



FCC RF Test Report

APPLICANT : Lenovo(Shanghai) Electronics Technology Co., Ltd.
EQUIPMENT : Portable Tablet Computer
BRAND NAME : Lenovo
MODEL NAME : TB520FU
FCC ID : O57TB520FU
STANDARD : FCC Part 15 Subpart C §15.209
CLASSIFICATION : (DCD) Part 15 Low Power Transmitter Below 1705 kHz
TEST DATE(S) : Aug. 22, 2024 ~ Sep. 04, 2024

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

Jason Jia

Approved by: Jason Jia



Sporton International Inc. (Kunshan)

**No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China**



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History of this test report

Report No.	Version	Description	Issued Date
FR480207D	01	Initial issue of report	Sep. 18, 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 14.31 dB at 36.79 MHz
3.3	15.207	AC Conducted Emission	Pass	Under limit 8.50 dB at 1.191 MHz
3.4	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/manufacture 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

Lenovo(Shanghai) Electronics Technology Co., Ltd.

Section 304-305, Building No. 4, # 222, Meiyue Road, China (Shanghai) Pilot Free Trade Zone

1.2 Manufacturer

Lenovo PC HK Limited

23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Portable Tablet Computer
Brand Name	Lenovo
Model Name	TB520FU
FCC ID	O57TB520FU
SN Code	Conducted: HA21MSV5 Conduction: HA21JQA7 Radiation: 8SSP69A6R0KXHA1547R0031
HW Version	TB520FU
SW Version	TB520FU_RF01_240903
WPT Frequency Range	111-145kHz
WPT Type of Modulation	ASK
WPT Antenna Type	Coil Antenna
EUT Stage	Identical Prototype

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

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CO01-KS 03CH02-KS TH01-KS	CN1257	314309

1.6 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH02-KS	AUDIX	E3	6.2009-8-24a1
2.	CO01-KS	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

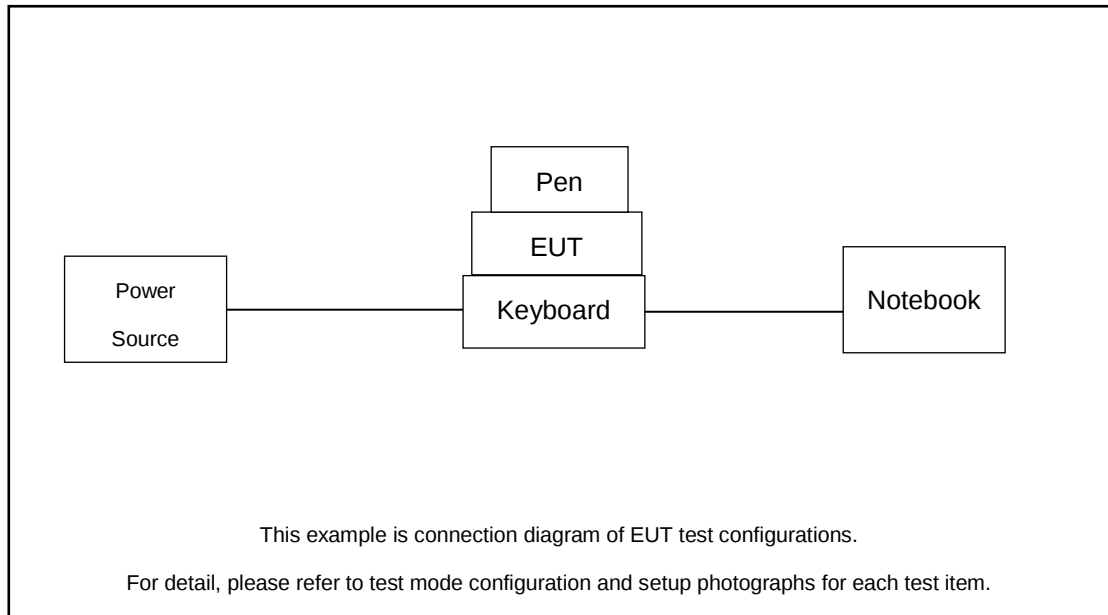
2.1 Test Mode

- 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: 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.

