sample</b>	Normal
<b>Test Result</b>	Pass
<b>Report Template</b>	AGCRT-US-BGN/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with requirement of FCC Part 15 Rules requirement.

Prepared By



Alan Duan  
(Project Engineer)

Jul. 12, 2023

Reviewed By



Calvin Liu  
(Reviewer)

Jul. 12, 2023

Approved By



Max Zhang  
Authorized Officer

Jul. 12, 2023

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## 2. GENERAL INFORMATION

### 2.1. PRODUCT DESCRIPTION

<b>Equipment Type</b>	<input type="checkbox"/> Outdoor access points <input type="checkbox"/> Indoor access points <input type="checkbox"/> Fixed P2P access points <input checked="" type="checkbox"/> Client devices
<b>Operation Frequency</b>	<input checked="" type="checkbox"/> U-NII 1:5150MHz~5250MHz <input type="checkbox"/> U-NII 2A: 5250MHz~5350MHz <input type="checkbox"/> U-NII 2C:5470MHz~5725MHz <input type="checkbox"/> U-NII 3: 5725MHz~5850MHz
<b>DFS Design Type</b>	<input type="checkbox"/> Master <input type="checkbox"/> Slave with radar detection <input checked="" type="checkbox"/> Slave without radar detection
<b>TPC Function</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>Hardware Version</b>	V1.0
<b>Software Version</b>	V1.0
<b>Test Frequency Range</b>	For 802.11a-HT20: 5180~5240MHz
<b>Output Power</b>	ANT1:IEEE 802.11a(HT20): 8.25dBm; ANT2:IEEE 802.11a(HT20): 7.83dBm;
<b>Output Power_ MIMO</b>	IEEE 802.11aHT(20): 11.04dBm;
<b>Modulation</b>	802.11a:(64-QAM, 16-QAM, QPSK, BPSK) OFDM
<b>Data Rate</b>	802.11a:6/9/12/18/24/36/48/54Mbps;
<b>Number of channels</b>	4 channels of U-NII-1 Band
<b>Antenna Designation</b>	Dipole Antenna
<b>Antenna Gain</b>	Refer to Chapter 2.8 of the report.
<b>Power Supply</b>	DC 7.6V by battery

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## 2.2. TABLE OF CARRIER FREQUENCIES

For 5180~5240MHz:

4 channels are provided for 802.11a:

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

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### 2.3. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2BBX7APLUS** filing to comply with the FCC Part 15 requirements.

### 2.4. TEST METHODOLOGY

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
4	KDB 662911	662911 D01 Multiple Transmitter Output v02r01
5	KDB 789033	789033 D02 General U-NII Test Procedures New Rules v02r01

### 2.5. SPECIAL ACCESSORIES

Refer to section 5.2.

### 2.6. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

### 2.7. 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 refer to Section 2.8 of the report

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## 2.8. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna Type	Frequency Band (MHz)	TX Paths	Bandwidth (MHz)	Max Peak Gain (dBi)		Max Directional Gain (dBi)
				Ant 1	Ant 2	
5G WIFI Dipole Antenna List (5GHz 2*2 MIMO)						
PIFA Antenna	5150 ~ 5250	2	20	3.74	3.74	6.75

Note 1: The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

If all antennas have the same gain,  $G_{ANT}$ , Directional gain =  $G_{ANT}$  + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on devices:

$$\text{Array Gain} = 10 \log (N_{ANT} / N_{SS}) \text{ dB} = 3.01;$$

- For power measurements on IEEE 802.1 devices:

$$\text{Array Gain} = 0 \text{ dB for } N_{ANT} \leq 4;$$

$$\text{Array Gain} = 0 \text{ dB (i.e., no array gain) for channel widths } \geq 40 \text{ MHz for any } N_{ANT};$$

$$\text{Array Gain} = 5 \log(N_{ANT}/N_{SS}) \text{ dB or } 3 \text{ dB, whichever is less, for } 20 \text{ MHz channel widths with } N_{ANT} \geq 5.$$

If antenna gains are not equal, Directional gain may be calculated by using the formulas applicable to equal gain antennas with  $G_{ANT}$  set equal to the gain of the antenna having the highest gain.

### 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 be in compliance with 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 be in compliance with 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.

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### 3.3 ENVIRONMENTAL CONDITIONS

	NORMAL CONDITIONS	EXTREME CONDITIONS
Temperature range (°C)	15 - 35	-30 - 50
Relative humidity range	20 % - 75 %	20 % - 75 %
Pressure range (kPa)	86 - 106	86 - 106
Power supply	DC 3.85V	--

Note: The Extreme Temperature and Extreme Voltages declared by the manufacturer.

### 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	$U_c = \pm 3.1 \text{ dB}$
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 4.0 \text{ dB}$
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.8 \text{ dB}$
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	$U_c = \pm 2.7 \%$

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### 3.5 LIST OF EQUIPMENTS USED

#### TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	Aug. 04, 2022	Aug. 03, 2023
LISN	R&S	ESH2-Z5	100086	Jun. 03, 2023	Jun. 02, 2024
Test software	R&S	ES-K1 (Ver.V1.71)	N/A	N/A	N/A

#### TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Feb. 18, 2023	Feb. 17, 2024
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Aug. 04, 2022	Aug. 03, 2023
Power sensor	Aglient	U2021XA	MY54110007	Mar. 03, 2023	Mar. 02, 2024
5GHz Fliter	EM Electronics	5150-5880MHz	N/A	N/A	N/A
Attenuator	ZHINAN	E-002	N/A	Sep. 01, 2022	Aug. 31, 2023
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Oct. 31, 2021	Oct. 30, 2023
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Mar. 12, 2022	Mar. 11, 2024
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Mar. 03, 2023	Mar. 02, 2024
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	N/A	N/A
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 05, 2023	Jan. 04, 2025
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

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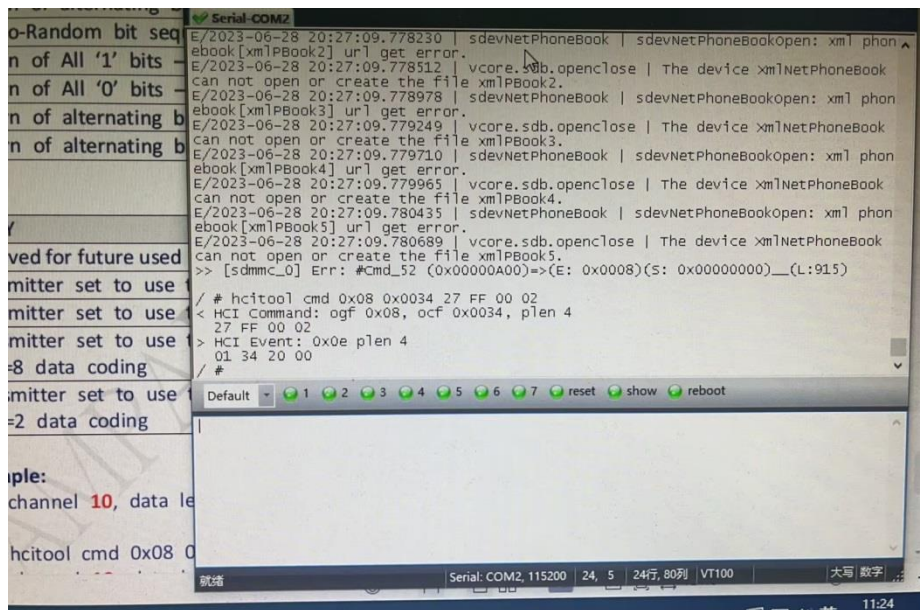
#### 4. DESCRIPTION OF TEST MODES

Mode	Available channel	Tested channel	Modulation	Date rate (Mbps)
802.11a	Refer to Section 2.2	36,40,48	OFDM	6Mbps/MCS0

##### Note:

- The EUT has been set to operate continuously on tested channel individually, and the EUT is operating at its maximum duty cycle>or equal 98%.
- All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.

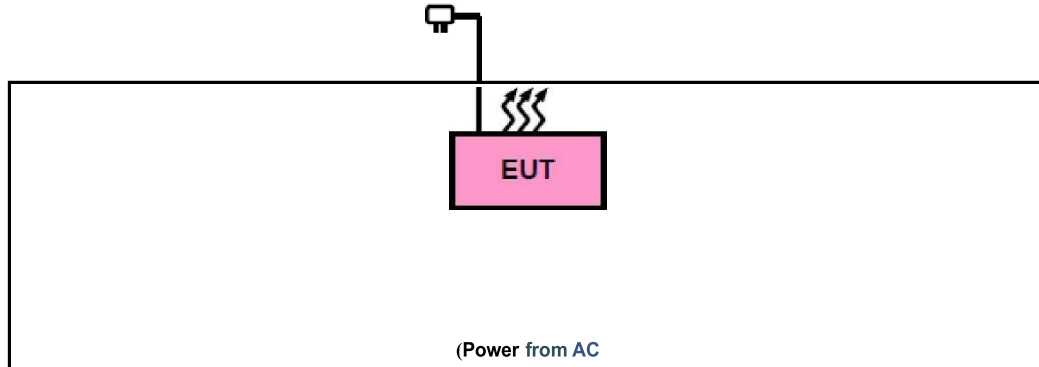
##### Software Setting



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## 5. SYSTEM TEST CONFIGURATION

### 5.1. CONFIGURATION OF EUT SYSTEM



### 5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Rc Quadcopter	X7 Ranger PLUS	2BBX7APLUS	EUT
2	Controller	N/A	N/A	AE
3	Cable	N/A	N/A	AE

### 5.3. SUMMARY OF TEST RESULTS

Item	FCC Rules	Description Of Test	Result
1	§15.203	Antenna Equipment	Pass
2	§15.407(a)(1)	RF Output Power	Pass
3	§15.407(e)	6dB Bandwidth Measurement	N/A
4	§2.1049	26dB bandwidth Measurement	Pass
5	§15.407(a)(1)	Power Spectral Density	Pass
6	§15.407(b)(1)	Conducted Spurious Emission	Pass
7	§15.209, §15.407(b)(1)	Radiated Emission & Band Edge	Pass
8	§15.207	AC Power Line Conducted Emission	N/A

Note: 1. N/A means not applicable  
2. The EUT cannot transmit when charging.



## 6. RF OUTPUT POWER MEASUREMENT

### 6.1 MEASUREMENT LIMITS

Operation Band	EUT Category		LIMIT
U-NII-1	<input type="checkbox"/>	Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p < 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
	<input type="checkbox"/>	Fixed point-to-point Access Point	1 Watt (30 dBm)
	<input type="checkbox"/>	Indoor Access Point	1 Watt (30 dBm)
	<input checked="" type="checkbox"/>	Client devices	250mW (23.98 dBm)
U-NII-2A	/		250mW (23.98 dBm) or 11 dBm+10 log B*
U-NII-2C	/		250mW (23.98 dBm) or 11 dBm+10 log B*
U-NII-3	/		1 Watt (30 dBm)

Note: Where B is the 26dB emission bandwidth in MHz.

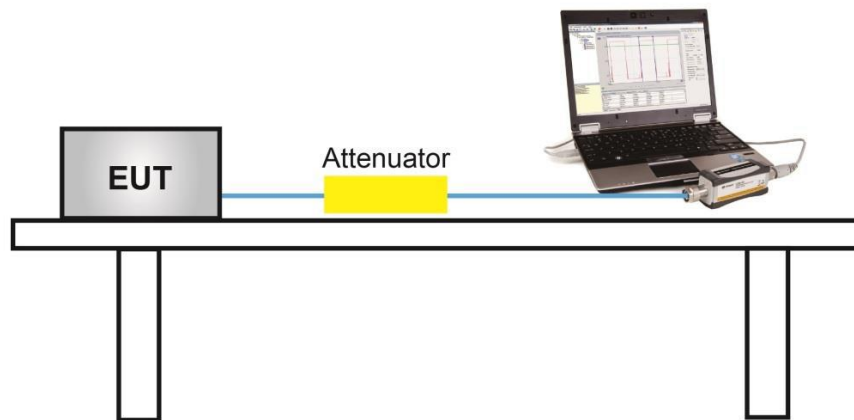
### 6.2 MEASUREMENT PROCEDURE

☒ Method PM is Measurement using an RF average power meter. The procedure for this method is as follows:

1. The testing follows the ANSI C63.10 Section 12.3.3.1
2. Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied:
3. The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
4. At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
5. The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
6. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
7. Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
8. Adjust the measurement in dBm by adding  $[10 \log (1 / D)]$ , where D is the duty cycle {e.g.,  $[10 \log (1 / 0.25)]$ , if the duty cycle is 25%}.
9. Record the test results in the report.

