



# FCC RF Test Report

**APPLICANT** : OnePlus Technology (Shenzhen) Co.,Ltd.  
**EQUIPMENT** : Smart Phone  
**BRAND NAME** : ONEPLUS  
**MODEL NAME** : NE2217, NE2215  
**FCC ID** : 2ABZ2-AA438  
**STANDARD** : FCC Part 15 Subpart C §15.209  
**CLASSIFICATION** : (DCD) Part 15 Low Power Transmitter Below 1705 kHz  
**TEST DATE(S)** : Nov. 02, 2021 ~ Nov. 13, 2021

We, Sporton International (ShenZhen) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (ShenZhen) Inc., the test report shall not be reproduced except in full.

Reviewed by: Derreck Chen / Supervisor

Approved by: Eric Shih / Manager



**Sportun International (ShenZhen) Inc.**

1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055  
People's Republic of China



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### Appendix A. Setup Photographs



## History of this test report



## Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	2.1049	20dB Bandwidth	Reporting Only	-
3.1	2.1049	99% Occupied Bandwidth	Reporting Only	-
3.2	15.209	Radiated Emission	Pass	Under limit 16.51 dB at 849.650 MHz
3.3	15.207	AC Conducted Emission	Pass	Under limit 7.76 dB at 0.200 MHz
3.4	15.203	Antenna Requirements	Pass	-

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.



## 1 General Description

### 1.1 Applicant

**OnePlus Technology (Shenzhen) Co.,Ltd.**

18C02, 18C03, 18C04, 18C05, Shum Yip Terra Building, Binhe Avenue North, Futian District, Shenzhen, Guangdong, China.

### 1.2 Manufacturer

**OnePlus Technology (Shenzhen) Co.,Ltd.**

18C02, 18C03, 18C04, 18C05, Shum Yip Terra Building, Binhe Avenue North, Futian District, Shenzhen, Guangdong, China.

### 1.3 Product Feature of Equipment Under Test

Product Feature	
<b>Equipment</b>	Smart Phone
<b>Brand Name</b>	ONEPLUS
<b>Model Name</b>	NE2217, NE2215
<b>FCC ID</b>	2ABZ2-AA438
<b>IMEI Code</b>	Conducted: 861679050034387 Conduction: 861679050034163 Radiation: 861679050034122
<b>HW Version</b>	11
<b>SW Version</b>	NE2217_11_A.02
<b>WPT Frequency Range</b>	110 ~ 148.5kHz
<b>WPT Type of Modulation</b>	ASK
<b>WPT Antenna Type</b>	Fixed Internal Antenna
<b>EUT Stage</b>	Production Unit

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

### 1.4 Modification of EUT

No modifications are made to the EUT during all test items.



## 1.5 Test Location

Sportun International (Shenzhen) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

<b>Test Firm</b>	Sportun International (Shenzhen) Inc.		
<b>Test Site Location</b>	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
<b>Test Site No.</b>	<b>Sportun Site No.</b>	<b>FCC Designation No.</b>	<b>FCC Test Firm Registration No.</b>
	CO01-SZ TH01-SZ	CN1256	421272

<b>Test Firm</b>	Sportun International (Shenzhen) Inc.		
<b>Test Location Site</b>	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398		
<b>Test Site No.</b>	<b>Sportun Site No.</b>	<b>FCC Designation No.</b>	<b>FCC Test Firm Registration No.</b>
	03CH05-SZ	CN1256	421272

## 1.6 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH05-SZ	AUDIX	E3	6.2009-8-24a1
2.	CO01-SZ	AUDIX	E3	6.120613b

## 1.7 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.209, §15.207
- FCC KDB 414788 D01 Radiated Test Site v01r01.
- ANSI C63.10-2013

**Remark:** All test items were verified and recorded according to the standards and without any deviation during the test.



## 2 Test Configuration of Equipment Under Test

### 2.1 Test Mode

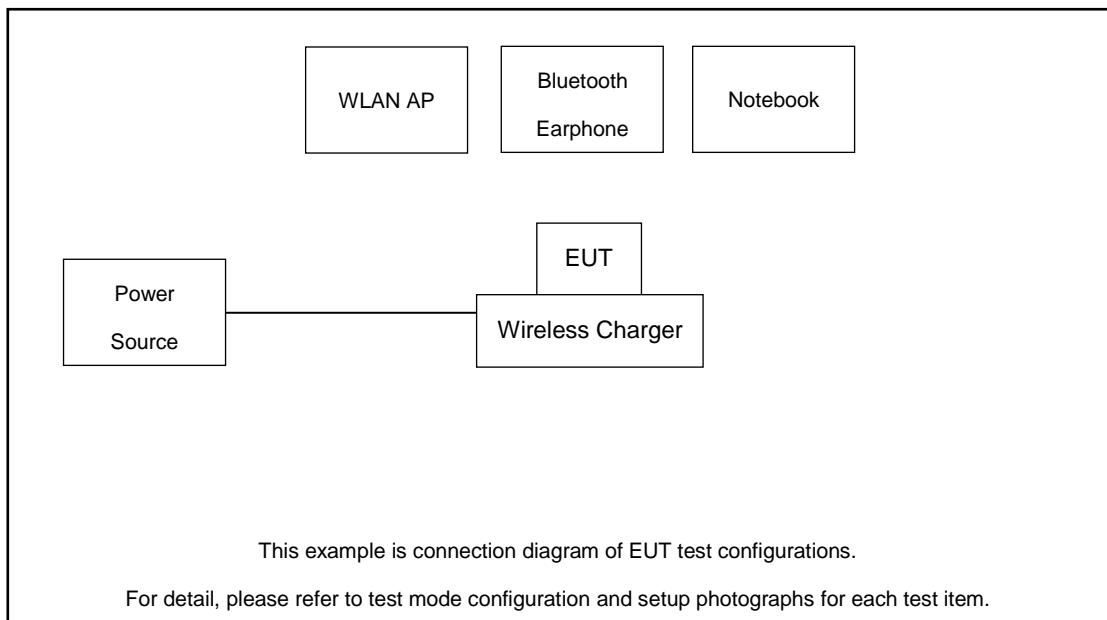
- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 1000 MHz).
- b. AC power line Conducted Emission was tested under maximum output power.

Test Items	Function Type
<b>20dB and 99% Occupied Bandwidth</b>	Mode 1: EUT + Battery + Other phone (Power-on State with Battery 90%) Wireless Charging from EUT Mode 2: EUT + Battery + Other phone (Power-off State) Wireless Charging from EUT
<b>AC Conducted Emission</b>	Mode 1: Bluetooth Link + WLAN 2.4GHz Link + Battery + Charing from Wireless Charger
<b>Radiated Emission</b>	Mode 1: EUT + Battery + Other phone (Power-on State with Battery 20%) Wireless Charging from EUT Mode 2: EUT + Battery + Other phone (Power-on State with Battery 50%) Wireless Charging from EUT Mode 3: EUT + Battery + Other phone (Power-on State with Battery 90%) Wireless Charging from EUT Mode 4: EUT(with Battery 50%) + Battery + Other phone (Power-off State) Wireless Charging from EUT

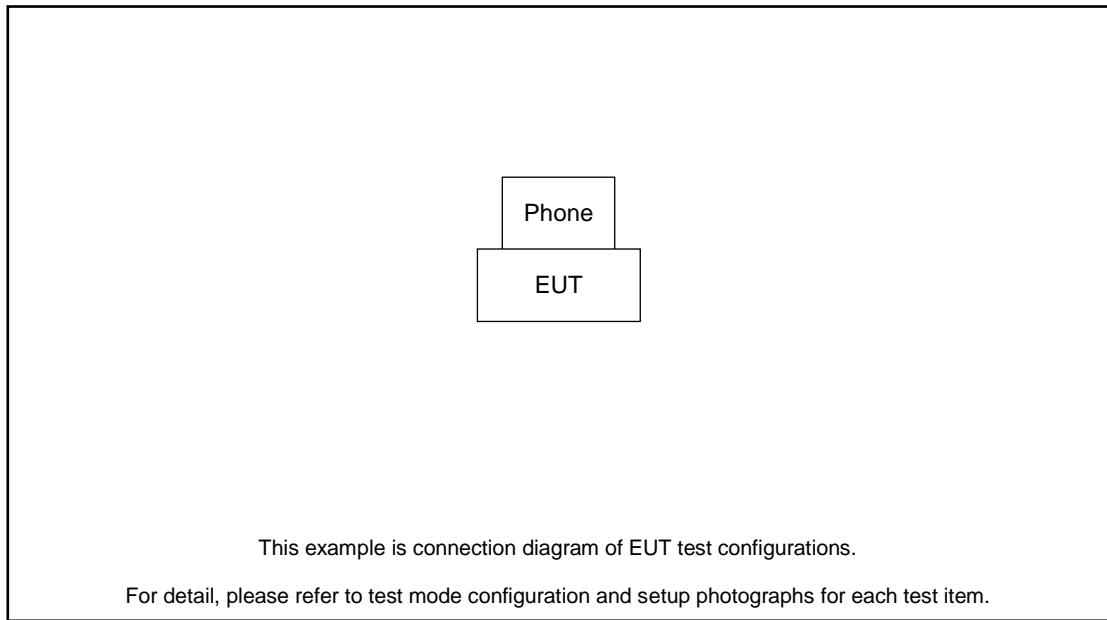
**Remark:** The worst case of radiated emission is mode 4; only the test data of it was reported.

