FCC RF Test Report

APPLICANT	:	OnePlus Technology (Shenzhen) Co., Ltd.
EQUIPMENT	:	Pencil
BRAND NAME	:	ONEPLUS
MODEL NAME	:	OPN2405
FCC ID	:	2ABZ2-OPN2405
STANDARD	:	FCC Part 15 Subpart C §15.209
CLASSIFICATION	:	(DCD) Part 15 Low Power Transmitter Below 1705 kHz
TEST DATE(S)	:	Sep. 06, 2024 ~ Sep. 30, 2024

We, Sporton International Inc. (ShenZhen), 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 Inc. (ShenZhen), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

ACCREDITED Cert #5145.01

Sporton International Inc. (ShenZhen)
1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055
People's Republic of China

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History of this test report

Report No.	Version	Description	Issued Date
FR480202B	01	Initial issue of report	Oct. 29, 2024

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 10.10 dB at 277.35 MHz
-	15.207	AC Conducted Emission	Not Applicable	EUT not connect to AC Mains
3.3	15.203	Antenna Requirements	Pass	-

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

1 General Description

1.1 Applicant

OnePlus Technology (Shenzhen) Co., Ltd.
18C02, 18C03, 18C04, and 18C05, Shum Yip Terra Building, Binhe Avenue North, Futian District, Shenzhen, Guangdong, P.R. China

1.2 Manufacturer

OnePlus Technology (Shenzhen) Co., Ltd.
18C02, 18C03, 18C04, and 18C05, Shum Yip Terra Building, Binhe Avenue North, Futian District, Shenzhen, Guangdong, P.R. China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Pencil
Brand Name	ONEPLUS
Model Name	OPN2405
FCC ID	2ABZ2-OPN2405
SN Code	Conducted / Radiation: M621679000014E862JMN
Frequency Range	111 ~ 489kHz
Type of Modulation	BPSK
Antenna Type	Coil Antenna
HW Version	V4.0.9
SW Version	V0.2

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. The EUT is only used with the designated tablet through software control, and the operating frequency is 356.34 kHz.

1.4 Modification of EUT

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

1.5 Test Location

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

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	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		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	TH01-SZ	CN1256	421272

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	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		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH04-SZ	CN1256	421272

1.6 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH04-SZ	AUDIX	E3	6.2009-8-24

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.

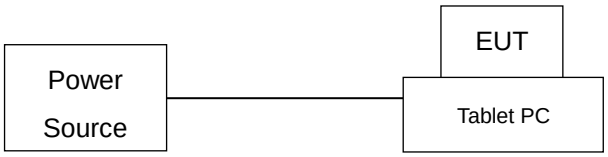
2 Test Configuration of Equipment Under Test

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: radiation emission (9 kHz to the 1000 MHz).

Test Items	Function Type
Radiated Emission	Mode 1 : Specific RF technology Tx_356.34 kHz

2.2 Connection Diagram of Test System



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Tablet PC	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, 99% OBW shall not located within 15.205 restricted bands.

