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HCT

TEST REPORT

EMI Test for FCC Certification of WSP-R350 Model

APPLICANT
WOOSIM SYSTEMS INC.

REPORT NO.
HCT-EM-2201-FC004

DATE OF ISSUE
January 13, 2022

Tested by
Kyoung-Hee Yoon (signature)

Technical Manager
Jeong-Hyun Choi (signature)

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TEST REPORT

EMI Test for FCC Certification

REPORT NO.
HCT-EM-2201-FC004

DATE OF ISSUE
January 13, 2022

FCC ID.
QDD-WSPR350

Applicant	WOOSIM SYSTEMS INC. 60, Sandan-ro 388beon-gil, Chwisaeng-ri, Galsan-myeon,Hongseong-gun, Chungcheongnam-do, Korea
Product Name Model Name	Mobile Printer WSP-R350
Date of Test	December 14, 2021 to December 20, 2021
Test Standard Used	FCC CFR 47 PART 15 Subpart B Class B ANSI C63.4-2014
Test Results	Refer to the present document
Manufacturer	WOOSIM SYSTEMS INC.

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test results were applied only to the test methods required by the standard.

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	January 13, 2022	Initial Release

The above Test Report is not related to the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA.

If this report is required to confirmation of authenticity, please contact to www.hct.co.kr

CONTENTS

1. GENERAL INFORMATION

1.1 Description of EUT

The EUT is Mobile Printer.

FCC ID	QDD-WSPR350
Model Name	WSP-R350
Product Name	Mobile Printer
Frequency Range	2 402 ㎒ ~ 2 480 ㎒
Power Voltage	Rating: DC 8.4 V, 0.8 A TA: AC 100 ~ 240 V, 50 / 60 Hz Battery: DC 7.2 V, 2 500 mAh
Manufacturer	WOOSIM SYSTEMS INC.

1.2 Tested System Details

All equipment descriptions used in the tested system (including inserted cards) are:

Device Type	Model Name	Serial Number	Manufacturer
Mobile Printer	WSP-R350	-	WOOSIM SYSTEMS INC.
Notebook PC	ProBook6560b	5CB2053MXF	HP
Notebook PC Adaptor	Series PPP009L-E	-	LITE-ON TECHNOLOGY (CHANGZHOU) CO.LTD
Gateway	TL-WR747N	-	TP Link
Gateway Adaptor	T090060-2H1	-	TP Link
Serial Mouse	Serial 2 Button mouse	02031069	Radio Shack
Cellphone	LM-G710EM	-	LG Electronics

1.3 Cable Description

EUT + Adaptor + Notebook PC

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
EUT	DC IN	N	N/A	(P)1.5
	USB	N/A	N/A	(D)1.2
Notebook PC	RJ 45	N/A	N	(D) 1.6
	Serial (Mouse)	N/A	Y	(D) 1.8
	DC IN	N	N/A	(P) 1.8
Gateway	DC IN	N	N/A	(P)1.8

"(D)" Data Cable, "(P)" Power Cable.

EUT in battery + Notebook PC

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
EUT	USB	N/A	N/A	(D)1.2
Notebook PC	RJ 45	N/A	N	(D) 1.6
	Serial (Mouse)	N/A	Y	(D) 1.8
	DC IN	N	N/A	(P) 1.8
Gateway	USB	N/A	N/A	(P)1.8

"(D)" Data Cable, "(P)" Power Cable.

EUT + Adaptor + Cellphone

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
EUT	DC IN	N	N/A	(P)1.5
Cellphone	-	-	-	-

EUT only + Cellphone

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
EUT	-	-	-	-

NOTE. This product has a removable battery.

1.4 Noise Suppression Parts on Cable (I/O Cable)

EUT + Adaptor + Notebook PC

Product Name	Port	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
EUT	DC IN	N	N/A	Y	EUT End
	USB	N	N/A	Y	Both End
Notebook PC	RJ 45	N	N/A	N	N/A
	Serial (Mouse)	N	N/A	Y	Notebook End

EUT in battery + Notebook PC

Product Name	Port	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
EUT	USB	N	N/A	Y	Both End
Notebook PC	RJ 45	N	N/A	N	N/A
	Serial (Mouse)	N	N/A	Y	Notebook End

EUT + Adaptor + Cellphone

Product Name	Port	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
EUT	DC IN	N	N/A	Y	EUT End

EUT only + Cellphone

Product Name	Port	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
EUT	-	-	-	-	-

1.5 Test Facility

Test site is located at 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Rep. of Korea.
Those measurement facilities are constructed in conformance with the requirements of ANSI C63.4-2014.
The Normalized site attenuations (30 ㎒ to 1 ㎓) and Site validation (1 ㎓ to 18 ㎓) were performed in accordance with the standard in ANSI C63.4-2014 and ANSI C63.4a-2017
This testing laboratories are accredited and accordance with the recognized international Standard ISO/IEC 17025:2017.

1.6 Calibration of Measuring Instrument

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in ac cordance with the manufacturers recommendations for utilizing calibration equipment, which is traceable to recognized national standards.Espectially, all antenna for measurement is calibrated in accordance with the requirements of C63.5:2017

1.7 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Test Item	Test Site (Chamber)	Expanded Uncertainty
Conducted Emission (150 ㎑ to 30 ㎒)	EMI Shield Room	2.0 dB
Radiated Emissions (30 ㎒ to 1 ㎓)	3 m Semi Anechoic Chamber #2	5.1 dB
Radiated Emissions (1 ㎓ to 18 ㎓)	3 m Semi Anechoic Chamber #2	4.7 dB

2. DESCRIPTION OF TEST

2.1 Measurement of Conducted Emission

The test procedure was in accordance with ANSI C63.4-2014, Clause 7.3

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN).
If the EUT is connected to the PC through USB, the AC power-line adapter of the PC is directly connected to a line impedance stabilization network (LISN).
Other support units were connected to the power mains through another LISN.
The two LISNs provide 50 Ω / 50 μH of coupling impedance for the measuring instrument.
b. Both conducted lines are measured in Quasi-Peak and Average mode, including the worst-case data points for each tested configuration.
c. The frequency range from 150 ㎑ to 30 ㎒ was searched.

