

Prüfbericht-Nr.: Test report no.:	CN22C2XV 001	Auftrags-Nr.: Order no.:	180240980	Seite 1 von 19 Page 1 of 19
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2022.08.16	
Auftraggeber: Client:	Ningbo Flowind New Energy Technology Co., Ltd. No.169 Zhenjiang Road, Jiangbei District, Ningbo, 315000 Zhejiang P.R. China			
Prüfgegenstand: Test item:	Wireless Charger Model			
Bezeichnung / Typ-Nr.: Identification / Type no.:	JBY-TH01-15W			
Auftrags-Inhalt: Order content:	TÜV Rheinland – FCC Service			
Prüfgrundlage: Test specification:	FCC Part 15, Subpart C:2021 FCC 47 CFR Part 1.1307 FCC 47 CFR Part 1.1310 FCC KDB Publication 680106 D01 RF Exposure Wireless Charging App v03r01			
Wareneingangsdatum: Date of sample receipt:	2022.08.24	Refer to Photo Documentation		
Prüfmuster-Nr.: Test sample no.:	A003323874			
Prüfzeitraum: Testing period:	2022.09.05 - 2023.01.06			
Ort der Prüfung: Place of testing:	Refer to section 1.1			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland / CCIC (Ningbo) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:	genehmigt von: authorized by:			
Datum: Date:	2023.01.09	Ausstelldatum: Issue date:	2023.01.09	
Stellung / Position:	Keda Zhou/PE	Stellung / Position:	Season Yang/Reviewer	
Sonstiges / Other:	FCC ID: 2A9OA-C0N-ZTH-WC			
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory F(ail) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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Test Summary

4.1.1 ANTENNA REQUIREMENT

Result:

Pass

4.1.2 20dB BANDWIDTH MEASUREMENT

Result:

Pass

4.1.3 RADIATED EMISSIONS

Result:

Pass

4.2.1 MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE

Result:

Pass

5.1.1 H-FIELD STRENGTHS

Result:

Pass

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1. Test Sites

1.1 Test Facilities

Laboratory: TÜV Rheinland /CCIC (Ningbo) Co., Ltd.

1st Floor, Building 11, Scholar Innovation Park, No.1188 Zhongguan Road, Zhenhai District, Ningbo 315200 P.R. China

The tests were conducted by TÜV Rheinland/CCIC's engineer directly in the above laboratory. The used test equipment is in accordance with CISPR 16-1 series standards for measurement of radio interference.

1.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment, Laboratory

Kind of Equipment	Type	Serial No.	Last cal. date	Cal. due date
EMI test receiver	ESR7	101929	2022.10.31	2023.10.30
Spectrum analyzer	FSV40	101412	2022.10.31	2023.10.30
Loop Antenna	FMZB 1519B	00241	2022.09.02	2025.09.01
Bilog Antenna	CBL6112D	49033	2021.03.15	2024.03.14
EMI test receiver	ESR3	102331	2022.10.31	2023.10.30
LISN	ENV216	102250	2022.10.31	2023.10.30

1.3 Uncertainty of Measurement

Table 2: Measurement Uncertainty

Test Item	Expanded Measurement Uncertainty (k=2)
Conducted Emission (9-150kHz)	3.70dB
Conducted Emission (150k-30MHz)	3.30dB
Radiated Emission (30-1000MHz)	4.39dB
Radiated Emission (1-18GHz)	4.67dB

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2. General Product Information

2.1 Product Function and Intended Use

The EUT (equipment under test) is a Wireless Charger Model operating at 110.5 – 205 KHz.

For more detail information, refer to the user's manual.

2.2 Ratings and System Details

Table 3: General Description of EUT

General Description of EUT	
Model name:	Wireless Charger Model
FCC ID:	2A90A-C0N-ZTH-WC
Input Voltage:	DC 5-12 V
Input Current:	≥2A
Output Power	5W, 7.5W, 10W, 15W
Protection Class:	Class III
Operating Temperature Range:	-20°C~60°C
Technical Specification of WPT	
Operating Frequency band	110.5 – 205 KHz
Antenna Type	Coil Antenna length less than 3m
Antenna Gain	0dBi

2.3 Independent Operation Modes

There are some modes:

Mode A: Standby

Mode B: Charging

1. 5 W
2. 7.5 W
3. 10 W
4. 15 W

Refer to the user's manual for further information.