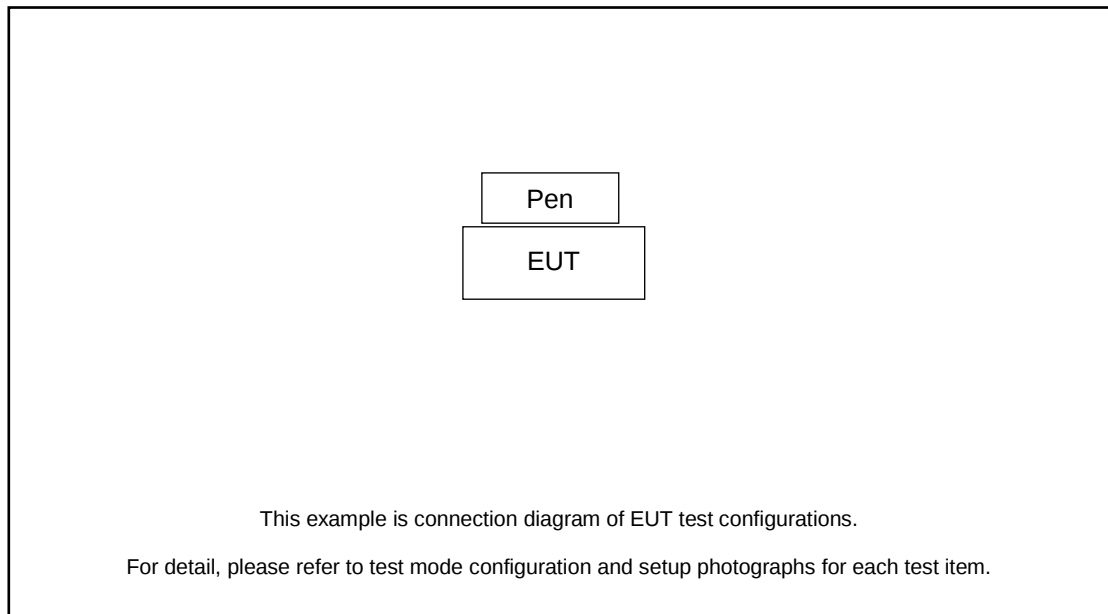
Test Items	Function Type
AC Conducted Emission	Mode 1: EUT + Wireless Charging With Pen + Adaptor 2 + USB Cable 2 + Keyboard
Radiated Emission	Mode 1: EUT +Wireless Charging With Pen

2.2 Connection Diagram of Test System

For Conducted Emission:



For 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.	SD Card	Kingston	8GB	N/A	N/A	N/A
2.	Notebook	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.

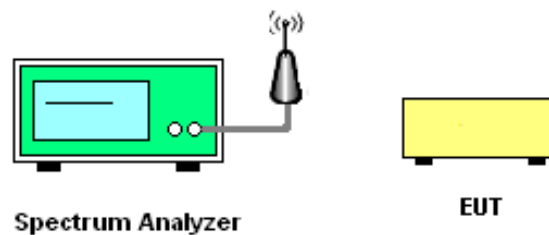
3.1.2 Measuring Instruments

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





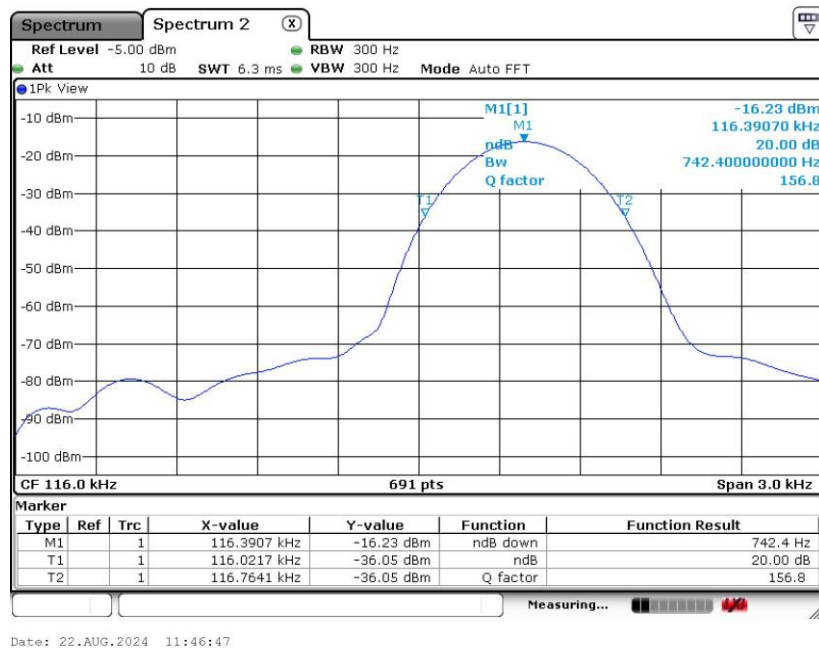
3.1.5 Test Result of 20dB and 99% Bandwidth

Test Engineer :	Lynn	Temperature :	22-24°C
		Relative Humidity :	53-55%

Occupied Bandwidth (kHz)	Frequency (kHz)
20dB Bandwidth(KHz)	0.742
99% Bandwidth(KHz)	0.634

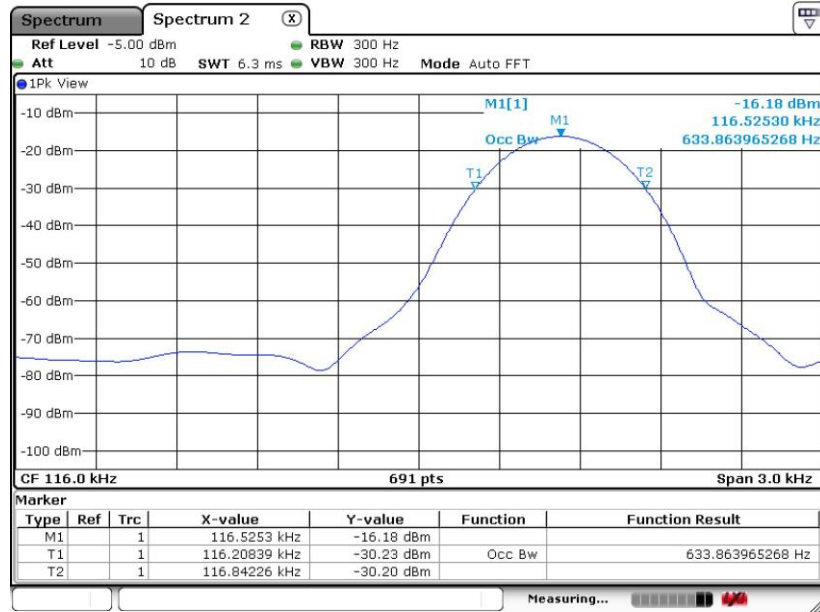
Remark: Because the measured signal is CW adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW

