



## FCC - TEST REPORT

Report Number	: <b>68.950.21.0105.01</b>	Date of Issue: <b>March 01, 2021</b>
Model	: <b>C302A</b>	
Product Type	: OnePlus Warp Charger 50 Wireless Charger	
Brand name	: ONEPLUS	
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	: <b>■ Positive</b> <b>□ Negative</b>	
Total pages including Appendices	: <b>18</b>	

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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  
Fax: 86 755 828 5299

FCC Registration No.: 514049  
No.:

### 3 Description of the Equipment Under Test

Product: OnePlus Warp Charger 50 Wireless Charger

Model no.: C302A

FCC ID: 2ABZ2-C302A

Rating: Input: DC5V4A, DC9V2A, DC10V6.5A, 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

<b>Test Standards</b>	
FCC Part 15 Subpart C 10-1-2019 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 Site	Test Result		
Test Condition			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.

### 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.

Sample Received Date: January 12, 2021

Testing Start Date: January 12, 2021

Testing End Date: February 2, 2021

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

Reviewed by:

Prepared by:

Tested by:



John Zhi  
Project Manager

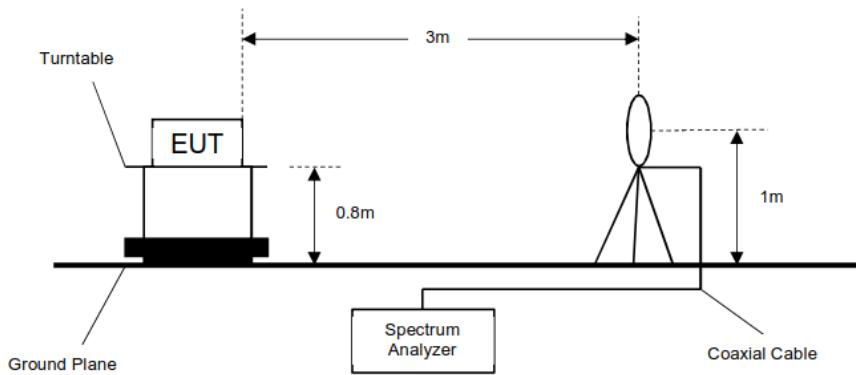
Moon Xiong  
Project Engineer

Tree Zhan  
Test Engineer

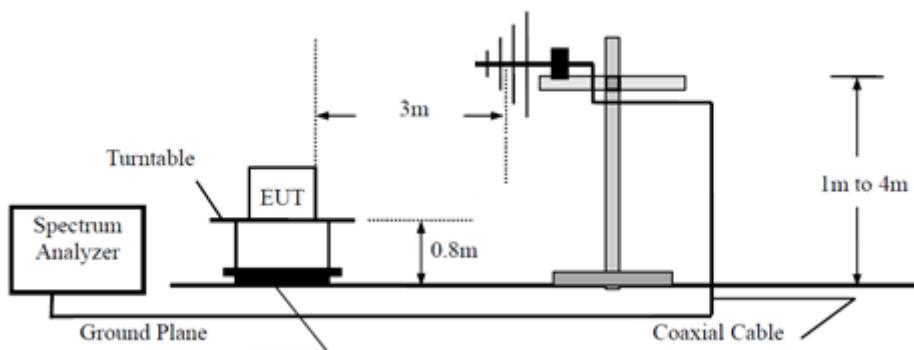
## 7 Test Setups

### 7.1 Radiated test setups

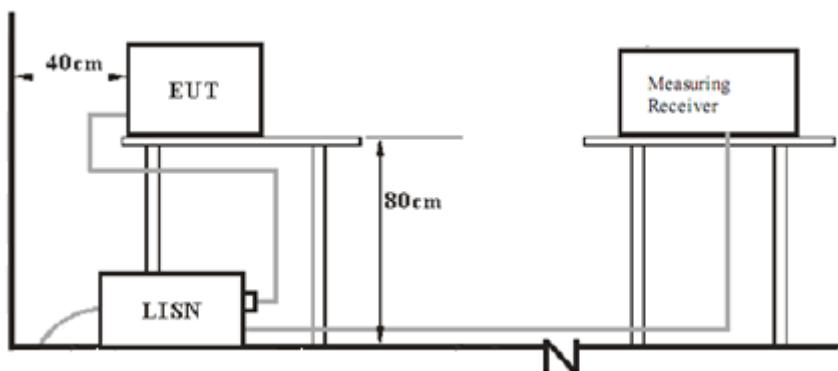
#### Below 30MHz



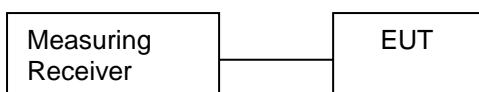
#### 30MHz-1GHz



### 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

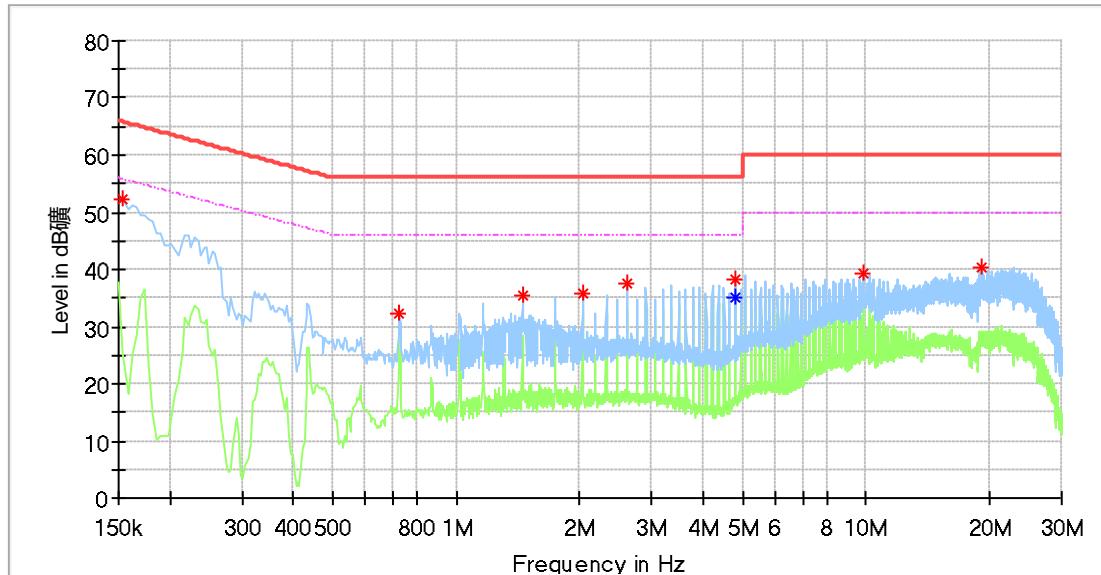
According to §15.207, conducted emissions limit as below:

Frequency MHz	QP Limit	AV Limit
	dB $\mu$ V	dB $\mu$ 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 (dB $\mu$ V)	Average (dB $\mu$ V)	Limit (dB $\mu$ V)	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:

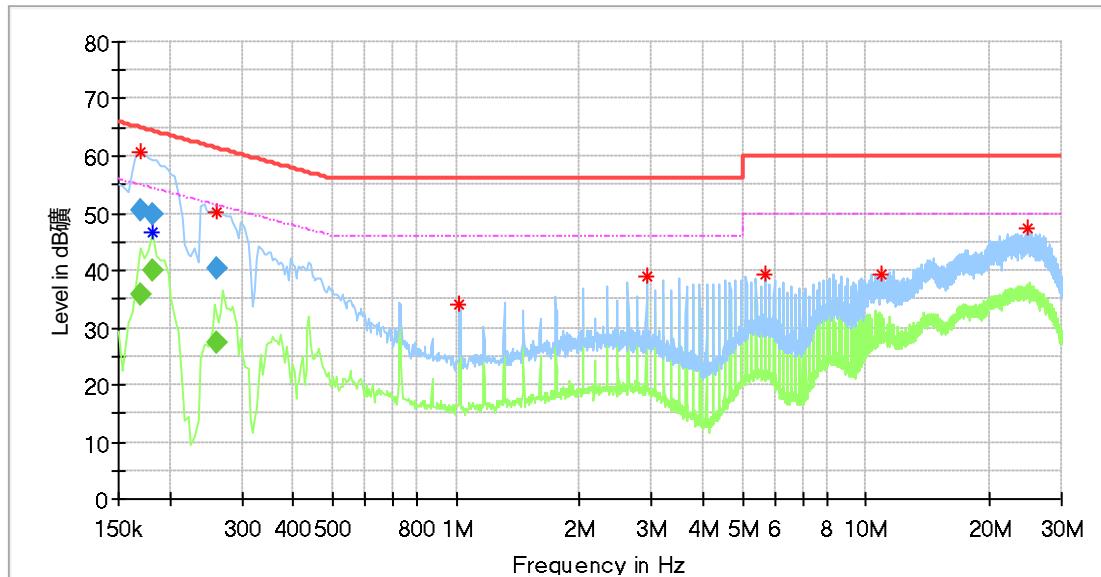
Level=Reading Level + Correction Factor

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 $\geq$ 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  $\geq$  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 <sub>L</sub> (KHz)	F <sub>H</sub> (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 place 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 μV/m	Field Strength dBμV/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: Limit  $3m(dB\mu V/m) = Limit\ 300m(dB\mu V/m) + 40\log(300m/3m)$  (Below 30MHz)