2.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram for further information.

2.5 Submitted Documents

Circuit diagram, Schematics, PCB Layout, Label, User Manual etc.

3. Test Set-up and Operation Modes

3.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

3.2 Test Operation and Test Software

All testing were performed according to the procedures in ANSI C63.10: 2013.

Test Software EMC32 V10.30 was used in the radiated emission test.

More details refer to the related paragraph of this report.

3.3 Special Accessories and Auxiliary Equipment

None.

3.4 Countermeasures to Achieve ERM Compliance

The test sample which has been tested contained the noise suppression parts as described in the Circuit Diagram. No additional measures were employed to achieve compliance.

3.5 Test set-up

Diagram of Measurement Configuration for Radiation Test (9KHz-30MHz)

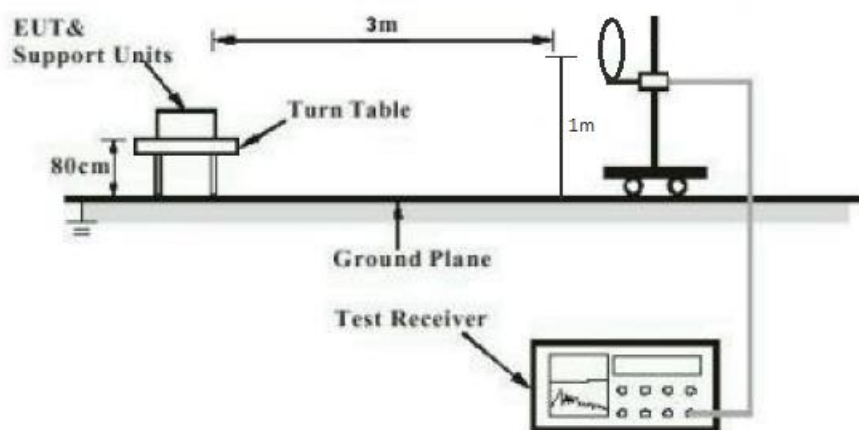


Diagram of Measurement Configuration for Radiation Test (30MHz-1GHz)

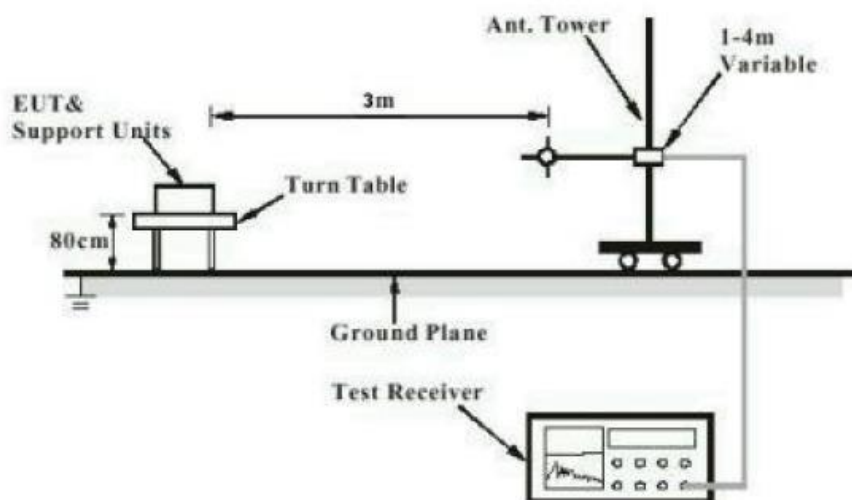
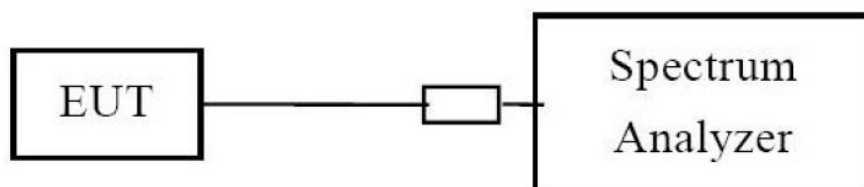


Diagram of Measurement Configuration for Conducted Transmitter Measurement



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4. Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Antenna Requirement

Result:

Pass

Test Specification
Test standard : FCC 47 CFR Part 15.203

The EUT has an internal coil antenna, which permanently attached and no consideration of replacement. Therefore, the EUT is considered sufficient to comply with the provision.