20 dB Bandwidth Plot





99% Occupied Bandwidth Plot



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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.

3.2.2 Measuring Instruments

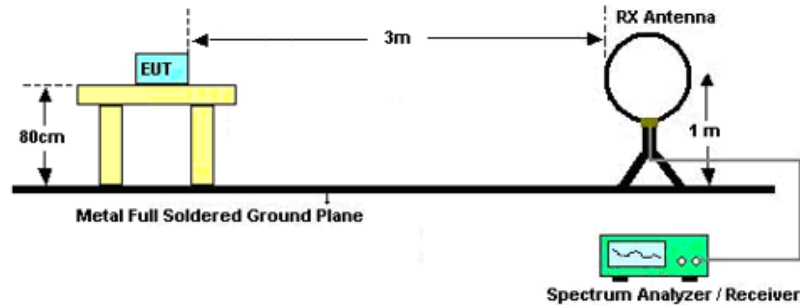
See list of measuring equipment of this test report.

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

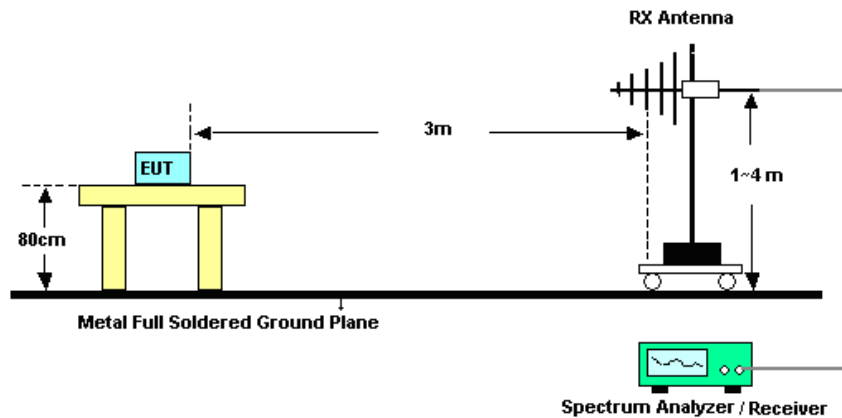
For radiated emissions below 30MHz



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

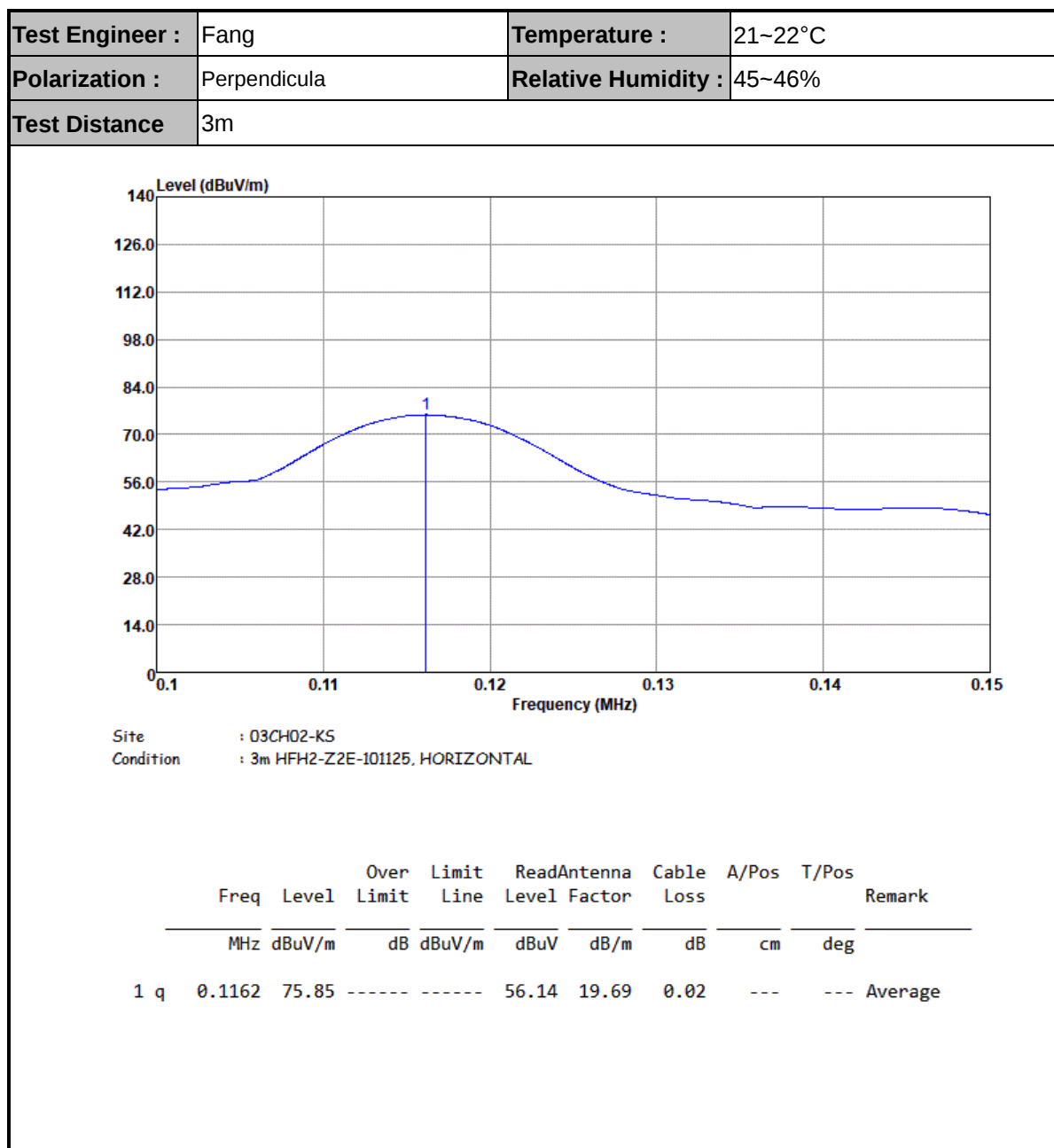




3.2.5 Test Result of Fundamental Emission

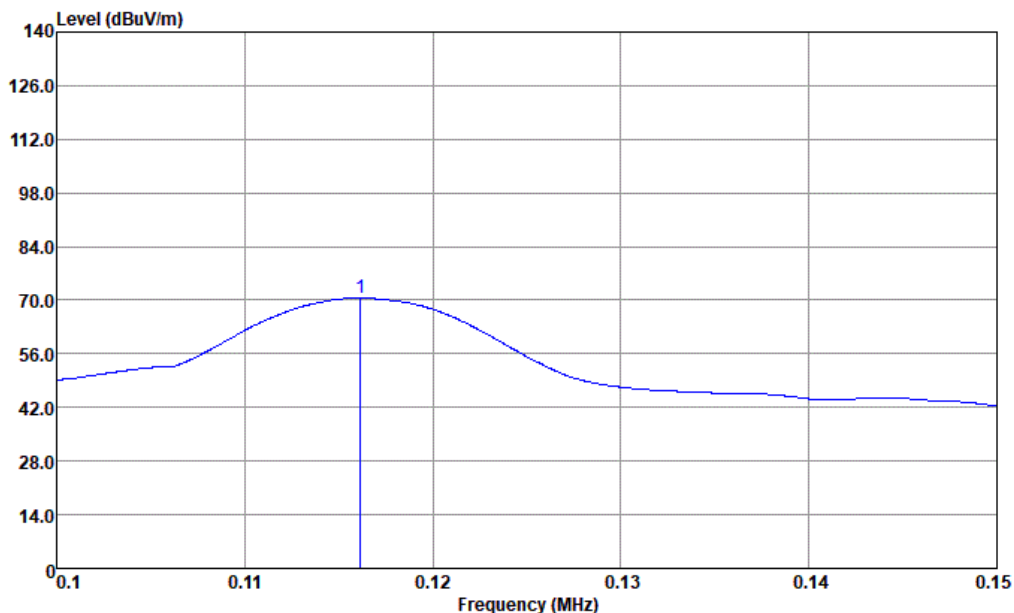
Frequency (MHz)	Level (dBuV/m) @3m	Distance Factor (dB)	Corrected level @30m (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Remark	Pol/Phase
0.1162	75.85	80	-4.15	-30.45	26.3	56.14	19.69	0.02	Average	Perpendicular
0.1162	70.59	80	-9.41	-35.71	26.3	50.88	19.69	0.02	Average	Parallel

Note: The field strength is tested at 3m distance then convert to 300m by adding distance factor $40 \cdot \log(d1/d2)$.





Test Engineer :	Fang	Temperature :	21~22°C
Polarization :	Parallel	Relative Humidity :	45~46%
Test Distance	3m		



Site : 03CH02-KS
Condition : 3m HFH2-Z2E-101125, VERTICAL

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg
1 q	0.1162	70.59	-----	-----	50.88	19.69	0.02	---	--- Average

Note:

- Level @3m (dB μ V/m) = Read Level @3m (dB μ V) + Antenna Factor(dB/m) + Cable Loss(dB).
- Corrected Level @30m (dB μ V/m) = Level @3m (dB μ V/m) - Distance extrapolation factor (dB).
- Distance extrapolation factor = 40 log (specific distance / test distance) (dB).
- Over Limit(dB) = Level(dB μ V/m) – Limit Line(dB μ V/m).