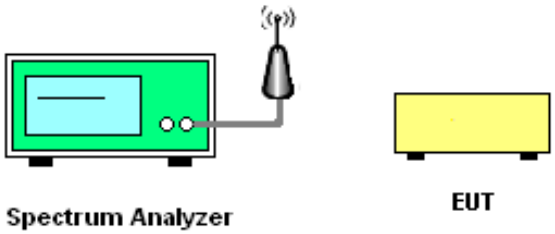
3.1.2 Measuring Instruments

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

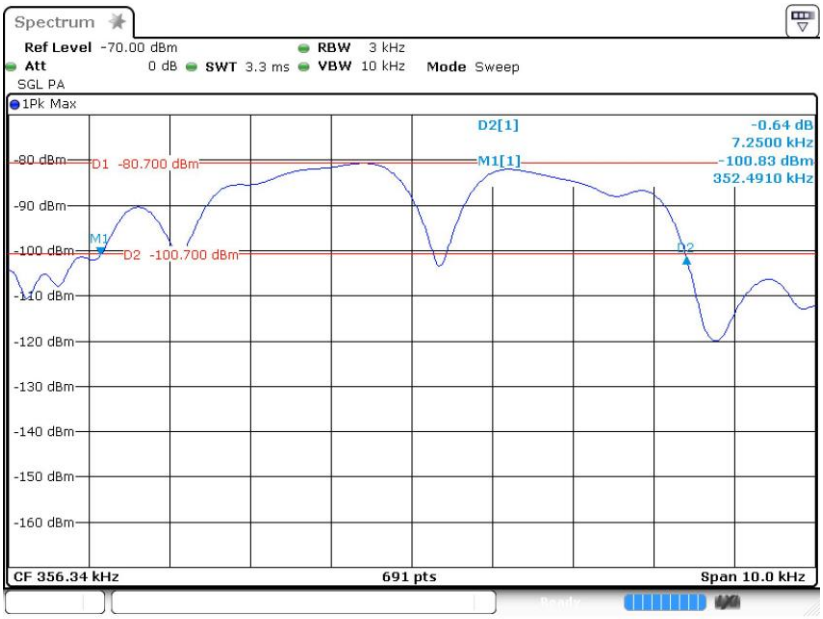


3.1.5 Test Result of 20dB and 99% Bandwidth

Test Engineer :	Liu Qiu Qiu	Temperature :	22~24℃
		Relative Humidity :	49~58%

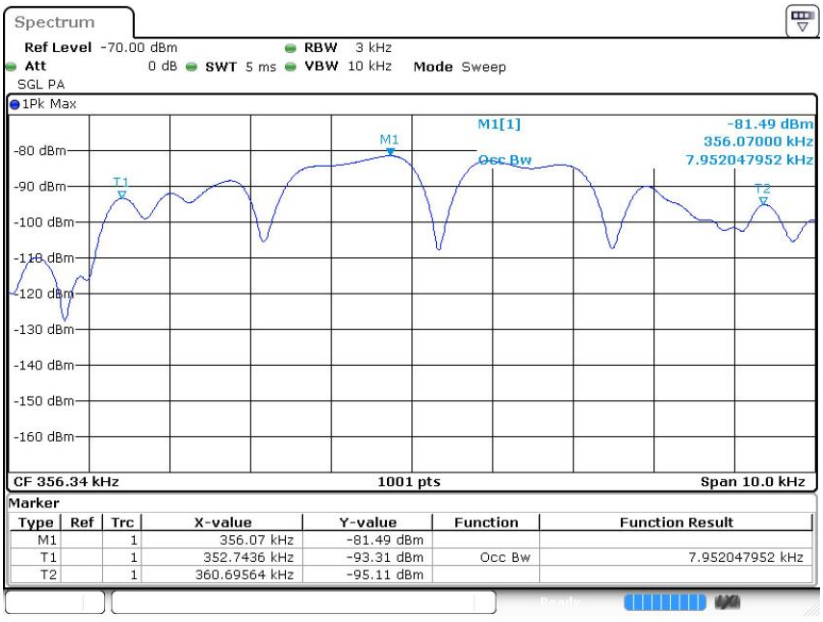
20dB Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
7.250	7.952

20 dB Bandwidth Plot



Date: 20.SEP.2024 17:26:53

99% Occupied Bandwidth Plot



Date: 20.SEP.2024 17:20:42

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 (specific distance / test distance) (dB);
3. specific line (dBμV/m) = 20 log Emission level (μV/m)
4. Limit line = specific limits (dBμV/m) + distance extrapolation factor.

3.2.2 Measuring Instruments

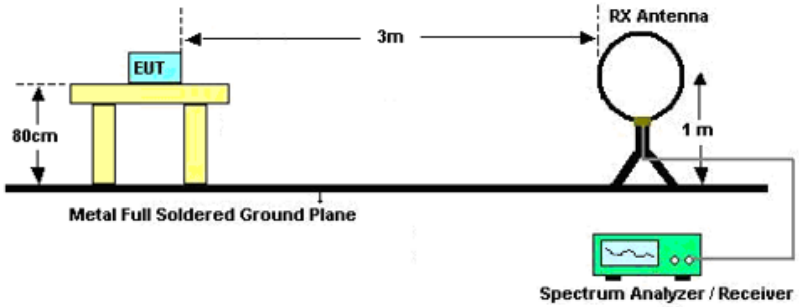
See list of measuring equipment of this test report.