[Conducted Emission Limits]

Frequency (㎒)	Class A		Class B	
	Quasi-Peak (dBμV)	Average (dBμV)	Quasi-Peak (dBμV)	Average (dBμV)
0.15 to 0.5	79	66	66 to 56	56 to 46
0.5 to 5	73	60	56	46
5 to 30	73	60	60	50

2.2 Measurement of Radiated Emission

The test procedure was in accordance with ANSI C63.4-2014, Clause 8.3

a. The EUT was placed on the top of a turn table 0.8 meters above the ground at a semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from 1 m to 4 m above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 m to 4 m and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Quasi-Peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 ㎓.
f. The test-receiver system was set to Peak and Average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 ㎓.
g. 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. (1 ㎓ to 40 ㎓)

[Radiated Emission Limits]

Frequency (㎒)	Class A			Class B		
	Antenna Distance (m)	Field Strength (㎶/m)	Quasi-Peak (dB㎶/m)	Antenna Distance (m)	Field Strength (㎶/m)	Quasi-Peak (dB㎶/m)
30 to 88	10	90	39.0	3	100	40.0
88 to 216	10	150	43.5	3	150	43.5
216 to 960	10	210	46.4	3	200	46.0
Above 960	10	300	49.5	3	500	54.0

Frequency (㎒)	Antenna Distance (m)	Class A		Class B	
		Peak (dB㎶/m)	Average (dB㎶/m)	Peak (dB㎶/m)	Average (dB㎶/m)
Above 1 000	3	80	60	74	54

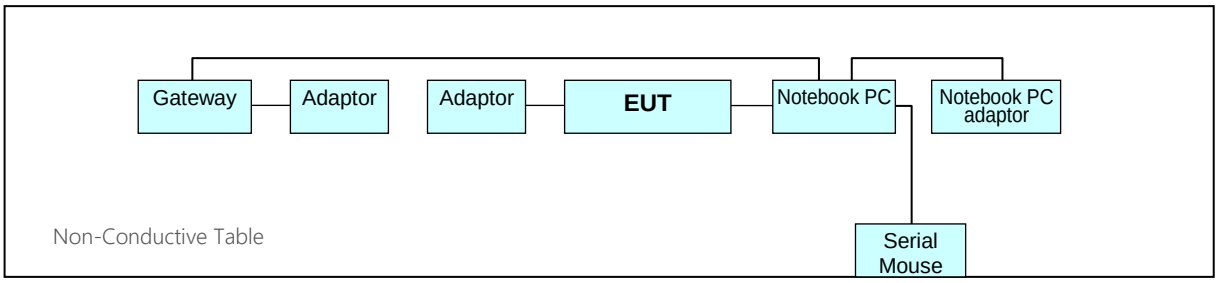
2.2.1 Frequency Range of Radiated Measurements

An unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a Radiated Emission limit is specified, up to the frequency shown in the following table

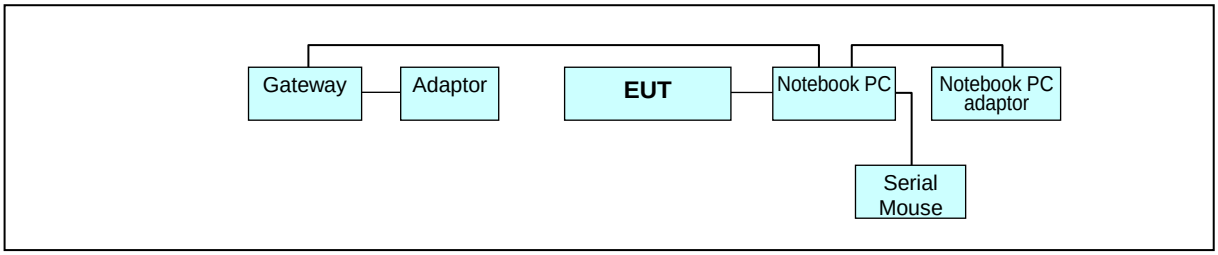
Highest frequency generated or used in the device or on which the device operates or tunes (㎒)	Upper frequency of measurement range (㎒)
Below 1.705	30
1.705 to 108	1 000
108 to 500	2 000
500 to 1 000	5 000
Above 1 000	5th harmonic of the highest frequency or 40 ㎓, whichever is lower

2.3 Configuration of Tested System

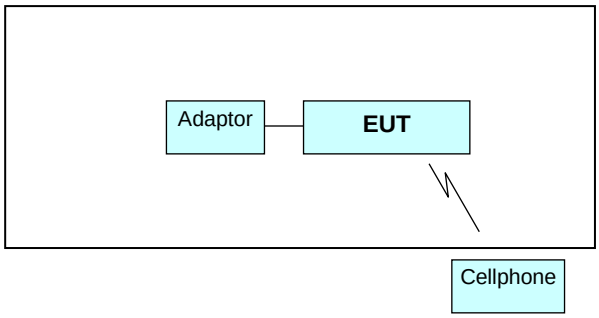
[PRINTER(USB DATA)] EUT + Adaptor + Notebook PC



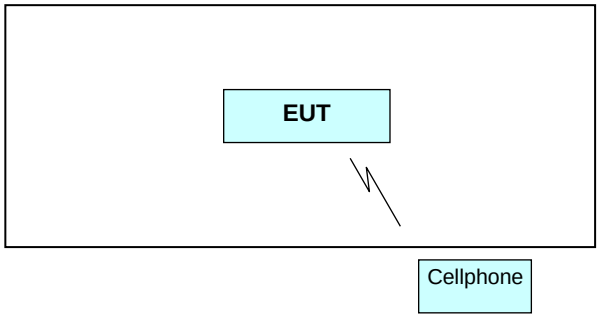
[PRINTER(USB DATA)] EUT (in battery) + Notebook PC



[Bluetooth Idle(BT DATA)] EUT+ Adaptor + Cellphone



[Bluetooth Idle(BT DATA)] EUT (only) + Cellphone



3. PRELIMINARY TEST

During preliminary test and final tests, the following operating mode was investigated.;

3.1 Conducted Emission

It was tested the following operating mode, after connecting all peripheral devices.