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

Test Mode :		WPT Tx					Polarization :		Perpendicular		
Frequency (MHz)	Level @3m (dBμV/m)	Distance Factor (dB)	Corrected Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
0.03	54.55	80	-25.45	-63.54	38.09	34.73	19.8	0.02	-	-	Average
0.05	44.05	80	-35.95	-69.56	33.61	24.23	19.8	0.02	-	-	Average
1.05	37.16	40	-2.84	-30.04	27.2	17.61	19.5	0.05	-	-	QP
6.51	29.27	40	-10.73	-40.27	29.54	9.73	19.35	0.19	-	-	QP
22.42	29.76	40	-10.24	-39.78	29.54	9.18	20	0.58	-	-	QP
29.81	31.18	40	-8.82	-38.36	29.54	10.04	20.38	0.76	-	-	QP

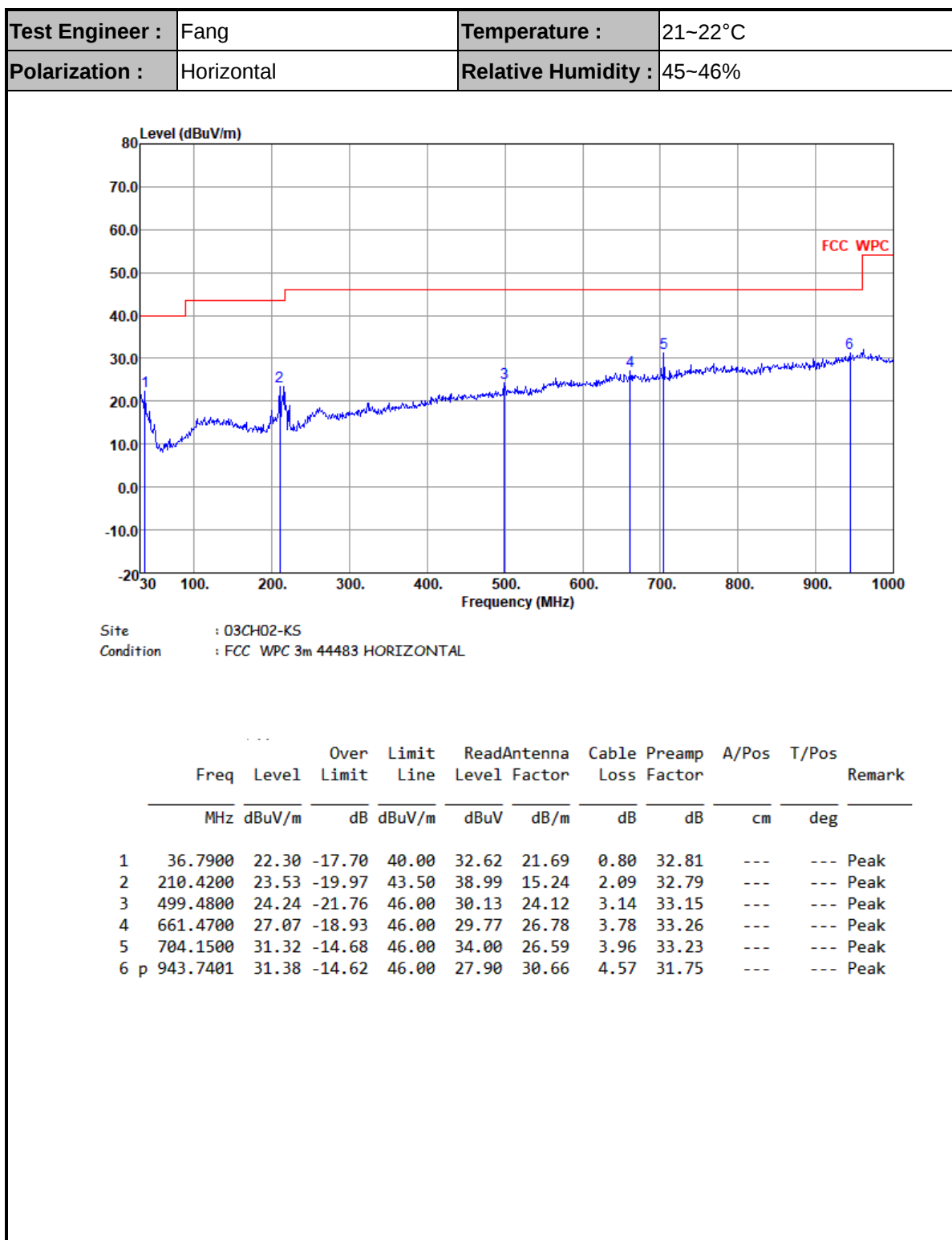
Test Mode :		WPT Tx					Polarization :		Parallel		
Frequency (MHz)	Level @3m (dBμV/m)	Distance Factor (dB)	Corrected Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
0.05	40.79	80	-39.21	-72.82	33.61	20.97	19.8	0.02	-	-	Average
0.07	37.36	80	-42.64	-73.66	31.02	17.64	19.7	0.02	-	-	Average
1.05	34.52	40	-5.48	-32.68	27.2	14.97	19.5	0.05	-	-	QP
7.72	28.74	40	-11.26	-40.8	29.54	9.04	19.47	0.23	-	-	QP
22.38	31.8	40	-8.2	-37.74	29.54	11.22	20	0.58	-	-	QP
29.80	31.03	40	-8.97	-38.51	29.54	9.89	20.38	0.76	-	-	QP

Note:

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. Corrected Level = Level @3m (dBμV/m) - distance extrapolation factor.