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

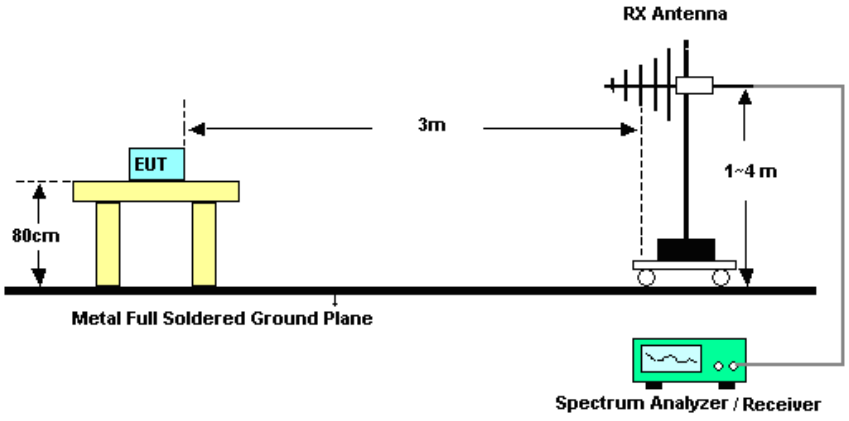
For radiated emissions below 30MHz



Note:

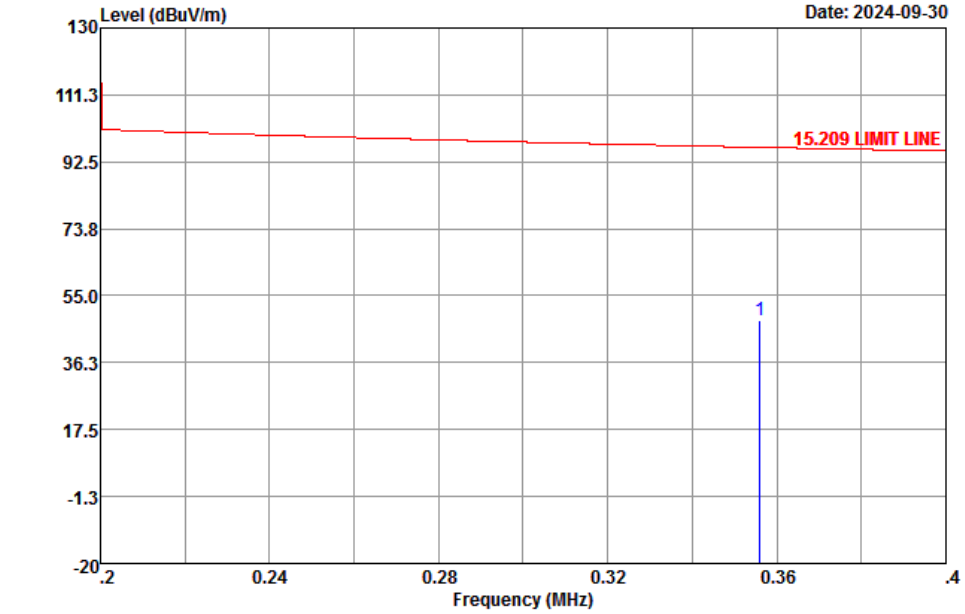
1. There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.
2. Tested for radiated below 30 MHz using a loop antenna in accordance with C63.10, the antenna was positioned in three antenna orientations: horizontal, vertical, and ground-parallel three polarization's, the worst case is horizontal & vertical polarization, test data of two mode was reported.