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### 6.3 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)



### 6.4 MEASUREMENT RESULT

Test Data of Conducted Output Power for band 5.15-5.25 GHz-ANT 1				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5180	8.25	23.98	Pass
	5200	8.15	23.98	Pass
	5240	8.22	23.98	Pass

Test Data of Conducted Output Power for band 5.15-5.25 GHz-ANT 2				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5180	7.74	23.98	Pass
	5200	7.76	23.98	Pass
	5240	7.83	23.98	Pass

Test Data of Conducted Output Power for band 5.15-5.25 GHz-MIMO				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11n20	5180	11.01	23.98	Pass
	5200	10.97	23.98	Pass
	5240	11.04	23.98	Pass

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## 7. 6DB&26DB BANDWIDTH MEASUREMENT

### 7.1 MEASUREMENT LIMITS

The minimum 6dB bandwidth shall be at least 500 kHz.

### 7.2 MEASUREMENT PROCEDURE

#### 7.2.1 -6dB bandwidth (DTS bandwidth) Test setting:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on operation frequency individually.
3. Set RBW = 100kHz.
4. Set the VBW  $\geq 3 \times$  RBW. Detector = Peak. Trace mode = max hold.
5. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.

#### 7.2.2 99% occupied bandwidth test setting:

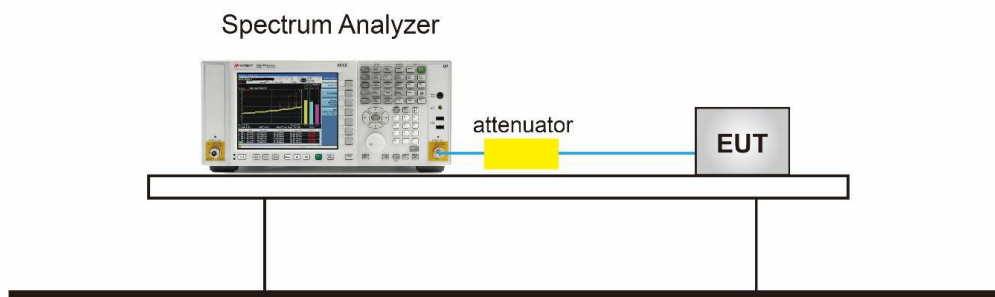
1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 1.5 to 5 times the OBW, centered on a nominal channel  
The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

#### 7.2.3 -26dB Bandwidth test setting:

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW > RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission.  
Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

**Note:** The EUT was tested according to KDB 789033 for compliance to FCC 47CFR 15.407 requirements.

### 7.3 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)



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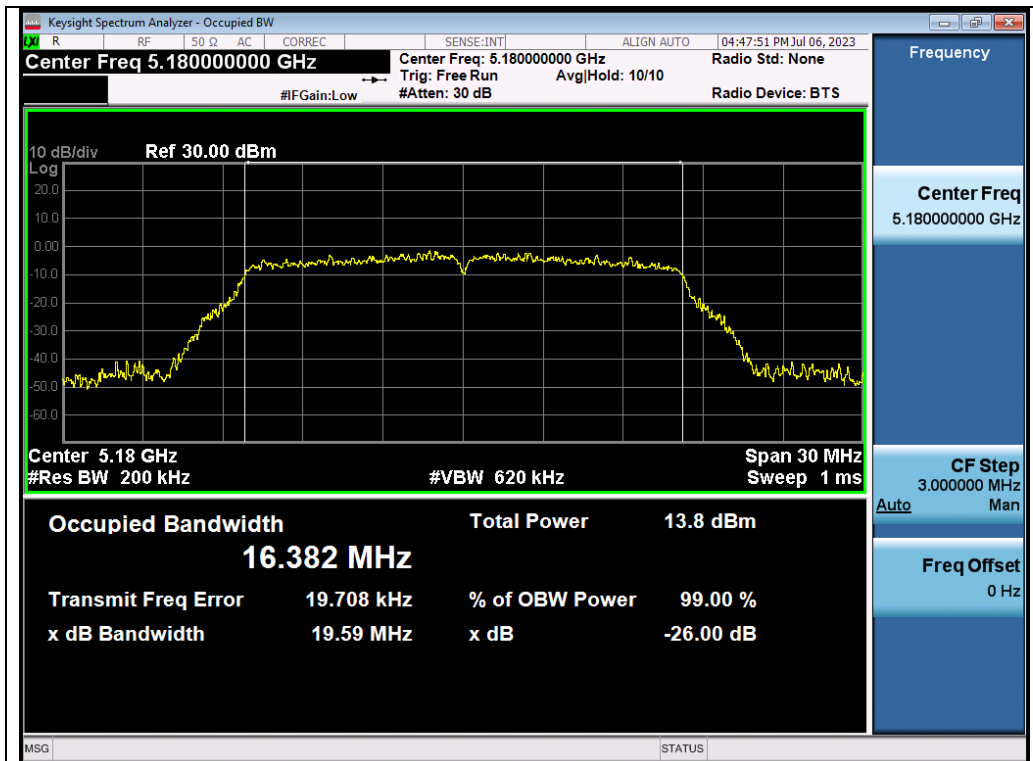
## 7.4 MEASUREMENT RESULTS

Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz-ANT 1					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5180	16.382	19.595	N/A	Pass
	5200	16.404	19.476	N/A	Pass
	5240	16.396	19.662	N/A	Pass

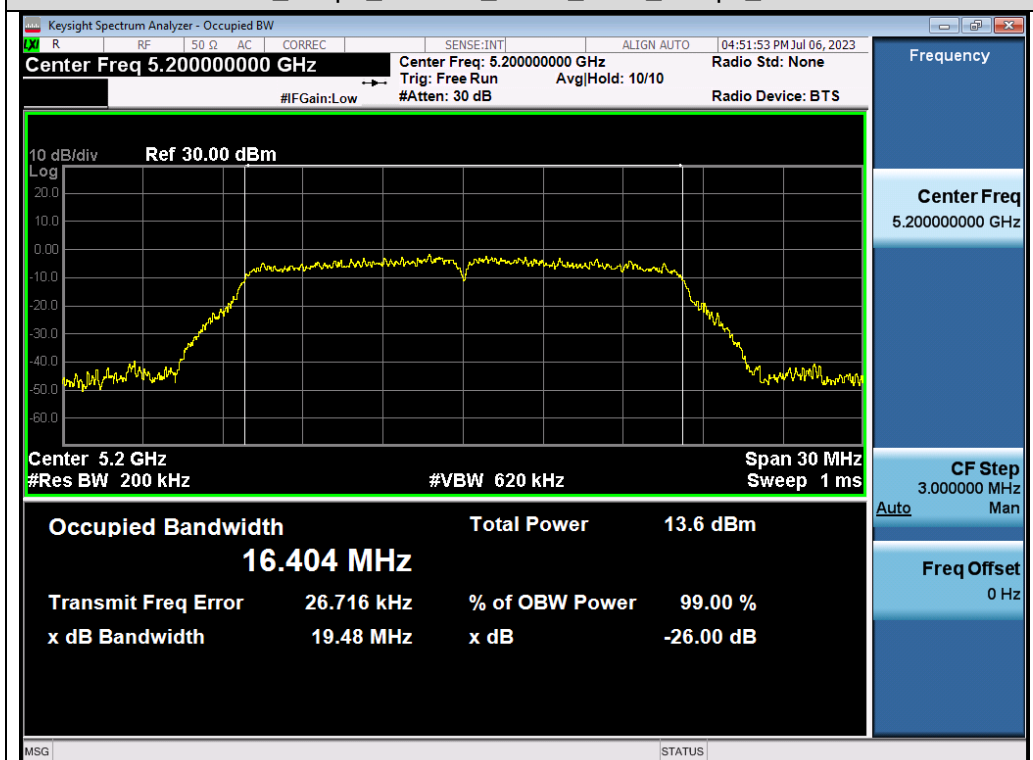
Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz-ANT 2					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5180	16.390	19.651	N/A	Pass
	5200	16.353	19.710	N/A	Pass
	5240	16.407	19.703	N/A	Pass

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### Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz

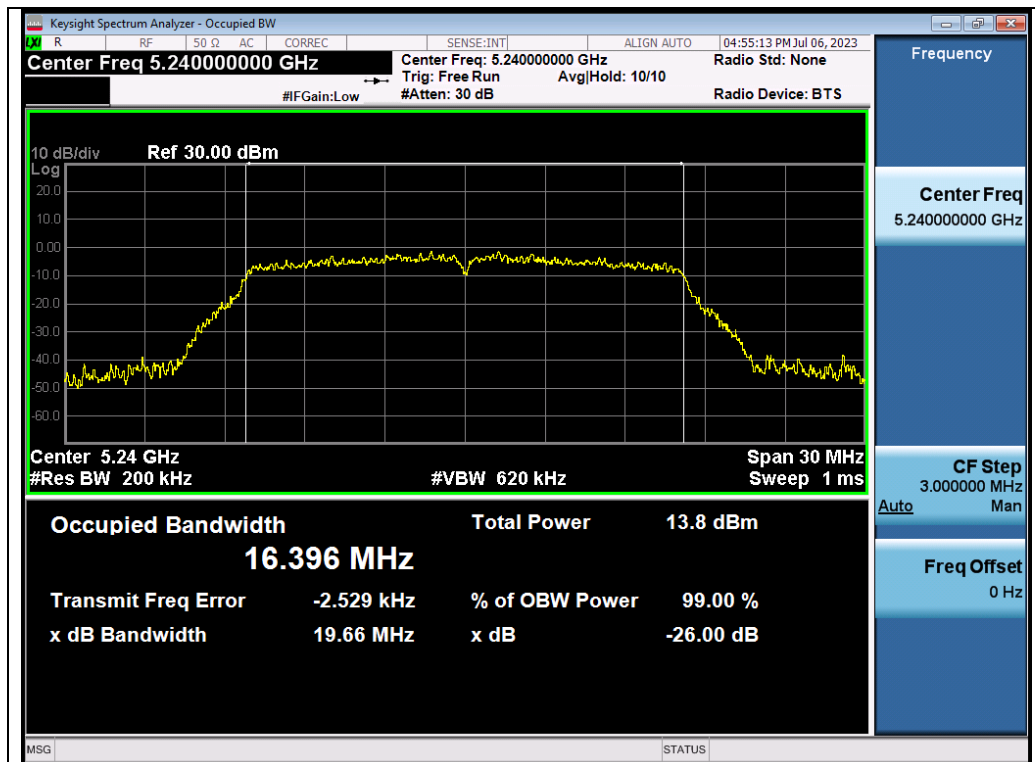


Test\_Graph\_802.11a\_ANT1\_5180\_6Mbps\_OBW

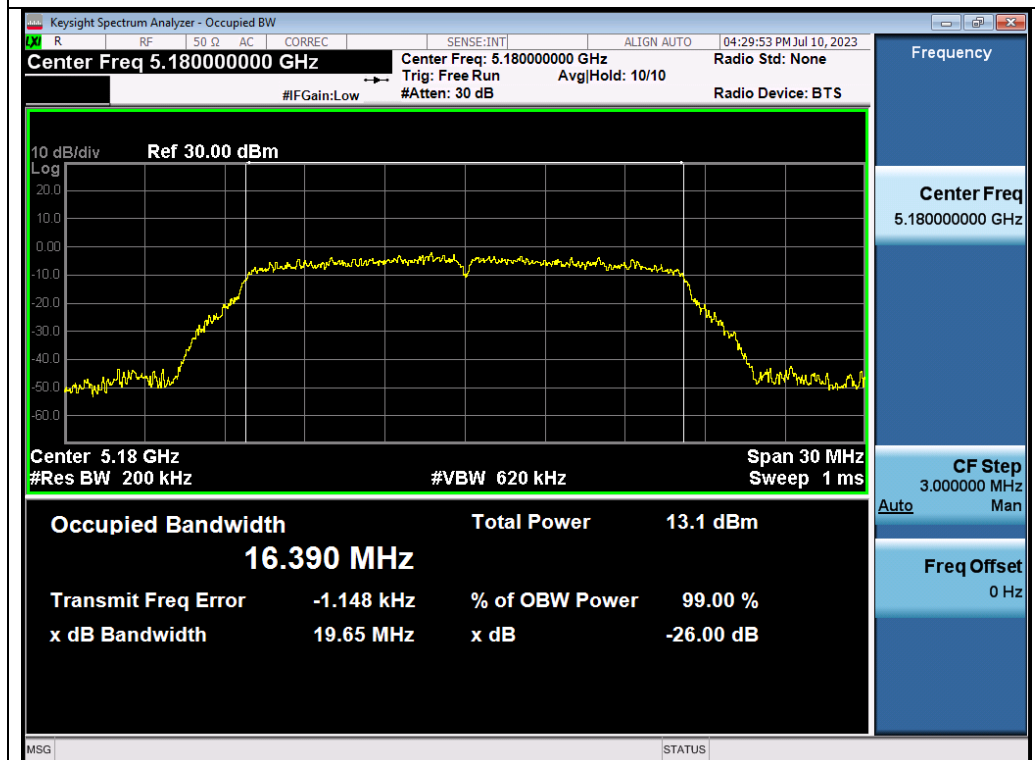


Test\_Graph\_802.11a\_ANT1\_5200\_6Mbps\_OBW

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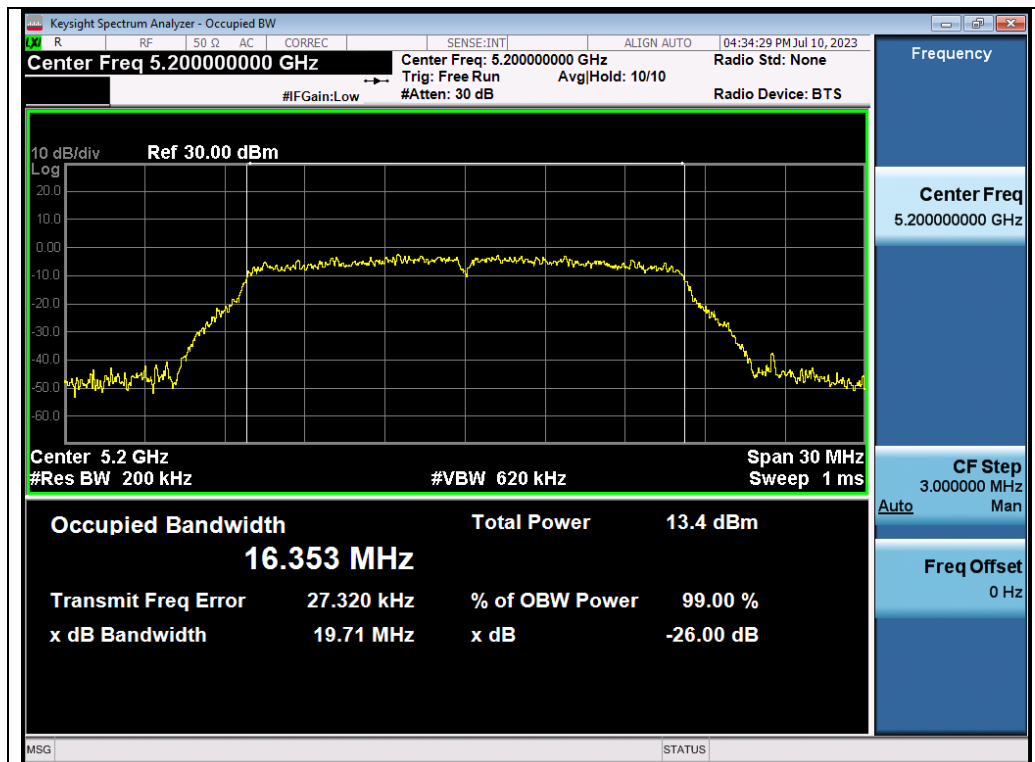


Test\_Graph\_802.11a\_ANT1\_5240\_6Mbps\_OBW

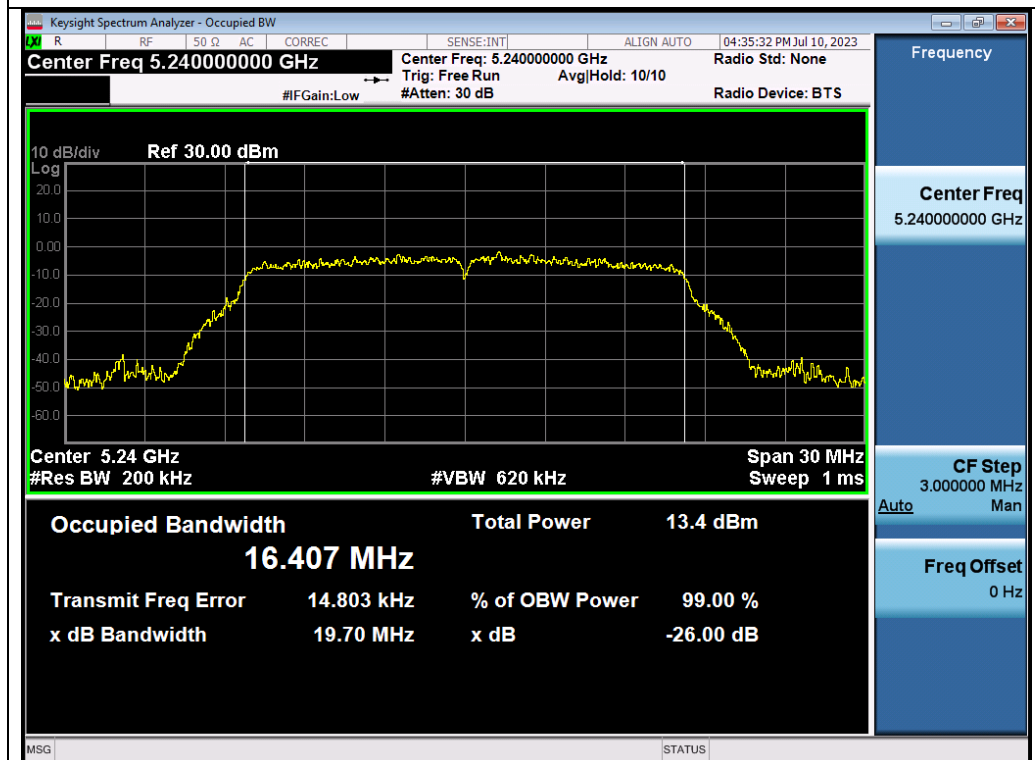


Test\_Graph\_802.11a\_ANT2\_5180\_6Mbps\_OBW

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Test\_Graph\_802.11a\_ANT2\_5200\_6Mbps\_OBW



Test\_Graph\_802.11a\_ANT2\_5240\_6Mbps\_OBW

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## 8. POWER SPECTRAL DENSITY MEASUREMENT

### 8.1 MEASUREMENT LIMITS

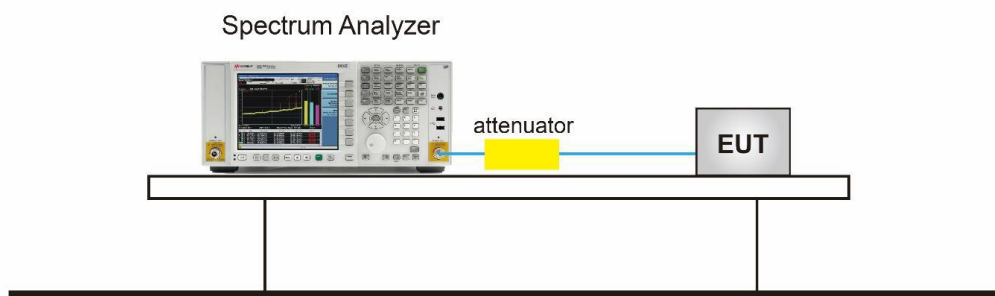
Operation Band	EUT Category		LIMIT
U-NII-1	<input type="checkbox"/>	Outdoor Access Point	17dBm/ MHz
	<input type="checkbox"/>	Fixed point-to-point Access Point	17dBm/ MHz
	<input type="checkbox"/>	Indoor Access Point	17dBm/ MHz
	<input checked="" type="checkbox"/>	Client devices	11dBm/ MHz
U-NII-2A	/		11dBm/ MHz
U-NII-2C	/		11dBm/ MHz
U-NII-3	/		30 dBm/500kHz

### 8.2 MEASUREMENT PROCEDURE

☒ For Average power spectral density test:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
2. Span was set to encompass the entire 26dB EBW of the signal.
3. RBW = 1MHz.
4. If measurement bandwidth of Maximum PSD is specified in 500 kHz, RBW = 100KHz
5. Set VBW  $\geq$  [3 $\times$ RBW].
6. Sweep Time=Auto couple.
7. Detector function=RMS (i.e., power averaging).
8. Trace average at least 100 traces in power averaging (rms) mode.
9. When the measurement bandwidth of Maximum PSD is specified in 100 kHz, add a constant factor  $10 \times \log(500\text{kHz}/100\text{kHz}) = 6.99$  dB to the measured result.
10. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
11. Add  $[10 \log (1/D)]$ , where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission). For example, add  $[10 \log (1/0.25)] = 6$  dB if the duty cycle is 25%.
12. Record the test results in the report.

### 8.3 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)



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#### 8.4 MEASUREMENT RESULT

Test Data of Conducted Output Power Density for band 5.15-5.25 GHz-ANT 1				
Test Mode	Test Channel (MHz)	Average Power Density (dBm/MHz)	Limits (dBm/MHz)	Pass or Fail
802.11a	5180	-1.865	11	Pass
	5200	-2.017	11	Pass
	5240	-1.849	11	Pass

Test Data of Conducted Output Power Density for band 5.15-5.25 GHz-ANT 2				
Test Mode	Test Channel (MHz)	Average Power Density (dBm/MHz)	Limits (dBm/MHz)	Pass or Fail
802.11a	5180	-2.277	11	Pass
	5200	-2.350	11	Pass
	5240	-2.413	11	Pass

Test Data of Conducted Output Power Density for band 5.15-5.25 GHz-MIMO				
Test Mode	Test Channel (MHz)	Average Power Density (dBm/MHz)	Limits (dBm/MHz)	Pass or Fail
802.11n20	5180	0.94	11	Pass
	5200	0.83	11	Pass
	5240	0.89	11	Pass

Note:1.Power density(dBm/500kHz) = Power density(dBm/100kHz)+10\*log(500/100).

2.The Total PSD(dBm/500kHz) =  $10 \cdot \log \{ 10^{(\text{Ant 1 PSD}/10)} + 10^{(\text{Ant 2 PSD}/10)} \}$  (dBm/500kHz).

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### Test Graphs of Conducted Output Power Spectral Density for band 5.15-5.25 GHz



Test\_Graph\_802.11a\_ANT1\_5180\_6Mbps\_PSD



Test\_Graph\_802.11a\_ANT1\_5200\_6Mbps\_PSD

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Test\_Graph\_802.11a\_ANT1\_5240\_6Mbps\_PSD



Test\_Graph\_802.11a\_ANT2\_5180\_6Mbps\_PSD

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## 9. CONDUCTED SPURIOUS EMISSION

### 9.1 MEASUREMENT LIMIT

Restricted bands	Applicable to	Limit	
	789033 D02 General UNII Test Procedures New Rules v02r01	Field strength at 3m (dBuV/m)	
		PK: 74	AV: 54
Out of the restricted bands	Applicable to	EIRP Limit (dBm/MHz)	Equivalent field Strength at 3m (dBuV/m)
	FCC 15.407(b)(1)	PK: -27	PK: 68.2
	15.407(b)(2)		
	15.407(b)(3)		
	15.407(b)(4)	See Note 2	

Note 1: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

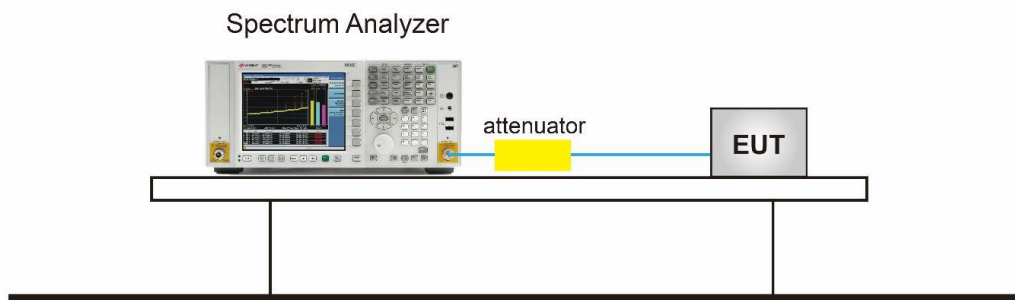
$$E = \frac{1000000}{3} \sqrt{30 P} \quad \mu\text{V/m, where } P \text{ is the eirp (Watts).}$$

Note 2: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

### 9.2 MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the Middle and the bottom operation frequency individually.
3. Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.
4. RBW = 100 kHz; VBW= 300 kHz; Sweep = auto; Detector function = peak.(Test frequency below 1GHz)
5. RBW = 1 MHz; VBW= 3 MHz; Sweep = auto; Detector function = peak.(Test frequency Above 1GHz)
6. Set SPA Trace 1 Max hold, then View.
7. Mark the maximum useless stray point and compare it with the limit value to record the result.