## 2.2 Connection Diagram of Test System

### Conducted Emission:



### Radiated Emission:





## 2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	Dlink	DIR-820L	KA2IR820LA1	N/A	Unshielded, 1.8m
2.	Bluetooth Earphone	Samsung	EO-MG900	PYAH5-107W	N/A	N/A
3.	Notebook	Lenovo	E540	FCC DoC	Lenovo	E540
4.	Phone	ONEPLUS	N/A	N/A	N/A	N/A
5.	Wireless Charger	N/A	N/A	N/A	N/A	N/A

### 3 Test Result

#### 3.1 20dB and 99% Occupied Bandwidth Measurement

##### 3.1.1 Limit of 20dB and 99% Occupied Bandwidth

Reporting only

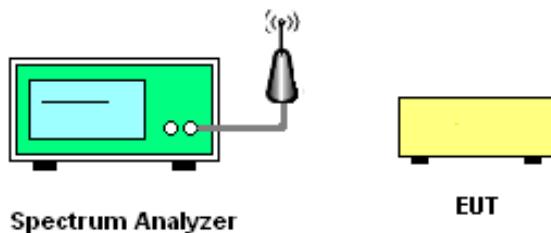
##### 3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

##### 3.1.3 Test Procedures

1. The 20dB bandwidth is measured with a spectrum analyzer connected via a receiver antenna placed near the EUT while wirelessly charging a charging board.
2. Use the following spectrum analyzer settings for 99 % Bandwidth measurement.
3. Measure and record the results in the test report.