For radiated emissions above 30MHz



3.2.5 Test Result of Field Strength of Fundamental Emissions

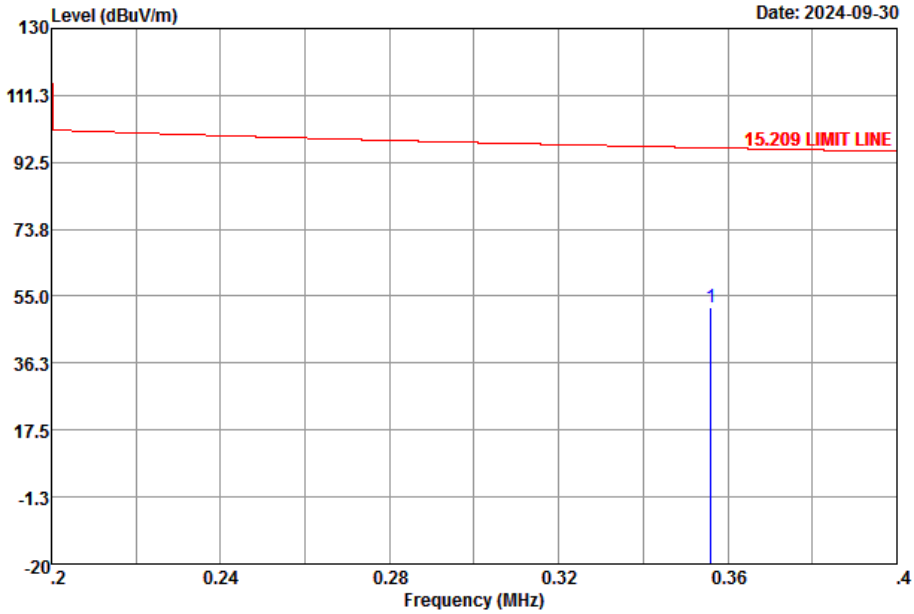
Test Engineer :	ZhangXu	Temperature :	24~25°C
Polarization :	Horizontal	Relative Humidity :	48~49%



Site : 03CH04-SZ
Condition : 15.209 LIMIT LINE 3m LOOP ANTENNA_3164 HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	0.36	48.10	-48.47	96.57	27.69	20.34	0.07	---	---	QP

Test Engineer :	ZhangXu	Temperature :	24~25°C
Polarization :	Vertical	Relative Humidity :	48~49%



Site : 03CH04-SZ
Condition : 15.209 LIMIT LINE 3m LOOP ANTENNA_3164 VERTICAL

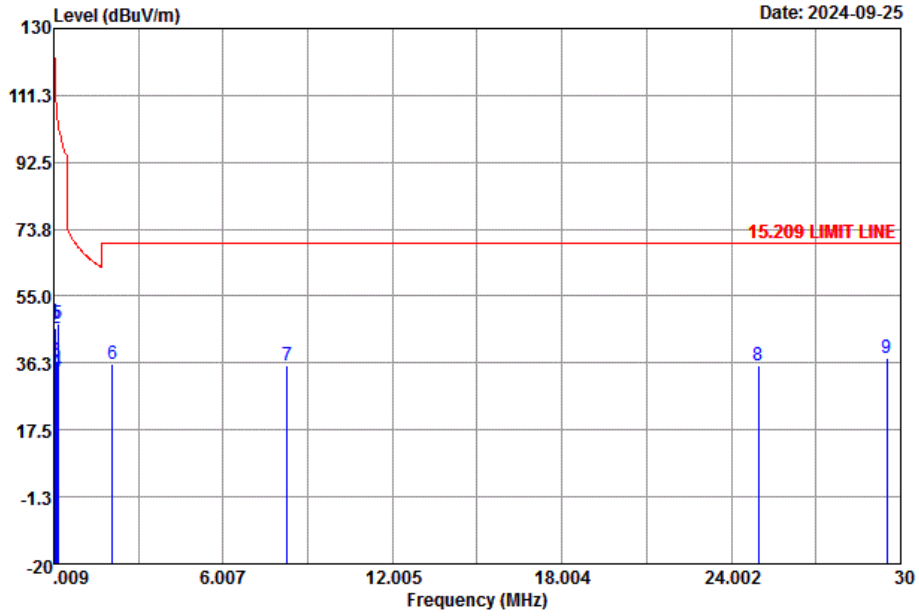
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	0.36	51.83	-44.74	96.57	31.42	20.34	0.07	---	---	QP