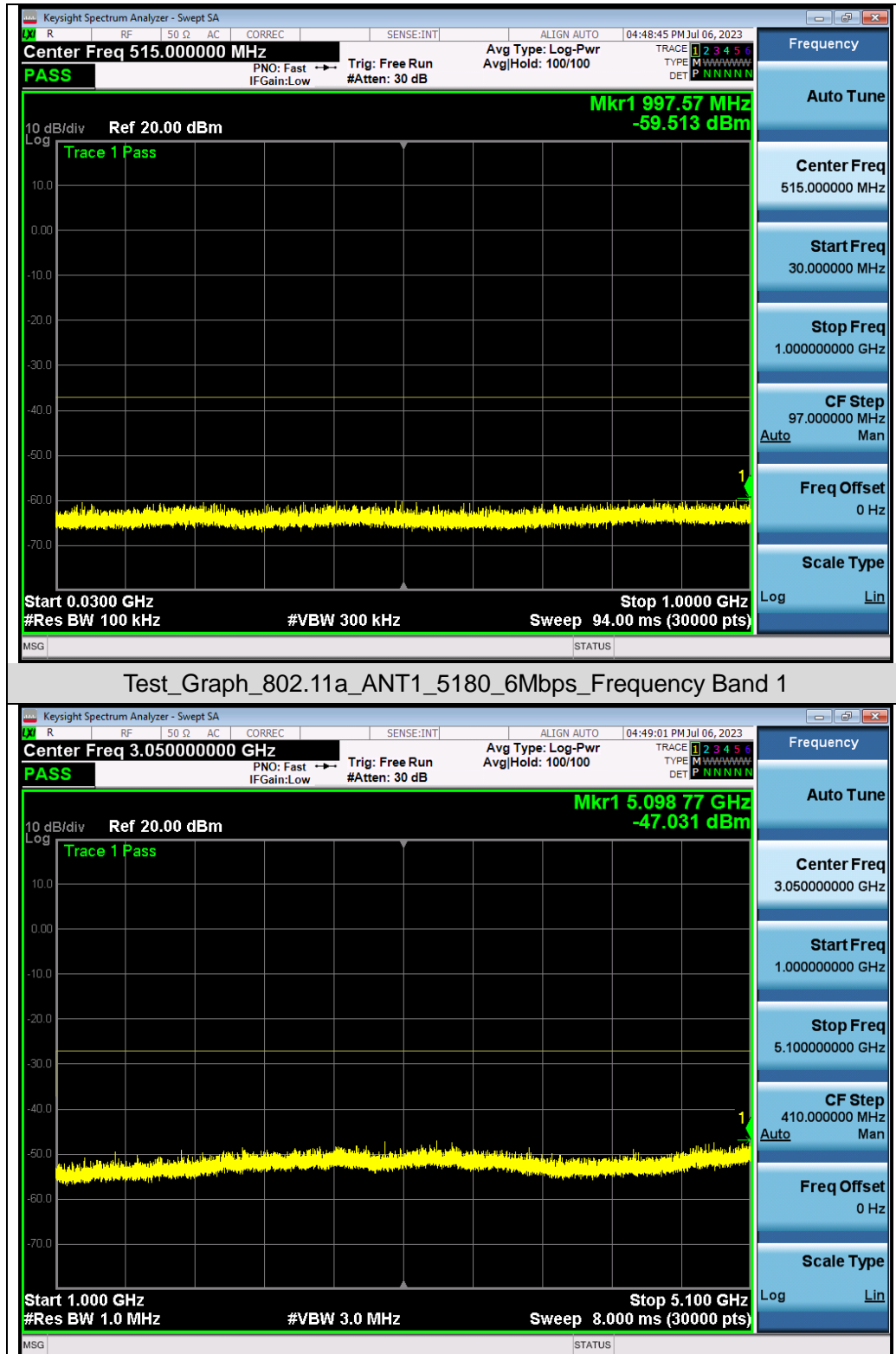
### 9.3 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)



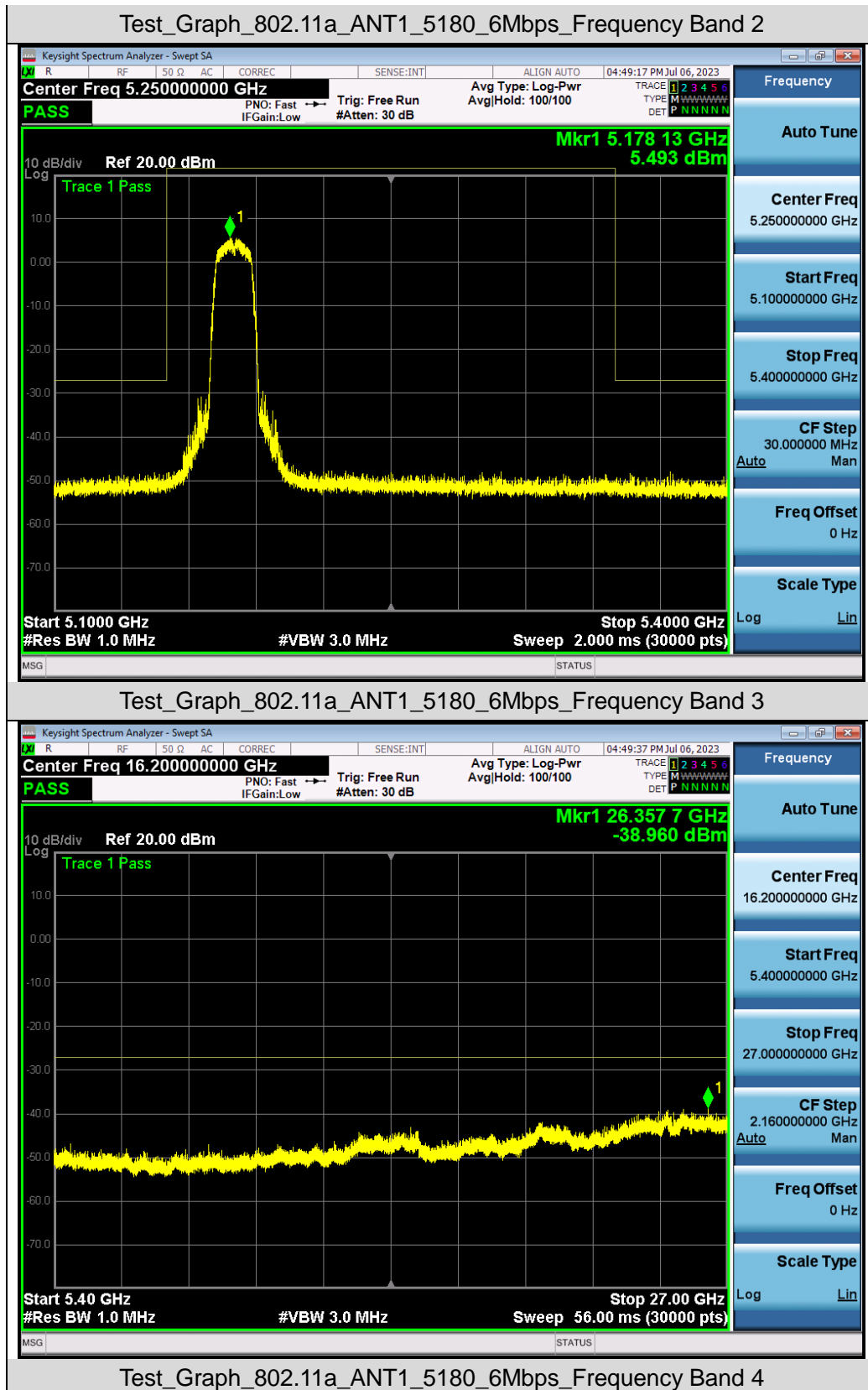
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## 9.4 MEASUREMENT RESULTS

Test Graphs of Spurious Emissions outside of the 5.15-5.25 GHz band for transmitters operating in the  
5.15-5.25 GHz band