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4.1.2 20dB Bandwidth Measurement

Result:

Pass

Test Specification

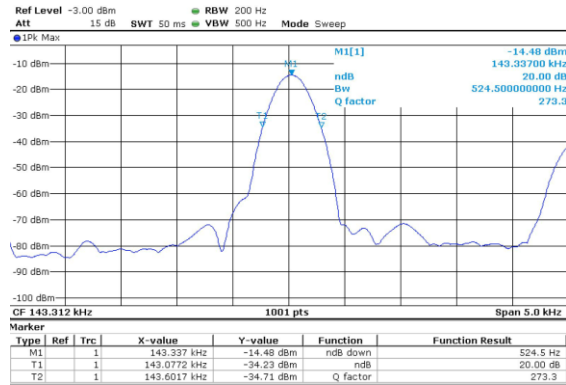
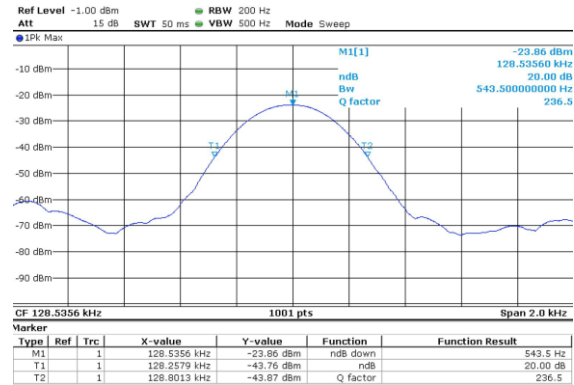
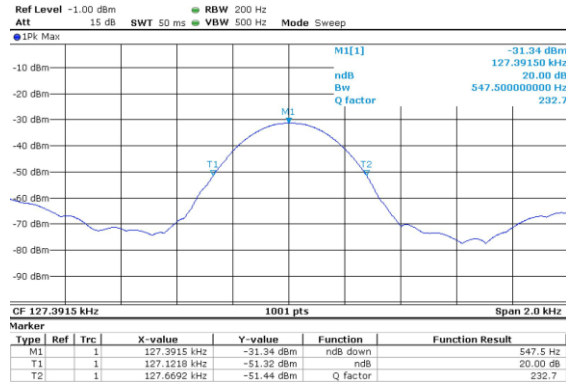
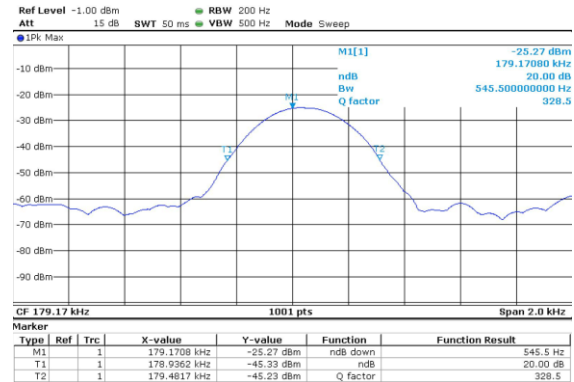
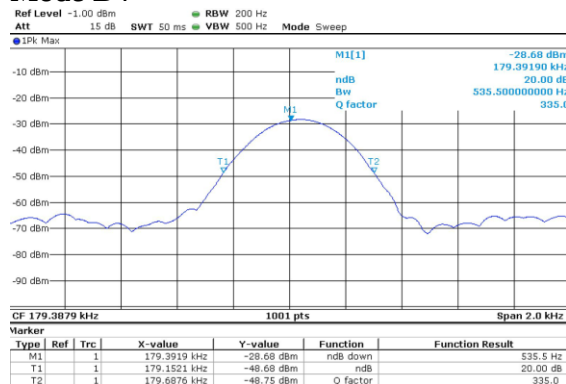
Test standard : FCC 47 CFR Part 15.215
Basic standard : ANSI C63.10: 2013
Limit : No limit
Test suite : Shielded Room

Test Setup

Date of testing : 2022.12.14
Test environment : Normal test conditions
Operational mode : A, B1, B2, B3, B4
Temperature : 23°C
Relative humidity : 56%
Atmospheric pressure : 101.2 kPa

