

FCC - TEST REPORT

Report Number : **68.950.21.0105.02** Date of Issue: **2022-06-09**

Model : **C302A**

Product Type : **AIRVOOC 50W Wireless Charger**

Brand name : **AIRVOOC**

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

Address : **18C02, 18C03, 18C04 and 18C05, Shum Yip Terra Building, Binhe**
: **Avenue North, Futian District, Shenzhen P.R.China**

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

Address : **18C02, 18C03, 18C04 and 18C05, Shum Yip Terra Building, Binhe**
: **Avenue North, Futian District, Shenzhen P.R.China**

Test Result : **Positive** **Negative**

Total pages including Appendices : **18**

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12 & 13, Zhiheng Wisdomland Business Park, Nantou Checkpoint
Road 2, Nanshan District
Shenzhen 518052
P.R. China

Telephone: 86 755 8828 6998

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FCC Registration No.: 514049

No.:

3 Description of the Equipment Under Test

Product:	AIRVOOC 50W Wireless Charger
Model no.:	C302A
FCC ID:	2ABZ2-C302A
Rating:	Input: DC5V4A, DC9V2A, DC10V6.5A, DC11V7.3A, DC20V3.25A Max Output: 50W Max
RF Transmission Frequency:	110-148.5KHz
Antenna Type:	Integrated coil antenna
Description of the EUT:	The Equipment Under Test (EUT) is a Wireless Charger which operated at 110-148.5kHz.



4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2020 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to ANSI C63.10 (2013).



5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C					
Test Condition		Test Site	Test Result		
			Pass	Fail	N/A
§15.207	Conducted emission AC power port	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--	20dB bandwidth	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.205	Restricted bands of operation	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.209	Radiated emission	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.203	Antenna requirement	See note 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note 1: The EUT uses an Integrated coil antenna, which gain is 0dBi. In accordance to §15.203, it is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) complies with Section 15.207, 15.209, 15.205 of the FCC Part 15, Subpart C rules.

This report is based on 68.950.21.0105.01, change Product Type to "AIRVOOC 50W Wireless Charger", added input rating "DC11V7.3A" and upgrade standard, there is no change of equipment. After evaluated, the original test results are still effective, it is deemed to fulfill the relevant RF requirements.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

□ - **Not** Performed

The Equipment under Test

■ - **Fulfills** the general approval requirements.

□ - **Does not** fulfill the general approval requirements.

Original:

Sample Received Date: January 12, 2021

Testing Start Date: January 12, 2021

Testing End Date: February 2, 2021

Current:

Date of report: June 9, 2022

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

Reviewed by:



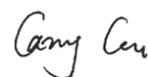
John Zhi
Project Manager

Prepared by:




Joe Gu
Project Engineer

Tested by:

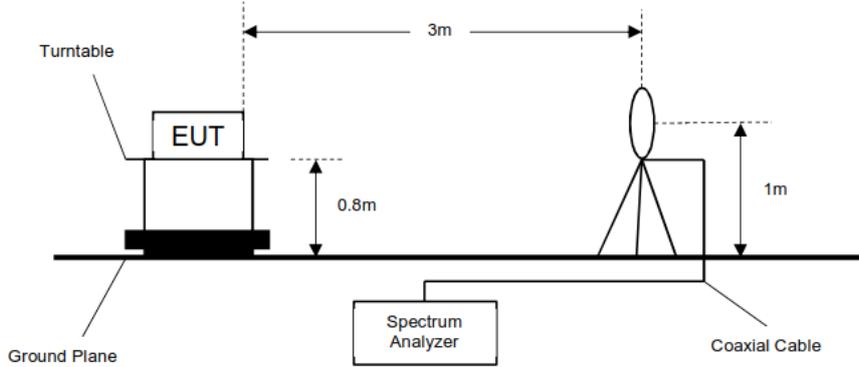


Carry Cai
Test Engineer

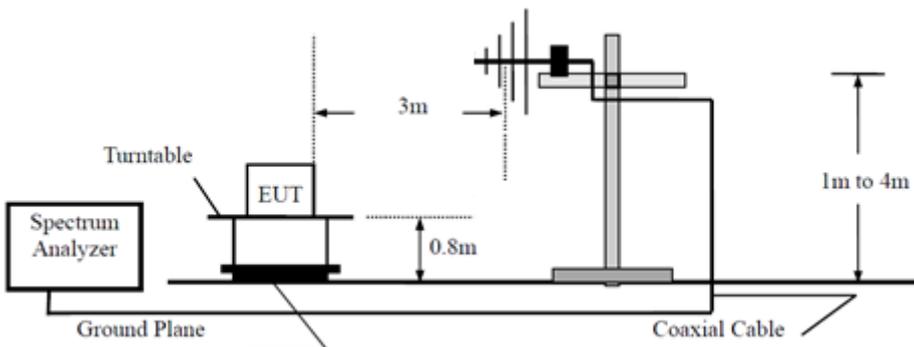
7 Test Setups

7.1 Radiated test setups

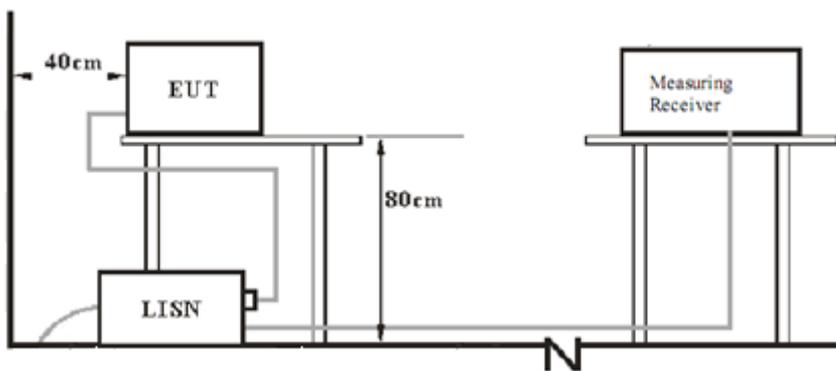
Below 30MHz



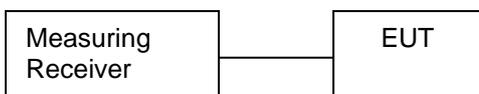
30MHz-1GHz



7.2 AC Power Conducted test setups



7.3 Conducted RF test setups



8 Technical Requirement

8.1 Conducted Emission Test

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through an Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

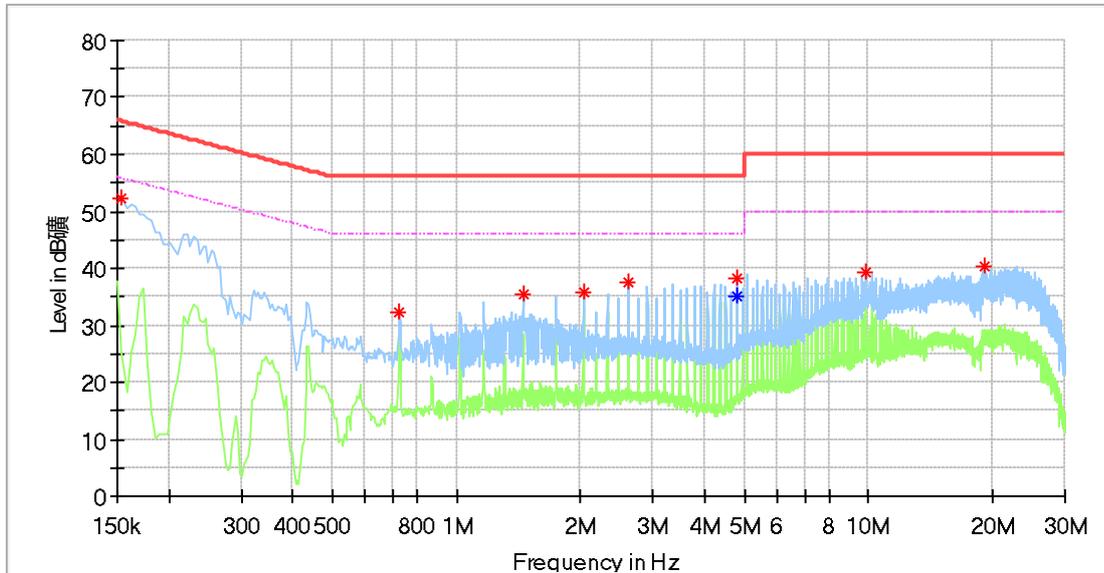
According to §15.207, conducted emissions limit as below:

Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

*Decreasing linearly with logarithm of the frequency

Conducted Emission

Model: C302A
 Test mode: Charging
 Test Voltage: AC 120V/60Hz
 Test Site: Shielding Room #4
 Remark: /



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.154000	52.14	---	65.78	13.64	L1	10.32
0.726000	32.43	---	56.00	23.57	L1	10.33
1.454000	35.42	---	56.00	20.58	L1	10.36
2.034000	35.95	---	56.00	20.05	L1	10.38
2.614000	37.43	---	56.00	18.57	L1	10.40
4.794000	38.12	---	56.00	17.88	L1	10.51
4.794000	---	35.15	46.00	10.85	L1	10.51
9.878000	39.31	---	60.00	20.69	L1	10.75
19.178000	40.22	---	60.00	19.78	L1	11.21

Remark:

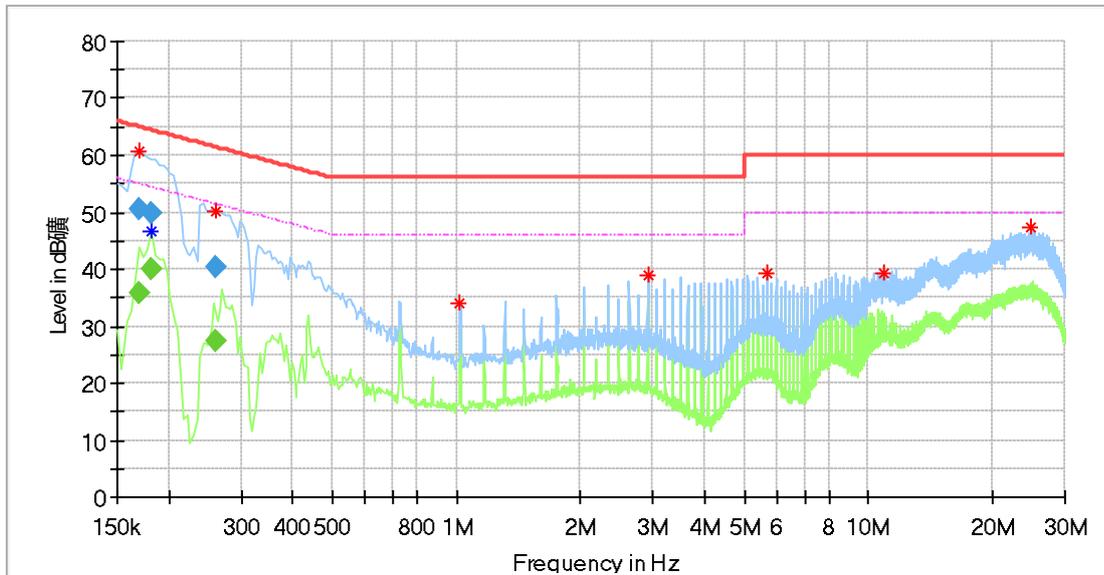
Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

Conducted Emission

Model: C302A
 Test mode: Charging
 Test Voltage: AC 120V/60Hz
 Test Site: Shielding Room #4
 Remark: /