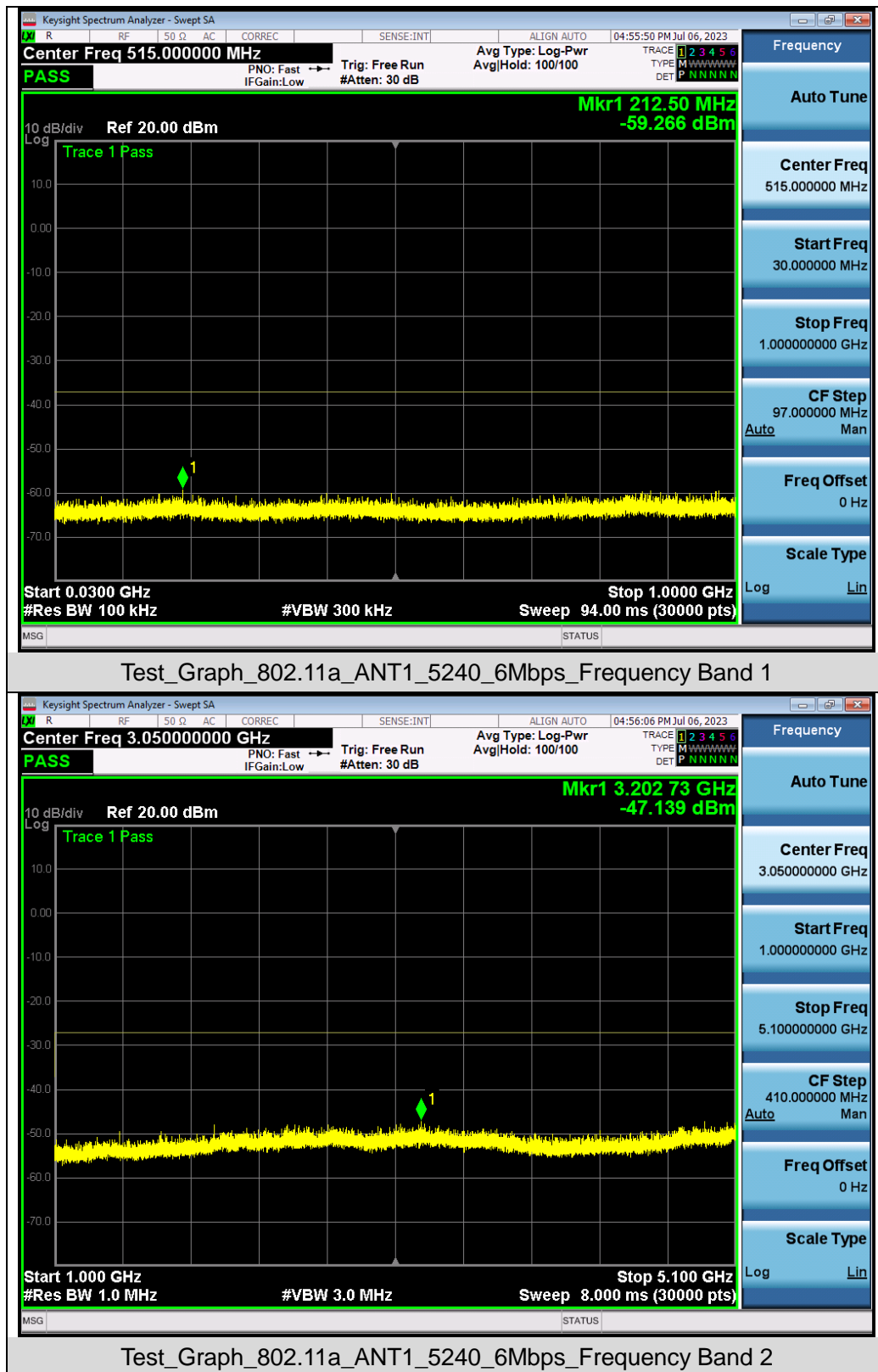


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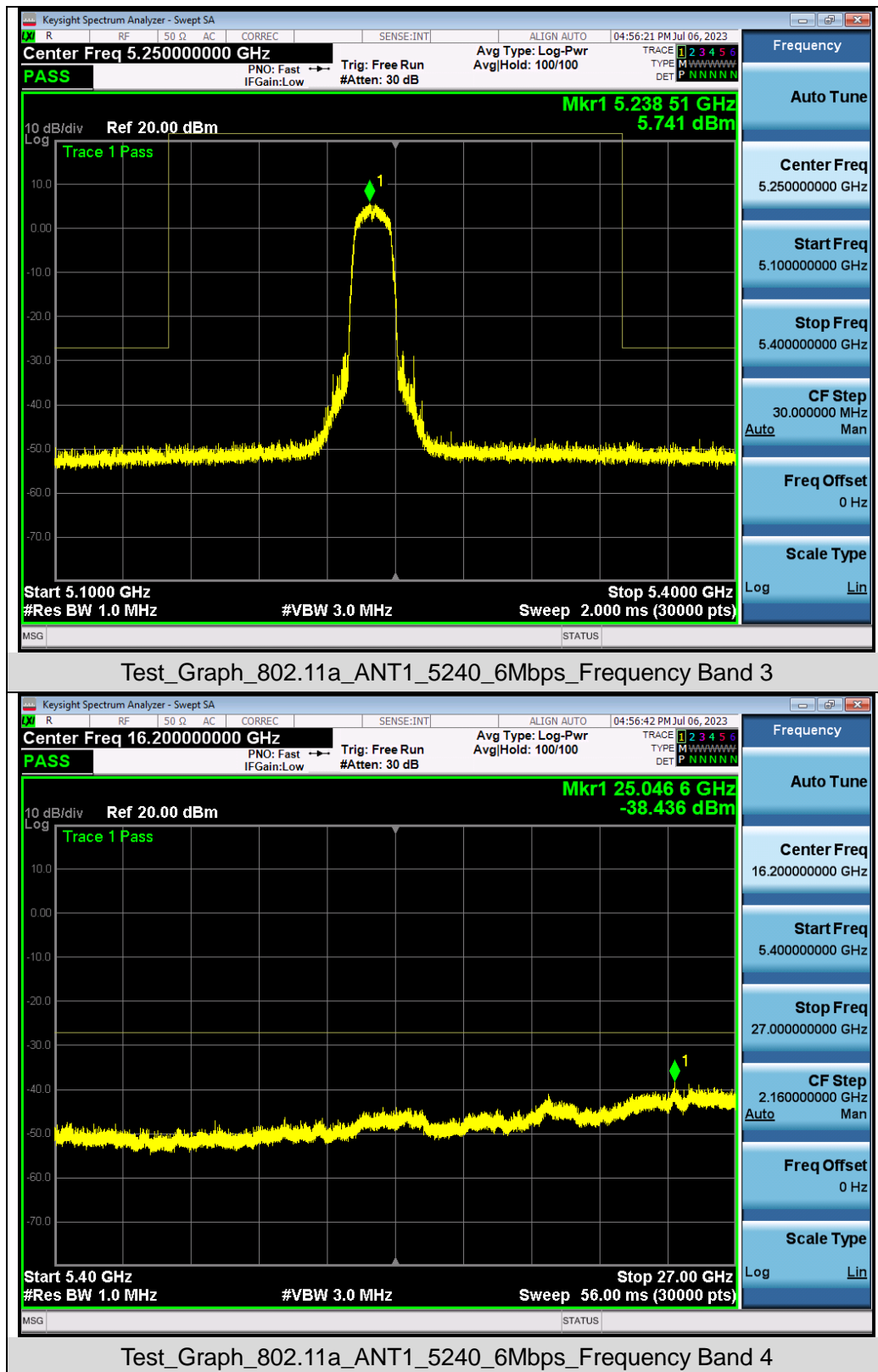


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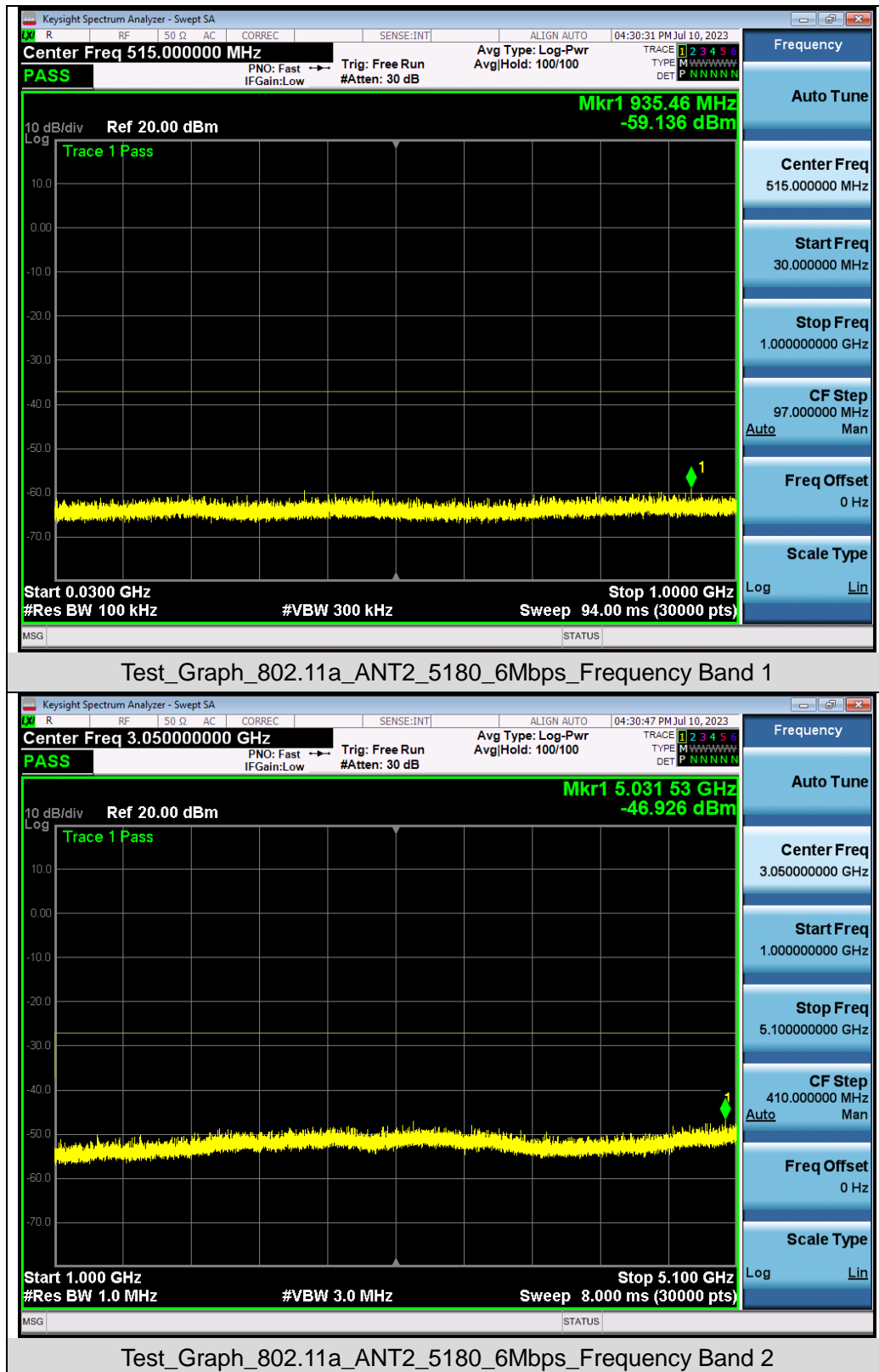


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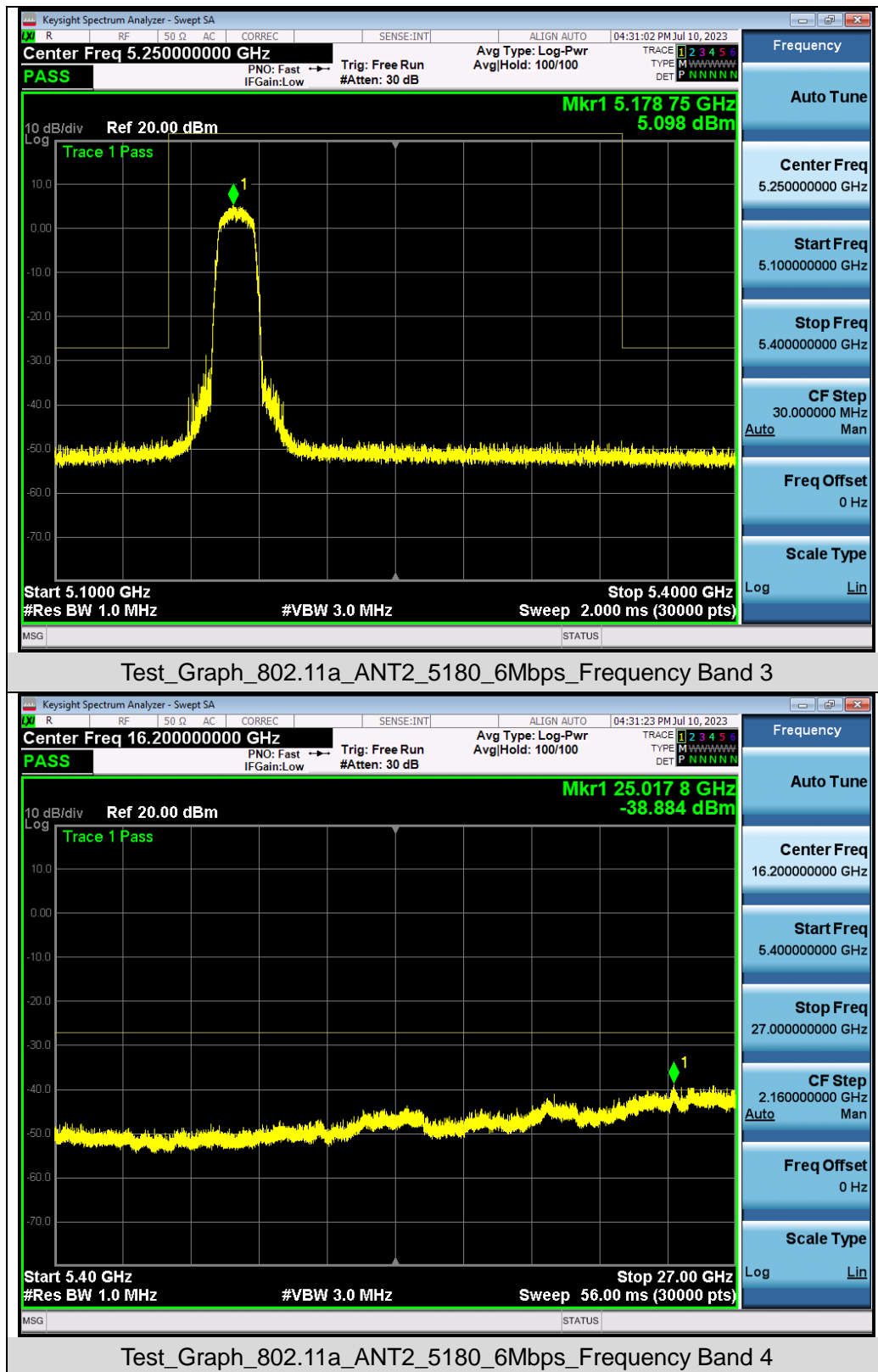
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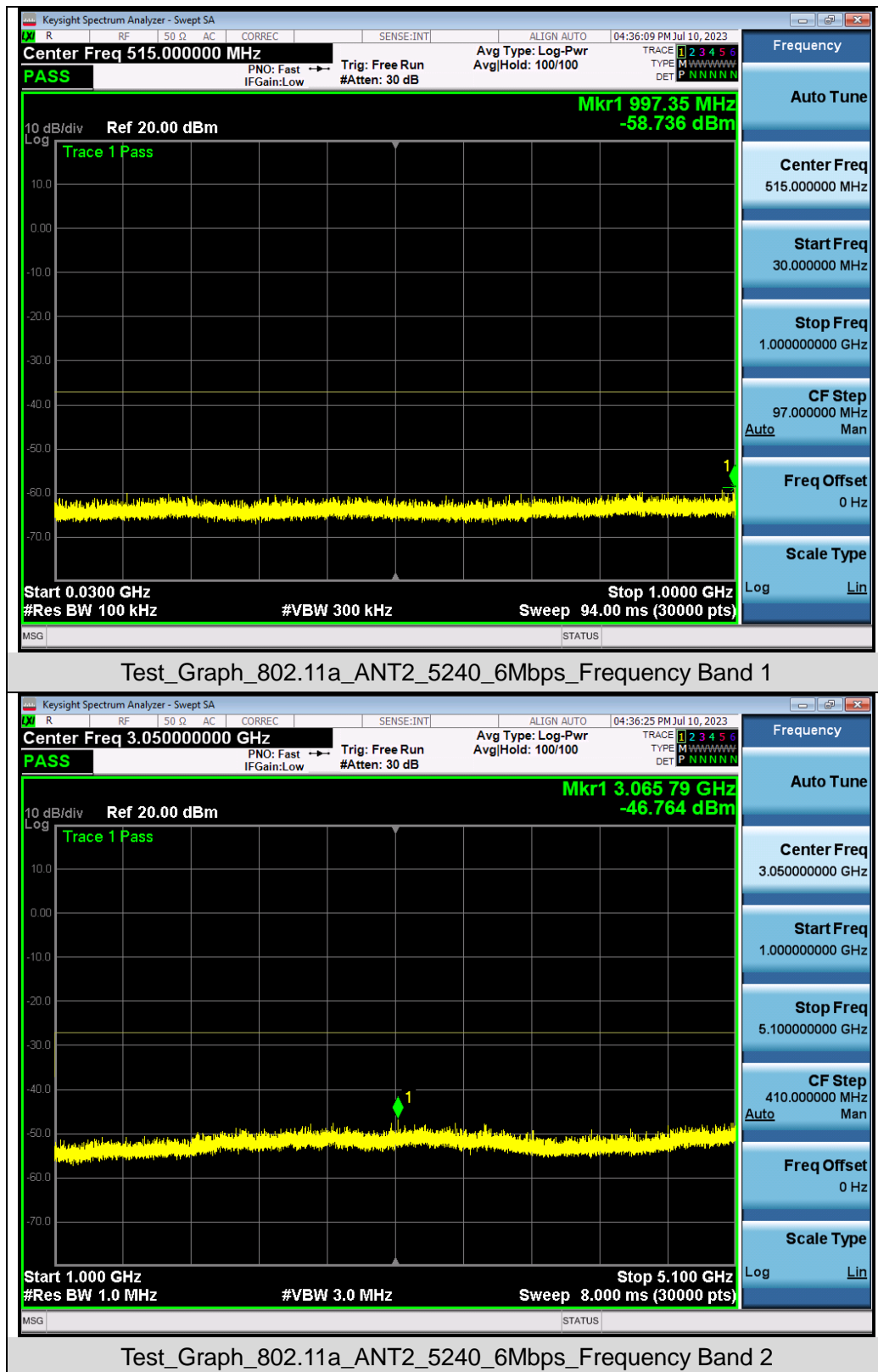