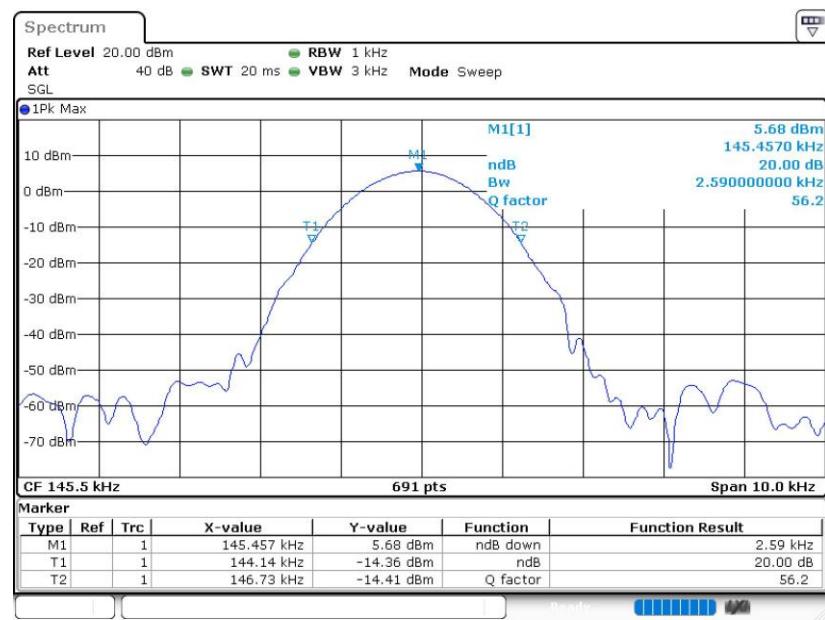
##### 3.1.4 Test Setup



### 3.1.5 Test Result of 20dB and 99% Bandwidth

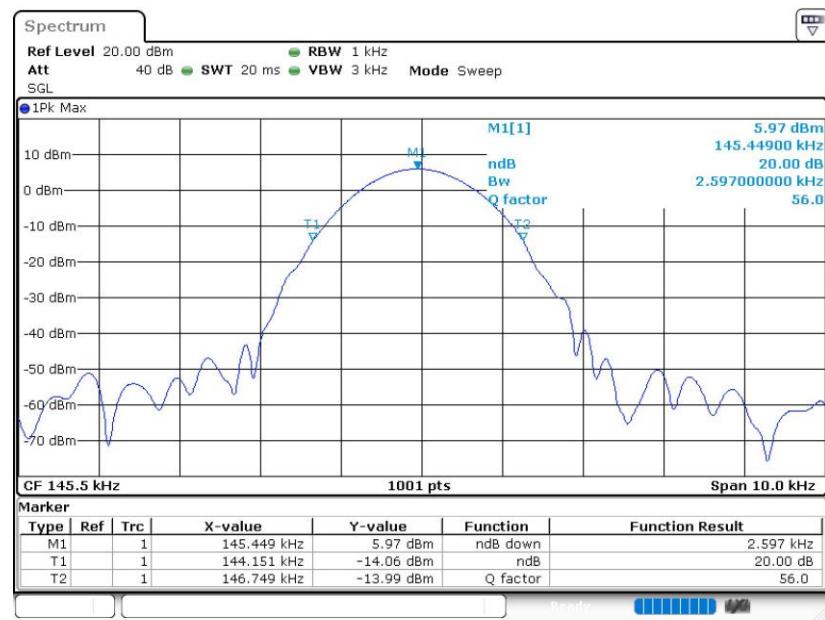
#### Mode 1

##### 20 dB Bandwidth Plot

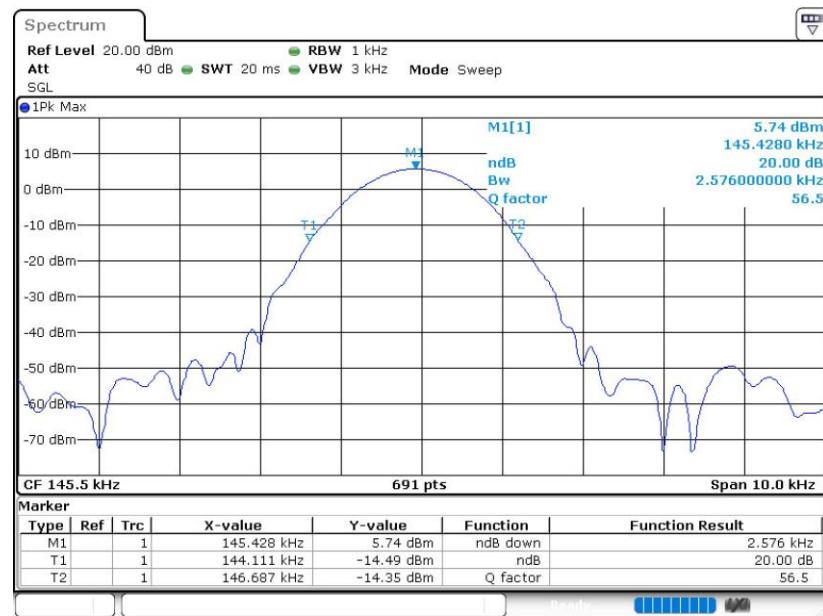


Date: 12.NOV.2021 16:10:29

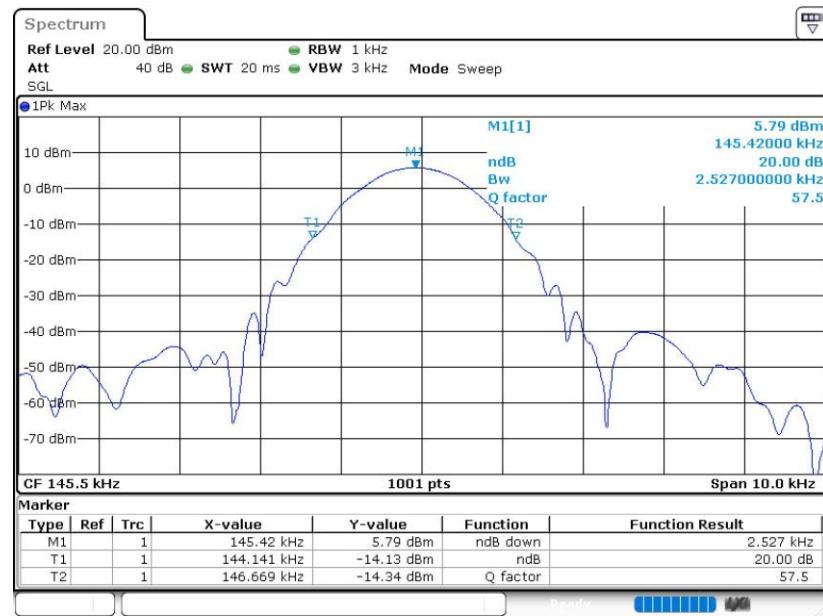
##### 99% Occupied Bandwidth Plot



Date: 12.NOV.2021 16:00:40

**Mode 2****20 dB Bandwidth Plot**

Date: 12.NOV.2021 16:10:47

**99% Occupied Bandwidth Plot**

Date: 12.NOV.2021 16:05:26



## 3.2 Radiated Emission Measurement

### 3.2.1 Limit of Radiated Emission

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following 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

Receiver Parameter	Setting
Frequency Range: 9kHz~150kHz	RBW 200Hz for QP
Frequency Range: 150kHz~30MHz	RBW 9kHz for QP
Frequency Range: 30MHz~1000MHz	RBW 120kHz for Peak