Operating Mode:

[EUT + Adaptor + Cellphone]	: BT IDLE(BT DATA) mode
[EUT + Adaptor + Notebook PC]	: PRINTER(USB DATA) mode

3.2 Radiated Emission

It was tested the following operating mode, after connecting all peripheral devices.

Operating Mode:

[EUT + Adaptor + Cellphone]	: BT IDLE(BT DATA) mode
EUT (only) + Cellphone	: BT IDLE(BT DATA) mode
[EUT + Adaptor + Notebook PC]	: PRINTER(USB DATA) mode
[EUT (in battery) + Notebook PC]	: PRINTER(USB DATA) mode

4. CONDUCTED EMISSION AND RADIATED EMISSION TEST SUMMARY

4.1 Conducted Emission

4.1.1 Measuring instruments

	Type	Model Name	Manufacturer	Serial Number	Calibration Cycle	Calibration Date
☒	EMI test receiver	ESR7	Rohde & Schwarz	101910	1 year	06.17.2021
☒	LISN	ENV216	Rohde & Schwarz	102245	1 year	08.23.2021
☒	LISN	ENV216	Rohde & Schwarz	100073	1 year	04.07.2021
☒	Software	EMC32	Rohde & Schwarz	-	-	-

4.1.2 Operating Condition

The test results of conducted emission at mains ports provide the following information:

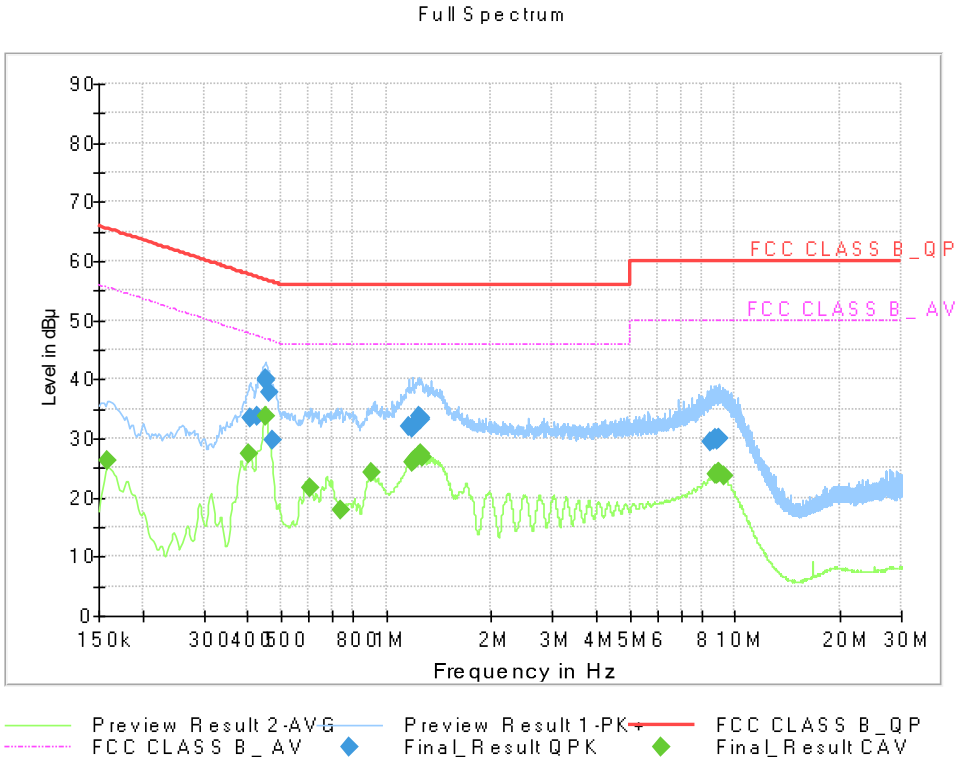
Test Standard Used	FCC CFR 47 PART 15 Subpart B Class B ANSI C63.4-2014
Frequency Range	0.15 ㎒ to 30 ㎒
Detector	Quasi-Peak, CISPR-Average
Bandwidth	9 ㎑ (6 dB)
Test Site	EMI Shield Room
Temperature	min. 19.2 / max. 22.3 °C
Relative Humidity	min. 31.2 / max. 34.8 %
Test Date	December 20, 2021

-Calculation Formula:

1. Conductor L1 = Hot, Conductor N = Neutral
2. Corr. = LISN Factor + Cable Loss
3. QuasiPeak or CAverage= Receiver Reading + Corr.
4. Margin = Limit – QuasiPeak or CAverage

4.1.3 Measuring Data

Figure 1: Conducted Emission (0.15 to 30) ㎒, Bluetooth Idle(BT DATA) mode, Line (L1)