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.169500	60.72	---	64.96	4.24	N	10.33
0.181500	---	46.61	54.39	7.79	N	10.33
0.261500	50.15	---	61.24	11.09	N	10.33
1.018000	34.21	---	56.00	21.79	N	10.35
2.914000	38.82	---	56.00	17.18	N	10.44
5.682000	39.32	---	60.00	20.68	N	10.59
10.926000	39.23	---	60.00	20.77	N	10.85
24.674000	47.43	---	60.00	12.57	N	11.63

Final Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.169500	---	35.74	54.98	19.24	N	10.33
0.169500	50.63	---	64.98	14.35	N	10.33
0.181500	---	39.94	54.42	14.48	N	10.33
0.181500	49.74	---	64.42	14.68	N	10.33
0.261500	---	27.29	51.38	24.09	N	10.33
0.261500	40.43	---	61.38	20.95	N	10.33

Remark:

Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)



8.2 20 dB Bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=200Hz, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 20 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 20 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]

No Limit

Test result

Frequency KHz	20dB bandwidth KHz	Result		Result
		F _L (KHz)	F _H (KHz)	
110KHz	2.6	111.69	--	Pass
148.5KHz	2.6	--	146.94	Pass

The fundamental frequency is outside the restricted bands of 15.205 section.

8.3 Radiated Emission Test

Test Method

- 1: The EUT was placed on a turn table which is 0.8m above ground for below 1GHz at 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
- 3: The height of antenna is varied from one meter to four meters 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.
- 4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5: Use the following spectrum analyzer settings According to C63.10:

Limit

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

Frequency MHz	Field Strength $\mu\text{V/m}$	Field Strength $\text{dB}\mu\text{V/m}$	Detector	Measurement distance meters
0.009-0.490	2400/F(kHz)	48.5-13.8	AV	300
0.490-1.705	24000/F(kHz)	33.8-23.0	QP	30
1.705-30	30	29.5	QP	30
30-88	100	40	QP	3
88-216	150	43.5	QP	3
216-960	200	46	QP	3
960-1000	500	54	QP	3
Above 1000	500	54	AV	3
Above 1000	5000	74	PK	3

Note 1: $\text{Limit } 3\text{m}(\text{dB}\mu\text{V/m}) = \text{Limit } 300\text{m}(\text{dB}\mu\text{V/m}) + 40\text{Log}(300\text{m}/3\text{m})$ (Below 30MHz)

Note 2: $\text{Limit } 3\text{m}(\text{dB}\mu\text{V/m}) = \text{Limit } 30\text{m}(\text{dB}\mu\text{V/m}) + 40\text{Log}(30\text{m}/3\text{m})$ (Below 30MHz)

Radiated emissions test (9KHz-30MHz)