Note:

1. Level(dBμV/m) = Read Level(dBμV) + Antenna Factor(dB/m) + Cable Loss(dB)
2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

3.2.6 Test Result of Radiated Emission (9kHz ~ 30MHz)

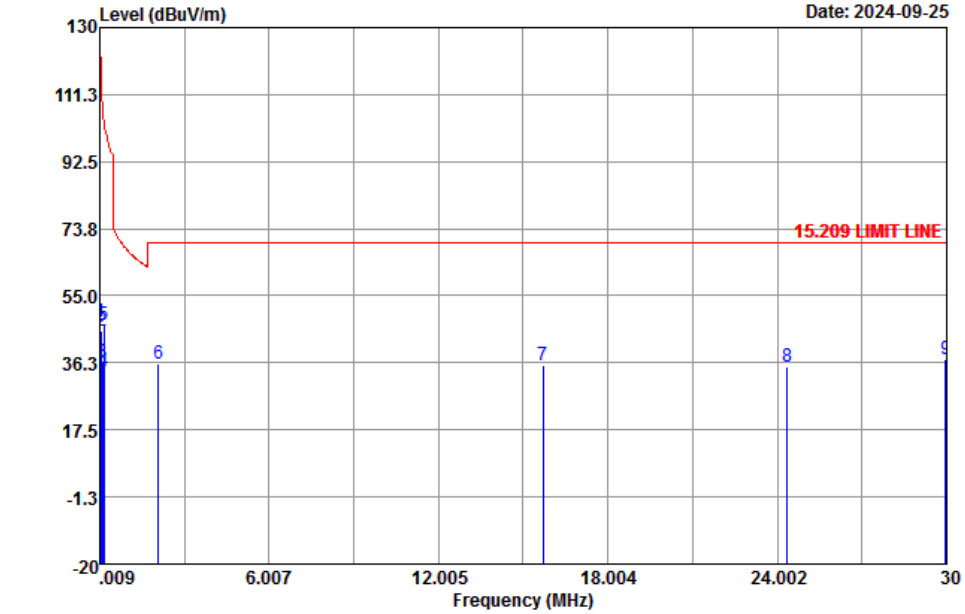
Test Engineer :	ZhangXu	Temperature :	24~25°C
Polarization :	Horizontal	Relative Humidity :	48~49%



Site : 03CH04-SZ
Condition : 15.209 LIMIT LINE 3m LOOP ANTENNA_3164 HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	0.01	47.77	-80.51	128.28	27.75	19.96	0.06	---	---	Average
2	0.08	46.16	-63.46	109.62	25.63	20.46	0.07	---	---	Average
3	0.09	36.95	-71.30	108.25	16.44	20.44	0.07	---	---	QP
4	0.13	33.96	-71.37	105.33	13.48	20.40	0.08	---	---	Average
5	0.15	47.46	-56.62	104.08	26.99	20.39	0.08	---	---	Average
6	2.09	35.82	-34.18	70.00	15.39	20.32	0.11	---	---	QP
7	8.26	35.49	-34.51	70.00	14.90	20.36	0.23	---	---	QP
8	24.96	35.49	-34.51	70.00	13.63	21.16	0.70	---	---	QP
9	29.51	37.74	-32.26	70.00	15.36	21.64	0.74	---	---	QP

Test Engineer :	ZhangXu	Temperature :	24~25°C
Polarization :	Vertical	Relative Humidity :	48~49%