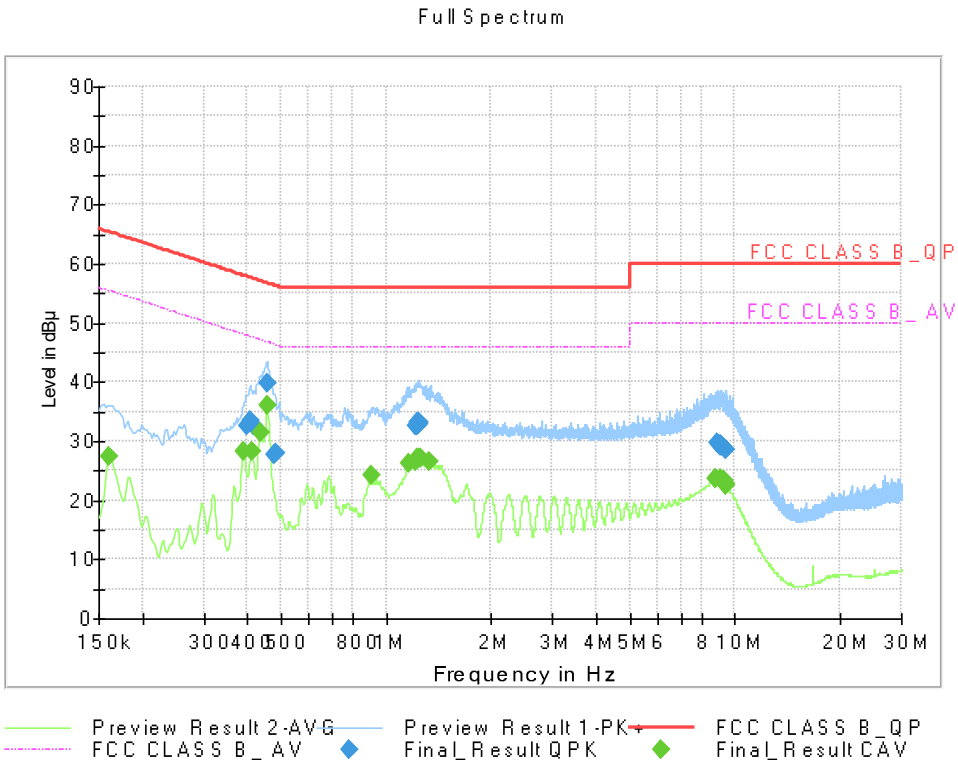
QuasiPeak Final Result

Frequency (㎒)	QuasiPeak (dB㎶)	Limit (dB㎶)	Margin (dB)	Bandwidth (㎑)	Line	Corr. (dB)
0.4065	33.59	57.72	24.13	9.000	L1	9.6
0.4290	33.75	57.27	23.52	9.000	L1	9.6
0.4493	39.78	56.89	17.11	9.000	L1	9.6
0.4538	40.16	56.81	16.65	9.000	L1	9.6
0.4605	37.83	56.68	18.85	9.000	L1	9.6
0.4740	29.78	56.44	26.66	9.000	L1	9.6
1.1638	32.06	56.00	23.94	9.000	L1	9.7
1.1908	31.82	56.00	24.18	9.000	L1	9.7
1.2268	32.84	56.00	23.16	9.000	L1	9.7
1.2380	33.62	56.00	22.38	9.000	L1	9.7
1.2515	33.51	56.00	22.49	9.000	L1	9.7
1.2560	33.09	56.00	22.91	9.000	L1	9.7
8.5528	29.45	60.00	30.55	9.000	L1	10.0
8.7530	29.82	60.00	30.18	9.000	L1	10.0
8.7710	29.88	60.00	30.12	9.000	L1	10.0
8.8543	29.84	60.00	30.16	9.000	L1	10.0
8.9713	30.10	60.00	29.90	9.000	L1	10.0
9.0185	30.02	60.00	29.98	9.000	L1	10.0

CAverage Final Result

Frequency (㎒)	CAverage (dB㎶)	Limit (dB㎶)	Margin (dB)	Bandwidth (㎑)	Line	Corr. (dB)
0.1590	26.28	55.52	29.24	9.000	L1	9.6
0.4043	27.30	47.77	20.47	9.000	L1	9.6
0.4493	33.69	46.89	13.20	9.000	L1	9.6
0.6080	21.61	46.00	24.39	9.000	L1	9.7
0.7430	17.87	46.00	28.13	9.000	L1	9.7
0.9118	24.29	46.00	21.71	9.000	L1	9.7
1.1930	25.90	46.00	20.10	9.000	L1	9.7
1.2065	26.30	46.00	19.70	9.000	L1	9.7
1.2178	26.67	46.00	19.33	9.000	L1	9.7
1.2403	27.25	46.00	18.75	9.000	L1	9.7
1.2538	27.31	46.00	18.69	9.000	L1	9.7
1.2650	26.96	46.00	19.04	9.000	L1	9.7
8.7710	24.06	50.00	25.94	9.000	L1	10.0
8.9173	24.09	50.00	25.91	9.000	L1	10.0
8.9713	24.28	50.00	25.72	9.000	L1	10.0
8.9960	24.22	50.00	25.78	9.000	L1	10.0
9.0500	24.10	50.00	25.90	9.000	L1	10.0
9.3133	23.62	50.00	26.38	9.000	L1	10.0

Figure 2: Conducted Emission (0.15 to 30) ㎒, Bluetooth Idle(BT DATA) mode, Line (N)