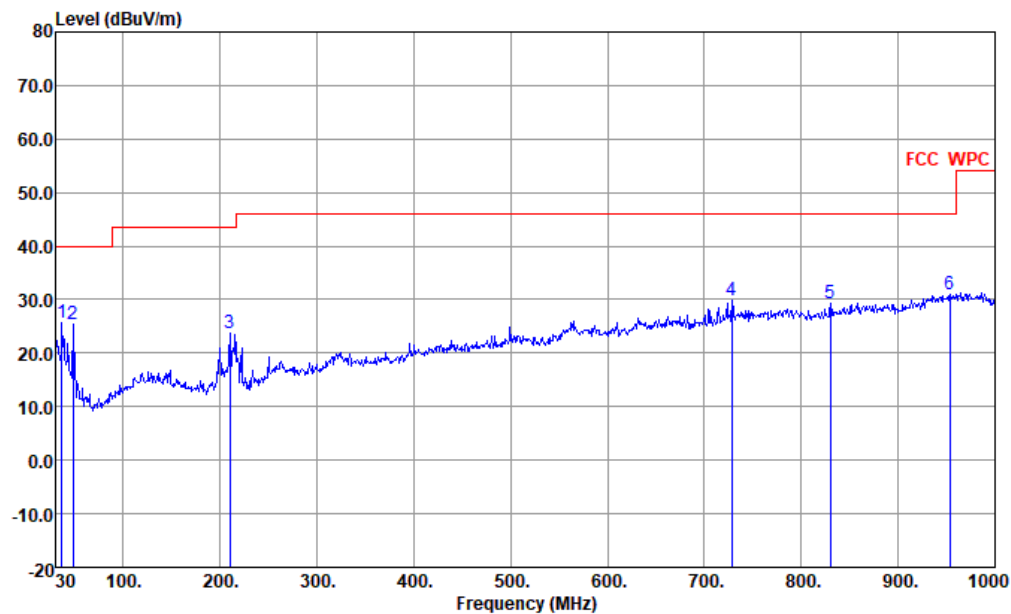


3.2.7 Test Result of Radiated Emission (30MHz ~ 1000MHz)





Test Engineer :	Fang	Temperature :	21~22°C
Polarization :	Vertical	Relative Humidity :	45~46%



Site : 03CH02-KS
Condition : FCC WPC 3m 44483 VERTICAL

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Preamp	A/Pos	T/Pos	Remark		
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 p	36.7900	25.69	-14.31	40.00	36.01	21.69	0.80	32.81	---	---	Peak
2	48.4300	25.31	-14.69	40.00	41.64	15.44	0.98	32.75	---	---	Peak
3	210.4200	23.84	-19.66	43.50	39.30	15.24	2.09	32.79	---	---	Peak
4	728.4000	29.96	-16.04	46.00	31.72	27.44	4.02	33.22	---	---	Peak
5	830.2500	29.44	-16.56	46.00	29.78	28.16	4.25	32.75	---	---	Peak
6	953.4400	30.85	-15.15	46.00	26.99	30.90	4.59	31.63	---	---	Peak

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 μ 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.