**Note:** The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

For radiated emissions from 9kHz to 1GHz test distance is 3m

For 9kHz ~ 30MHz

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB);
3. specific line (dB $\mu$ V/m) =  $20 \log \text{Emission level} (\mu\text{V}/\text{m})$
4. Limit line = specific limits (dB $\mu$ V/m) + distance extrapolation factor.

### 3.2.2 Measuring Instruments

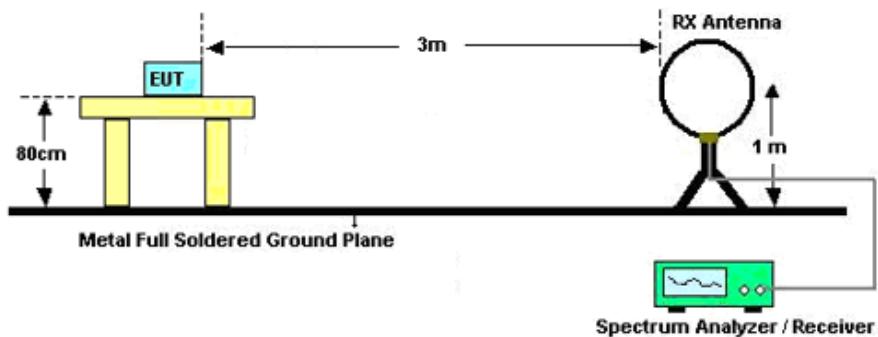
See list of measuring equipment of this test report.

### 3.2.3 Measuring Instrument Setting

Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission for three EUT orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for this test in order to get the good signal level.

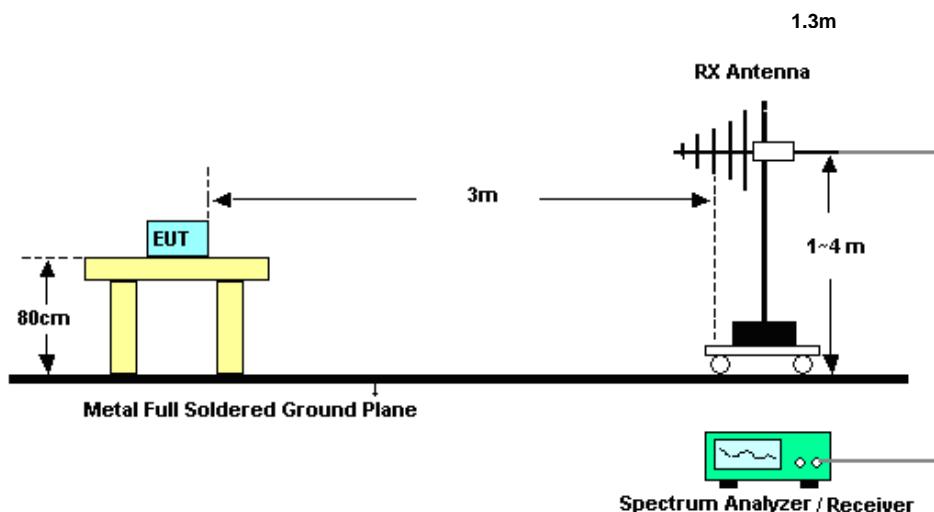
### 3.2.4 Test Setup of Radiated Emission

For radiated emissions below 30MHz



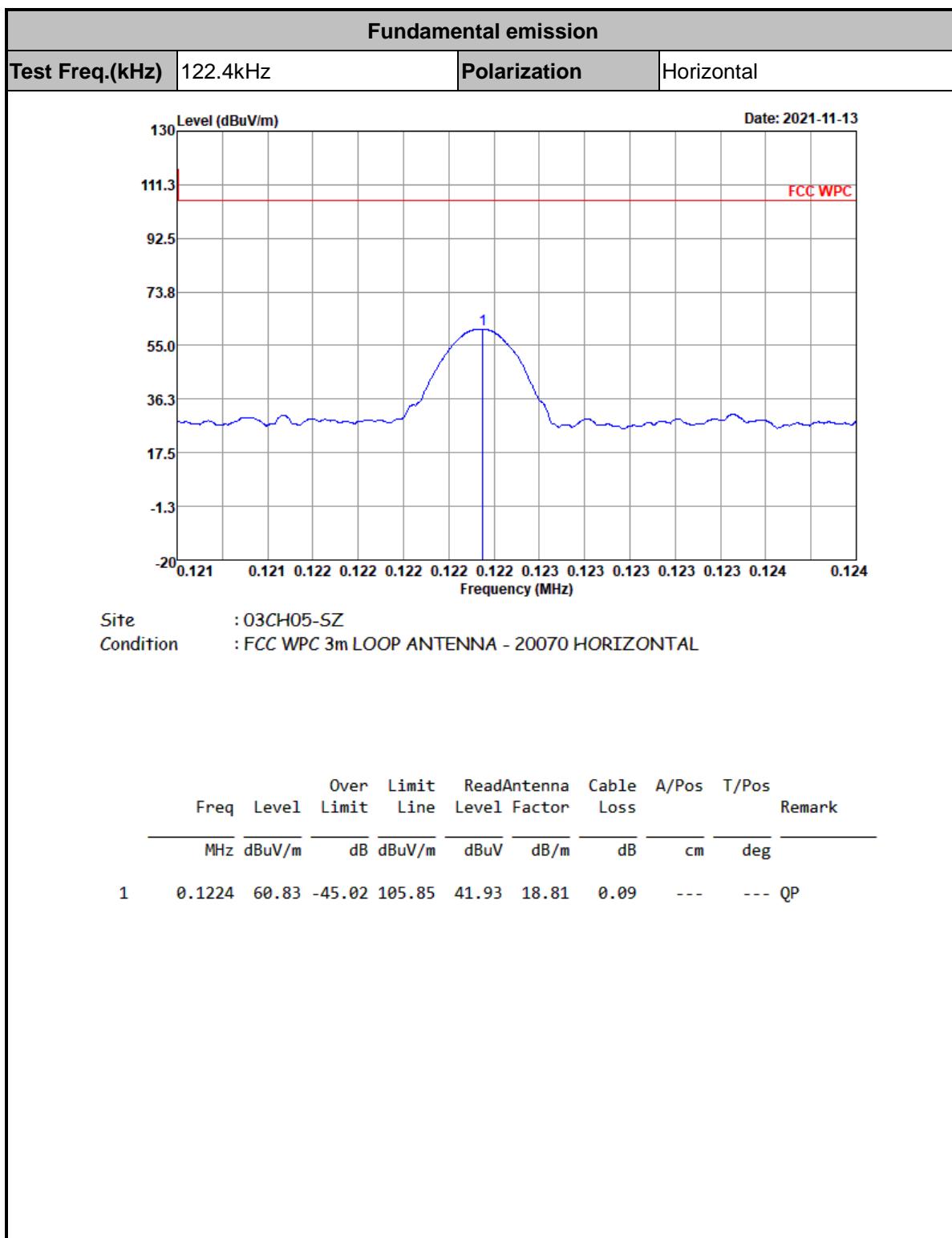
**Note:** There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