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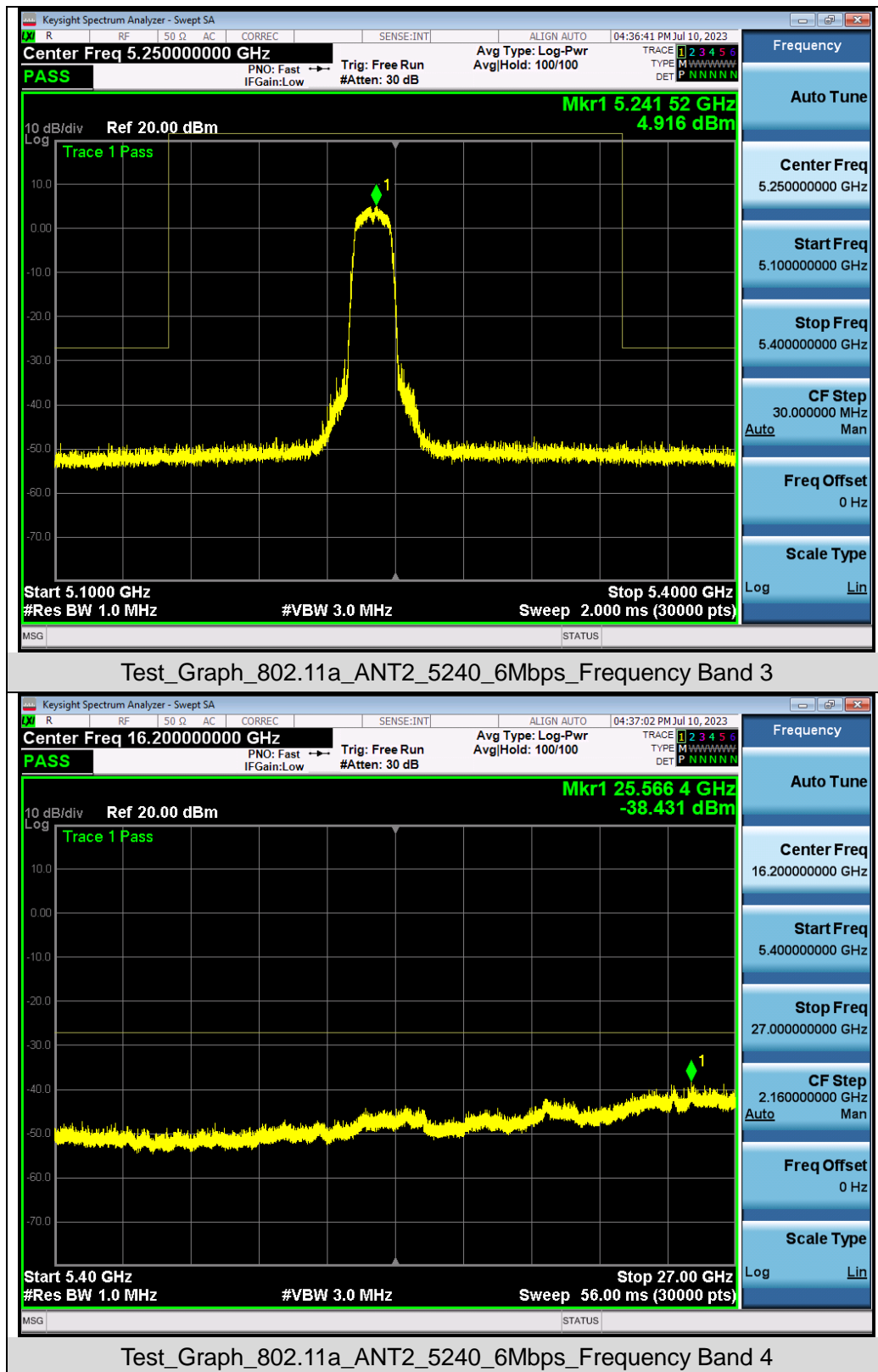




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## 10. RADIATED EMISSION

### 10.1 LIMITS OF RADIATED EMISSION TEST

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Restricted bands	Applicable to	Limit	
	789033 D02 General UNII Test Procedures New Rules v02r01	Field strength at 3m (dBuV/m)	
		PK: 74	AV: 54
Out of the restricted bands	Applicable to	EIRP Limit (dBm/MHz)	Equivalent field Strength at 3m (dBuV/m)
	FCC 15.407(b)(1)	PK: -27	PK: 68.2
	15.407(b)(2)		
	15.407(b)(3)		
	15.407(b)(4)	See Note 2	

Note 1: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000}{3} \sqrt{30 P} \quad \mu\text{V/m, where } P \text{ is the eirp (Watts).}$$

Note 2: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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## 10.2 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.

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 testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04.Section G)  
Unwanted emissions measurement.

**(1) Procedure for Unwanted Emissions Measurements Below 1000MHz:**

- RBW = 120 kHz
- VBW = 300 kHz
- Detector = Peak
- Trace mode = max hold

**(2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz:**

- RBW = 1 MHz
- VBW  $\geq$  3 MHz
- Detector = Peak
- Sweep time = auto
- Trace mode = max hold

**(3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz:**

- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW  $\geq$  1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

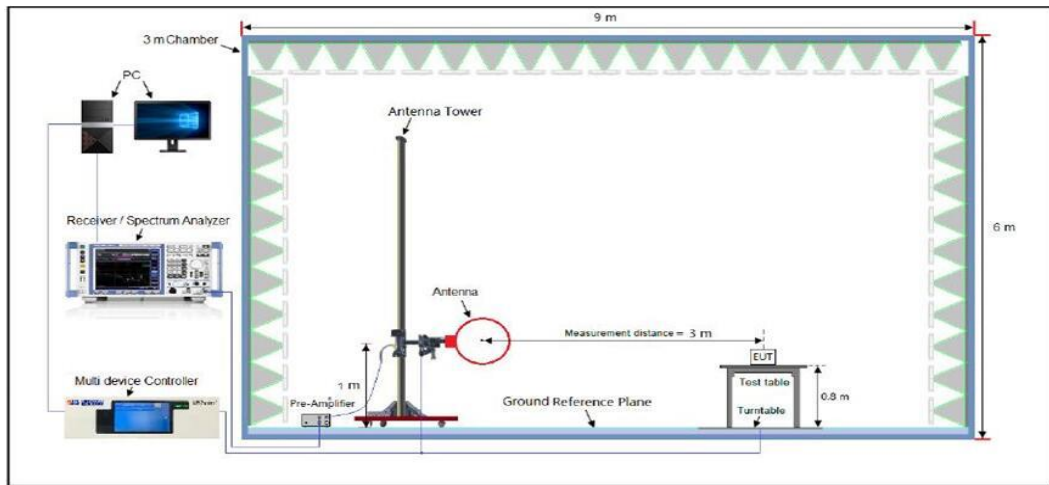
**(4) Procedures for Average Unwanted Emissions Measurements Above 1000MHz:**

- RBW = 1 MHz
- VBW = 3 MHz • Detector = power averaging (rms), set span/(# of points in sweep)  $\geq$  RBW/2.
- Averaging type = power averaging (RMS)
- The correction factor shall be offset is 10 log (1/x), where x is the duty cycle.

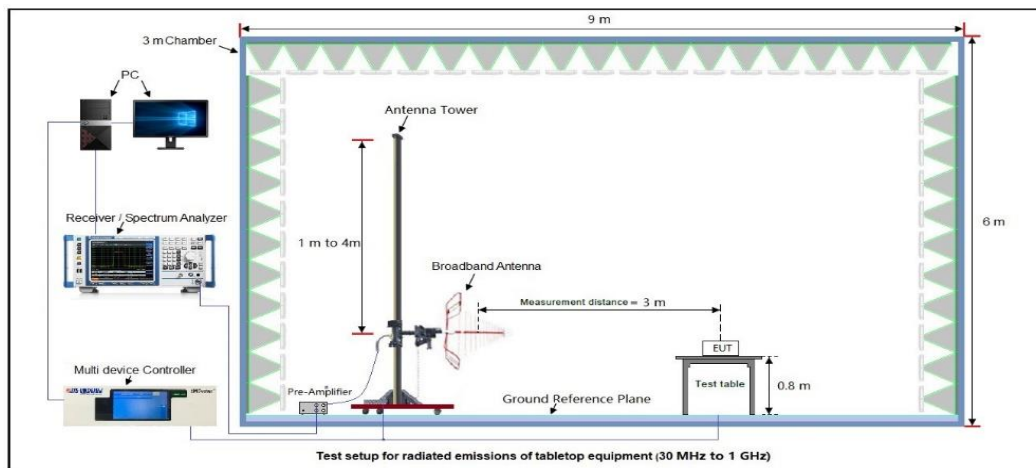
Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

### 10.3 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)

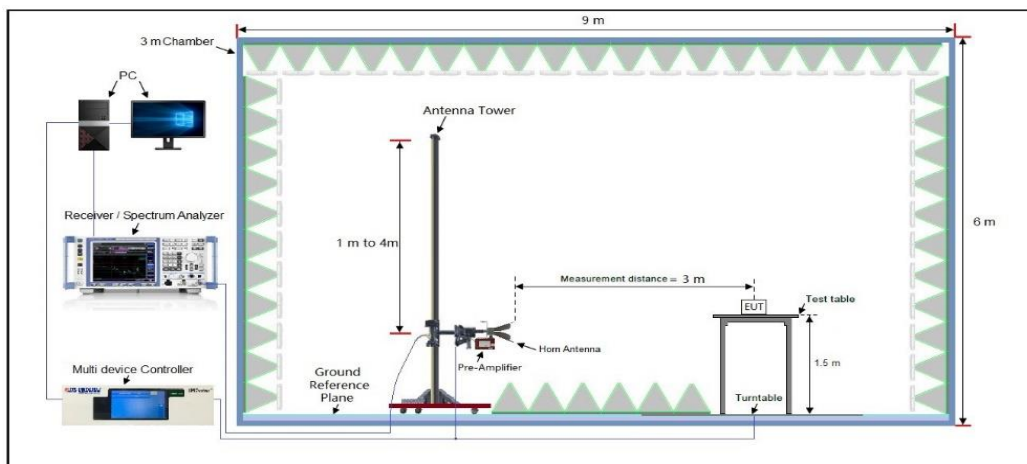
#### RADIATED EMISSION TEST SETUP 9KHz-30MHz