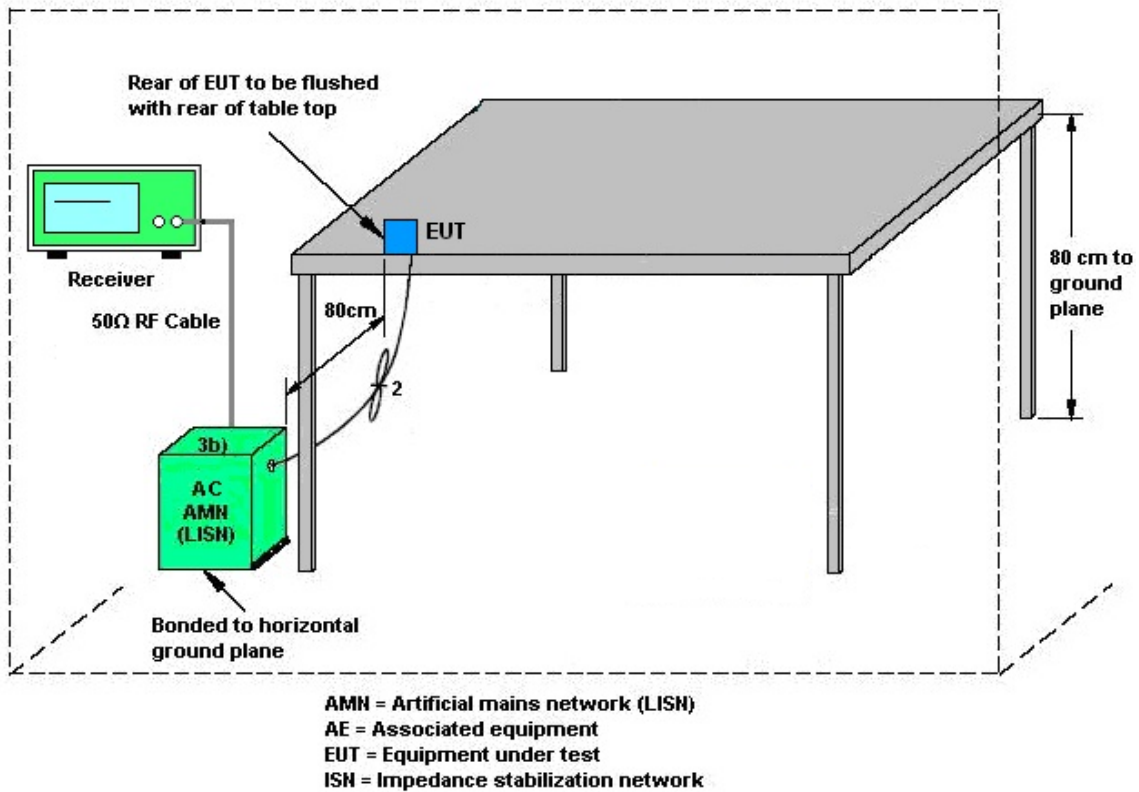
3.3.2 Measuring Instruments

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.

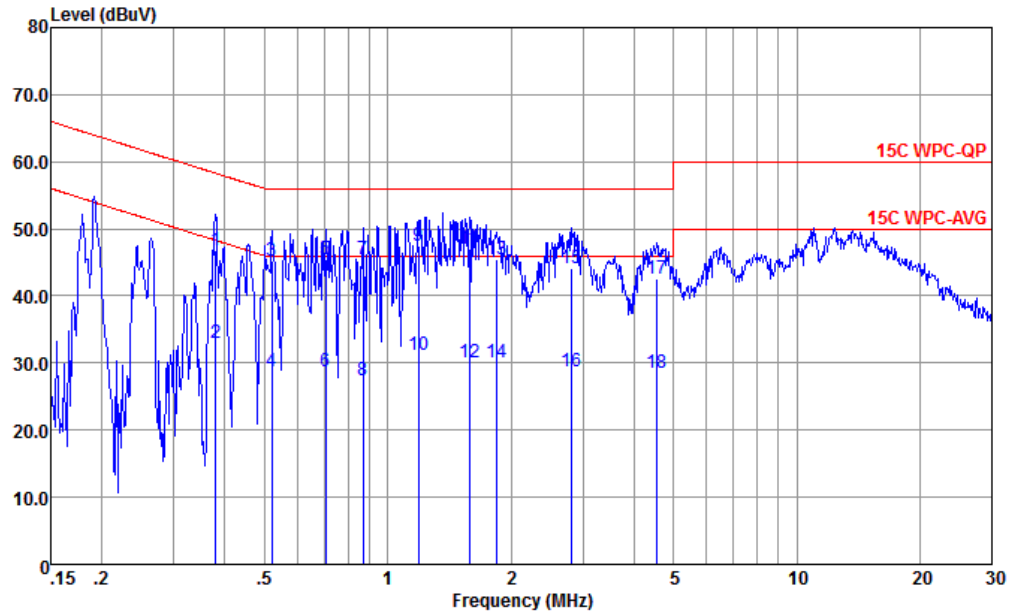
3.3.4 Test Setup





3.3.5 Test Result of AC Conducted Emission

Test Engineer :	Amos	Temperature :	25.3~26.2°C
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