Table 4: Test result of 20dB Bandwidth

Test Mode	Frequency (KHz)	Bandwidth (Hz)	Limit	Verdict
A	143.3	524.5	N/A	Pass
B1	128.5	543.5	N/A	Pass
B2	127.4	547.5	N/A	Pass
B3	179.2	545.5	N/A	Pass
B4	179.4	535.5	N/A	Pass

Figure 1: The Measurement of 20dB Bandwidth
Mode A

Mode B1

Mode B2

Mode B3

Mode B4


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4.1.3 Radiated Emissions

Result:

Pass

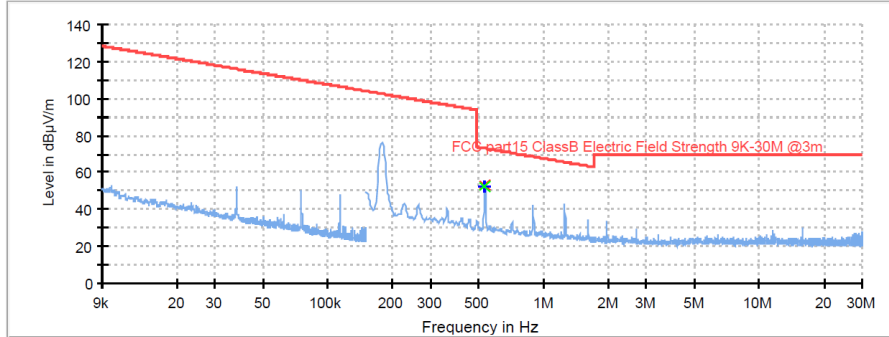
Test Specification
Test standard : CFR47 FCC Part 15.205
CFR47 FCC Part 15.209
Basic standard : ANSI C63.10: 2013
Limits : CFR47 FCC Part 15.205 (a)
CFR47 FCC Part 15.209 (a)
Test suite : 3m Semi Anechoic Room

Test Setup

Date of testing : 2022.12.15
Test environment : Normal test conditions
Operational mode : B4
Temperature : 23°C
Relative humidity : 56%
Atmospheric pressure : 101.2 kPa

Figure 2: Spectral Diagrams, Radiated Spurious Emission

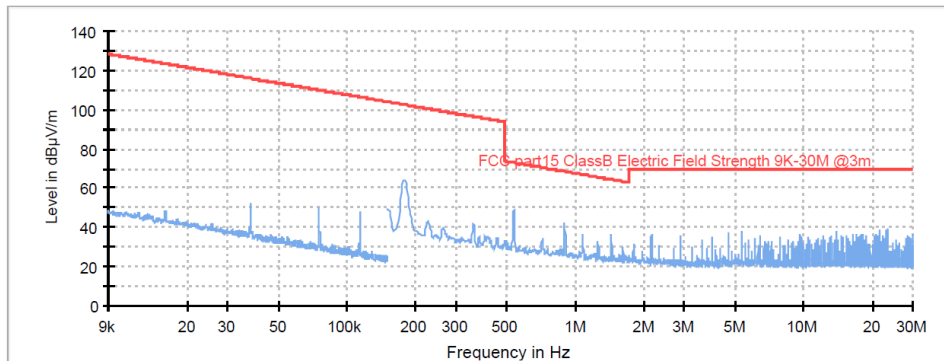
Mode B4
 9KHz-30MHz, Polarization X


Result Table Single

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)
0.536400	52.8	52.6	1.0	9.000	19.0

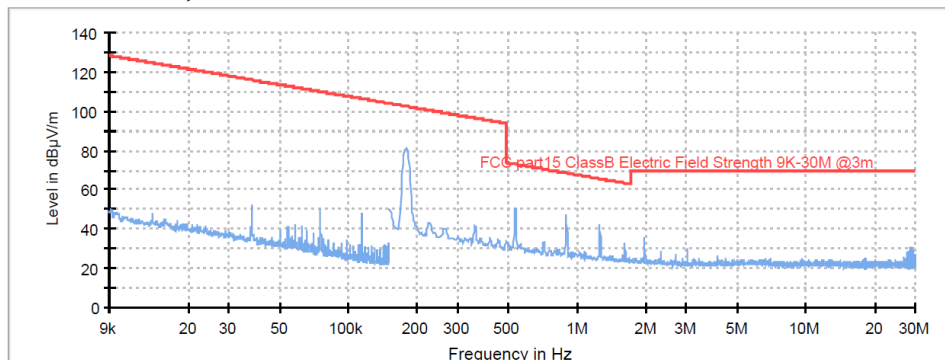
Just one emission was smaller than 20 dB below the limit