Site : 03CH04-SZ
Condition : 15.209 LIMIT LINE 3m LOOP ANTENNA_3164 VERTICAL

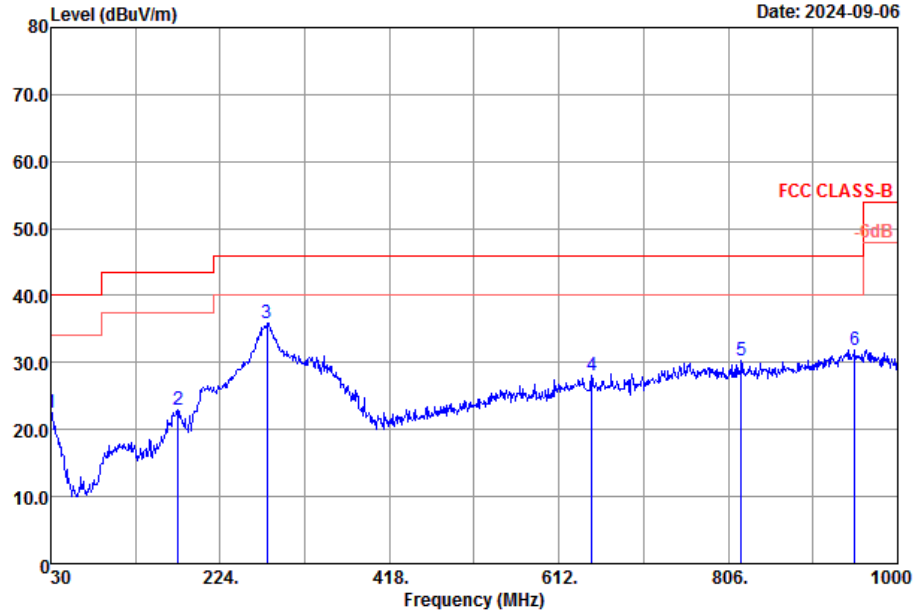
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	0.01	47.55	-80.68	128.23	27.53	19.96	0.06	---	---	Average
2	0.08	45.07	-64.55	109.62	24.54	20.46	0.07	---	---	Average
3	0.09	36.25	-72.00	108.25	15.74	20.44	0.07	---	---	QP
4	0.12	33.80	-71.90	105.70	13.32	20.40	0.08	---	---	Average
5	0.16	46.77	-57.00	103.77	26.30	20.39	0.08	---	---	Average
6	2.10	36.09	-33.91	70.00	15.66	20.32	0.11	---	---	QP
7	15.71	35.78	-34.22	70.00	14.78	20.52	0.48	---	---	QP
8	24.34	35.20	-34.80	70.00	13.43	21.09	0.68	---	---	QP
9	29.95	37.41	-32.59	70.00	14.99	21.68	0.74	---	---	QP

Note:

1. Level(dBμV/m) = Read Level(dBμV) + Antenna Factor(dB/m) + Cable Loss(dB)
2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

3.2.7 Test Result of Radiated Emission (30MHz ~ 1000MHz)

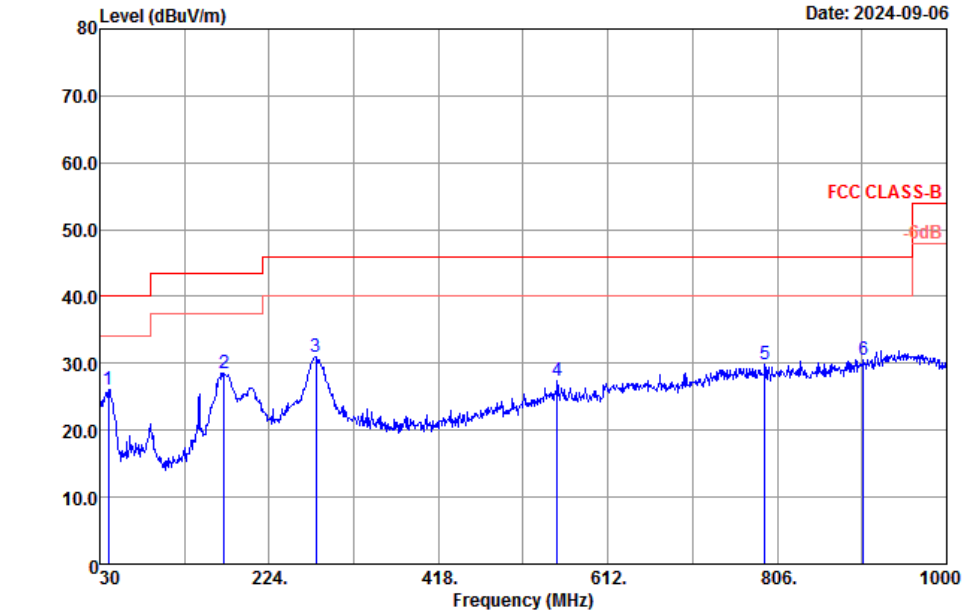
Test Engineer :	ZhangXu	Temperature :	24~25°C
Polarization :	Horizontal	Relative Humidity :	48~49%