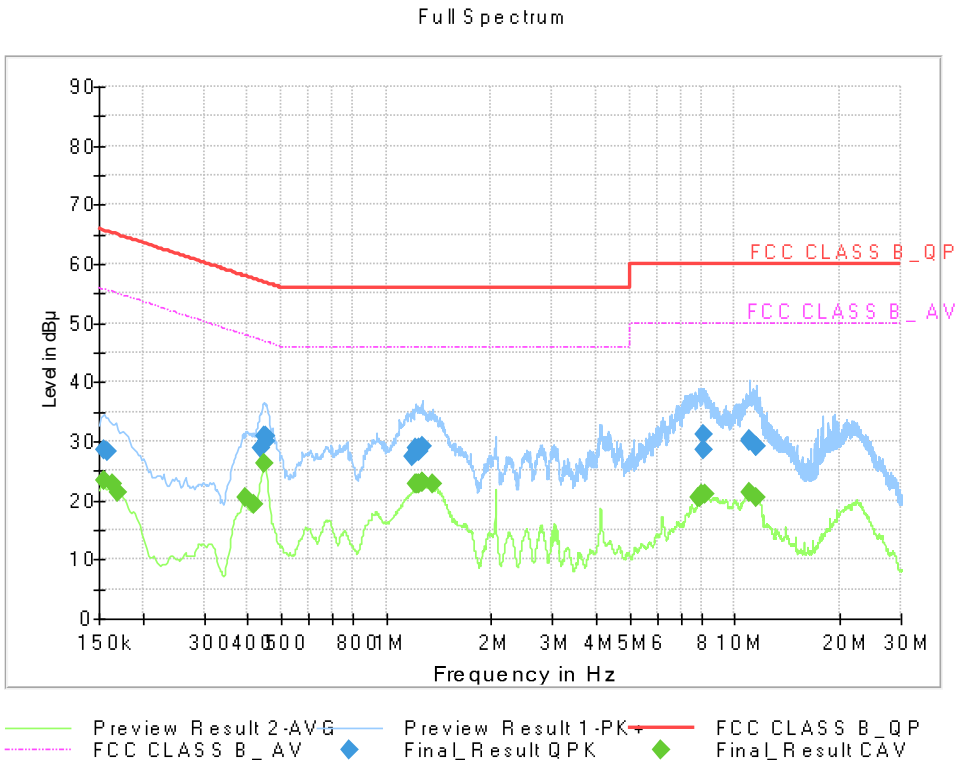
QuasiPeak Final Result

Frequency (㎒)	QuasiPeak (dB㎶)	Limit (dB㎶)	Margin (dB)	Bandwidth (㎑)	Line	Corr. (dB)
0.3975	32.58	57.91	25.33	9.000	N	9.6
0.4065	33.54	57.72	24.18	9.000	N	9.6
0.4155	32.49	57.54	25.05	9.000	N	9.6
0.4560	39.95	56.77	16.82	9.000	N	9.6
0.4785	27.64	56.37	28.73	9.000	N	9.6
0.4830	28.07	56.29	28.22	9.000	N	9.6
1.2155	32.66	56.00	23.34	9.000	N	9.7
1.2245	32.63	56.00	23.37	9.000	N	9.7
1.2313	33.13	56.00	22.87	9.000	N	9.7
1.2380	33.12	56.00	22.88	9.000	N	9.7
1.2425	33.11	56.00	22.89	9.000	N	9.7
1.2493	32.86	56.00	23.14	9.000	N	9.7
8.9330	29.60	60.00	30.40	9.000	N	10.0
8.9960	29.50	60.00	30.50	9.000	N	10.0
9.0613	29.36	60.00	30.64	9.000	N	10.0
9.0748	29.23	60.00	30.77	9.000	N	10.0
9.2458	29.18	60.00	30.82	9.000	N	10.0
9.4055	28.67	60.00	31.33	9.000	N	10.0

CAverage Final Result

Frequency (㎒)	CAverage (dB㎶)	Limit (dB㎶)	Margin (dB)	Bandwidth (㎑)	Line	Corr. (dB)
0.1613	27.47	55.40	27.93	9.000	N	9.6
0.3885	28.38	48.10	19.72	9.000	N	9.6
0.4110	28.30	47.63	19.33	9.000	N	9.6
0.4358	31.47	47.14	15.67	9.000	N	9.6
0.4560	36.03	46.77	10.74	9.000	N	9.6
0.9118	24.27	46.00	21.73	9.000	N	9.7
1.1615	26.27	46.00	19.73	9.000	N	9.7
1.2155	26.66	46.00	19.34	9.000	N	9.7
1.2313	27.09	46.00	18.91	9.000	N	9.7
1.2403	27.19	46.00	18.81	9.000	N	9.7
1.2538	27.11	46.00	18.89	9.000	N	9.7
1.3370	26.52	46.00	19.48	9.000	N	9.7
8.7778	23.66	50.00	26.34	9.000	N	10.0
8.8115	23.58	50.00	26.42	9.000	N	10.0
9.1333	23.54	50.00	26.46	9.000	N	10.0
9.2885	23.23	50.00	26.77	9.000	N	10.0
9.3898	22.70	50.00	27.30	9.000	N	10.0
9.4460	22.59	50.00	27.41	9.000	N	10.0

Figure 3: Conducted Emission (0.15 to 30) ㎒, PRINTER(USB DATA) mode, Line (L1)



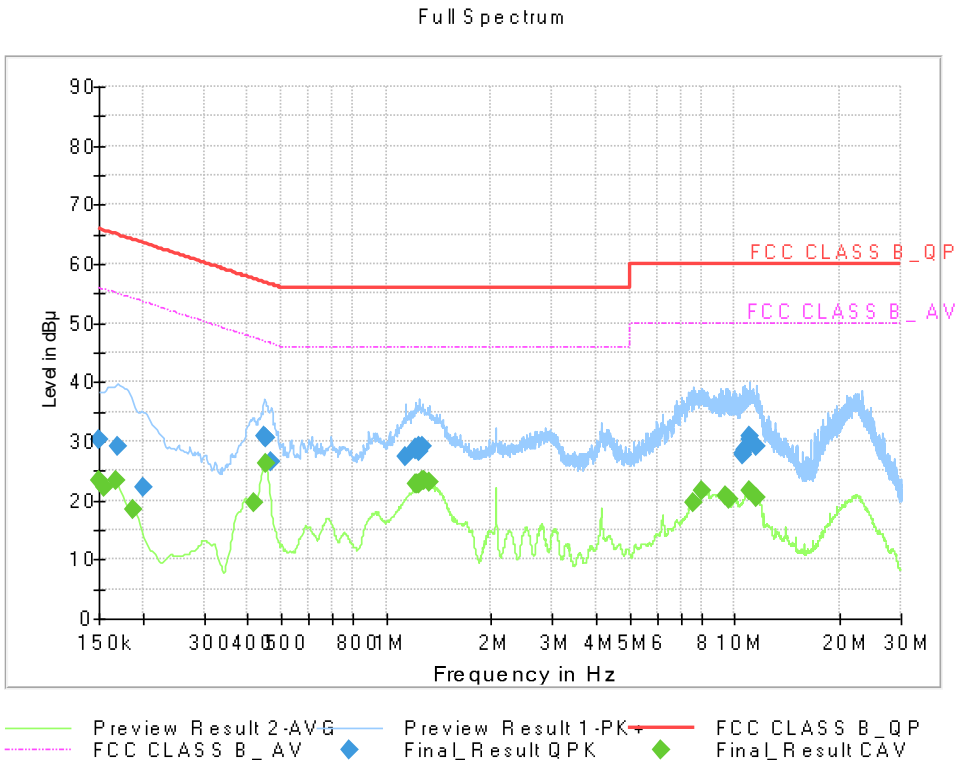
QuasiPeak Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.1545	28.70	65.75	37.05	9.000	L1	9.6
0.1590	28.36	65.52	37.16	9.000	L1	9.6
0.4358	28.99	57.14	28.15	9.000	L1	9.6
0.4448	30.94	56.97	26.03	9.000	L1	9.6
0.4493	30.83	56.89	26.06	9.000	L1	9.6
0.4538	30.03	56.81	26.78	9.000	L1	9.6
1.1885	27.36	56.00	28.64	9.000	L1	9.7
1.2155	28.90	56.00	27.10	9.000	L1	9.7
1.2245	28.42	56.00	27.58	9.000	L1	9.7
1.2403	28.94	56.00	27.06	9.000	L1	9.7
1.2493	28.23	56.00	27.77	9.000	L1	9.7
1.2673	29.05	56.00	26.95	9.000	L1	9.7
8.1253	31.25	60.00	28.75	9.000	L1	10.0
8.1388	28.61	60.00	31.39	9.000	L1	10.0
10.9895	30.32	60.00	29.68	9.000	L1	10.1
11.0525	29.99	60.00	30.01	9.000	L1	10.1
11.5385	29.03	60.00	30.97	9.000	L1	10.1
11.5430	29.17	60.00	30.83	9.000	L1	10.1