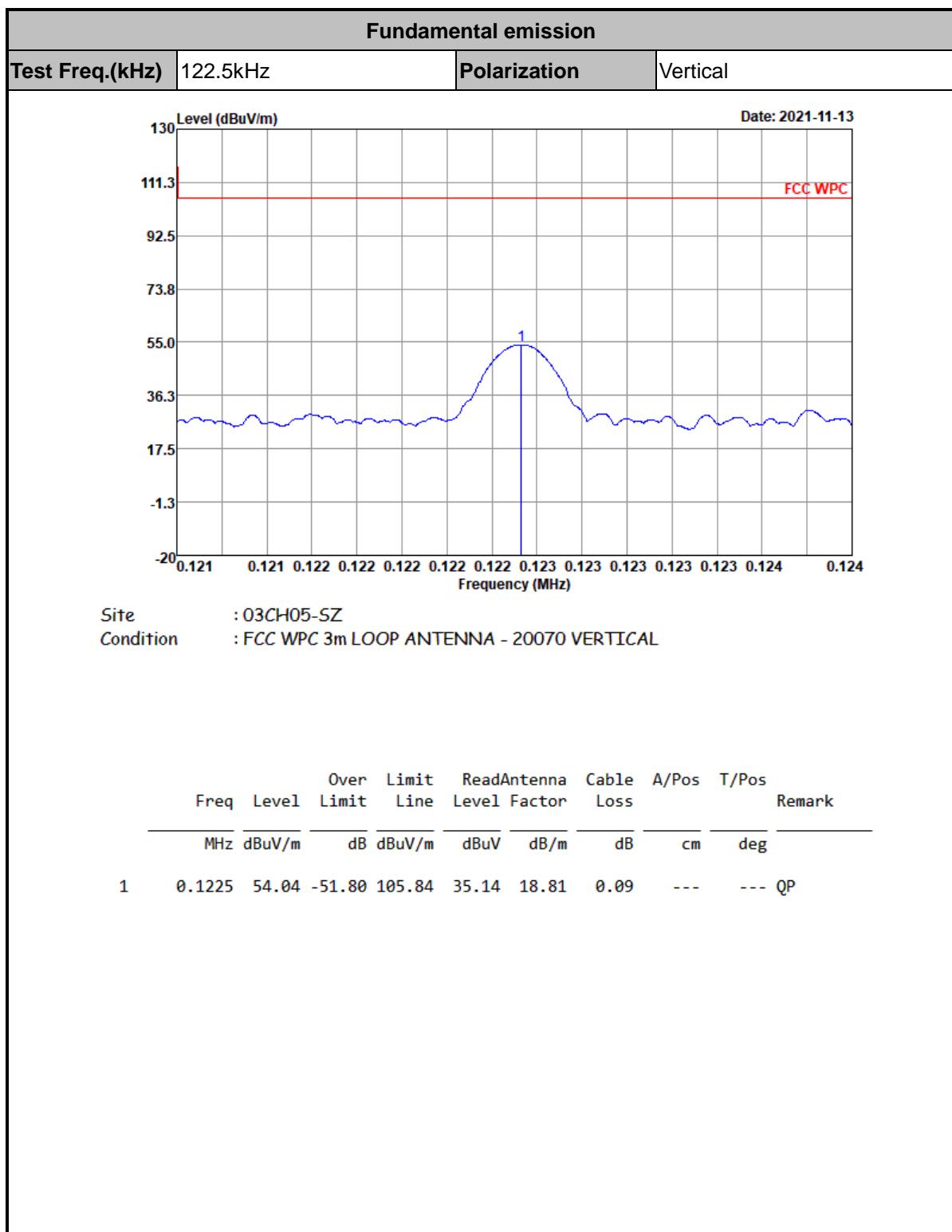
For radiated emissions above 30MHz

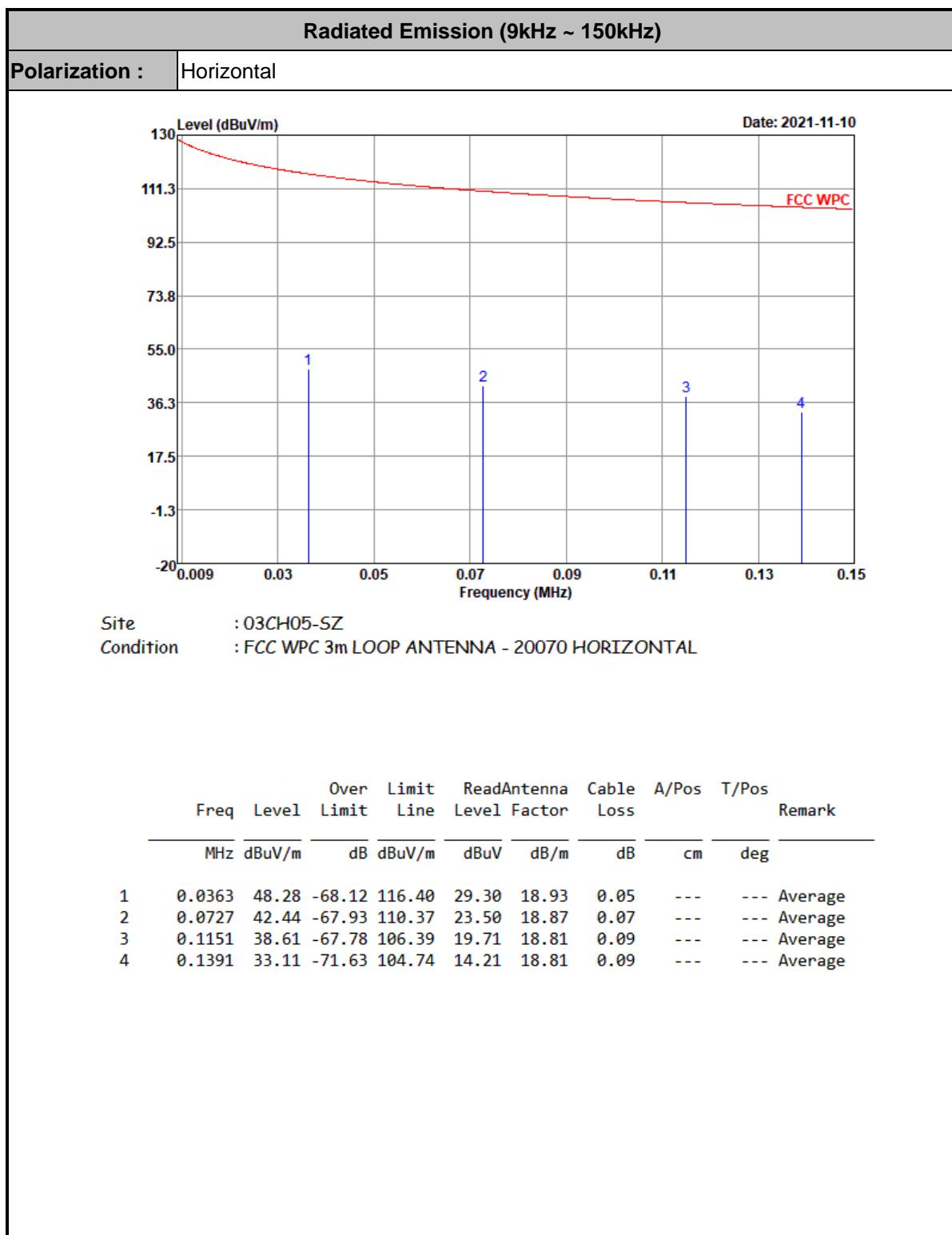