Site : 03CH04-SZ
Condition : FCC CLASS-B 3m LF_ANT_41909 HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	30.00	22.53	-17.47	40.00	28.31	25.29	0.53	31.60	---	---	Peak
2	175.50	22.93	-20.57	43.50	37.22	16.01	1.35	31.65	---	---	Peak
3 *	277.35	35.90	-10.10	46.00	46.56	19.16	1.73	31.55	---	---	Peak
4	649.83	28.12	-17.88	46.00	29.93	26.74	2.65	31.20	---	---	Peak
5	820.55	30.37	-15.63	46.00	29.64	28.84	2.99	31.10	---	---	Peak
6	950.53	31.88	-14.12	46.00	28.05	31.40	3.23	30.80	---	---	Peak

Test Engineer :	ZhangXu	Temperature :	24~25°C
Polarization :	Vertical	Relative Humidity :	48~49%



Site : 03CH04-SZ
Condition : FCC CLASS-B 3m LF_ANT_41909 VERTICAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 *	39.70	26.06	-13.94	40.00	37.07	20.17	0.61	31.79	---	---	Peak
2	172.59	28.46	-15.04	43.50	42.64	16.13	1.34	31.65	---	---	Peak
3	277.35	31.03	-14.97	46.00	41.69	19.16	1.73	31.55	---	---	Peak
4	553.80	27.51	-18.49	46.00	29.86	26.37	2.47	31.19	---	---	Peak
5	791.45	29.76	-16.24	46.00	29.21	28.75	2.92	31.12	---	---	Peak
6	904.94	30.59	-15.41	46.00	28.42	29.89	3.17	30.89	---	---	Peak

Note:

1. Level(dBμV/m) = Read Level(dBμV) + Antenna Factor(dB/m) + Cable Loss(dB)
2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

3.3 Antenna Requirements

3.3.1 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.

3.3.2 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. 09, 2024	Sep. 20, 2024	Apr. 08, 2025	Conducted (TH01-SZ)
Thermal Chamber	Ten Billion Hongzhangroup	LP-150U	H2014081803	-40~+150°C	Jul. 03, 2024	Sep. 20, 2024	Jul. 02, 2025	Conducted (TH01-SZ)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Oct. 18, 2023	Sep. 06, 2024~ Sep. 30, 2024	Oct. 17, 2024	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 03, 2024	Sep. 06, 2024~ Sep. 30, 2024	Jul. 02, 2025	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2E	101141	9kHz~30MHz	Dec. 29, 2023	Sep. 06, 2024~ Sep. 30, 2024	Dec. 28, 2024	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	May 09, 2024	Sep. 06, 2024~ Sep. 30, 2024	May 08, 2025	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 18, 2023	Sep. 06, 2024~ Sep. 30, 2024	Oct. 17, 2024	Radiation (03CH04-SZ)
AC Power Source	APC	AFV-S-600B	F119050019	N/A	Oct. 18, 2023	Sep. 06, 2024~ Sep. 30, 2024	Oct. 17, 2024	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Sep. 06, 2024~ Sep. 30, 2024	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Sep. 06, 2024~ Sep. 30, 2024	NCR	Radiation (03CH04-SZ)

NCR: No Calibration Required

5 Measurement Uncertainty

Uncertainty of Radiated Emission Measurement (9 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.8dB**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.1dB**

---------- THE END ----------