CAverage Final Result

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.1545	23.23	55.75	32.52	9.000	L1	9.6
0.1635	22.74	55.28	32.54	9.000	L1	9.6
0.1703	21.35	54.95	33.60	9.000	L1	9.6
0.3953	20.57	47.95	27.38	9.000	L1	9.6
0.4155	19.31	47.54	28.23	9.000	L1	9.6
0.4470	26.13	46.93	20.80	9.000	L1	9.6
1.2178	22.76	46.00	23.24	9.000	L1	9.7
1.2313	22.67	46.00	23.33	9.000	L1	9.7
1.2425	22.92	46.00	23.08	9.000	L1	9.7
1.2650	23.17	46.00	22.83	9.000	L1	9.7
1.2785	23.22	46.00	22.78	9.000	L1	9.7
1.3618	22.92	46.00	23.08	9.000	L1	9.7
7.9048	20.47	50.00	29.53	9.000	L1	10.0
7.9273	20.35	50.00	29.65	9.000	L1	10.0
8.0533	21.17	50.00	28.83	9.000	L1	10.0
8.1928	21.10	50.00	28.90	9.000	L1	10.0
10.9940	21.42	50.00	28.58	9.000	L1	10.1
11.5408	20.62	50.00	29.38	9.000	L1	10.1

Figure 4: Conducted Emission (0.15 to 30) ㎒, PRINTER(USB DATA) mode, Line (N)



QuasiPeak Final Result

Frequency (㎒)	QuasiPeak (dB㎶)	Limit (dB㎶)	Margin (dB)	Bandwidth (㎑)	Line	Corr. (dB)
0.1500	30.26	66.00	35.74	9.000	L1	9.6
0.1703	29.06	64.95	35.89	9.000	L1	9.6
0.2018	22.10	63.54	41.44	9.000	L1	9.6
0.4470	31.00	56.93	25.93	9.000	L1	9.6
0.4538	30.69	56.81	26.12	9.000	L1	9.6
0.4673	26.49	56.56	30.07	9.000	L1	9.6
1.1390	27.34	56.00	28.66	9.000	L1	9.7
1.2088	28.48	56.00	27.52	9.000	L1	9.7
1.2200	28.85	56.00	27.15	9.000	L1	9.7
1.2425	29.16	56.00	26.84	9.000	L1	9.7
1.2493	28.37	56.00	27.63	9.000	L1	9.7
1.2673	29.00	56.00	27.00	9.000	L1	9.7
10.5035	27.60	60.00	32.40	9.000	L1	10.1
10.5665	27.88	60.00	32.12	9.000	L1	10.1
10.6633	28.60	60.00	31.40	9.000	L1	10.1
10.9918	30.72	60.00	29.28	9.000	L1	10.1
11.0390	30.16	60.00	29.84	9.000	L1	10.1
11.5408	29.09	60.00	30.91	9.000	L1	10.1

CAverage Final Result

Frequency (㎒)	CAverage (dB㎶)	Limit (dB㎶)	Margin (dB)	Bandwidth (㎑)	Line	Corr. (dB)
0.1500	23.39	56.00	32.61	9.000	L1	9.6
0.1545	22.13	55.75	33.62	9.000	L1	9.6
0.1680	23.50	55.06	31.56	9.000	L1	9.6
0.1883	18.47	54.11	35.64	9.000	L1	9.6
0.4155	19.51	47.54	28.03	9.000	L1	9.6
0.4493	26.13	46.89	20.76	9.000	L1	9.6
1.2178	22.66	46.00	23.34	9.000	L1	9.7
1.2313	22.77	46.00	23.23	9.000	L1	9.7
1.2425	22.93	46.00	23.07	9.000	L1	9.7
1.2650	23.33	46.00	22.67	9.000	L1	9.7
1.2898	23.30	46.00	22.70	9.000	L1	9.7
1.3258	23.13	46.00	22.87	9.000	L1	9.7
7.6370	19.62	50.00	30.38	9.000	L1	10.0
8.0645	21.65	50.00	28.35	9.000	L1	10.0
9.4348	20.88	50.00	29.12	9.000	L1	10.0
9.5810	20.07	50.00	29.93	9.000	L1	10.0
10.9940	21.50	50.00	28.50	9.000	L1	10.1
11.5430	20.45	50.00	29.55	9.000	L1	10.1

4.2 Radiated Emission Below 1 ㎓

4.2.1 Measuring instruments

	Type	Model Name	Manufacturer	Serial Number	Calibration Cycle	Calibration Date
☐	EMI test receiver	ESU40	Rohde & Schwarz	100524	1 year	05.10.2021
☐	Bilog antenna	VULB9168	Schwarzbeck	255	2 year	03.15.2021
☐	Antenna master	MA4640-XP-ET	INNCO SYSTEM	-	-	-
☐	Antenna master controller	CO3000	INNCO SYSTEM	CO3000/870 /35990515/L	-	-
☐	Turn Table	1060	INNCO SYSTEM	-	-	-
☐	Turn Table controller	CO2000	INNCO SYSTEM	CO2000/095 /7590304/L	-	-
☒	EMI test receiver	ESU40	Rohde&Schwartz	100361	1 year	09.17.2021
☒	Bilog Antenna	VULB 9168	SCHWARZBECK	01156	2 year	05.30.2020
☒	Antenna Master	MA4640-XP-ET	INNCO SYSTEM	-	-	-
☒	Antenna Master Controller	CO3000	INNCO SYSTEM	CO3000/1250 /4892320/P	-	-
☒	Turn Table	DS2000-S	INNCO SYSTEM	-	-	-
☒	Turn Table Controller	CO2000	INNCO SYSTEM	CO3000/1250 /4892320/P	-	-
☒	Software	EMC32	Rohde & Schwarz	-	-	-