9KHz-30MHz, Polarization Y



All emissions were greater than 20 dB below the limit

9KHz-30MHz, Polarization Z



All emissions were greater than 20 dB below the limit

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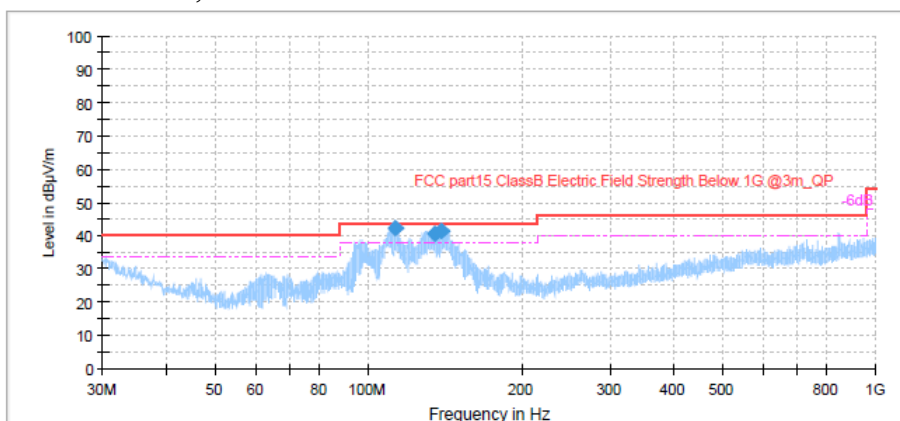
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Mode B4

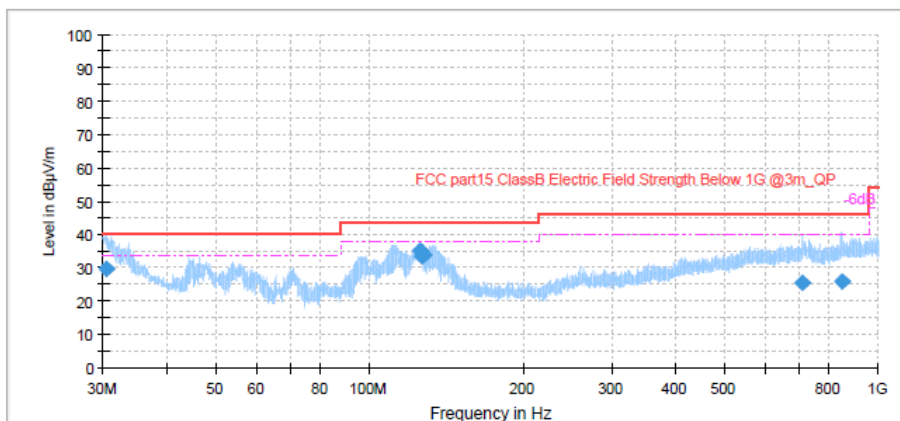
30MHz-1000MHz, Horizontal



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
112.739444	42.34	43.50	1.16	1000.0	120.000	250.0	H	250.0	19.0
135.480556	40.65	43.50	2.85	1000.0	120.000	203.0	H	248.0	18.7
139.094444	41.41	43.50	2.09	1000.0	120.000	157.0	H	26.0	18.5

30MHz-1000MHz, Vertical



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.437222	29.88	40.00	10.12	1000.0	120.000	100.0	V	90.0	25.7
125.968333	34.96	43.50	8.54	1000.0	120.000	100.0	V	149.0	19.0
127.046111	33.40	43.50	10.10	1000.0	120.000	104.0	V	179.0	19.1
127.746667	33.76	43.50	9.74	1000.0	120.000	104.0	V	144.0	19.0
708.941667	25.55	46.00	20.45	1000.0	120.000	250.0	V	129.0	27.8
845.221667	26.01	46.00	19.99	1000.0	120.000	117.0	V	231.0	29.4

Remark: All the modes were tested, just record the worst case.