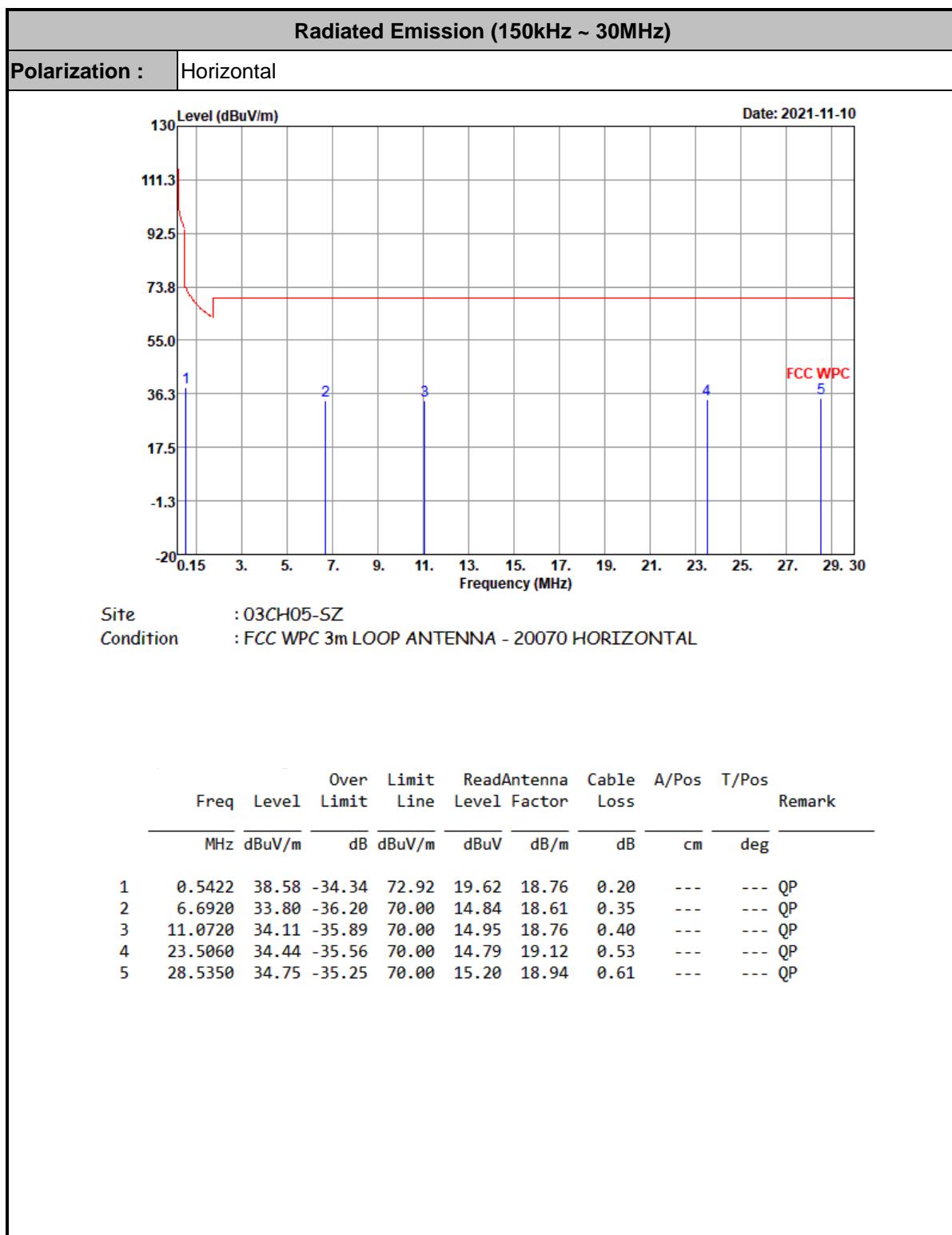


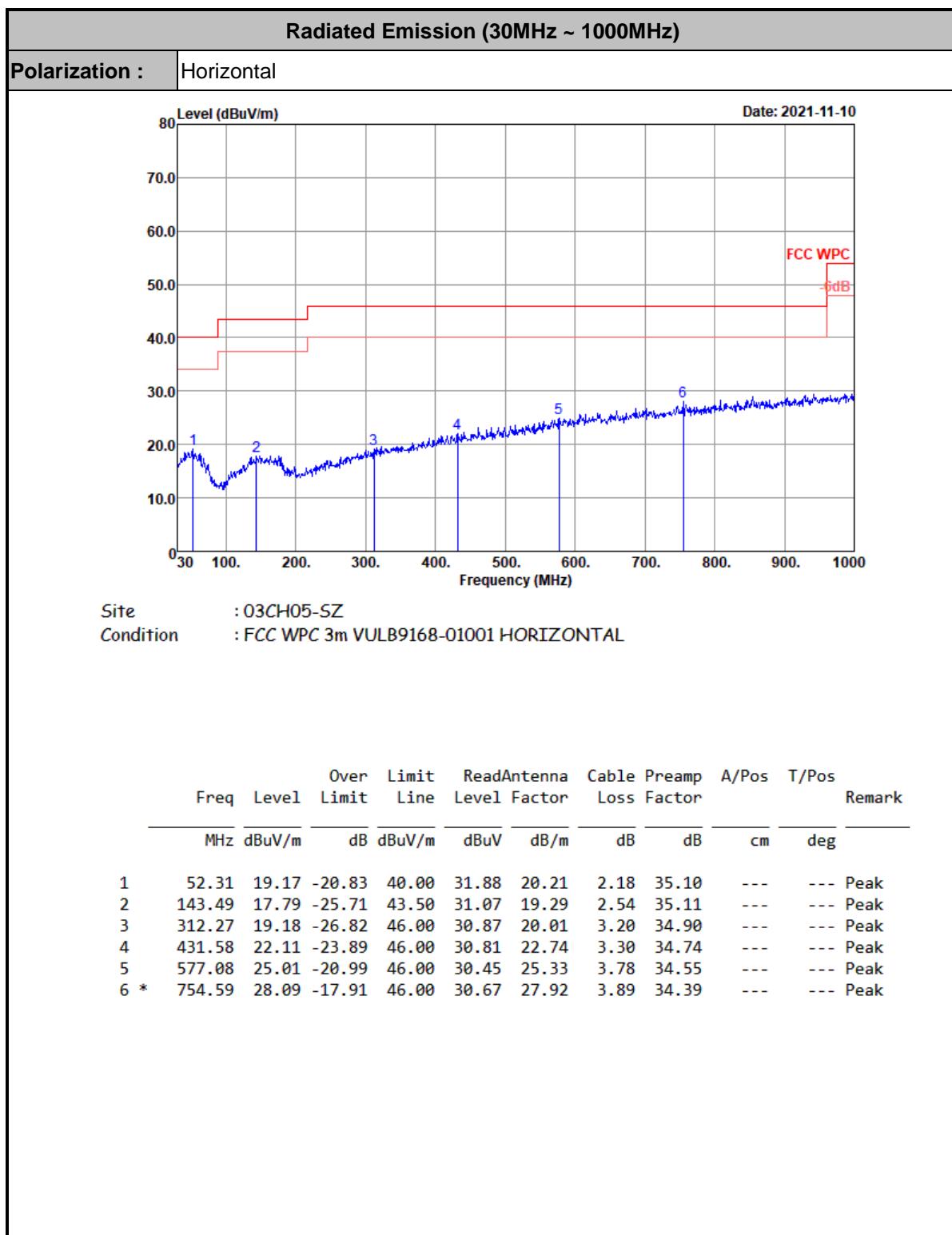
## 3.2.5 Test Result of Radiated Emission