4.2.2 Operating Condition

The test results of radiated emission provide the following information:

Used Test Standard	FCC CFR 47 PART 15 Subpart B Class B ANSI C63.4-2014
Frequency Range	30 ㎒ to 1 000 ㎒
Detector	Quasi-Peak
Bandwidth	120 ㎑ (6 dB)
Test Site	3 m Semi Anechoic Chamber #2
Temperature	min. 18.1 / max. 19.3 °C
Relative Humidity	min. 36.8 / max. 43.1 %
Test Date	December 15, 2021

-Calculation Formula:

1. POL. H = Horizontal, POL. V = Vertical
2. QuasiPeak = Reading (Receiver Reading) + Corr.
3. Corr. (Correction Factor) = Antenna Factor + Cable Loss
4. Margin = Limit - QuasiPeak

4.2.3 Measuring Data

[EUT + Adaptor + Cellphone] Bluetooth Idle(BT DATA) Mode

Frequency (㎒)	Quasi Peak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Antenna Height (㎝)	POL. (H/V)	Azimuth (deg)	Corr. (dB)
45.9440	27.51	40.00	12.49	100.0	V	184.0	19.9
73.3950	28.84	40.00	11.16	100.0	V	247.0	16.9
122.9460	23.90	43.50	19.60	100.0	V	144.0	17.8
155.7420	23.97	43.50	19.53	100.0	V	305.0	19.8
215.8920	22.10	43.50	21.40	100.0	V	302.0	17.3
864.0230	37.90	46.00	8.10	100.0	H	280.0	30.5

[EUT (only) + Cellphone] Bluetooth Idle(BT DATA) Mode

Frequency (㎒)	Quasi Peak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Antenna Height (㎝)	POL. (H/V)	Azimuth (deg)	Corr. (dB)
54.2220	18.10	40.00	21.90	100.0	V	233.0	19.7
139.9810	20.03	43.50	23.47	100.0	V	311.0	19.5
159.6890	19.45	43.50	24.05	100.0	V	253.0	19.9
300.6260	18.40	46.00	27.60	225.0	H	25.0	20.3
432.0080	28.06	46.00	17.94	100.0	H	306.0	23.5
864.0230	37.98	46.00	8.02	100.0	H	290.0	30.5

[EUT + Adaptor + Notebook PC] PRINTER(USB DATA) Mode

Frequency (㎒)	Quasi Peak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Antenna Height (㎝)	POL. (H/V)	Azimuth (deg)	Corr. (dB)
46.7240	29.93	40.00	10.07	100.0	V	-23.0	19.9
64.5840	29.66	40.00	10.34	100.0	V	249.0	18.7
159.7560	24.51	43.50	18.99	100.0	V	268.0	19.9
240.0050	36.00	46.00	10.00	125.2	H	185.0	18.3
277.1200	35.00	46.00	11.00	103.9	H	256.0	19.6
960.0130	35.30	54.00	18.70	100.0	H	130.0	31.5

[EUT (in battery) + Notebook PC] PRINTER(USB DATA) Mode

Frequency (㎒)	Quasi Peak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Antenna Height (㎝)	POL. (H/V)	Azimuth (deg)	Corr. (dB)
60.0070	25.70	40.00	14.30	100.0	V	35.0	19.4
246.4180	34.00	46.00	12.00	125.1	H	300.0	18.5
259.6780	36.00	46.00	10.00	179.2	V	162.0	19.0
281.5140	37.00	46.00	9.00	177.9	V	186.0	19.8
768.0330	35.11	46.00	10.89	100.0	H	184.0	29.4
816.0080	35.36	46.00	10.64	178.9	H	298.0	30.1

4.3 Radiated Emission Above 1 ㎓

4.3.1 Measuring instruments

	Type	Model Name	Manufacturer	Serial Number	Calibration Cycle	Calibration Date
☐	EMI test receiver	ESU40	Rohde & Schwarz	100524	1 year	05.10.2021
☐	Antenna master	MA4640-XP-ET	INNCO SYSTEM	-	-	-
☐	Antenna master controller	CO3000	INNCO SYSTEM	CO3000/870/ 35990515/L	-	-
☐	Turn table	1060	INNCO SYSTEM	-	-	-
☐	Turn table controller	CO2000	INNCO SYSTEM	CO2000/095/ 7590304/L	-	-
☐	Horn antenna	BBHA 9120D	Schwarzbeck	01836	1 year	07.20.2021
☐	Low noise amplifier	TK-PA18H	TESTEK	170034-L	1 year	03.02.2021
☐	Horn Antenna	BBHA 9170	Schwarzbeck	BBHA 9170 #786	1 year	11.16.2021
☐	Power Amplifier	TK-PA1840H	TESTEK	170030-L	1 year	03.09.2021
☒	EMI test receiver	ESU40	Rohde&Schwartz	100361	1 year	09.17.2021
☒	Antenna Master	MA4640-XP-ET	INNCO SYSTEM	-	-	-
☒	Antenna Master Controller	CO3000	INNCO SYSTEM	CO3000/1250 /4892320/P	-	-
☒	Turn Table	DS2000-S	INNCO SYSTEM	-	-	-
☒	Turn Table Controller	CO2000	INNCO SYSTEM	CO3000/1250 /4892320/P	-	-
☒	Horn Antenna	BBHA 9120D	SCHWARZBECK	296	1 year	02.02.2021
☒	Amplifier	CBLU5183530	CERNEX	24348	1 year	06.03.2021
☐	Horn Antenna	BBHA 9170	SCHWARZBECK	810	1 year	04.26.2021
☐	Power Amplifier	TK-PA1804H	TESTEK	170033-L	1 year	03.03.2021
☒	Software	EMC32	Rohde & Schwarz	-	-	-

4.3.2 Operating Condition

The test results of radiated emission provide the following information:

Used Test Standard	FCC CFR 47 PART 15 Subpart B Class B ANSI C63.4-2014
Detector	Peak (Bandwidth: 1 ㎒) CISPR-Average (Bandwidth: 1 ㎒)
Highest Frequency	2 480 ㎒
Tested Frequency Range	1 ㎓ to 18 ㎓
Test Site	3 m Semi Anechoic Chamber #2
Temperature	min. 18.5 / max. 19.4 °C
Relative Humidity	min. 37.2 / max. 41.7 %
Test Date	December 19, 2021

-Calculation Formula:

1. POL. H = Horizontal, POL. V = Vertical
2. Peak or CAverage = Reading (Receiver Reading) + Corr.
3. Corr. (Correction Factor) = Antenna Factor+ Cable Loss –Amplifier Gain
4. Margin = Limit - Peak or CAverage

4.3.3 Measuring Data

[EUT + Adaptor + Cellphone] Bluetooth Idle(BT DATA) Mode

Frequency (㎒)	Peak (dB㎶/m)	CAverage (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)	Antenna Height (㎝)	POL. (H/V)	Azimuth (deg)	Corr. (dB)
1152.1400	---	17.95	54.00	36.05	299.9	H	56.0	-21.7
1152.6200	27.78	---	74.00	46.22	199.6	V	298.0	-21.7
1636.6750	---	15.09	54.00	38.91	299.9	V	290.0	-20.6
1674.9850	27.53	---	74.00	46.47	300.0	H	23.0	-20.6
4328.8350	35.44	---	74.00	38.56	299.8	V	216.0	-13.4
4368.8200	---	23.22	54.00	30.78	100.0	V	262.0	-13.2
6736.5800	45.43	---	74.00	28.57	199.6	V	274.0	-4.7
7650.6850	---	31.97	54.00	22.03	100.0	H	169.0	-2.8
13864.3400	51.43	---	74.00	22.57	299.8	V	73.0	6.5
14328.4000	---	38.30	54.00	15.70	200.1	V	58.0	7.0
17974.6000	---	44.22	54.00	9.78	100.0	V	119.0	13.1
17983.1400	56.85	---	74.00	17.15	299.8	V	282.0	13.2

[EUT (only) + Cellphone] Bluetooth Idle(BT DATA) Mode

Frequency (㎒)	Peak (dB㎶/m)	CAverage (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)	Antenna Height (㎝)	POL. (H/V)	Azimuth (deg)	Corr. (dB)
1225.9650	27.22	---	74.00	46.78	199.8	H	242.0	-21.5
1235.0400	---	14.80	54.00	39.20	100.0	V	216.0	-21.5
2009.2600	28.56	---	74.00	45.44	200.0	V	239.0	-20.0
2077.8300	---	16.62	54.00	37.38	200.0	V	239.0	-19.8
2915.0950	32.10	---	74.00	41.90	100.0	H	65.0	-17.1
3617.4850	---	20.94	54.00	33.06	100.0	V	23.0	-16.0
7451.3900	---	33.16	54.00	20.84	200.0	H	326.0	-2.9
9032.8400	44.49	---	74.00	29.51	100.0	V	305.0	-2.6
11513.9000	---	36.19	54.00	17.81	200.0	V	109.0	3.2
15021.6800	45.24	---	74.00	28.76	100.0	H	98.0	6.7
17989.8096	---	35.92	54.00	18.08	100.0	H	27.0	13.2
17993.5661	47.53	---	74.00	26.47	100.0	H	41.0	13.3

[EUT + Adaptor + Notebook PC] PRINTER(USB DATA) Mode

Frequency (㎒)	Peak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Antenna Height (㎝)	POL. (H/V)	Azimuth (deg)	Corr. (dB)
1382.1900	---	14.45	54.00	39.55	300.0	V	337.0	-21.1
1421.6550	27.40	---	74.00	46.60	199.9	V	104.0	-21.0
1997.1950	33.47	---	74.00	40.53	100.0	V	221.0	-20.1
2066.7200	---	16.41	54.00	37.59	100.0	V	-9.0	-19.8
2399.7200	35.01	---	74.00	38.99	299.9	V	174.0	-18.4
2577.1100	---	18.29	54.00	35.71	100.0	V	256.0	-17.8
6332.7950	44.06	---	74.00	29.94	100.0	V	242.0	-6.2
6958.5000	---	32.55	54.00	21.45	199.8	H	3.0	-3.9
14509.7150	51.51	---	74.00	22.49	199.9	H	288.0	7.1
14597.1050	---	39.09	54.00	14.91	199.8	V	14.0	7.1
17999.0174	---	44.08	54.00	9.92	199.8	H	193.0	13.3
17999.5642	58.03	---	74.00	15.97	100.0	V	291.0	13.3

[EUT (in battery) + Notebook PC] PRINTER(USB DATA) Mode

Frequency (㎒)	Peak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Antenna Height (㎝)	POL. (H/V)	Azimuth (deg)	Corr. (dB)
1152.0600	---	16.61	54.00	37.39	299.8	H	189.0	-21.7
1196.9500	32.25	---	74.00	41.75	100.0	V	-17.0	-21.5
1742.1750	28.43	---	74.00	45.57	100.0	V	1.0	-20.5
1768.5350	---	15.43	54.00	38.57	199.6	H	88.0	-20.4
2550.1550	31.67	---	74.00	42.33	300.0	V	261.0	-17.9
2573.1350	---	18.98	54.00	35.02	100.0	V	115.0	-17.8
7117.1750	45.72	---	74.00	28.28	199.8	V	16.0	-3.5
7163.6500	---	32.49	54.00	21.52	199.6	H	180.0	-3.4
14105.4750	52.09	---	74.00	21.91	300.0	V	286.0	6.9
14312.1850	---	38.81	54.00	15.19	100.0	V	13.0	7.0
17990.4615	53.85	---	74.00	20.15	100.0	V	69.0	13.2
17998.0237	---	41.62	54.00	12.38	299.8	H	286.0	13.3

5. CONCLUSION

The data collected shows that the **Product Name: Mobile Printer, Model Name: WSP-R350** complies with §15.107 and §15.109 of the FCC rules

6. APPENDIX A. TEST SETUP PHOTO

Please refer to Appendix. A and test setup photo file no. as follows;

File No.	Date of Issue	Description
HCT-EM-2201-FC004-P	January 13, 2022	Initial Release

End of report