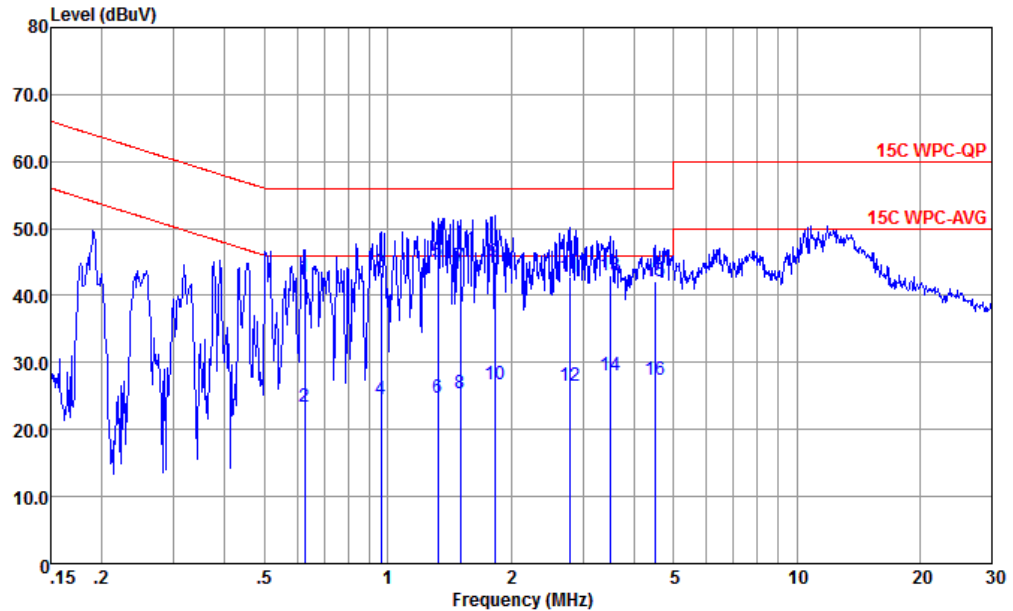


Site : CO01-KS
Condition : 15C WPC-QP LISN-060105-L 2024 LINE

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.379	46.89	-11.41	58.30	36.60	0.00	10.29	QP
2	0.379	32.89	-15.41	48.30	22.60	0.00	10.29	Average
3	0.521	45.30	-10.70	56.00	35.20	-0.11	10.21	QP
4	0.521	28.70	-17.30	46.00	18.60	-0.11	10.21	Average
5	0.705	45.49	-10.51	56.00	35.50	-0.15	10.14	QP
6	0.705	28.79	-17.21	46.00	18.80	-0.15	10.14	Average
7	0.871	45.53	-10.47	56.00	35.60	-0.17	10.10	QP
8	0.871	27.43	-18.57	46.00	17.50	-0.17	10.10	Average
9 *	1.191	47.50	-8.50	56.00	37.60	-0.19	10.09	QP
10	1.191	31.10	-14.90	46.00	21.20	-0.19	10.09	Average
11	1.585	47.08	-8.92	56.00	37.21	-0.21	10.08	QP
12	1.585	30.18	-15.82	46.00	20.31	-0.21	10.08	Average
13	1.848	45.46	-10.54	56.00	35.60	-0.22	10.08	QP
14	1.848	30.06	-15.94	46.00	20.20	-0.22	10.08	Average
15	2.824	44.10	-11.90	56.00	34.20	-0.17	10.07	QP
16	2.824	28.80	-17.20	46.00	18.90	-0.17	10.07	Average
17	4.549	42.65	-13.35	56.00	32.80	-0.21	10.06	QP
18	4.549	28.45	-17.55	46.00	18.60	-0.21	10.06	Average



Test Engineer :	Amos	Temperature :	25.3~26.2°C
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
Condition : 15C WPC-QP LISN-060105-N 2024 NEUTRAL

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.627	42.81	-13.19	56.00	32.80	-0.16	10.17	QP
2	0.627	23.31	-22.69	46.00	13.30	-0.16	10.17	Average
3	0.963	43.52	-12.48	56.00	33.61	-0.18	10.09	QP
4	0.963	24.42	-21.58	46.00	14.51	-0.18	10.09	Average
5 *	1.324	45.10	-10.90	56.00	35.20	-0.18	10.08	QP
6	1.324	24.80	-21.20	46.00	14.90	-0.18	10.08	Average
7	1.503	44.40	-11.60	56.00	34.51	-0.19	10.08	QP
8	1.503	25.50	-20.50	46.00	15.61	-0.19	10.08	Average
9	1.829	45.09	-10.91	56.00	35.20	-0.19	10.08	QP
10	1.829	26.79	-19.21	46.00	16.90	-0.19	10.08	Average
11	2.779	42.76	-13.24	56.00	32.90	-0.21	10.07	QP
12	2.779	26.46	-19.54	46.00	16.60	-0.21	10.07	Average
13	3.491	43.06	-12.94	56.00	33.20	-0.21	10.07	QP
14	3.491	28.06	-17.94	46.00	18.20	-0.21	10.07	Average
15	4.501	42.05	-13.95	56.00	32.20	-0.21	10.06	QP
16	4.501	27.45	-18.55	46.00	17.60	-0.21	10.06	Average

Note:

- Level(dBuV) = Read Level(dBuV) + LISN Factor(dB) + Cable Loss(dB)
- Over Limit(dB) = Level(dBuV) – Limit Line(dBuV)



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
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Ma x 30dBm	Oct. 11, 2023	Aug. 24, 2024	Oct. 10, 2024	Radiation (03CH02-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Sep. 11, 2023	Aug. 24, 2024	Sep. 10, 2024	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6111D	44483	30MHz-1GHz	Dec. 06, 2023	Aug. 24, 2024	Dec. 05, 2024	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	413740	9KHz-1GHz	Jan. 03, 2024	Aug. 24, 2024	Jan. 02, 2025	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002 473	N/A	NCR	Aug. 24, 2024	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Aug. 24, 2024	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Aug. 24, 2024	NCR	Radiation (03CH02-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr 18, 2024	Sep. 04, 2024	Apr 17, 2025	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 11, 2023	Sep. 04, 2024	Oct. 10, 2024	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Apr 18, 2024	Sep. 04, 2024	Apr 17, 2025	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 11, 2023	Sep. 04, 2024	Oct. 10, 2024	Conduction (CO01-KS)
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 11, 2023	Aug. 22, 2024	Oct. 10, 2024	Conducted (TH01-KS)

NCR: No Calibration Required



5 Measurement Uncertainty

Uncertainty of Conducted Measurement

Occupied Channel Bandwidth	$\pm 0.1\%$
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Uncertainty of AC Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.84 dB
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Uncertainty of Radiated Emission Measurement (9 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.30 dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	6.04 dB
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