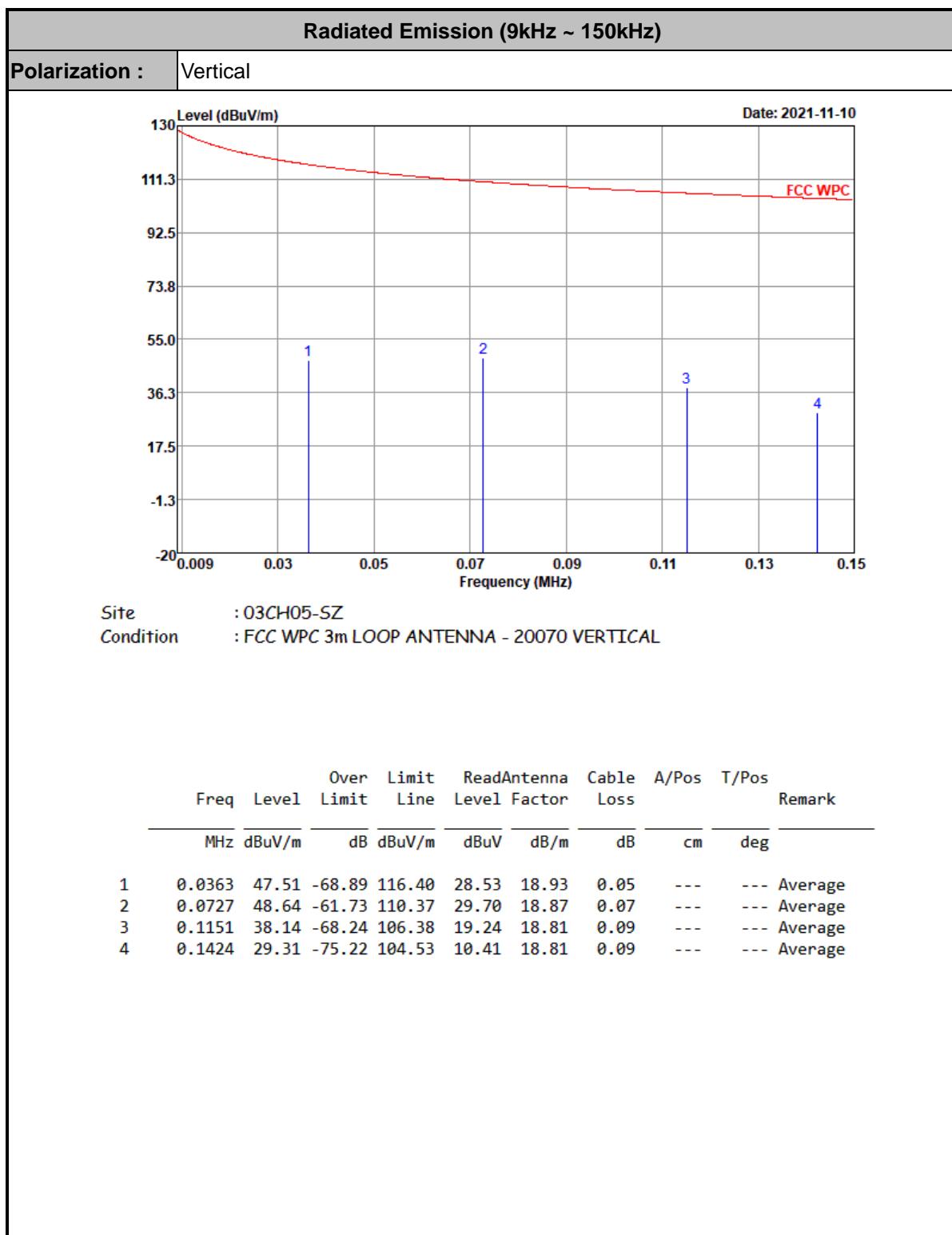


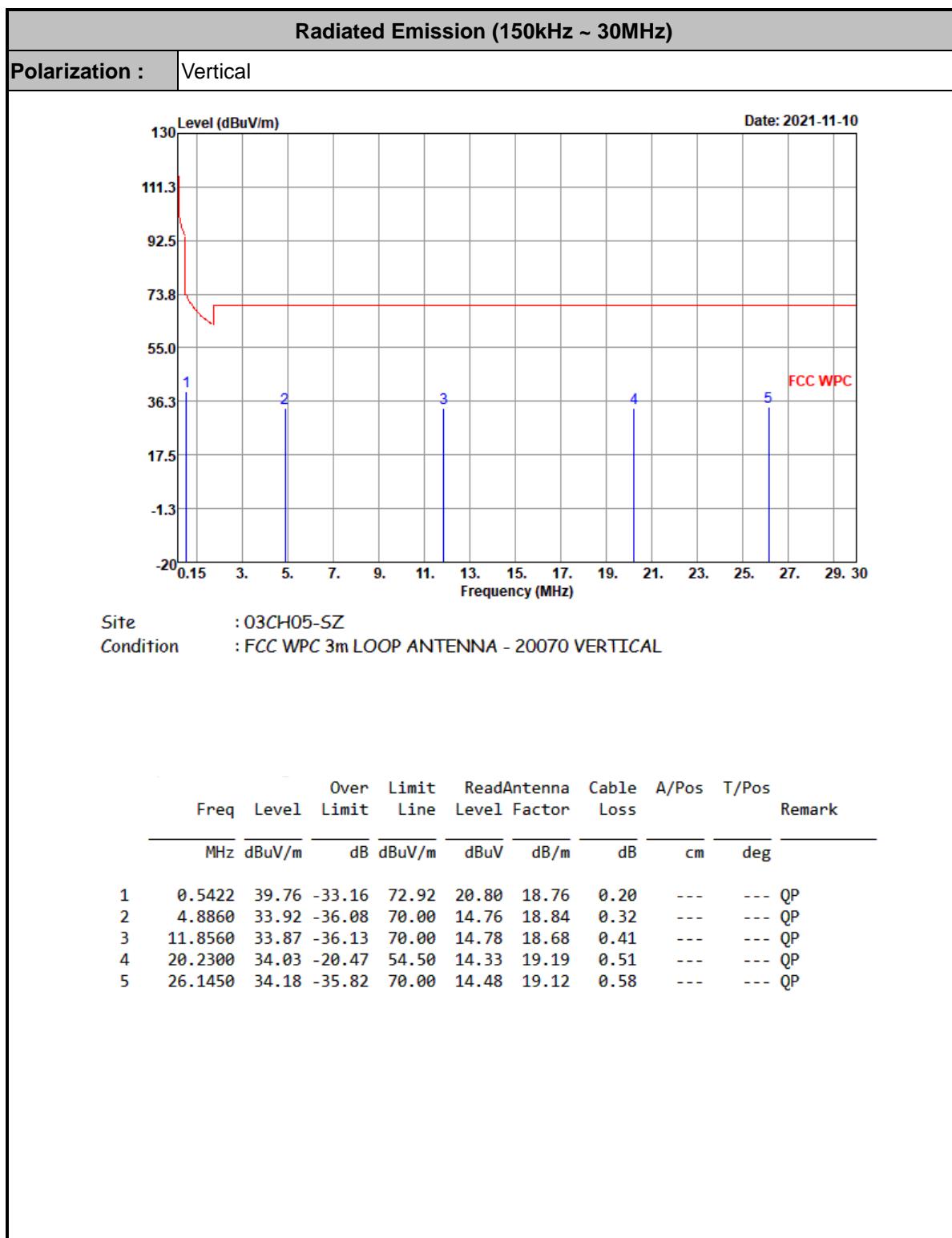


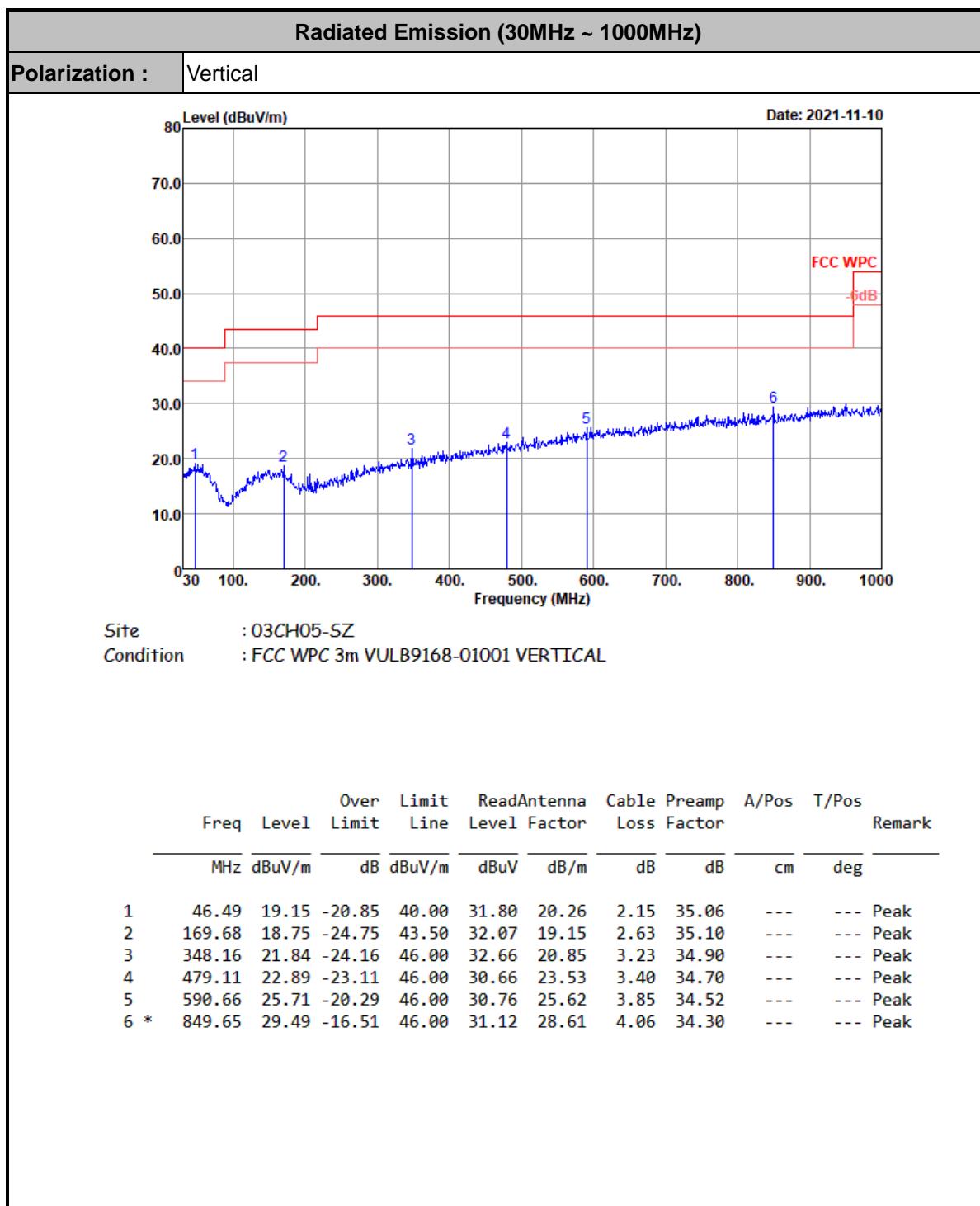












Note:

1. Level(dB $\mu$ V/m) = Read Level(dB $\mu$ V) + Antenna Factor(dB/m) + Cable Loss(dB) - Preamp Factor(dB)
2. Over Limit(dB) = Level(dB $\mu$ V/m) - Limit Line(dB $\mu$ V/m)



### 3.3 AC Conducted Emission Measurement

#### 3.3.1 Limits of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

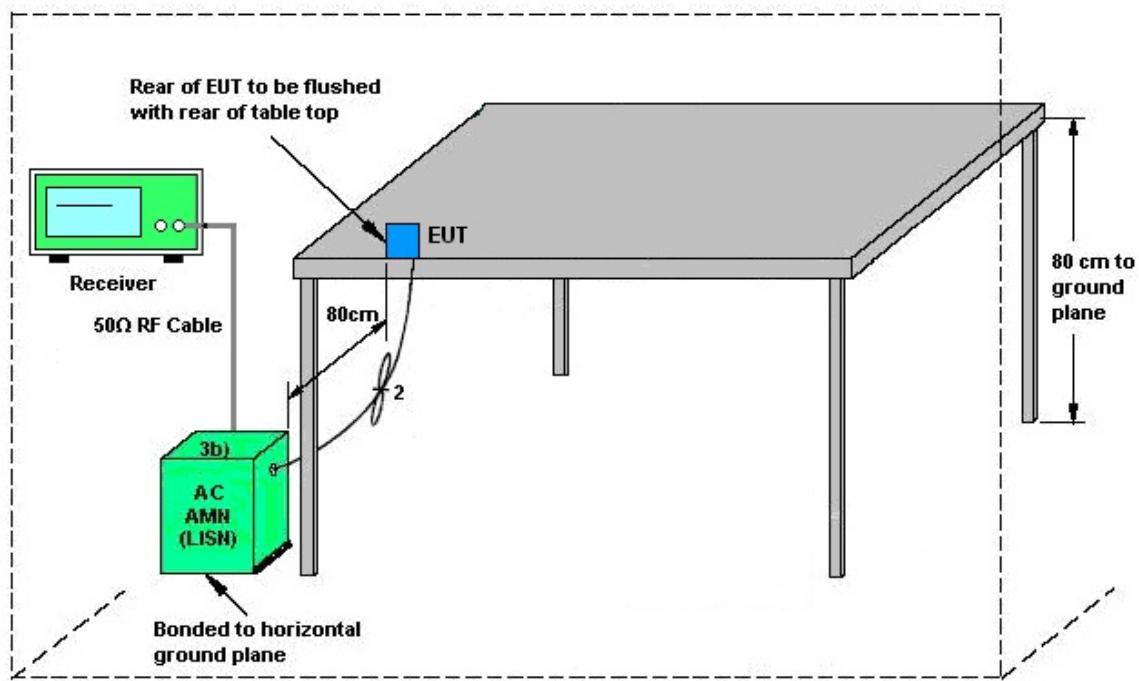
#### 3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

#### 3.3.3 Test Procedure

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

### 3.3.4 Test Setup



AMN = Artificial mains network (LISN)