#### RADIATED EMISSION TEST SETUP 30MHz-1000MHz



#### RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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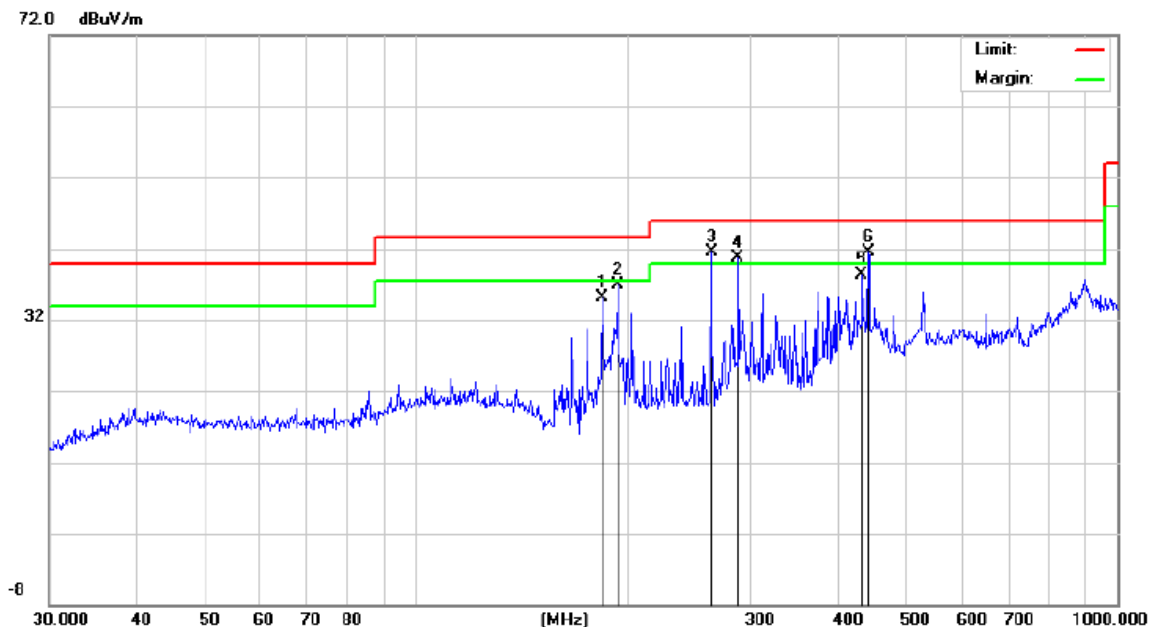
## 10.4 MEASUREMENT RESULT

### Radiated Emission Below 30MHz

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

### Radiated emission from 30MHz to 1000MHz

EUT	Rc Quadcopter	Model Name	X7 Ranger PLUS
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11a20 5180MHz	Antenna	Horizontal



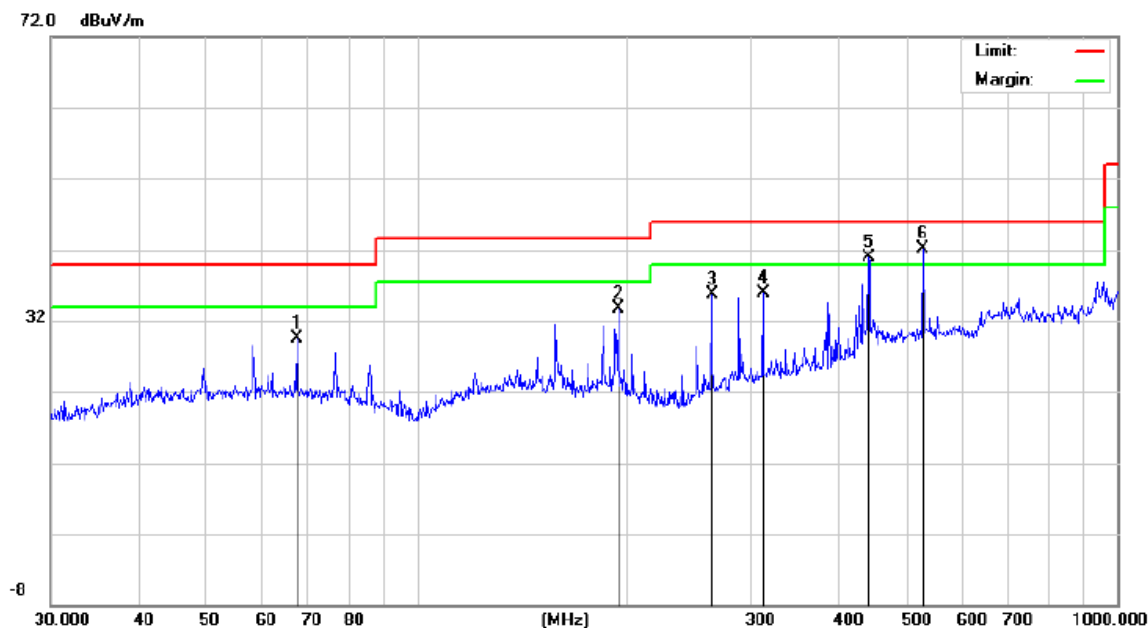
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		184.4898	22.36	12.72	35.08	43.50	-8.42	peak
2		193.7726	23.17	13.78	36.95	43.50	-6.55	peak
3	!	263.8190	26.84	14.63	41.47	46.00	-4.53	peak
4	!	287.9904	26.19	14.54	40.73	46.00	-5.27	peak
5		432.5457	14.82	23.50	38.32	46.00	-7.68	peak
6	*	441.7425	16.47	25.04	41.51	46.00	-4.49	peak

## RESULT: PASS

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EUT	Rc Quadcopter	Model Name	X7 Ranger PLUS
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11a20 5180MHz	Antenna	Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		67.4381	12.38	17.03	29.41	40.00	-10.59	peak
2		193.7726	15.60	18.09	33.69	43.50	-9.81	peak
3		263.8190	17.77	18.00	35.77	46.00	-10.23	peak
4		312.1792	16.18	19.75	35.93	46.00	-10.07	peak
5	!	441.7425	14.91	26.02	40.93	46.00	-5.07	peak
6	*	528.2458	18.36	23.82	42.18	46.00	-3.82	peak

## RESULT: PASS

**Note:** All test channels had been tested. The 802.11a20 at 5180MHz is the worst case and recorded in the test report.

Factor = Antenna Factor + Cable loss - Amplifier gain, Margin= Limit-Level.

The "Factor" value can be calculated automatically by software of measurement system.

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### Radiated emission above 1GHz

<b>EUT</b>	Rc Quadcopter	<b>Model Name</b>	X7 Ranger PLUS
<b>Temperature</b>	25°C	<b>Relative Humidity</b>	60%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	Normal Voltage
<b>Test Mode</b>	802.11a20 5180MHz	<b>Antenna</b>	Horizontal/Vertical

### RADIATED EMISSION ABOVE 1GHZ–Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
10360.042	48.68	9.14	57.82	68.20	-10.38	peak
15540.063	42.34	10.22	52.56	74.00	-21.44	peak
15540.063	33.62	10.22	43.84	54.00	-10.16	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

### RADIATED EMISSION ABOVE 1GHZ–Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
10360.042	48.98	9.14	58.12	68.20	-10.08	peak
15540.063	41.66	10.22	51.88	74.00	-22.12	peak
15540.063	32.39	10.22	42.61	54.00	-11.39	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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<b>EUT</b>	Rc Quadcopter	<b>Model Name</b>	X7 Ranger PLUS
<b>Temperature</b>	25°C	<b>Relative Humidity</b>	60%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	Normal Voltage
<b>Test Mode</b>	802.11a20 5200MHz	<b>Antenna</b>	Horizontal/Vertical

#### RADIATED EMISSION ABOVE 1GHZ–Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
10400.042	47.68	9.14	56.82	68.20	-11.38	peak
15600.063	43.33	10.22	53.55	74.00	-20.45	peak
15600.063	33.41	10.22	43.63	54.00	-10.37	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

#### RADIATED EMISSION ABOVE 1GHZ–Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
10400.042	48.91	9.14	58.05	68.20	-10.15	peak
15600.063	42.82	10.22	53.04	74.00	-20.96	peak
15600.063	32.36	10.22	42.58	54.00	-11.42	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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<b>EUT</b>	Rc Quadcopter	<b>Model Name</b>	X7 Ranger PLUS
<b>Temperature</b>	25°C	<b>Relative Humidity</b>	60%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	Normal Voltage
<b>Test Mode</b>	802.11a20 5240MHz	<b>Antenna</b>	Horizontal/Vertical

#### RADIATED EMISSION ABOVE 1GHZ–Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
10480.042	48.69	9.27	57.96	68.20	-10.24	peak
15720.063	42.37	10.38	52.75	74.00	-21.25	peak
15720.063	32.69	10.38	43.07	54.00	-10.93	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

#### RADIATED EMISSION ABOVE 1GHZ–Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
10480.042	47.71	9.27	56.98	68.20	-11.22	peak
15720.063	42.93	10.38	53.31	74.00	-20.69	peak
15720.063	33.37	10.38	43.75	54.00	-10.25	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

#### Note:

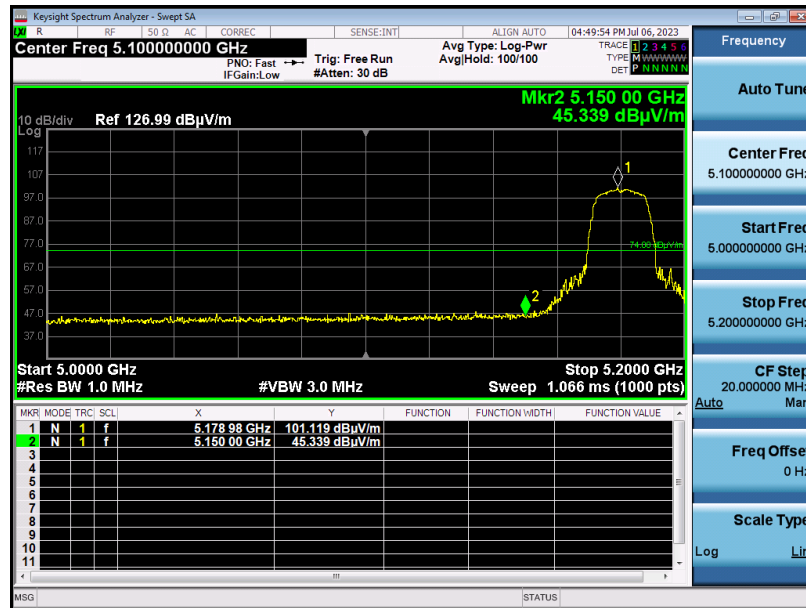
1. All the ANT had been tested. The ANT 1 is the worst case and recorded in the test report.
2. Other frequencies radiation emission from 1GHz to 40GHz at least have 20dB margin and not recorded in the test report.
3. Factor = Antenna Factor + Cable loss - Amplifier gain, Margin= Limit-Level.
4. The “Factor” value can be calculated automatically by software of measurement system.

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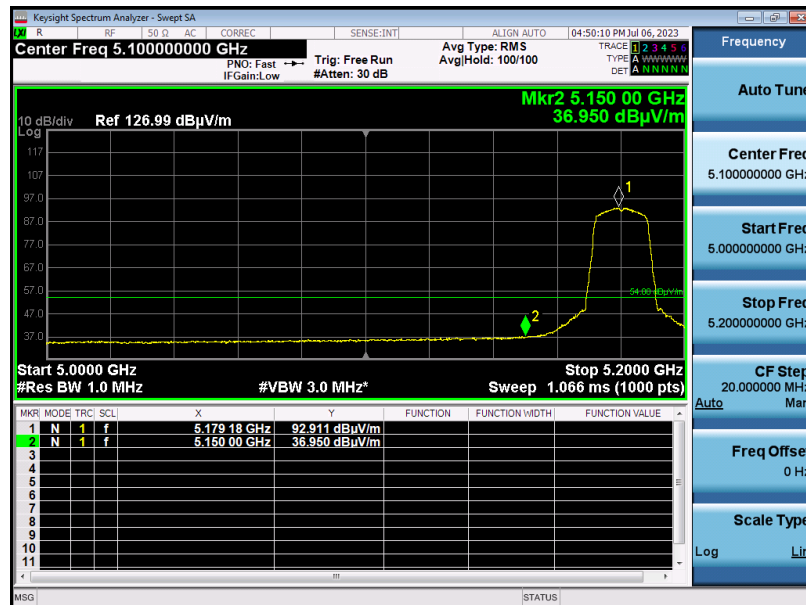
**Test result for band edge emission at restricted bands 5.150GHz~5.250GHz\_ANT 1**

EUT	Rc Quadcopter	Model Name	X7 Ranger PLUS
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11a20 5180MHz	Antenna	Horizontal