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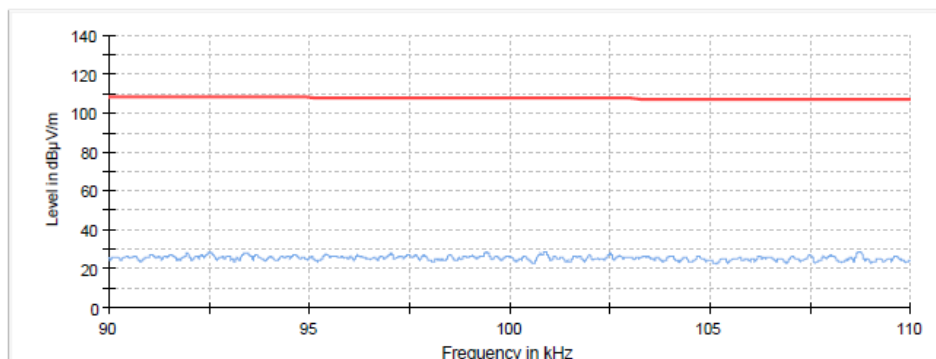
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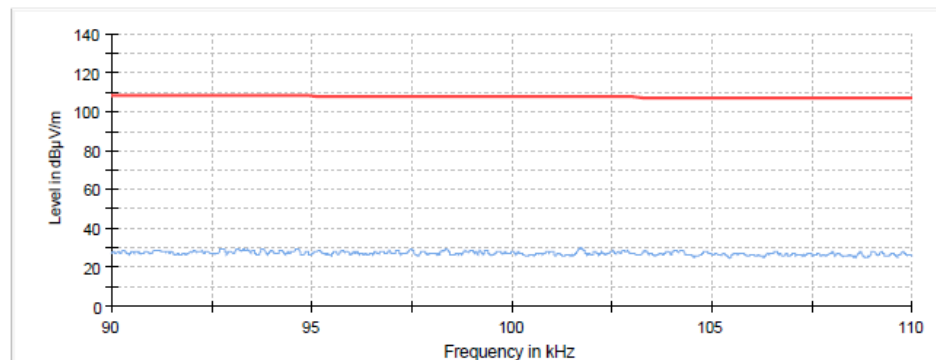
Figure 3: Spectral Diagrams, Restricted bands

Mode B4

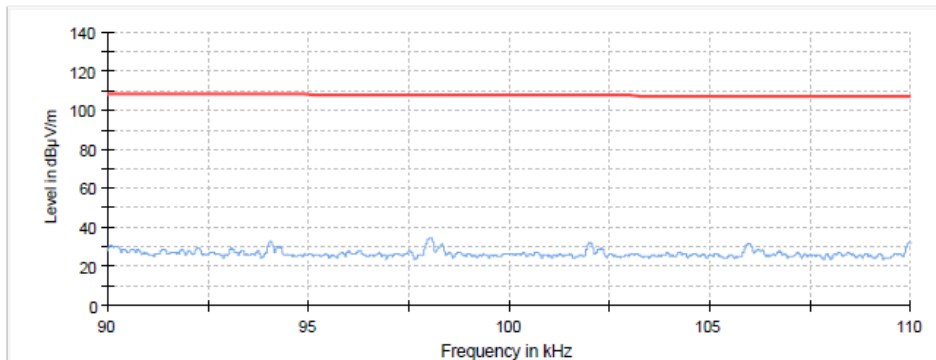
90KHz-110KHz, Polarization X



90KHz-110KHz, Polarization Y



90KHz-110KHz, Polarization Z



Remark: All the modes were tested, just record the worst case.

4.2 Other Requirement & Test Suites

4.2.1 Mains Terminal Continuous Disturbance Voltage

Result:	Pass
----------------	-------------

Date of testing	: 2023.01.06
Test procedure	: ANSI C63.4:2014 and CISPR 16-1 series standards
Frequency range	: 0.15 – 30MHz
Limits	: CFR47 FCC Part 15.207(c)
Kind of test site	: Shielding Room
Operation modes	: B4
Port	: Mains
Temp.& Humidity	: 21°C, 63%

The measurement setup was made according to ANSI C63.4:2014 in a shielded room.

The measurement equipment like test receivers, quasi-peak detector and artificial mains network (AMN) are in compliance with ANSI C63.4:2014 and CISPR 16-1 series standards.

The tested object was set-up on a wooden table. The EUT was set 0.8m away from the AMN. The cord longer than necessary to be connected to the AMN was folded forth and back parallel so as to form a bundle with a length between 0.3m and 0.4m.