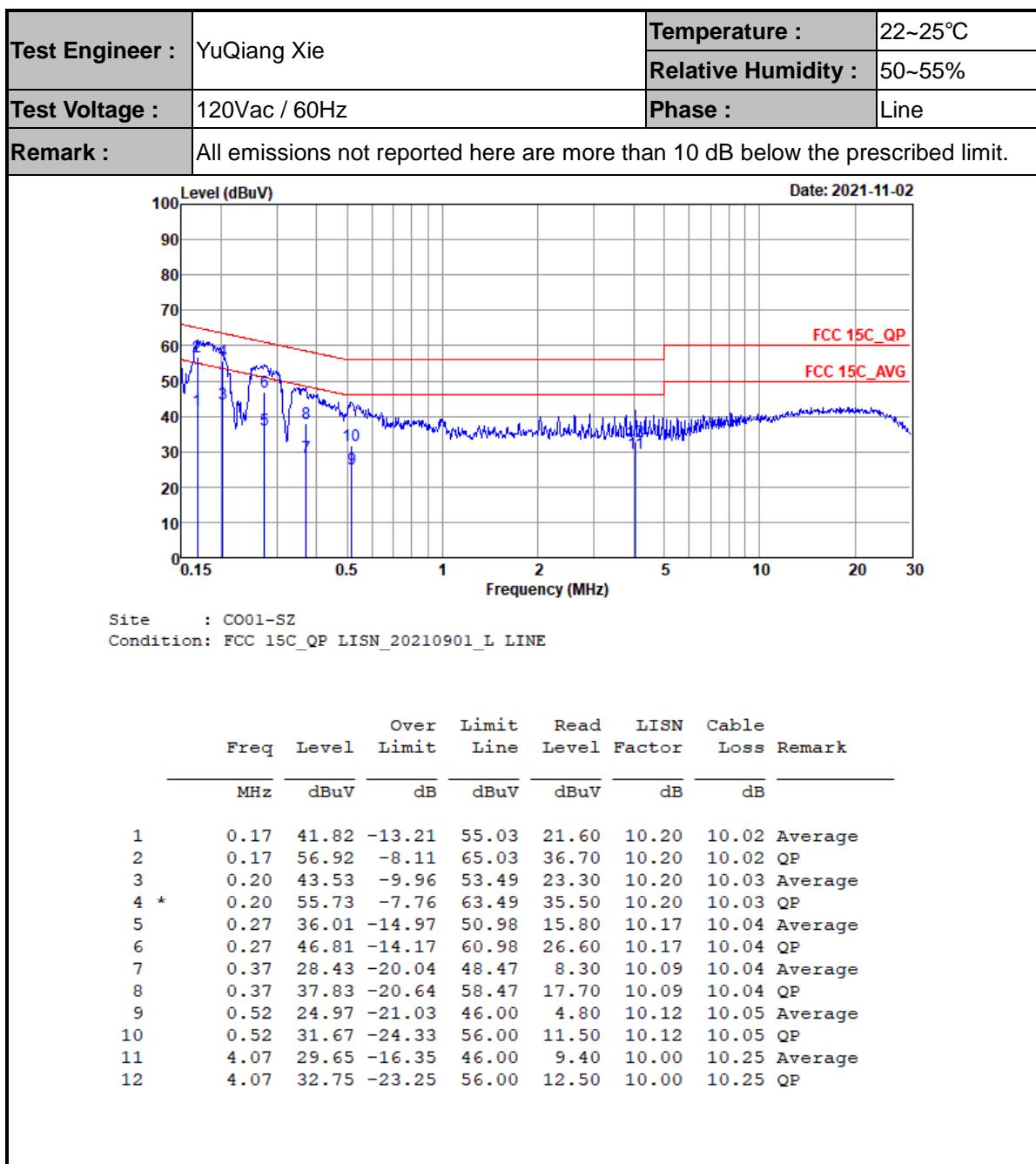
AE = Associated equipment

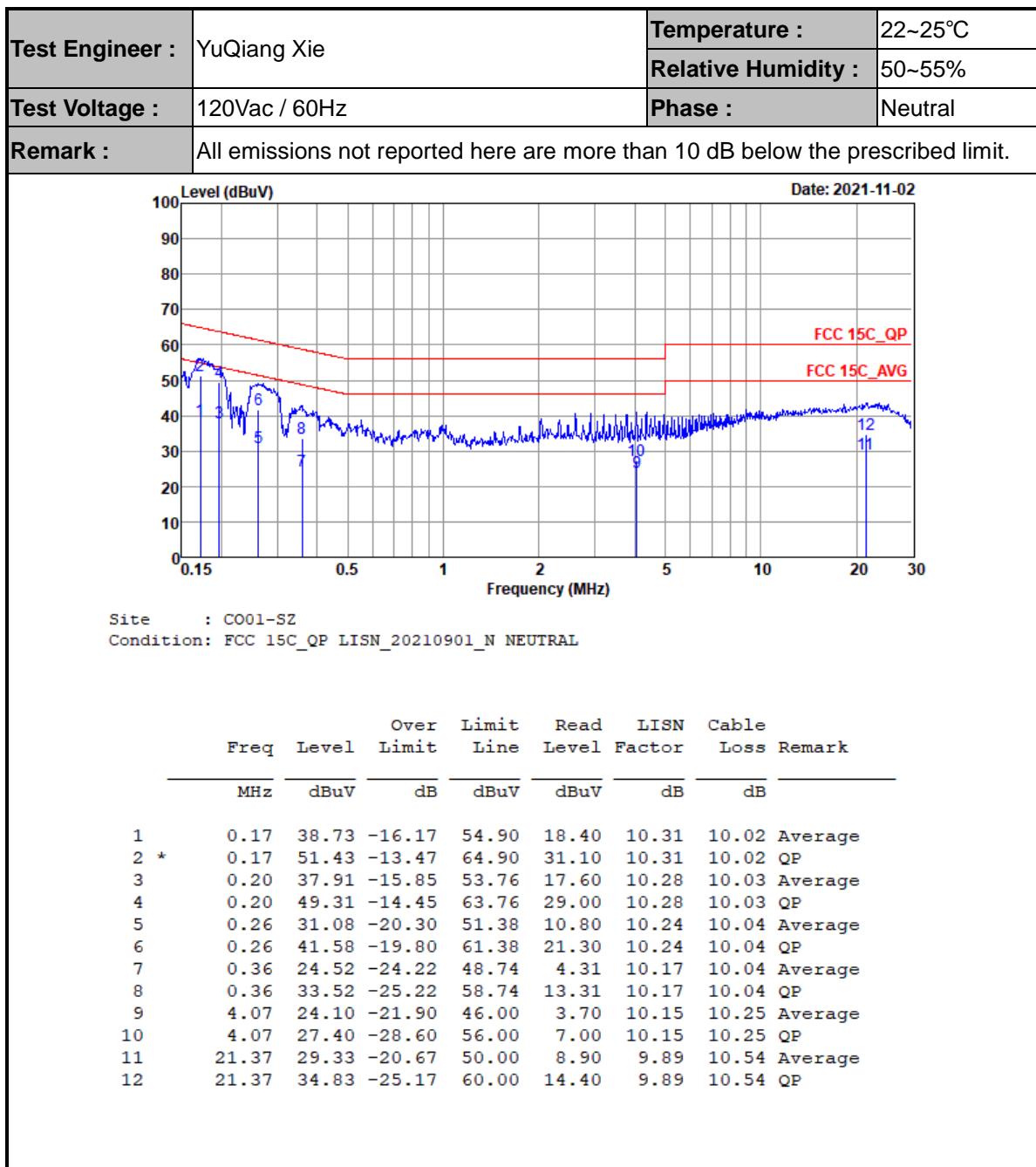
EUT = Equipment under test

LISN = Impedance stabilization network



## 3.3.5 Test Result of AC Conducted Emission





Note:

1. Level(dB $\mu$ V) = Read Level(dB $\mu$ V) + LISN Factor(dB) + Cable Loss(dB)
2. Over Limit(dB) = Level(dB $\mu$ V) - Limit Line(dB $\mu$ V)



## 3.4 Antenna Requirements

### 3.4.1 Standard Applicable

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

### 3.4.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.



## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 08, 2021	Nov. 12, 2021	Apr. 07, 2022	Conducted (TH01-SZ)
EMI Test Receiver	R&S	ESR7	102261	9kHz~7GHz	May 21, 2021	Nov. 10, 2021~Nov. 13, 2021	May 20, 2022	Radiation (03CH05-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY590711 91	10Hz~44GHz	Apr. 07, 2021	Nov. 10, 2021~Nov. 13, 2021	Apr. 06, 2022	Radiation (03CH05-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jun. 22, 2020	Nov. 10, 2021~Nov. 13, 2021	Jun. 21, 2022	Radiation (03CH05-SZ)
Log-periodic Antenna	SCHWARZBECK	VULB 9168	01001	20MHz~1.5GHz	Mar. 25, 2021	Nov. 10, 2021~Nov. 13, 2021	Mar. 24, 2022	Radiation (03CH05-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-220 6	1GHz~18GHz	Apr. 11, 2021	Nov. 10, 2021~Nov. 13, 2021	Apr. 10, 2022	Radiation (03CH05-SZ)
Amplifier	EM Electronics	EM330	060756	0.01Hz ~3000MHz	Apr. 07, 2021	Nov. 10, 2021~Nov. 13, 2021	Apr. 06, 2022	Radiation (03CH05-SZ)
HF Amplifier	EM Electronics	EM01G18GA	060781	1GHz~18GHz	Apr. 07, 2021	Nov. 10, 2021~Nov. 13, 2021	Apr. 06, 2022	Radiation (03CH05-SZ)
Amplifier	Keysight	83017A	MY532703 57	500MHz~26.5GHz	Apr. 07, 2021	Nov. 10, 2021~Nov. 13, 2021	Apr. 06, 2022	Radiation (03CH05-SZ)
AC Power Source	APC	AFV-S-600	F11905001 3	N/A	NCR	Nov. 10, 2021~Nov. 13, 2021	NCR	Radiation (03CH05-SZ)
Turn Table	EMEC	T-200-S-1	060925-T	0~360 degree	NCR	Nov. 10, 2021~Nov. 13, 2021	NCR	Radiation (03CH05-SZ)
Antenna Mast	EMEC	MBS-400-1	060927	1 m~4 m	NCR	Nov. 10, 2021~Nov. 13, 2021	NCR	Radiation (03CH05-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Mar. 08, 2021	Nov. 02, 2021	Mar. 07, 2022	Conduction (CO01-SZ)
AC LISN	R&S	ENV216	100063	9kHz~30MHz	Sep. 01, 2021	Nov. 02, 2021	Aug. 31, 2022	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Oct. 28, 2021	Nov. 02, 2021	Oct. 27, 2022	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000 891	100Vac~250Vac	Jul. 14, 2021	Nov. 02, 2021	Jul. 13, 2022	Conduction (CO01-SZ)

NCR: No Calibration Required



## 5 Uncertainty of Evaluation

### Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.2dB
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### Uncertainty of Radiated Emission Measurement (9 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.5dB
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### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.2dB
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----- THE END -----