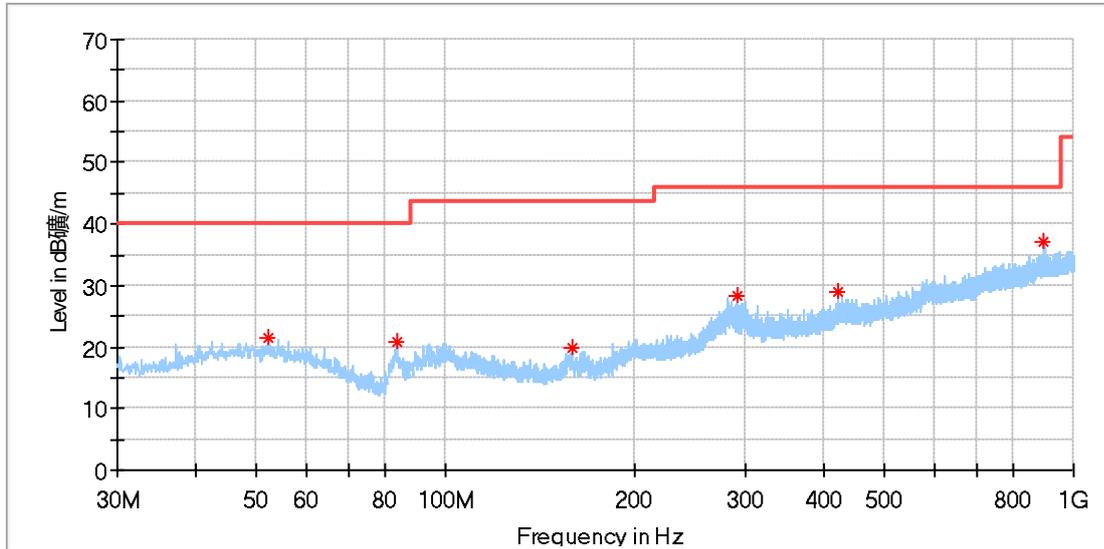
Frequency Band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Correct factor (dB)	Result
	MHz	dB μ V/m		dB μ V/m		dB μ V/m		
9KHz-30MHz	0.145488	98.81	H	104.35	Average	5.54	19.65	Pass
	0.144078	83.41	H	104.43	Average	21.02	19.66	Pass
	0.143373	100.76	H	104.47	Average	3.71	19.66	Pass
	0.433575	74.49	H	94.86	Average	20.37	19.61	Pass
	0.144454	85.89	H	104.41	Average	18.52	19.66	Pass
	Other frequency	--	H		Average	--	--	Pass
	0.145488	91.34	V	104.35	Average	13.01	19.65	Pass
	0.144454	72.48	V	104.41	Average	31.93	19.66	Pass
	0.009047	57.82	V	128.47	Average	70.65	20.03	Pass
	0.150000	73.00	V	104.08	Average	31.08	19.65	Pass
	0.433575	62.49	V	94.86	Average	32.37	19.61	Pass
	Other frequency	--	V		Average	--	--	Pass

Remark:

- (1) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.
- (2) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are the noise floor or attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss

Radiated emissions test (30MHz-1000MHz)

Model: C302A
 Test Mode: Charging
 Test Voltage: AC 120V/50Hz
 Remark: /



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
52.249375	21.42	40.00	18.58	100.0	H	83.0	17.80
83.713750	20.79	40.00	19.21	200.0	H	172.0	12.03
159.313125	19.79	43.50	23.71	200.0	H	234.0	13.14
291.051250	28.27	46.00	17.73	100.0	H	73.0	18.50
421.880000	28.97	46.00	17.03	100.0	H	219.0	21.93
898.392500	36.99	46.00	9.01	200.0	H	0.0	29.58

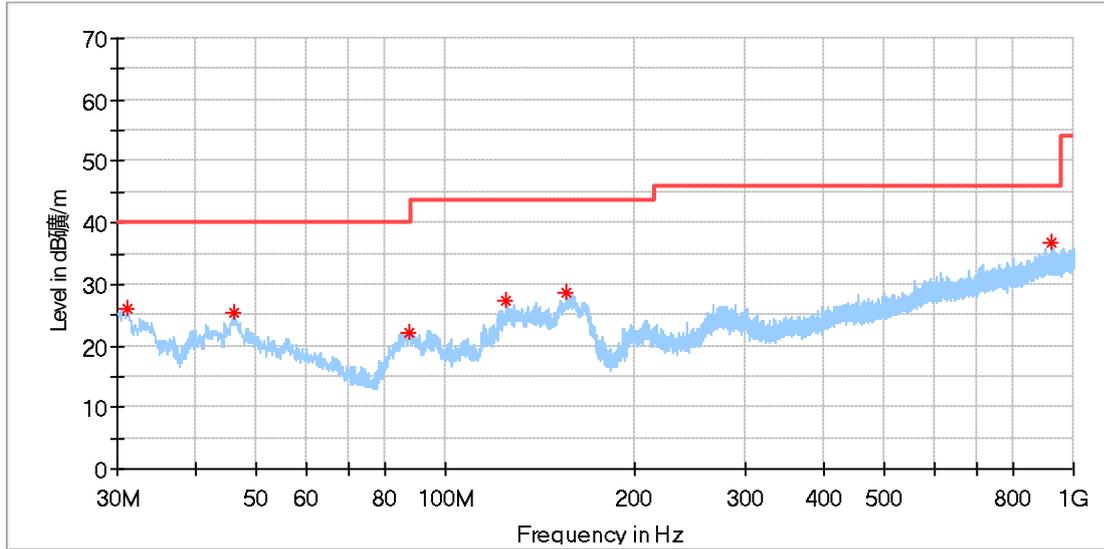
Remark:

Level=Reading Level + Correction Factor

Correction Factor=Antenna Factor + Cable Loss

(The Reading Level is recorded by software which is not shown in the sheet)

Model: C302A
 Test Mode: Charging
 Test Voltage: AC 120V/50Hz
 Remark: /



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
31.151875	26.01	40.00	13.99	100.0	V	31.0	14.42
46.186875	25.28	40.00	14.72	100.0	V	83.0	17.77
87.654375	22.26	40.00	17.74	100.0	V	31.0	13.38
125.120625	27.43	43.50	16.07	100.0	V	327.0	13.32
155.978750	28.63	43.50	14.87	100.0	V	185.0	12.98
919.914375	36.63	46.00	9.37	100.0	V	0.0	29.66

Remark:

Level=Reading Level + Correction Factor

Correction Factor=Antenna Factor + Cable Loss

(The Reading Level is recorded by software which is not shown in the sheet)

9 Test Equipment List

List of Test Instruments

Radiated Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 7	68-4-74-19-001	102176	1	2021-6-29
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	68-4-80-14-002	707	1	2021-8-4
Horn Antenna	Rohde & Schwarz	HF907	68-4-80-14-005	102294	1	2021-7-14
Loop Antenna	Rohde & Schwarz	HFH2-Z2	68-4-80-14-006	100398	1	2021-9-2
Pre-amplifier	Rohde & Schwarz	SCU 18	68-4-29-14-001	102230	1	2021-6-21
Attenuator	Agilent	8491A	68-4-81-16-001	MY39264334	1	2021-6-21
3m Semi-anechoic chamber	TDK	9X6X6	68-4-90-14-001	----	3	2022-10-28
Test software	Rohde & Schwarz	EMC32	68-4-90-14-001-A10	Version10.35.0 2	N/A	N/A

Conducted Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	68-4-74-14-001	101782	1	2021-6-29
LISN	Rohde & Schwarz	ENV4200	68-4-87-14-001	100249	1	2021-6-12
LISN	Rohde & Schwarz	ENV432	68-4-87-16-001	101318	1	2021-6-12
LISN	Rohde & Schwarz	ENV216	68-4-87-14-002	100326	1	2021-6-12
ISN	Rohde & Schwarz	ENY81	68-4-87-14-003	100177	1	2021-6-12
ISN	Rohde & Schwarz	ENY81-CA6	68-4-87-14-004	101664	1	2021-6-12
High Voltage Probe	Schwarzbeck	TK9420(VT9420)	68-4-27-14-001	9420-584	1	2021-6-23
RF Current Probe	Rohde & Schwarz	EZ-17	68-4-27-14-002	100816	1	2021-6-28
Attenuator	Shanghai Huaxiang	TS2-26-3	68-4-81-16-003	080928189	1	2021-6-21
Test software	Rohde & Schwarz	EMC32	68-4-90-14-003-A10	Version9.15.00	N/A	N/A

10 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Conducted Emission 150kHz-30MHz (for test using AMN ENV432 or ENV4200)	3.62dB
Uncertainty for Radiated Emission in 3m chamber 9KHz-30MHz	4.60 dB
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.63dB; Vertical: 4.61dB;