The disturbance voltage test was performed on the neutral line and phase line of the power supply of the EUT respectively.

Before measurement, a survey was made to determine in which state the maximum disturbance was obtained. And the measurement was made in the state the maximum disturbance was obtained.

The following figures and tables were those measured by an automatic measuring system. Both Quasi Peak and Average Value were measured. Quasi-Peak and Average Value were measured and listed respectively where they had a maximum in previous scanning survey. In the Figures, “♦” means Quasi-Peak Value and Average Value which were measured in final measurement.

The measurement result is calculated based on the following formula by the test software:
Emission Level = Reading level + Correction (LISN factor + cable loss)

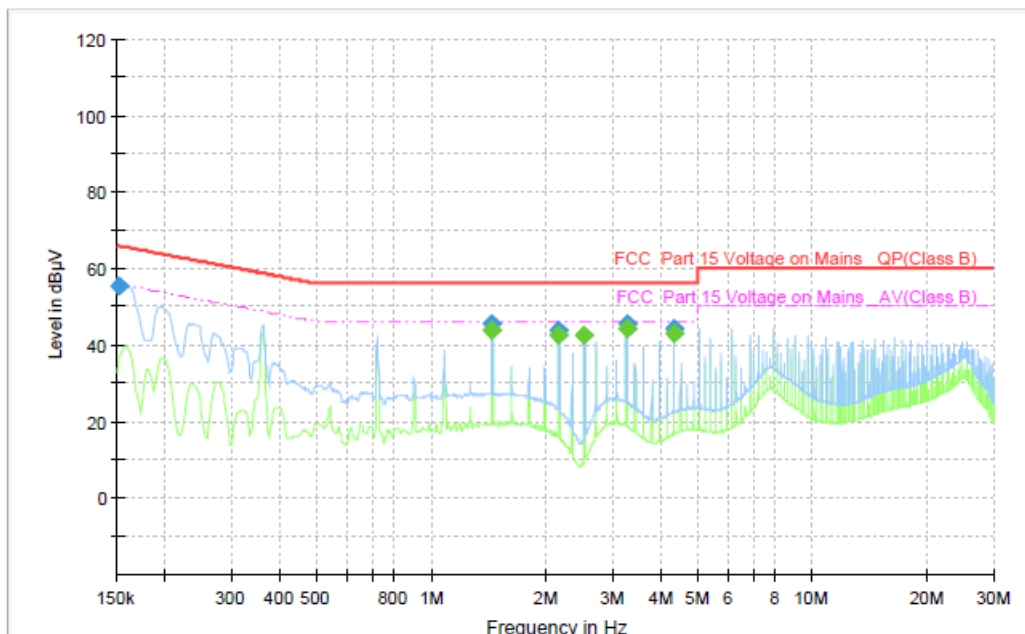
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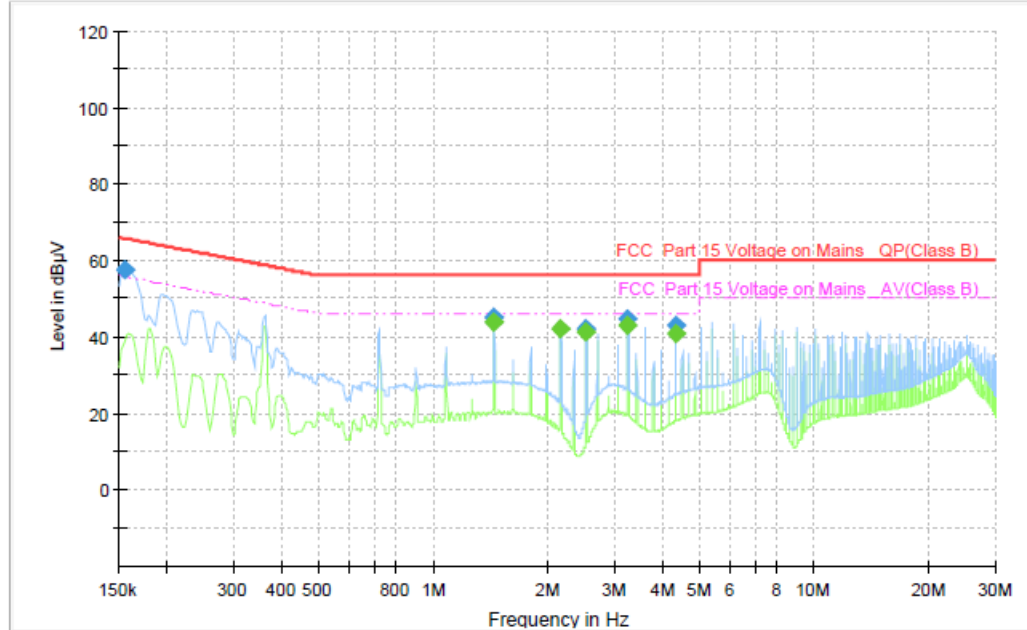
Figure 4: Spectral Diagrams, Conducted Emission, 150KHz - 30MHz, L