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

## Radiated emissions test (9KHz-30MHz)

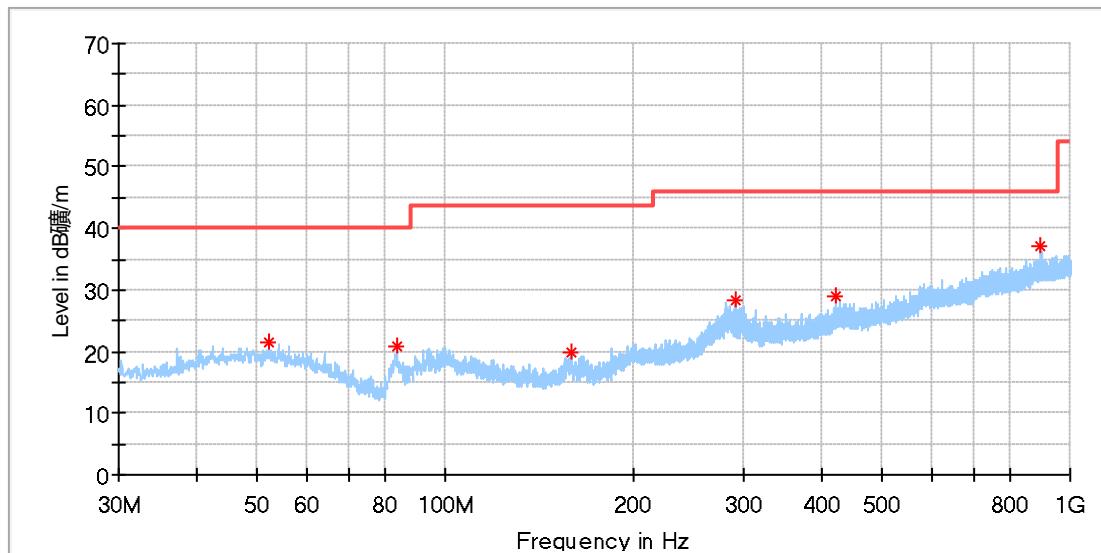
Frequency Band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Correct factor	Result
	MHz	dB $\mu$ V/m		dB $\mu$ V/m		dB $\mu$ V/m	(dB)	
9KHz-30MHz	0.145488	98.81	H	104.35	Average	5.54	19.65	Pass
	0.144078	83.41	H	104.43	Average	21.02	19.66	Pass
	0.143373	100.76	H	104.47	Average	3.71	19.66	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

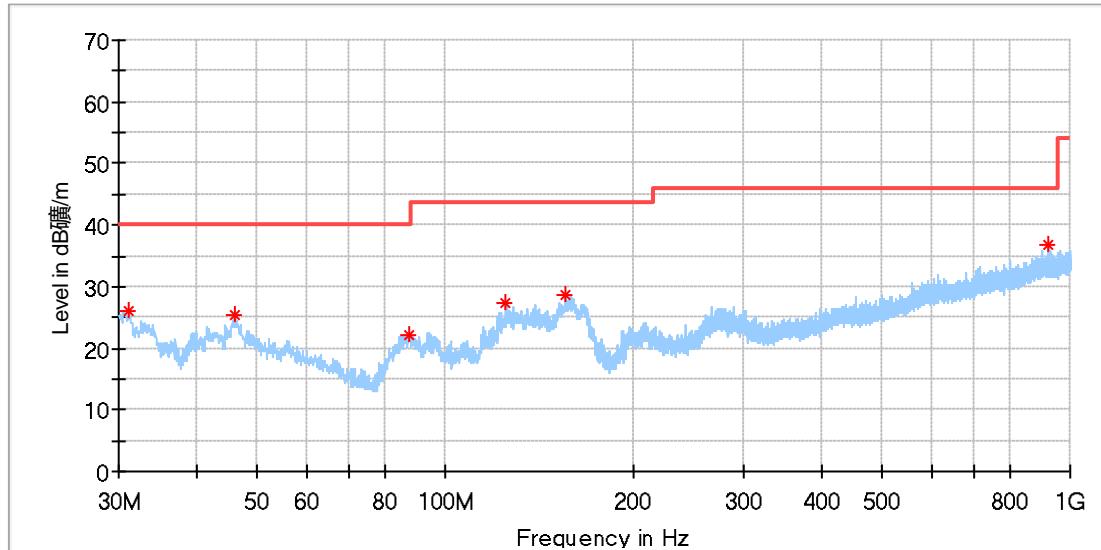
Remark:

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 (dB $\mu$ V/m)	Limit (dB $\mu$ V/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	MANUFACTURE R	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	MANUFACTURE R	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(VT942 0)	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	Version9.15.0 0	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;