**Test Graph for Peak Measurement**



**Test Graph for Average Measurement**



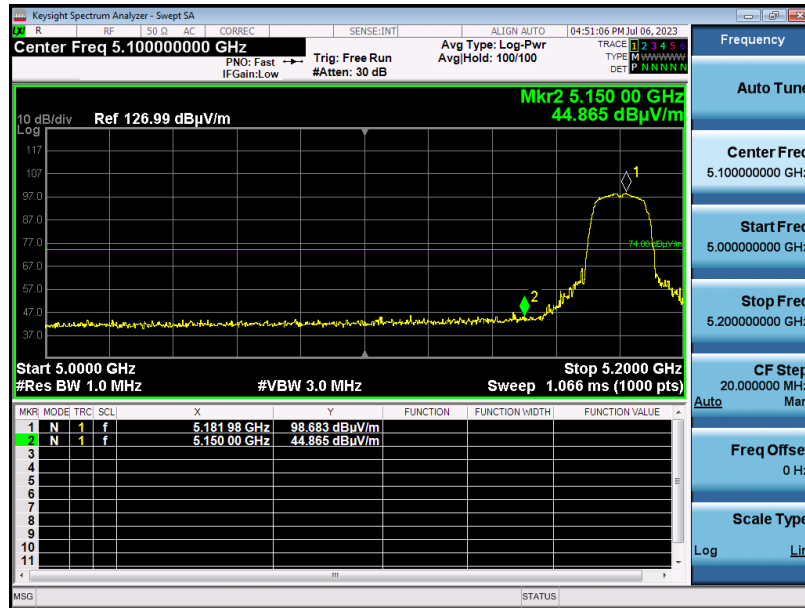
**RESULT: PASS**

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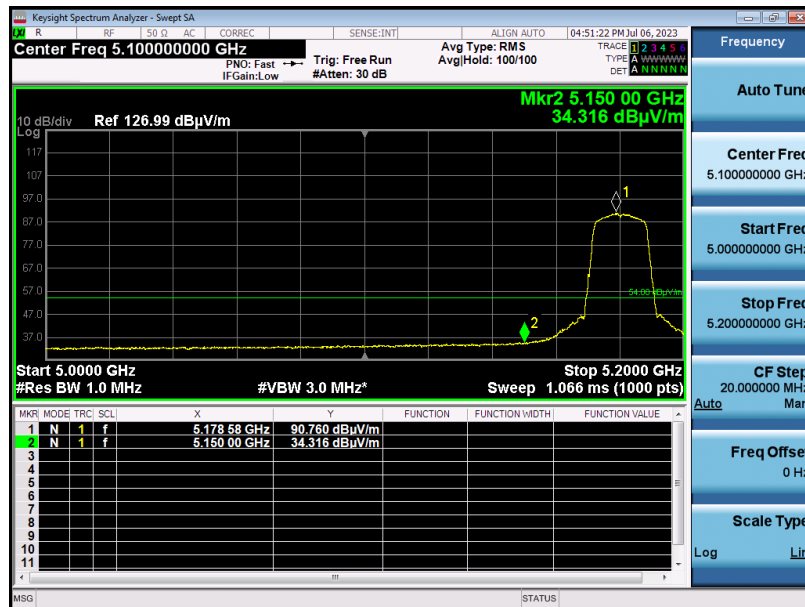
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Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd  
Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/

EUT	Rc Quadcopter	Model Name	X7 Ranger PLUS
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11a20 5180MHz	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



**RESULT: PASS**

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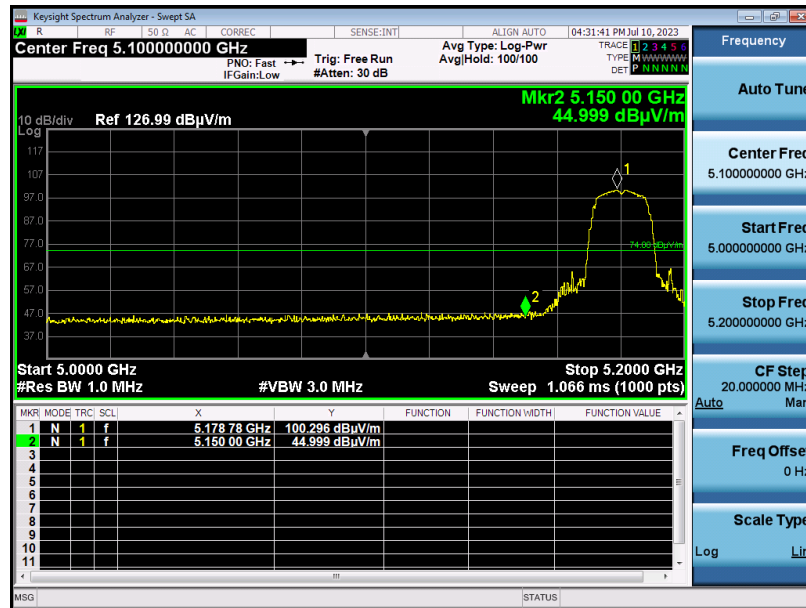
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Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd  
Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/



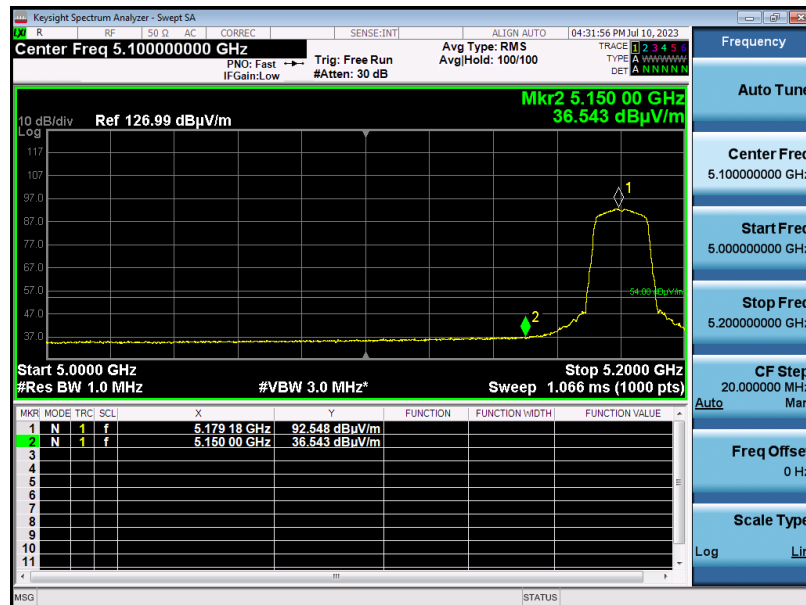
**Test result for band edge emission at restricted bands 5.150GHz~5.250GHz\_ANT 2**

EUT	Rc Quadcopter	Model Name	X7 Ranger PLUS
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11a20 5180MHz	Antenna	Horizontal

**Test Graph for Peak Measurement**



**Test Graph for Average Measurement**



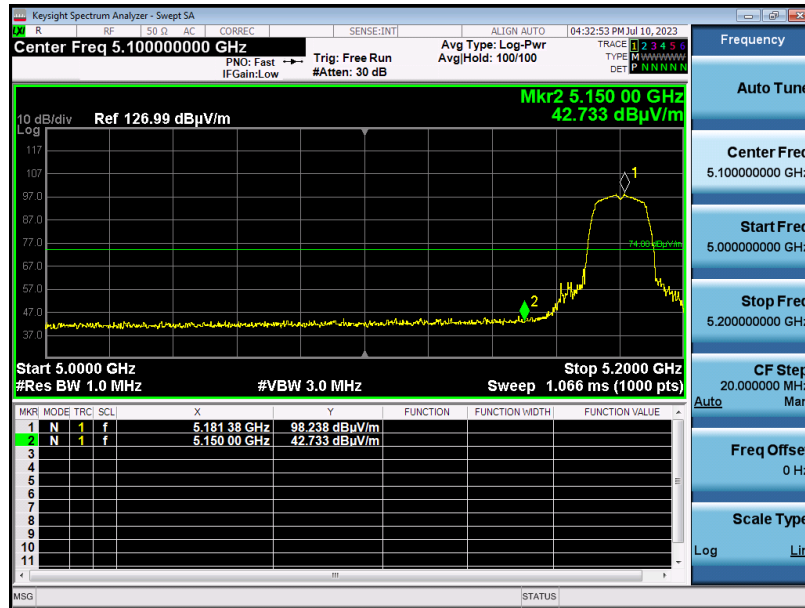
**RESULT: PASS**

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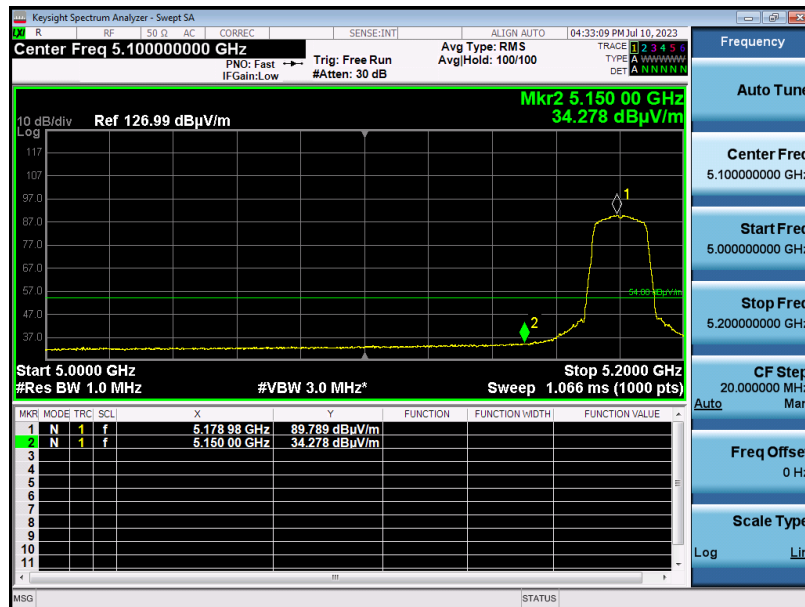
Attestation of Global Compliance(Shenzhen)Co., Ltd  
Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd  
Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/

EUT	Rc Quadcopter	Model Name	X7 Ranger PLUS
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11a20 5180MHz	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



## RESULT: PASS

Note:

- The factor had been edited in the “Input Correction” of the Spectrum Analyzer.

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## 11. AC POWER LINE CONDUCTED EMISSION TEST

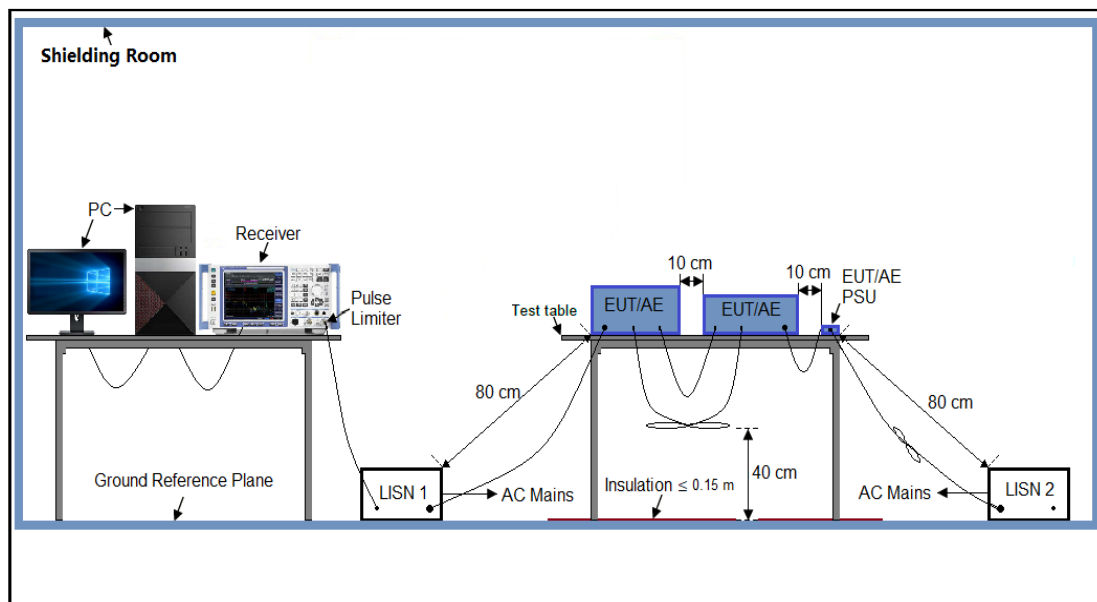
### 11.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P (dB $\mu$ V)	Average (dB $\mu$ V)
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 0.50MHz.

### 11.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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### 11.3. 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 charging voltage by adapter which received 120V/60Hz power by a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using 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.

### 11.4. 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 was reported on the Summary Data page.

### 11.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

N/A

Note: The EUT cannot transmit when charging.

## **APPENDIX I: PHOTOGRAPHS OF TEST SETUP**

Refer to the Report No.: AGC15798230670AP02

## **APPENDIX II: PHOTOGRAPHS OF EUT**

Refer to the Report No.: AGC15798230670AP03

**----END OF REPORT----**

Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by [agc01@agccert.com](mailto:agc01@agccert.com).

Attestation of Global Compliance(Shenzhen)Co., Ltd

Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd

Tel: +86-755 2523 4088 E-mail: [agc@agccert.com](mailto:agc@agccert.com) Web: <http://www.agccert.com/>



## Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the “Company”) solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the “Clients”).
2. Any report issued by Company as a result of this application for testing services (the “Report”) shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.
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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