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.152250	55.26	---	65.88	10.61	1000.0	9.000	L1	ON	10.2
1.443750	---	43.99	46.00	2.01	1000.0	9.000	L1	ON	10.3
1.443750	45.29	---	56.00	10.71	1000.0	9.000	L1	ON	10.3
2.166000	---	42.49	46.00	3.51	1000.0	9.000	L1	ON	10.4
2.166000	43.74	---	56.00	12.26	1000.0	9.000	L1	ON	10.4
2.526000	---	42.45	46.00	3.55	1000.0	9.000	L1	ON	10.4
3.248250	45.32	---	56.00	10.68	1000.0	9.000	L1	ON	10.4
3.248250	---	44.10	46.00	1.90	1000.0	9.000	L1	ON	10.4
4.332750	---	42.80	46.00	3.20	1000.0	9.000	L1	ON	10.4
4.332750	44.11	---	56.00	11.89	1000.0	9.000	L1	ON	10.4

Figure 5: Spectral Diagrams, Conducted Emission, 150KHz - 30MHz, N



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.154500	57.59	---	65.75	8.16	1000.0	9.000	N	ON	10.2
1.443750	---	43.92	46.00	2.08	1000.0	9.000	N	ON	10.3
1.443750	45.28	---	56.00	10.72	1000.0	9.000	N	ON	10.3
2.163750	---	41.93	46.00	4.07	1000.0	9.000	N	ON	10.4
2.523750	42.07	---	56.00	13.93	1000.0	9.000	N	ON	10.4
2.523750	---	41.06	46.00	4.94	1000.0	9.000	N	ON	10.4
3.246000	44.68	---	56.00	11.32	1000.0	9.000	N	ON	10.4
3.246000	---	43.01	46.00	2.99	1000.0	9.000	N	ON	10.4
4.328250	---	40.98	46.00	5.02	1000.0	9.000	N	ON	10.4
4.328250	42.93	---	56.00	13.07	1000.0	9.000	N	ON	10.4

5. Safety Human Exposure

5.1 Radio Frequency Exposure Compliance

5.1.1 H-field strengths

Result:

Pass

Test Specification

Test standard : FCC 47 CFR Part 1.1307
FCC 47 CFR Part 1.1310
FCC KDB Publication 680106 D01 RF Exposure Wireless
Charging App v03r01

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*(900/f ²)	<6
30-300	61.4	0.163	1.0	<6
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f ²)	<30
30-300	27.5	0.073	0.2	<30
300-1,500			f/1500	<30
1,500-100,000			1.0	<30

f = frequency in MHz. * = Plane-wave equivalent power density.

According to the clause 5(b)(6) of FCC KDB Publication 680106 D01 RF Exposure Wireless Charging App v03r01, the limit of H-field strengths is 50% of the applicable MPE limit. Therefore, limit: 0.815 (A/m).

Table 5: Test result of H-field strengths

Mode	Operating frequency	Test position	Test distance (cm)	Measured value (uT)	H-field strengths (A/m)	Limit (A/m)	Verdict
B4	179.4	Top	20	0.426	0.338	0.815	Pass
B4	179.4	Front	15	0.289	0.229	0.815	Pass
B4	179.4	Back	15	0.259	0.205	0.815	Pass
B4	179.4	Left	15	0.282	0.224	0.815	Pass
B4	179.4	Right	15	0.327	0.259	0.815	Pass

Remark: 1A/m = 1.26uT. All the modes were tested, just record the worst case.

Conclusion:

EUT is compliance with the RF exposure.

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